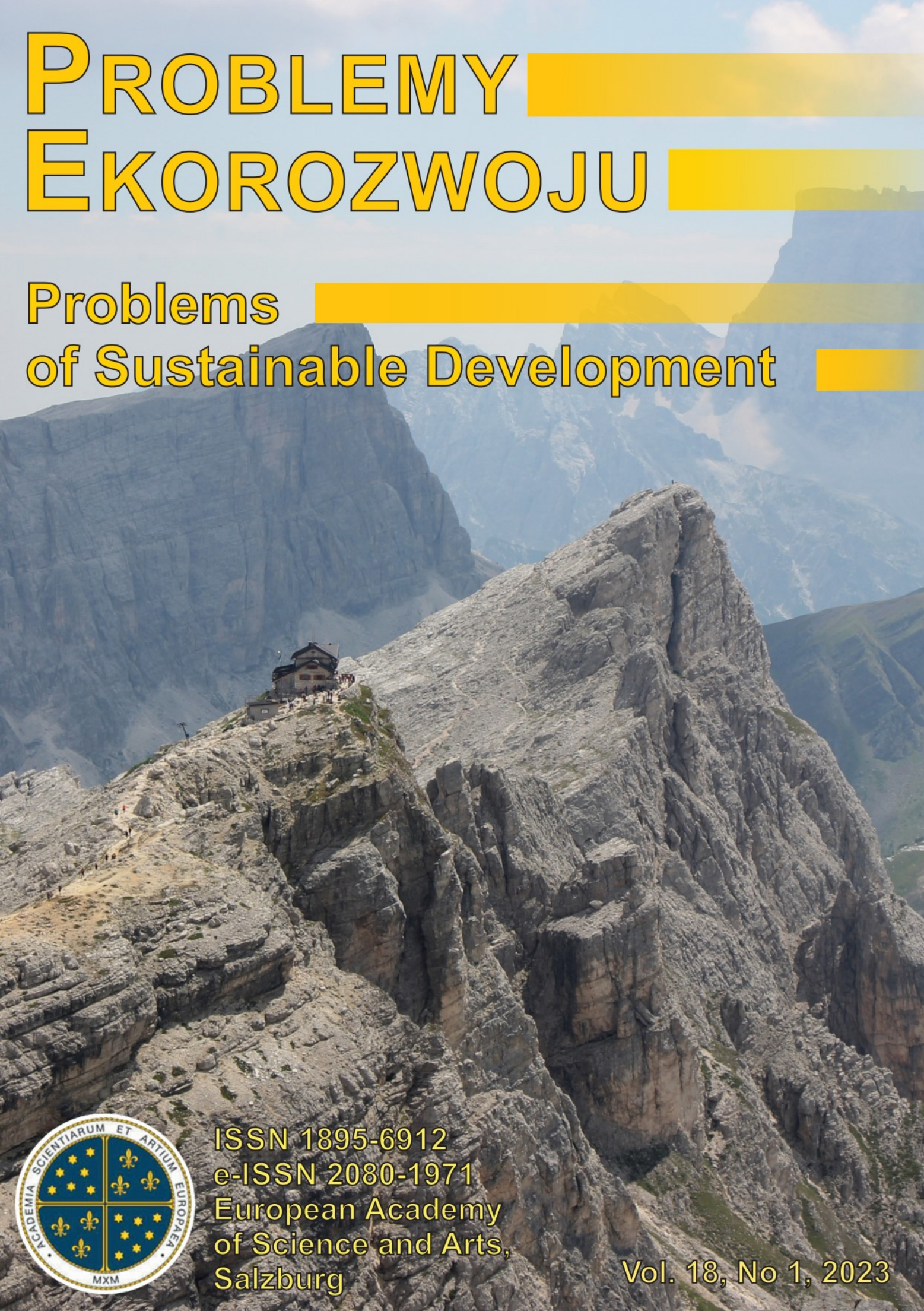
Problemy Ekorozwoju

Problems of Sustainable Development



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PROBLEMY EKOROZWOJU

PROBLEMS OF SUSTAINABLE DEVELOPMENT

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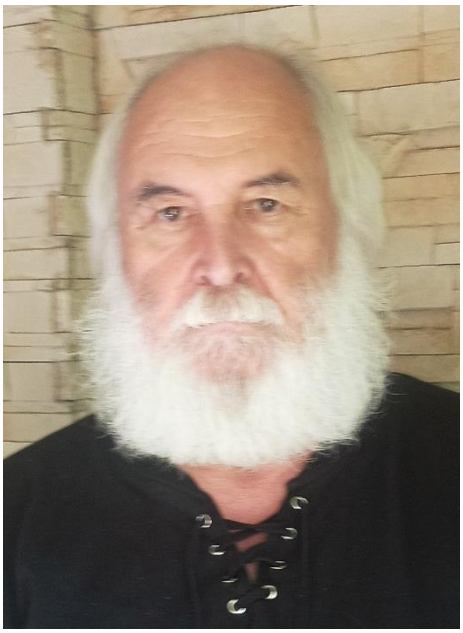
In Gratitude to Professor Leszek Gawor

Podziękowania dla profesora Leszka Gawora



Professor Leszek Gawor decided to resign from being co-editor of the journal due to retirement. Dear Leszek, we would like to thank You very much for the fruitful cooperation lasting over 15 years!

Prof. Leszek Gawor graduated in philosophy from the University of Warsaw, Poland in 1978. In the years 1981-2003 he worked at the Institute of Philosophy of the Maria Curie-Skłodowska University in Lublin, Poland. Since 2003 he has been employed at the Institute of Philosophy of the University of Rzeszów, Poland. He obtained his doctorate in 1989 at the Maria Curie-Skłodowska University, and habilitation there in 2000; he became a professor of humanities in 2015. In the years 2015-2018 he was a member of the Committee on Philosophical Sciences of the Polish Academy of Sciences. In the years 2006-2022 he was Co-Editor of *Problemy Ekorozwoju/ Problems of Sustainable Development*.

Since 2008, he has been a member of the Editorial Board of the Warsaw *Yearbook of the History of Polish Philosophy*; from 2017 – member of the Editorial Board of the Lublin *Eastern Humanistic Yearbook* and from 2018 – member of the Editorial Board of *Вісник Львівського університету, Серія філософські науки/ Visnyk of the Lviv University. Series philosophical science* in Lviv, Ukraine.

Author of many monographs, chapters in books and scientific papers being the result of research on the history of Polish philosophy, social philosophy and ecophilosophy. Among author's own monograps let's mention the latest ones, published in 2021 *Studia z filozofii społecznej/ Studies in Social Philosophy* and in 2022 *Z dziejów polskiej myśli filozoficzno-społecznej przełomu XIX i XX stulecia. Varia/ The history of Polish philosophical and social thought at the turn of the 19th and 20th centuries. Varia*. Among earlier books let's recall *Ekoszkice/ Eco-sketches* (2017), *Myśliciele mało znani. Filozofia polska końca XIX wieku i pierwszych dekad XX stulecia/ Little-known thinkers. Polish philosophy at the end of the 19th century and the first decades of the 20th century* (2011), *Szkice o cywilizacji/ Sketches about civilization* (2009) and *Wprowadzenie do filozofii i etyki. Główne zagadnienia i stanowiska/ Introduction to philosophy and ethics. Main issues and positions* (2005).

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Sustainable Development and Sustainable Science. Where We Came From, Where We Are Now and Where We Are Heading? Part II: An In-Depth Analysis of the Concept of Sustainable Development

Zrównoważony rozwój i zrównoważona nauka. Skąd przyszliśmy, gdzie jesteśmy i dokąd zmierzamy? Część II: Dogłębna analiza koncepcji zrównoważonego rozwoju

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Abstract

The concept of sustainable development (SD) is broad and moreover, it is often interchangeably used with the more general, but sometimes also more specific, concept of sustainability. The concept of SD is analysed on the basis on its development (analysed in the first part: Drastichová, 2022) and relationships with sustainability and related scientific (theoretical) and practical concepts. The rationale behind this work lies in clarifying the meaning of SD, including the concept of sustainability, and, on the basis of this, identifying the main ways of moving closer towards the aims of SD, including quality of life and wellbeing. The limitations of the concept are identified and summarized, as are the alternatives to SD and sustainability. The rationale behind this work lies not only in the clarifying of the SD concept, but also in the normative evaluation of this concept in relation to the wellbeing and quality of life of the Earth's population for an infinite time period, while maintaining the supply of ecosystem services which the planet provides, taking into account that these resources are not only a source of people's wellbeing, but are essential for people's survival in general. Hence, this work includes an in-depth sophisticated consideration of the SD concept based on its historical development, as well as normative assessments of the concept resulting from this knowledge. Alternative concepts and the possibilities of sustain-ability science are also summarized. A significant effort has been made to identify the relationships of the SD concept with sustainability and to the main related scientific (theoretical) and practical concepts, as well as to the alternative concepts to them. These outcomes were again obtained from a detailed analysis of history and relevant scientific works. Finally, a possible design of the SD concept is outlined on the basis of the analysis and synthesis of the knowledge.

Key words: quality of life, sustainable development, sustainability, sustainability science, wellbeing
JEL Classification: I10, I13, I15, I18, Q01

Słowa kluczowe: jakość życia, rozwój zrównoważony, zrównoważoność, zrównoważona nauka, dobrostan

1. Introduction

Over the course of human development, the human-nature (human-environment) relationships have changed. The capitalist model of production and consumption has caused huge changes in the environment and the scale of its degradation. The reality of relationships between human and ecological systems, as well as between progress, growth and development, and between the development and conservation of nature, predetermined the emergence of the SD concept as a compromise between these concepts and interdependent issues within them. Although they are closely interrelated, there are some distinct features in their use.

The relevant fundamental knowledge for this work is provided in Drastichová (2022), on which this work builds. Sustainability as a nebulous, but attractive concept, poses an essential question for every activity – whether it can continue. The concepts of sustainability and sustainable development (SD) are broad and often used interchangeably, but there are significant differences, although they are interconnected. If an activity is sustainable, it can continue forever, which reflects a general definition of sustainability in relation to the SD concept.
As in the first part, the most famous of WCED (1987), which defined SD as *development that meets the needs of the present without compromising the ability of future generations to meet their own needs,* is considered as fundamental for this work. So are its two key concepts – the concept of needs and that of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs. Hence, the concept of SD is composed of two crucial elements, i.e. meeting human needs and respecting the limits imposed by the environment (WCED, 1987). Based on the analysis of history of the SD concept in the first part (Drastichová, 2022), this definition is further analysed and critically evaluated in the following sections.
Similar to the first part (Drastichová, 2022), the rationale behind this study lies in a consideration of the concept of SD as a basic philosophy. Mainstream neoclassical environmental (EN) economics is regarded as the basic scientific (theoretical) approach for dealing with environmental issues in economics. Other crucial approaches in economics, including alternative approaches, i.e. the theoretical foundations for practical applications, are also considered. Beeks (2016) studied fourteen economic systems, including environmental (EN), circular (CR), green (GN), resilience (RE), ecological (EC), complexity (CY), feminist (FE), compassionate (CT), caring (CG), degrowth (DH), steady-state (SE), no-growth (NH), ecosocialism (EM), and anarcho-ecosocialism concepts/systems (AEM). According to him, the formation of these systems is related to the misunderstanding that a sustainable society can be based on an economy with economic growth which also has significant effects on ecosystem services (see more about these services in Drastichová (2022). Nevertheless, the approach applied in this work is different to some extent. Not all of these concepts can be understood as alternatives to sustainability and SD, especially the EN, CR, GN, and RE economy/systems, although they can be provide alternatives to the system of capitalism from several perspectives. Additionally, the EN and EC economics can be understood more as the theoretical foundations to the practical concepts that focus on the relationships and balance between the economic, social, and environmental dimensions of economies. EC economics also provides an alternative to the neoclassical EN economics. Based on this approach, the concepts of sustainability and SD are considered as basic concepts, the concepts of green economy (GE) and green growth (GG) are regarded as more practical concepts, which also operationalize the concepts of sustainability and SD. As alternative approaches, the concepts of SE, NH and DH economies, and a number of even more practical alternatives to the concept of DH, reflecting the cultural features of smaller communities, are considered. The remaining concepts in the list, including CY, FE, CE, CG, EM, and AEM economy/systems are understood as more comprehensive concepts, which significantly support quality of life and wellbeing. They provide not only alternative thinking on the concept of SD, but also alternatives to the concept of capitalism in general.
In this work, the knowledge resulting from the analysis of history and crucial scientific works dealing with SD are summarized (see Drastichová, 2022), further analysed and deeper conclusions derived. The main aim of the work is to clarify the essence and deeper significance of SD based on an analysis of the history of the concept, key scientific works and practical policies, strategies, and actions. Putting the concept into operation is crucial. It should be aimed at sustaining or increasing wellbeing and quality of life within the limits of the planet/ecological limits. Analysis and synthesis of the obtained knowledge are the basic methods applied. Normative approach and critical evaluation are used to derive conclusions and recommendations.
This paper has been divided into the following parts: Introduction (section 1); Results of an in-depth analysis of the concept of sustainable development (section 2); Sustainability science and possible design of the concept of sustainable development (section 3); Conclusions (section 4).

2. Results of an in-depth analysis of the concept of sustainable development

For a deeper understanding of the content of the SD concept, the differences between the concepts of SD and sustainability need to be analysed in more detail. The related basic and more practical concepts, and alternative scientific concepts need to be analysed and correctly understood.

2.1. Sustainability versus sustainable development; related concepts; alternative concepts

The fundamental science in the field of economics on which sustainability science could be based can be represented by environmental economics and the fundamental alternative (transdisciplinary) science especially by ecological economics (EC) and subsequently by other concepts, which can be understood as parts of (or to some extent based on/resulting from) the previous two. However, some of them have already developed to such a high level of comprehensiveness that they can be understood as more or less separate concepts. They include circular (CR), green (GN), degrowth (DH), non-growth (NH), steady state (SE), and resilience (RE) economics. They also have

their practical counterparts, which can also be understood as strategies in policies which are comparable or alternatives to the concepts of SD or sustainability or their alternatives. A number of them have already developed to a high level of comprehensiveness, i.e., use at global, international, national levels (and subsequent application at lower levels) has been achieved. This has occurred especially with the concepts of the GE and GG; the CR might also be included, although it can be understood as part of the GE. CR corresponds with the field of biomimicry (Church, 2014; Pauli, 2010), which represents eliminating waste, mimicking nature, internalizing externalities (as is seen in natural processes), and emulating a closed loop cycle. A circular economy, as opposed to a linear consumption economy, is one that is regenerative and that recycles and reuses products rather than disposing of them. NH and SE economies maybe more specific; nevertheless, there are several definitions of these concepts. NH economists support the SE economy, considering economic growth to be a main contributor to numerous global problems. A number of works support both SE and NH economies, regarding them as compatible with each other; however, a distinction is that an SE economy may experience qualitative growth without exceeding ecological limits, and may therefore achieve a kind of equilibrium. In contrast, an NH economy shows no quantitative economic growth in general, and its advocates propose consumption and population levels below the Earth's carrying capacity, so that ecological limits are not surpassed (Trainer, 2011). NH economists consider capitalism in its present form to be too focused on accumulation. Therefore, it is necessary to stop reliance on market forces, laissez-faire idealism, and the related pursuit of profits and economic growth (Trainer, 2011). Jackson (2012) claimed that a sustainable economy can be achieved and prosper without economic growth.

From the practical alternative concepts, that of DH has been gaining ground. However, there are still significant obstacles to putting it into operation fully. As lower-level alternatives to DH or other concepts, several practical concepts at regional or local levels have evolved, especially in the developing countries, better responding to their needs. They include Buen Vivir, or Ecological Swaraj, which represent genuine alternatives to both SD and the GE. Although in Beeks (2016), the fourteen scientific socio-economic-environmental models are defined together as the alternative systems to capitalism, here a deeper classification was adopted, while some of them are understood as basic scientific socio-economic-environmental concepts, especially the EN economics, which can be understood as a fundamental science for the so-called sustainability science. The concepts indicated above, including CR, GN, DH, NH, SE, RE economics, are partly based on it, and partially on the EL economics, which can be understood as an alternative to EE economics, but these eight models can be based on both of them, while also including alternative ideas and having some relations to SD/sustainability concepts.

CT, CG, CY, EM, AEM and FT economics, which are the remaining concepts (systems) analysed in Beeks (2016), can be understood in a more complex way, while the previous models can affect and determine particular aspects of their philosophy. These models also involve more complex social aspects, and as more complex models they can represent the alternatives to the current system of capitalism, which is increasingly understood as destructive to natural and social systems (Martínez-Alier et al., 2010). Finally, there are supplementary concepts, especially those involving human development approaches, and different sustainability types, which can significantly determine and define the approach to SD and sustainability in general. Moreover, there are many more fundamental concepts involved in the SD concept and its practical counterparts, especially GE, GG and CR, which must work with them in order to move closer towards SD and sustainability. These especially include the concept of decoupling economic activity from environmental harm (further: *decoupling*). The concept of decoupling implies breaking the link between environmental *bads*, which represent environmental pressures, including the use of natural resources and the emission of pollutants/generation of waste, and economic *goods*, referred to as driving forces, which are economic activities, often expressed in terms of GDP at the macroeconomic level. Hence, all ecosystem services can be included. Absolute decoupling, including an absolute decline in resource (ecosystem service) use over time while the economy grows, has not been taking place (Fritz and Koch, 2016; O'Neill et al., 2018), and it does not have to change in the future (Jackson, 2017). There are several key factors responsible for this development. The crucial one is the *rebound effect*, which is an umbrella term for a variety of mechanisms that reduce the potential energy savings from improved energy efficiency. It results in any reduction in the market costs of relevant resources caused by improvements in efficiency being translated into an increase in aggregate throughput, rather than a decrease (Sorrell, 2009). Since the seminal work of S. Jevons (*The Coal Question*) (Jevons, 1866), the issue of the rebound effect has repeatedly been a subject of energy policy debates, challenging the consensus that improved energy efficiency will reduce energy use (carbon emissions) and mitigate resource depletion. Energy efficiency is often considered to be essential for harmonizing economic growth with environmental sustainability. Although the rebound effect has often been considered to be modest in size and easily addressed, there has always been a minority of scholars who have argued that rebound effects frequently exceed 100% and can potentially eliminate all of the energy savings from improved energy efficiency. This is referred to as the Jevons Paradox (Ruzzenenti et al., 2019), which implies that, in the long term, an increase in efficiency in resource use will generate an increase in resource consumption rather than a decrease (Sorrell, 2009; Madureira, 2014).

The concept of sustainable consumption and production (SCP) and resource (eco-)efficiency must be further emphasised. They are significantly interconnected together as well as with the concept of decoupling. The concept of

sustainable consumption and production (SCP) has gained interest along with the concept of SD. Overconsumption, especially in developed countries, has been identified as a major challenge in moving closer towards SD and, therefore, moving closer towards the path of SD/sustainability will require a subsequent SCP to put it into operation. SCP will also require additional tools and processes to put it into operation. Several studies have dealt separately with the concept of sustainable consumption (SC), which has also received attention in relation to SD. Concerning the formation of the term sustainable consumption, the problems related to consumption have been recognised since the publication of The Limits to Growth in 1972. The consequences of a rapidly growing world population and finite resource supplies were modelled there, using a model to simulate the interactions between the Earth's and human systems (see section 2). Improvements in the eco-efficiency of consumption mean a reduction in resource consumption per consumption unit due to improvements in production processes or an efficiency friendly design. This is a weak SC approach. The second approach considers the need to achieve a change in consumption patterns and a reduction in consumption volume. Concepts of SC that integrate both developments are referred to as strong SC. In summary, concepts and definitions of weak SC emphasise increasing the eco-efficiency of consumption, while those of strong SC emphasise the importance of changes in terms of consumption patterns and volume for achieving SD. Moreover, the strong SC approach goes beyond its use in achieving SD within the current system of capitalism, and is closely related to the concept of degrowth. Nevertheless, the 10-year framework of regional and national SCP initiatives developed after the 2002 WCED favoured eco-efficiency (Berg, 2010). This weak SC approach is still commonly applied. The EU approach is also based on this, although its SD policies are considered to be among the strongest. The European Commission SCP policies put the emphasis on the production side.

The relationships between the concepts of SD, GE and GG should be further analysed to derive conclusions related to the aim of this work. As regards the concepts of green economy (GE) and green growth (GG), these concepts can be understood as the practical counterparts of the more theoretical concepts of sustainability and SD. Both GE and GG concepts have gained importance in political agendas at the national/global levels. GG can be understood as a political catchword, introduced to overcome reservations of the business sector against all kinds of *greenery*, regardless of the potential economic benefits. It is at the core of the GE concept (UNEP, 2011). The OECD has made it its new overarching slogan (OECD, 2011), although it has not been coherently applied. The concept of GG was championed by the Republic of Korea. Like SD, the GE and GG are multidimensional concepts. GE focuses on the potential trade-offs/synergies between economic and environmental dimensions without ignoring social issues. The first mention of the GE concept was from the late 1980's by Pearce et al. (1989). However, apart from its title, the work (usually presented as the conceptual *landmark* in this field), does not refer to the term GE. During the 1990's and early 2000's, the concept of GE almost disappeared from common usage at an international level (Brown et al., 2014), and was rarely addressed in scientific literature. This was, besides other reasons, due to the emergence of SD, which attracted political attention, especially after the UNCED (1992). The concept of the GE was revived in the time of the global financial and economic crisis (broadly: 2007-2011), without any consensus on its definition. In particular, it was not until 2008 that key international organizations again recognized in the GE concept a possible policy response to the global financial crisis and to the environmental problems that the current socio-economic systems were still encompassing (Bina and La Camera, 2011; Death, 2015). In this particular context, the concept was revived as an operational strategy enabling both economic recovery and more sustainable growth in the future. The UNEP, which institutionally promoted the concept at the international level, launched the Green Economy Initiative in 2008 and called for a Global Green New Deal in 2009 (Barbier, 2012; Bowen et al., 2009; Georgeson et al., 2017). When the UN General Assembly convened the 2012 UNCSD in 2009, it designated the GE as one of its two main focal areas. The UNEP defined an inclusive GE as *one that results in improved human wellbeing and social equity, while significantly reducing environmental risks and ecological scarcities* (UNEP, 2011). GE discourses were also seen as a way to cope with the decreasing traction of the SD concept on economic policymaking (Jacobs, 2013). The GG concept did not draw considerable attention before the 2000. The OECD adopted the Green Growth Declaration in 2009 (OECD, 2009) and published its Green Growth Strategy Package in 2011. Such a package included among other reports the widely cited *Towards Green Growth*, where GG is defined as a strategy *fostering economic growth and development while ensuring that natural assets continue to provide the resources and environmental services on which our well-being relies* (OECD, 2011). Ferguson's study of GE discourses (Ferguson, 2014) concludes that GG discussions must be separated from GE discussions. The author identified many tensions in GE discourses as well as three categories of GE discourse: weak, transformational and strong. Part of this categorisation involves assessing measurement, focusing on its relationship to GDP. This classification is also related to the weak/strong differences from definitions of sustainability (see subsection 2.2). He assigned particular strategies to these discourses. The OECD's approach (Towards Green Growth, (OECD, 2011)) is referred to as weak and the UNEP's approach (Towards a Green Economy (UNEP, 2011) as transformational. Of the remaining strategies, it is worth mentioning the approach of the EU in Europe 2020: a strategy for smart, sustainable and inclusive growth (European Commission, 2010). GE was broadly defined as *smart, sustainable and inclusive growth*, which was again associated with weak/ transformational approach. Then, the approach of the World Bank in its report *Inclusive green growth* (World Bank, 2012)

is also weak and inclusive GG is referred to be the pathway to SD. There are also works supporting the transformational/ strong approaches, which involves the need that policies deliver economy-wide innovation and structural transformation (several publications of Barbier, e.g. Barbier (2011, 2015), or a clearly strong approach (several publications, e.g. Cato, 2009; Jackson and Victor, 2011), where academic strong GE literature varies from green and ecological economics to de-growth and no growth perspectives. Hence, it is confirmed again that a strong approach in this area is closer to the alternative concept of degrowth.

Thus, additional considerations are focused on degrowth and its local alternatives, i.e. the concepts which fit to specific communities, such as Buen Vivir (from Latin America) and Ecological Swaraj (Radical Ecological Democracy from India) and their relationships with the SD concept and the related concepts. These can be understood as alternatives to both SD and GE, involving an alternative to economic growth (the two latter – at a local level) (Kothari, Demaria and Acosta, 2014). Of the analysed concepts, these concepts can be identified as the major alternative to the SD concept.

In 2008, the First International Conference on Socially Sustainable Economic Degrowth for Ecological Sustainability and Social Equity took place in Paris. A number of scholars supporting the degrowth idea participated to develop the idea of degrowth and the *Paris Degrowth Declaration* was adopted. The term degrowth is used in different ways by different authors (e.g. van den Bergh and Kallis, 2012). Kerschner (2010) defined the main idea behind the concept as: *an equitable downscaling of production and consumption that increases human wellbeing and enhances ecological conditions at the local and global level, in the short and long-term.* This definition requires the reduction of production and consumption to a sustainable level, which should lead to a decrease in resource use and pollution, which in turn will improve environmental conditions. Degrowth involves two aspects in this definition. Tabellini (2019) defined it as the process of material downscaling of a society and the resulting reduction of its environmental impact on the planet's ecosystem (similar to Kallis, 2011). In compliance with that, degrowth cannot be a long-term goal for societies, but just a means to achieve a state of environmentally sustainable equilibrium with planetary ecosystems. Then degrowth can be understood as the means and a SE economy as the final goal (O'Neill, 2012). The author also defined an SE economy as a functionally stable economy in which *a constant stock of capital is maintained by a low rate of throughput that is within the regenerative and assimilative capacity of the ecosystem* (Daly, 2008).

The first aspect is the down-scaling of production as measured by the GDP indicator. This aspect is also referred to as GDP degrowth, economic degrowth, or planned economic contraction. The second aspect is the down-scaling of consumption, i.e., consumption degrowth. Besides these two main ideas, there are also additional aspects of degrowth and related definitions. Work-time degrowth requires a gradual change towards shorter working weeks, longer holidays, and earlier retirement. It is argued that increased labour productivity due to improved education, skills, labour division, and technological progress results in the production and consumption of more goods rather than an increase in leisure. As a direct effect, work-time degrowth would not only lead to a decrease in production and lower wages, and therefore less consumption, but arguably, also less work stress and more happiness due to increased leisure (Van den Bergh, 2011).

It can be concluded that the concepts of GE and GG can be understood as practical strategies created by international organisations. They should complement or even try to replace the SD concept. These terms can also be understood as theoretical concepts, which have certain identifying features developed over time based on these political concepts and strategies. The concepts of degrowth, Buen Vivir and Ecological Swaraj can be identified as the major alternatives to the SD concept. A main common feature of them is that the focus should be diverted from the quantitative economic variables, such as production, consumption and more generally, the macroeconomic indicator GDP. On the contrary, it should be shifted towards wellbeing, happiness, life satisfaction and other subjective variables. A deeper analysis of all the concepts is beyond the focus of this work. However, the basic analysis of the relationships between sustainability and SD must be added.

2.2. Sustainability versus sustainable development

Sustainability and SD represent two crucial contemporary discourses at global, international, EU and national policy levels. These concepts have attracted more interest at both national and global levels due to the challenges and risks faced by human populations (in areas such as rural development, environmental conservation, energy, climate change, human wellbeing etc.) (Axelsson et al., 2011). The background to understanding these two concepts, including the differences between them, was outlined in the previous section, dealing with the origin and history of the concept of SD. The idea of sustainability has ancient roots in human societies, related to the need to find ways to use natural resources without depleting them (e.g., Hartig, 1804); Hunter, 1996). Hence, regarding the origin of the term *sustainability* (in the sense of the relationship between human beings and ecological systems), it can be understood as deriving from a semantic modification, extension, and transfer of the term *sustained yield* (the doctrine of foresters for two centuries) (Carlowitz, 1713; Grober, 2007). In compliance with that, Axelsson et al. (2011) described sustainability as a policy vision of the society with primary purpose of preventing the depletion of natural resources. Dovers and Handmer (1992) claimed that it is a process of *intentional change and improvement*. More generally, sustainability is a wide and complex research field with several applications in different

areas and disciplines (Olawumi et al., 2018). The concept of sustainability is conceptual (Ekins et al., 2003) in general and hence often misunderstood.

The terms *sustainability* and *sustainable development* are often used interchangeably (especially in public debates) (Norton, 2005). However, many scholars, such as Axelsson et al. (2011), emphasised that the two terms have different meanings. According to some scholars, the issue of what sustainability means is much more complex currently (Kidd, 1992; Lee, 1993 Clark, 2002). According to several of them, this term includes ecological integrity, biodiversity conservation or ecological sustainability (Parotta et al., 2006; Ramakrishnan, 2001). Ultimately, this is linked to the potential of an exploited ecosystem to subsist over time (Reboratti, 1999), and continue to provide goods and values for humans. According to Sartori et al. (2014), sustainability is a process and mechanism to achieve the intended SD. Nevertheless, SD is about the societal process of moving toward collective economic, ecological and socio-cultural goals by multiple stakeholders (actors) with different powers at multiple levels of decision-making (WCED, 1987; Baker, 2006; Strange and Bayley, 2008). A shift from government to governance (Pierre, 2000, Peters, 2000), which requires collaboration between societal sectors at different administrative levels (Ostrom, 1990), is crucial to this process. The importance of the institutional aspects, and, more generally, of the institutional pillar of SD, results from the facts described above. Both concepts can also be understood as social learning and steering processes, both involving management and governance mechanisms (Lee, 1993). SD is also understood as a collaborative learning process, i.e. social learning (Keen et al., 2005) in the local to global community (Daniels and Walker, 2001; Pretty, 2003; Wals, 2009) with the aim of building social capital and capacity to address sustainability issues (Woolcock 1998). SD is multidimensional in scope (Slimane, 2012) and an integrated concept (Sartori et al., 2014). It is based on the principles of sustainability (Dovers and Handmer, 1992). The concept of SD is aimed at finding a balance between preserving the ecosystem and meeting human needs (Olawumi et al., 2018). It can be concluded that SD is one of the most challenging policy concepts developed (Turner, 1992). Its core objective is to provide to everybody everywhere and at any time the opportunity to have a dignified life in his respective society (a kind of ethical directive). This demand for a high quality of life is assumed to include a decent standard of living, social cohesion, full participation and a healthy environment (WCED, 1987). Although several scholars have described the relationships between the concepts of sustainability and SD differently, after an in-depth analysis several key approaches were identified in this work as crucial to explaining the relationships between the concepts of SD and sustainability.

The first approach is based on the necessity of that development (process of change) which is sustainable in order to achieve a desired state of sustainability. However, the final state of sustainability reached is not a static point, but is changeable and always evolving and developing if the path of SD is achieved. The meaning of the term sustainability in relation to SD as a *sustained yield*, as well as the views of different scholars dealing with this term in relation to SD are considered. The second approach to understanding sustainability in relation to SD recognized as the crucial one is based on several concepts of sustainability defined by particular criteria. In accordance with this approach, SD can be explained in relation to the criteria of very weak, weak, strong and very strong sustainability concepts and, furthermore, several particular types of sustainability form parts of one or several dimensions of SD. These especially include economic, social, environmental, ecological, human and institutional sustainability. Although the first four types can be mainly associated with particular dimensions of SD, taking into account their interconnections and interdependence, the last two go beyond all the pillars of SD. Moreover, it should also be included in the first approach outlined above. Human sustainability, wellbeing and quality of life should be understood as the main aims of SD, and strategies and policies in this area.

From the neoclassical economic perspective, the sustainability issue has at its core the phenomenon of market failure and its correction through proper resource pricing. Then, an intertemporal efficient allocation of environmental resources through price corrections based on individual preference value is required (Solow, 1974, 1986). Differences in disciplinary perspectives and in the philosophical and ethical interpretation of SD have resulted in concepts of sustainability which prioritize either economic or environmental objectives. In broader terms these concepts include the opposing paradigms of weak and strong sustainability (Hediger, 1999; Neumayer, 1999b; Pearce et al., 1994) which are based on different conceptions of capital theory. Victor (1991) indicated that one of the contributions that economists have made to the SD debate is the idea that by pursuing economic growth the depletion of environmental resources, i.e. source and sink resources, is akin to living off capital rather than income. Then, SD is defined as the maximum development that can be achieved without exhausting the capital assets of the nation, which represents its resource base. The particular forms and roles of these assets differ depending on the concept of sustainability that is applied. Hence the following classification of the concepts of sustainability is derived from the capital base of countries. Widely interpreted, this capital base includes man-made capital (K_m), natural capital (K_n), human capital (K_h), moral (ethical, K_e) and cultural capital (K_c). It is still controversial what types of capital, should be preserved for current and future generations (Costanza et al., 2007). Nevertheless, it must be emphasised that some characteristics of these concepts (in a borader as well as in a narrower classification) are in practice less clearly defined and sometimes overlap (a detailed analysis of these concepts was elaborated on by the author (Drastichová, 2018).

Weak sustainability concept involves the necessity of maintaining the stock of total capital, including the man-made and natural capital, or, an economy's generalized productive capacity (Solow, 1986). In narrower terms, there is also a *very weak sustainability*, which requires that the generalized production capacity of an economy is maintained intact in order to enable constant consumption per capita over time (Solow, 1974, 1986). This is also referred to as *Solow sustainability* (Common and Perrings, 1992). In broader terms, *weak sustainability* requires that the welfare potential of the overall capital stock remains intact (Hediger, 2000; Opschoor, 1996; Pearce et al., 1994). This is not limited to sustaining a material standard of living or consumption, but it also includes values related to non-consumptive uses, i.e. existence and bequest values, and the public good character, i.e. amenity and recreational values, of the environment. On the contrary, from a system perspective, a minimum necessary condition of *strong sustainability* is to maintain the total stock of natural capital constant over time (Daly, 1991). This is a prerequisite for SD. In the more detailed classification, the very strong sustainability perspective is added. It calls for a steady-state economic system based on thermodynamic limits and the constraints imposed by them on the overall scale of the macroeconomy. Zero economic and zero population growth are required to achieve a zero increase in the scale of the macroeconomy. However, it is emphasised by supporters of the steady-state paradigm that development is not excluded and that social preferences, community-regarding values and generalised obligations to future generations can all be fully involved in the steady-state economy as it evolves. This requires the conservation of the moral capital (K_e), on which economic activity eventually depends (Hirsch, 1976; Daly and Cobb, 1989). The analytical descriptions of all concepts of sustainability are included in Table 1.

Table 1. Sustainability rules and indicators, source: Turner (1992), author's elaboration

	No critical natural capital	*Critical natural capital*
Very weak sustainability (VWS)	$\frac{s}{y} - \frac{d_k}{y} = SI$ $SI > 0$	Perfect Substitution: All K_n a K_m Growth Economy
Weak sustainability (WS)	$\frac{s}{y} - \frac{d_m}{y} - \frac{d_n}{y} = SI$ $SI > 0;\ \lambda > h; n > Z$	$SI > 0;\ \lambda > h;$ $n > Z; d_n^* \leq 0$
Strong sustainability (SS)	$d_n \leq 0; SI > 0$	$SI > 0;\ d_n \leq 0;$ $d_n^* \leq 0;\ d_{K_c} \leq 0$
Very strong sustainability (VSS)	Perfect Complementarity: All K_n and K_m Stationary State Economy	$SI > 0;$ $d_n \leq 0; d_n^* \leq 0;$ $h \leq 0;\ d_{K_c} \leq 0;\ d_{K_e} \leq 0$

Notes: K = total capital assets; K_m = man-made capital K_n = natural capital, s = savings; d_m = depreciation on man-made capital; d_n = depreciation on natural capital; λ = technical change; h = rate of population growth; n^* = critical natural capital: *no substitutes*; K_c = cultural capital; K_e = moral/ethical capital; Z = lower bound stock limit (determined via SMS) to ensure ecosystem stability; SI = sustainability index.

Moreover, Victor (1991) identified four schools of thought on the environment as a capital asset whose views range across a spectrum from very weak sustainability to very strong sustainability. These include the mainstream neoclassical school, the London school (after Pearce, Barbier, Markandya and Turner), the post-Keynsian school and the thermodynamic school (after Boulding, Georgescu-Roegen, Daly, Perrings and Common). In summary, the four key concepts of sustainability, and the place of SD in relation to them, can also be characterized by their different minimum requirements. VWS is defined by constant per capita consumption, WS by non-decreasing social welfare, SS by constant environmental quality, VSS by a set of stationary-state conditions. By contrast, SD requires compliance with critical levels of natural capital and basic human needs that are not addressed by notional conceptions of neither weak nor strong sustainability (Hediger, 2006, 2004). Then the position of the concept of SD would be between the concepts of WS and SS. However, it goes beyond all these concepts since it includes the requirement of meeting basic human needs.

Additional concepts which are based on particular criteria have also been developed. These concepts can be assigned to one or more dimensions of SD, or go beyond all the dimensions of SD and be affected by all of them (and also affect them). Environmental sustainability concept is associated with the deep ecology movement and it requires sustenance for every specific component of natural capital and every flow of particular natural resources. Hence this concept is characterised by the respect for the environment and prioritization of ecological concerns over economic development acknowledging the natural changes. The ecological sustainability goes even further towards the protection of natural capital (environmental assets) and it is interpreted as maintaining the composition, structure, and processes of an ecological system (Anderson, 2010, 2013). Human sustainability can be understood in narrower terms as a sustenance of the human capital that is needed to maintain levels of health, wealth, production, and thus also welfare (Spangenberg, 2002). In broader terms, the HD paradigm draws on the conceptual works of Sen (1985) and the Capability Approach (CA), among others. The CA is *a moral approach that sees persons from two different perspectives: wellbeing and agency* (Sen, 1985). People pursue wellbeing in that they seek to *function* well as human beings. People exercise *agency* in that they decide how to shape their lives and

environment. Hence, according to the CA, human wellbeing includes capabilities beyond functioning. HD paradigm builds on the work of the United Nations Development Programme (UNDP), and the publication of its annual reports, starting from 1990. It is an approach for advancing human wellbeing which is focused on expanding the richness of human life, rather than simply the richness of the economy in which human beings live. Accordingly, the HD paradigm is based on the understanding of development as being *development of the people by the people, for the people* (UNDP, 2022). The contribution of HD can be perceived in two main areas: the idea of moving development away from a purely economic-based perspective (one measured by GDP); and from a purely state-centred perspective, to one in which people become the main agents of development. As mentioned above, HD's shift to people-centred approaches was underpinned by the CA, especially articulated by Sen and Nussbaum (e.g. Nussbaum and Sen, 1993; Sen, 1999). The ideas of HD and more precisely of the CA have been gradually introduced to ecological economics in the mid 2000's. This kind of sustainability should have its place in the SD concept as its philosophy, purpose and ultimate goal. Thus, the HD approach must be included in every SD strategy.

Another kind of sustainability, which is more specific and human oriented, is social sustainability. It focuses on personal assets, including education, skills, experience, consumption, income and employment. Social welfare depends on citizens' ethics, discipline, tolerance and trust (among other factors). Institutional sustainability can be understood as an institutional pillar of SD when explicitly speaking about SD. It can also be understood as being aimed at interpersonal processes like democracy and participation (institutional mechanisms), distributional and gender equity (institutional orientations) or independent and pluralistic sources of information (organisations). (Spangenberg, 2002). All the types of sustainability introduced in this section have an importance for achieving SD either as part of the goal, the concept of SD, or as a part of the strategy (process) leading towards SD.

New, alternative and complementary concepts should be considered when dealing with SD, quality of life and wellbeing. Innovative ideas and strategies but also systemic changes in the longer period should be included. EL economics can provide a platform for a transformation towards a new socio-economic model respecting the environment (biophysical planetary boundaries), and improving wellbeing and quality of life (challenging current forms of economic growth and taking the above-mentioned concepts into account). Moreover, sustainability science has already been established as a discipline (see more in section 3). As recent developments have shown, functioning health and social systems are essential for SD, wellbeing and quality of life, and this will be a crucial challenge for the near future.

2.3. Summary approaches to the definition of sustainable development

Resulting from the crucial definition of WCED (1987), SD is a global development concept giving top priority to the satisfaction of human needs, in particular of the global poor, while respecting environmental limits. As it is stated in the second part of the WCED (1987) definition, it contains within it two key concepts. It is the concept of needs, in particular the essential needs of the world's poor, to which overriding priority should be given; and the idea of limitations imposed by the state of technology and social organization on the environment's ability to meet present and future needs.

Building on previous knowledge, three major approaches to SD have been developed (United Nations et al., 2003) since the adoption of the WCED report (WCED, 1987):

1. The three-pillar approach is based on that view of SD which refers simultaneously to economic, social and environmental systems, all of which must be sustainable at the same time, because each of the three pillars is independently crucial and the three pillars are interlinked.
2. The ecosystem health approach regards the economic and social systems as sub-systems of the global environment. The capacity of ecosystems must be sustained to respond with resilience to external effects. The health of ecosystems must be protected and enhanced. This approach is focused on:
    - The *pressures* put on ecosystems by human activities, which are often the cause of reduced ecosystem health. This is reflected in degraded service flows.
    - The *responses* of ecosystems to these pressures.
3. The resources/capital approach considers SD to be development that ensures non-declining per capita national wealth by replacing or conserving the stocks of man-made (produced, physical), human, social and natural capital. It broadens the concept of economic capital by integrating concepts from physical and social sciences to include measures of human, social, natural and environmental capital (Goossens et al., 2010).

Although each of these approaches emphasises a particular view of the concept, they are significantly interconnected with one another. The first approach places the same importance on each of the pillars, which are interconnected, while the second one also takes into account that socio-economic systems exist within ecosystems.

Although the three-pillar conception of social, economic, and environmental sustainability in the SD concept represented as three intersecting circles with overall SD/sustainability at the centre has become universally used. It can be concluded that there is no single point of origin of the three-pillar conception. Rather, a gradual emergence can be seen, which is related to various critiques of the economic status quo in the early academic literature from

both social and environmental perspectives, and to research into the possibilities of using economic growth as a solution to social and environmental problems at the UN level (Purvis et al., 2019). To identify the origin and theoretical foundations of this conception, it is necessary to study historical sustainability literature (see section 2). The three-circle diagram (see Figure in section 3) seems to have been presented first by Barbier (1987), although with differences to modern interpretations. A more detailed analysis of these aspects in relation to the practical application of the concepts of SD/sustainability, including some additional aspects of their critique, is included in section 3.

The third approach defines different kinds of capital assets related to the pillars of the previous two approaches. The last approach also includes a general consideration of the sustainability of the use of different forms of capital (already mentioned in the introduction). Wellbeing is an important aim of all these approaches. Ecosystem services (supporting, provisioning, regulating and cultural), which are the benefits people obtain from ecosystems, are sources of human wellbeing and essential for life continuing life on Earth as it is (Millennium Ecosystem Assessment, 2005; see more in Drastichová, 2022).

Moreover, the fourth institutional dimension is emphasized as the fourth pillar of SD because of its necessity in supporting progress in the previous three pillars and in SD generally (United Nations et al., 2003). This can be specifically related to the first approach to the definition of SD. However, the functioning institutional dimension has a crucial role for achieving SD in general. The three pillars of SD, including environmental, social, and economic sustainability, need to be harmonized to achieve a holistic SD. According to Cusack (2019), the goals of SD, oriented around the *three E's*, namely, economic growth, environmental protection, and social equity, also correlate with quality of life considerations. Accordingly, the focus on the economic, environmental, and social dimensions of SD must also be extended, or rather, they must be seen to include a human dimension.

Although there are many different interpretations by various scholars of what the particular dimensions of SD include, it is clear that there must be a balance between these dimensions. This should be achieved in such a way as to minimize the collateral impact on the environment; human activities aimed at increasing social wellbeing (quality of life) should not exceed the carrying capacity of ecosystems. In compliance with the WCED report (WCED, 1987), SD is future oriented in that it is aimed at ensuring that future generations are at least as well off as current generations in terms of wellbeing (welfare). In economic terms it is a matter of intergenerational equity and not just efficiency. The distribution of rights and assets across generations determines whether the efficient allocation of resources sustains welfare across human generations (Howarth and Norgaard, 1990). The concrete challenges of SD are heterogeneous and complex due to the diversity of human societies and natural ecosystems, and the limitations to the definition of the WCED report have gradually become more apparent. Some of them have already been outlined, but the overall evaluation is provided in terms of the results of the SWOT analysis carried out in the analytical part of this work. First, in relation to these limitations, the supplementary and alternative concepts to SD are introduced and critically evaluated.

Despite a continuing debate on the meaning of the SD concept, a few common principles have often been emphasized. The first one is a commitment to equality and fairness, in which priority should be given to improving the conditions of the poorest in the world and the rights of future generations should be considered. The second is a long-term view emphasizing the precautionary principle according to the Principle 15 of the Rio Declaration, i.e. w*here there are threats of serious or irreversible damage, lack of full scientific certainty shall not be used as a reason for postponing cost-effective measures to prevent environmental degradation* (UNEP, 2016c). Thirdly, SD embodies understanding, integration and acting on the complex interconnections that exist between the environment, economy, and society. This does not imply pursuing one issue at the expense of other, but recognizing the interdependence of these three SD pillars (Drexhage and Murphy, 2010), also taking into account the role of the institutional pillar.

3. Sustainability science and possible design of the concept of sustainable development

In the previous sections, there was an attempt to outline crucial milestones in the history of the sustainability/SD concepts in order to derive their importance for humanity. Then, their deeper aspects were analysed and their crucial features were derived. Subsequently, it is necessary to deal with aspects of the form of science which would deal with issues of sustainability/SD from a scientific and methodological point of view (subsection 3.1), as well as the appropriate form for their inevitable practical application (subsection 3.2).

3.1. Possibilities of sustainability science

There is a demand to create a science that would address sustainability/SD recognising the fundamental link between science and the economy, while remaining free of political bias, in an attempt *to be responsive to the needs and values in society while preserving the life support systems of planet Earth* (Kates et al. 2001; see also Komiyama and Takeuchi 2006). It has been intensively discussed whether sustainability science would be a subtopic of other sciences, a cross-cutting question, or a completely new discipline (ICSU [International Council for Science], 2002; Clark and Dickson, 2003).

It is essential to advance and improve the methodology of the measurement in the field of the SD and related concepts, which is a particularly challenging task. These concepts are inevitable for meeting the needs and maintaining the wellbeing of future generations at current levels, but also for the survival of humanity in general. Other features include the multidimensionality of the concepts (including at least three basic dimensions plus the institutional dimension), flexibility and the resulting flexible application by different units, an overall lack of clarity, ambiguity and vagueness, and the comprehensiveness and broadness of the concepts, among other features. Another crucial feature is the development of a number of alternative concepts, often in the form of practical counterparts of these concepts due to deficiencies in their practical application, or, on the contrary, more scientific concepts changing the philosophy of these concepts where it is considered by advocates of alternative concepts that sustainability/SD have deficiencies. These and other factors, which are often interconnected, cause that the measurement and the methodological aspects related to it represent a really challenging task. Resulting especially from the first characteristic of other concepts, i.e. the inevitability of the concepts for the wellbeing and survival of humanity, putting them into operation is a crucial task. However, as results from their features, the knowledge from many scientific disciplines will be required and also quality policies, strategies and institutions. So on the one hand, transdisciplinary approach is likely to be required (for many aspects included) and on the other hand, institutional background to put the concepts into operation and integrate them into policies must be developed carefully.

A growing number of publications on sustainability/SD has led to the perception of sustainability science as a distinct field of science (Kates et al., 2001; Komiyama and Takeuchi, 2006; Schoolman et al., 2012; Kajikawa et al., 2014). Sustainability science has developed into an important discipline, with scientific conferences, journals and scientific societies having dealt with research into this area of interest. Although an *umbrella term* (Kastenhofer et al., 2011), sustainability science has arisen as a *not yet mature* (Ostrom et al., 2007), but distinctive, vibrant and maturing field of research, defined by problems rather than by the disciplines it employs (Clark 2007; Kajikawa, et al., 2007). It has emerged as a discipline with sustainability at the core of its distinctive worldview (Kauffman, 2009) – a dynamic and evolving transdisciplinary discipline addressing the symbiosis between human activities and the environment (Rapport, 2007), and providing visions and scenarios for transition towards global sustainability (Komiyama and Takeuchi, 2006) while explicating relevant decisions and agents (Raskin, 2008). So, it is defined by its research purpose rather than by a common set of methods or subject matter. Currently, sustainability science is usually understood as research providing the necessary insights to make the normative concept of sustainability operational, along with the means to plan and implement this.

Sustainability science can be perceived as embracing two elements. It can be divided into the more traditional disciplinary-based science for sustainability, and the transdisciplinary science of sustainability. The first one consists of more descriptive, analytical and basic science, whereas the latter is characterized by reflexivity and applicability. On a meta level, the emergence of the latter is like a new stage in the evolution of science. Science for sustainability can be monodisciplinary or multidisciplinary, but it must be at least interdisciplinary-ready. Its implementation should take into account the meaning of a broader concept of sustainability, and therefore be ready for integration with results from other disciplines. It addresses key sustainability challenges including much of basic science. These challenges include unsustainable trends (global problems), such as climate change, biodiversity losses or ozone layer depletion (among others). This science attempts to strengthen the dialogue between society and science, which should increase the benefits provided by science to society. It also supports the processes of investigating sustainable solutions. It assesses the impacts of current decisions and identifies the actions needed to reach a certain state in the future. As this science has a purpose, which is the pursuit of sustainability/SD, it is teleological, aimed at the goals of SD. It is heterogeneous in scope and practice, and it endeavours to reassess interactions across domains and scales, primarily those between nature and society, between global and local aspects, and between the past, the present and possible futures (Jerneck et al., 2011). This determines the choice of the methods applied. In compliance with this, a key means for analysing interaction is the use of scenarios. (see e.g. Raskin, 2008). A place-based analysis of problems, considering the global and intertemporal context, is necessary to discover solutions. The structure, methodology and content of this science must differ fundamentally from other disciplines, since reductionist methods will not be sufficient to develop solutions to the sustainability/SD challenges (Weinstein, 2010). It must be admitted that the research carried out in this science can only provide partial knowledge and depends on contributions from other disciplines

Table 2 displays differences between science for sustainability and science of sustainability. The emergence of science of sustainability can be understood as part of a larger trend in the evolution of science (Spangenberg and O'Connor, 2010). It is part of a paradigm shift emerging from a scientific sub-current that characterises the evolution of science in general – a shift from mode-1 to mode-2 science (Martens, 2006). Accordingly, mode-1 science is completely monodisciplinary and academic in nature, whereas in mode-2 science research is but one component of an extensive process of knowledge production (Nowotny et al., 2001). The first one can provide a necessary analytical and methodological background and a simpler view of reality, while the second one, being a transdisciplinary science, a detailed view of interactions between human, economic, institutional and environmental (ecological) systems.

Table 2. Two branches of sustainability science and their distinctive features. Source: Spangenberg (2011)

Science for sustainability: Mode-l sustainability science	**Science of sustainability: Mode-2 sustainability science**
Monodisciplinary; Highly focused; Normal science; Curiosity driven and problem solving; Academic; Academic peers; Certainty; Hierarchical logic; Scientific proofs, unequivocal results; Top-down, command and control; Stakeholders affected.	Interdisciplinary and transdisciplinary; Broadly based; Post-normal science; Critical research; Academic and social; Extended peer community; Uncertainty and ignorance; Relational logic; Discursive processes, ranges of options; Discursive process of opening up and closing down; Stakeholders involved.

A crucial area of interest in the economics (in terms of all the disciplines indicated or no matter which one is considered) should include searching for a balance between the public and private goods that will also determine a path towards sustainability/SD or alternative goals, such as steady state. Environmental research must include knowledge and tools for better understanding of ecosystem processes, including effective ecosystem management (Jerneck et al., 2011). It is also essential to consider the interconnections with the social and economic pillar. Among other factors, this should involve an understanding of societal preference change mechanisms in the transition towards sustainability and the factors of quality of life in general in the social pillar. As regards economics and the economic pillar, sustainability macroeconomics and microeconomics should be gradually developed. There should be a continual search for a balance between mainstream neoclassical economics, including traditional environmental and resource economics (ERE), and transdisciplinary ecological economics. The first one can provide a necessary analytical and methodological background and a simpler view of reality, while the second one, being a transdisciplinary science, a detailed view of interactions between human, economic, institutional and environmental (ecological) systems. A crucial area of interest in the economics (in terms of all the disciplines indicated or no matter which one is considered) should include searching for a balance between the public and private goods that will also determine a path towards sustainability/SD or alternative goals, such as steady state.

Sustainability science is applied science. Its results should be directly or indirectly instrumental in solving sustainability which determines the subjects of its interest and the methodology. However, there is a difference in the interpretation of results and their application between science for and the science of sustainability, while in the former the traditional scientific paradigms prevail (see more in Spangenberg, 2011). In the science of sustainability, situations where scientific input is needed are often described as cases where stakes are high, decisions urgent, facts uncertain and values disputed. Hence, the use of post-normal science is required, which differs from the normal science approach (Kuhn, 1962).

Both sustainability science disciplines contribute to the key research issues. Three core topics for sustainability science can be identified, and they should also be put into a policy context. The first topic involves adaptiveness, vulnerability and resilience in complex socio-ecological systems. Sustainability is dependent on building and maintaining the adaptive capacity needed to deal with the shocks as well as longer-term structural transformations. New instruments and concepts that facilitate management of these aspects for the interlinked socio-ecological systems are inevitable. The second one is sustainability in complex production-consumption systems. This is a core component part of the effort towards sustainability/SD and is also one of the practical ways of moving closer towards them. Additionally, it is a crucial component of other ways of putting these basic concepts into operation, including the decoupling of environmental aspects from economic activities and the circular economy. The circular economy also leads to decoupling. An integrated understanding of the relationships between consumption and production is required. The third topic involves institutional aspects, such as rules, procedures and institutions which support the shift towards sustainability/SD. These are crucial and must be taken into consideration. Transforming and redesigning existing institutions and methodological backgrounds are necessary prerequisites for a functioning sustainability science in the future. The advance of science and technology itself or the widening of competitive markets is not likely to encourage a path towards SD/sustainability (Spangenberg, 2011).

The science of sustainability requires not only the re-evaluation and rearranging of the approaches and methodologies of science, but also the interlinking of concepts between different disciplines, linking biosciences and geosciences with social and economic sciences. The crucial disciplines, which have developed over time, include ecological economics (Martinez-Alier, 1987; Söderbaum, 2000), industrial ecology (Ayres and Simonis, 1994), social ecology (Fischer-Kowalski, 1996); resilience theory (Berkes et al., 2000), transition theory (Rotmans et al., 2001), world system analysis (Wallerstein, 1974), and technology assessment and science and technology studies (Kastenhofer et al., 2011). This is partly in compliance with the concepts and systems considered by Beeks (2016) presented in subsection 3.1. Overall, it can be concluded that since SD/sustainability concepts are multidimensional, they will interfere with a number of theories and concepts, not only those summarized in this work. However, such concepts and theories are often applied in a static manner, considering a certain state of other systems as an external constraint in system analysis (Jerneck et al., 2011). It is necessary to investigate the dynamics and mutual dependencies of co-evolving systems, and how the resilience of the metasystem of *society – economy – nature* depends on the contemporaneous resilience and dynamics of the subsystems.

A new management approach is also required. In the science of sustainability, it is necessary to balance the approaches and make scientific results meaningful by involving non-scientific expertise without abandoning scientific quality. For the future, crucial challenges for SD should be involved in sustainability science themes, including those meaningful aspects arising within the key alternative concepts, which should lead to the advancement of the concept of SD (and certainly not the undermining of this concept). Not only the clusters and their themes, which can be researched in detail in mode-1 science, but also their interconnections from the inter- and transdisciplinary perspective must be studied, especially within mode-2 science. Within both modes, the unsustainable trends leading to global environmental trends, including biodiversity losses, climate change and ozone layer depletion, as well as environmental problems at lower levels, should be investigated. Hence a detailed knowledge of ecosystems, including climatic and geochemical and other cycles involved in ecosystem processes, is required. Consequently, a justified determination of planetary boundaries is inevitable. The detailed studies of interactions between human, economic, institutional and environmental (ecological) systems will be crucial. With regard to research on the interaction of society and economy, value systems and power structures and their interaction with environmental systems and sustainability objectives, the Millennium Ecosystem Assessment (MA, 2005), the IPCC's Assessment Reports (IPCC, 2007) or and the UNEP GEO 4th report (UNEP, 2007) should be emphasised.
Resulting from the previous knowledge, it is also crucial to consider SD in terms of systems science to derive the appropriate form of SD and to understand its deeper essence. In this respect, SD requires synchronisation with a metasystem and its complex and evolving subsystems, including nature, economy and society (Bossel, 1998) over a long-term period and including distant effects (WCED, 1987). The SD concept must cope with non-linear effects and delayed responses, which means that the system operates beyond cause-effect logic, with feedback loops and also extensive temporal-spatial heterogeneity (Allen, 2001). The interlinkages among dimensions must be considered (Weaver and Rotmans, 2006), and each of these systems needs to be sustainable in itself and able to deal with the dynamics of the system environment (Bossel, 1996), while not limiting the other systems' ability to do this as well. Only then can development of the metasystem be sustainable. Taking these aspects into account, systems science is a promising approach to developing a coherent description of sustainability (Weinstein, 2010).

3.2. Possible design of SD/sustainability concepts: relationships with related concepts

Resulting from the previous analysis, possible forms of understanding of the SD concept are summarized. Two additional relationships with the related concepts analysed in this work which are also of practical importance for achieving the goals of increases in wellbeing and quality of life are added. All these aspects are displayed in Figure 1.
Sustainability/SD remain concepts with a number of interpretations and context-specific understanding. Purvis et al. (2019) argued that the emergence of the three-pillar paradigm, with little theoretical foundation, is mainly a product of the specific origins of sustainability as a concept, aided in part by the agenda of the various actors that helped to shape its early history. A prevalent description involves three interconnected *pillars* (e.g. Moldan et al., 2012; Schoolman et al., 2012; Boyer et al., 2016), *dimensions* (e.g. Carter and Moir, 2012; Mori and Christodoulou, 2012), *components* (e.g. Du Pisani, 2006; Zijp et al., 2015), *stool legs* (e.g. Dawe and Ryan, 2003; Vos, 2007), '*aspects*' (e.g. Goodland, 1995; Lozano, 2008; Tanguay et al., 2010), *perspectives* (e.g. Brown et al., 1987; Arushanyan et al., 2017), etc. encompassing economic, social, and environmental (or ecological) factors or *goals*. These competing terms are principally used interchangeably. This three-dimensional description is often presented in the form of three intersecting circles of society, environment, and economy, with sustainability being placed at the intersection (right, below in Figure 1). Alternative descriptions include the three nested concentric circles (right, above in Figure 1) or literal *pillars* (right, in the middle, in Figure 1) (among others). The message provided by these diagrams and the wider *pillar* conception can often be unclear, although it is a simple depiction. The conceptual origins of this description, the reasons of inclusion it into the mainstream, and its exact meaning have not been clarified. The discourse around sustainability has predominantly formed around the three-circle depiction without transforming it into a more comprehensive meaning of sustainability (Thompson, 2017). The three pillars themselves were explicitly incorporated into the formulation of the SDGs (UN 2012a). It must be concluded that a theoretically rigorous description of the three pillars is not available. It can be due to the nature of the sustainability discourse having arising from broadly different schools of thought historically. The absence of such a theoretically solid conception frustrates approaches towards a theoretically rigorous operationalisation of sustainability (Purvis et al., 2019).
The first picture on the left side above displaying a GE as understood by the EEA, which is included in the *Roadmap to a Resource Efficient Europe* (European Commission, 2011) should indicate that transforming the economy into a resource-efficient path will bring increased competitiveness and new sources of growth and jobs through cost savings from improved efficiency, innovations and better management of resources over their whole life cycle. This requires policies that recognise the interdependencies between the economy, wellbeing and natural capital. Although clearly based on the weak SC approach, this picture at least shows, how the more theoretical three interconnected pillar description of SD can be displayed in a more practical way of GE which also enhances human wellbeing (see subsection 3.1.)

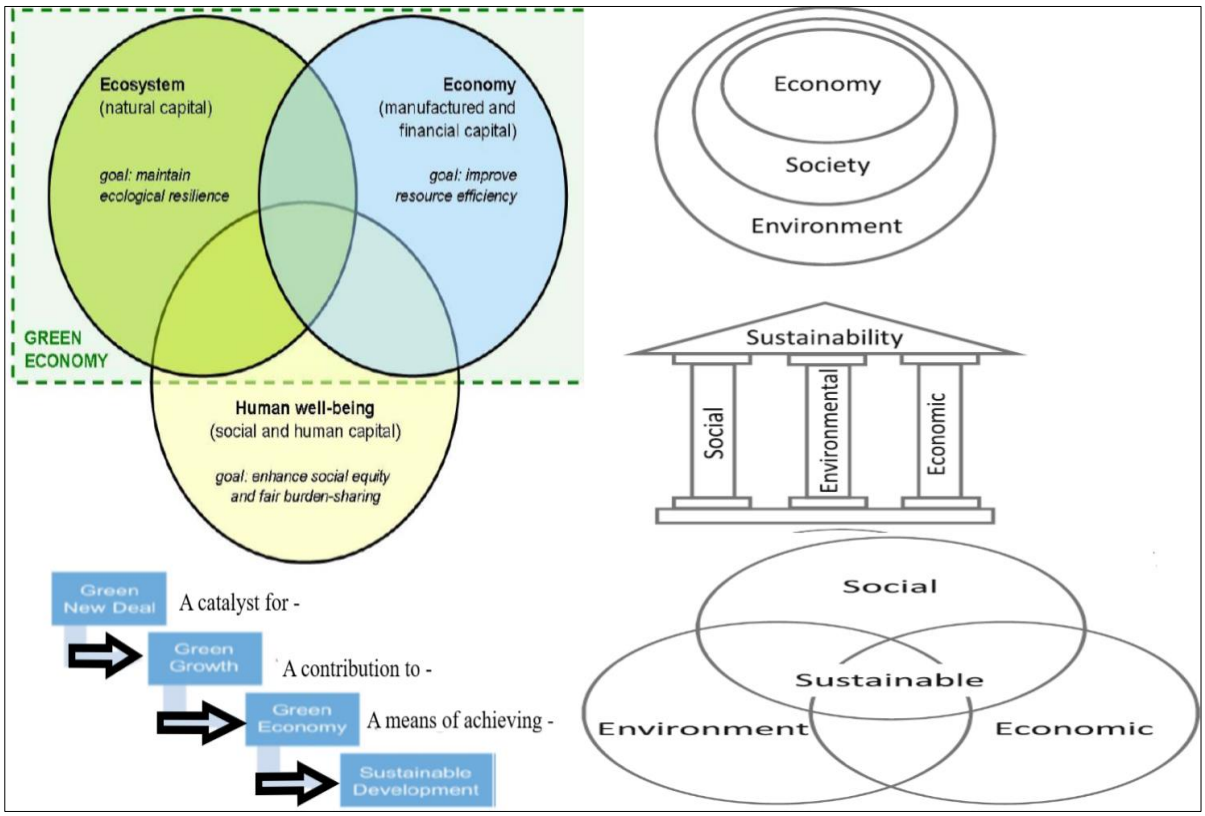

Figure 1. Left side above: Green economy chart (left, above); 2. Right side: Sustainable development scheme: a) typical presentation of SD as three intersecting circles (right, below). Alternative depictions: b) literal *pillars*, c) a concentric circles approach; 3. Left side below: The hierarchy of GE concepts (based on the conceptualisation of TEEB in ten Brink et al. 2012), source: European Environment Agency (EEA) (1.); Purvis et al. (2019) (2.); ten Brink et al., (2012), Georgeson et al. (2017); author's elaboration

The second picture on the left side below displays the fact that the GE must coexist with the SD concept, the related concepts and strategies. The Economics of Ecosystem and Biodiversity's (TEEB) GE report describes a clearer hierarchy (ten Brink et al. 2012), represented by this part in Figure 1. According to this hierarchy, there is no conceptual inconsistency with the SD concept, challenging the artificially imposed barriers around policy debates. However, these terms are not often used in alignment with this hierarchy. Nevertheless, the conclusion that GE and GG are the more practical counterparts of SD is confirmed. And above that they all can serve for policy purposes, such as achieving a Green New Deal (introduced in subsection 3.1), which also currently has its concrete form in the EU.

To finalize with more practical aspects, it is concluded that many countries at different stages of development have adopted their SD strategies, but with different priorities and conceptual foundations, since they have faced different socioeconomic and biogeophysical situations, but also differences in priorities, since SD strategies affect interests of various stakeholders differently. A rationale behind that was already indicated in *Our Common Future*, (WCED, 1987), where in chapter 2, it is stated that *the goals of economic and social development must be defined in terms of sustainability in all countries – developed or developing, market-oriented or centrally planned. Interpretations will vary, but must share certain general features and must flow from a consensus on the basic concept of sustainable development and on a broad strategic framework for achieving it*. Although searching for win-win situations forms a basis of such strategies, a solution maximizing gains for all stakeholders can be hardly achieved. Trade-offs are unavoidable and compensations by complementary measures are necessary. Usually no single simple solution exists and waiting for a win-win situation seem to be inappropriate. From a more theoretical point of view, it can also be concluded that the SD concept and all the related and alternative concepts, including the theoretical (scientific) and practical concepts, should still support wellbeing and in broader terms, quality of life, while living in environmental limits of the planet, which can be determined by planetary boundaries or alternative concepts, or at best by the combination of a number of ways. The problematic aspects associated with the SD concept resulting from its complexity and multidimensionality (among other aspects), which also related to the concepts of wellbeing and quality of life, affecting the methodology used and their measurement, should not mean that a shift towards SD (or even to the aims of alternative concepts) and improvements in wellbeing and quality of life are unnecessary. Rather, there is a need for place- and culture-specific measures. Although SD is a multidimensional concept,

achieving progress in wellbeing and quality of life through SD (or in combination with a path resulting from alternative concepts) is a required goal. However, a one-size-fits-all approach to SD and quality of life is not an appropriate one. The success of SD initiatives depends on how closely they comply with and contribute to a sense of place in a given space.

4. Conclusions

Generally, if an activity is sustainable, in practice it can continue forever, which is in compliance with a general definition of sustainability in relation to the SD concept. Sustainability and SD represent two crucial contemporary discourses at global, international, EU and national policy levels. The work was aimed at clarifying of the essence and deeper significance of SD on the basis of an analysis of the history of the concept, key scientific works and practical policies, strategies, and actions.

On the basis of the analysis (including the first part, i.e. Drastichová, 2022), the three most used approaches to SD were summarized, i.e. the three-pillar approach, the ecosystem health approach and the resources or capital approach. All these approaches reflect the origin and development of the concept, the approaches to its operationalization as well as methods of its measurement. Despite the continuing debate on the meaning of the SD concept, certain common principles have been emphasized. The first is a commitment to equality and fairness, in which priority should be given to improving the conditions of the poorest in the world and the rights of future generations should be considered. The second is a long-term view emphasizing the precautionary principle according to Principle 15 of the Rio Declaration. Thirdly, SD embodies understanding, integration, and acting on the complex interconnections that exist between the environment, economy, and society. This does not imply pursuing one issue at the expense of another, but recognizing the interdependence of these three SD pillars, also recognizing the role of the institutional pillar.

Although several scholars have described the relationships between the concepts of sustainability and SD differently, after an in-depth analysis several key approaches were identified as crucial to explaining the relationships between the concepts of SD and sustainability. The approaches to sustainability and its relation to SD derived from the analysis in this work involve the necessity of such development (process of change) which is sustainable in order to achieve a desired state of sustainability. However, the final state of sustainability reached is not a static point, but is changeable and always evolving and developing if the path of SD is achieved. The second approach to understanding sustainability in relation to SD recognized in this work is based on several concepts of sustainability defined by particular criteria. In accordance with this approach, SD can be explained in relation to the criteria of very weak, weak, strong and very strong sustainability concepts and, furthermore, several particular types of sustainability form parts of one or several dimensions of SD. These especially include economic, social, environmental, ecological, human and institutional sustainability. Although the first four types can be mainly associated with particular dimensions of SD, taking into account their interconnections and interdependence, the last two go beyond all the pillars of SD. Moreover, it should also be included in the first approach outlined above. Human sustainability, wellbeing and quality of life should represent the main aims of SD, and strategies and policies in this area. From the more sophisticated point of view, both SD and sustainability concepts are not positive analytical concepts, but the normative ones, describing parameters of economy, society and environment considered to be sustainable, i.e. optimal based on concrete aspects. It is an utillitarian concept and can also be understood as an ethically justified utopia.

The concepts of practical approaches to moving closer towards SD involve appropriate structural reforms that include the engagement of the concepts of decoupling environmental degradation from economic activity, which is closely related to resource/eco-efficiency, and that of sustainable consumption and production (SCP). In summary, concepts and definitions of weak SC emphasise increasing the eco-efficiency of consumption, while those of strong SC are based on reductions in the amount of consumption and changes in consumption patterns in order to achieve SD. Moreover, the strong SC approach goes beyond its use towards achieving SD in terms of the current system of capitalism and it is closely related to the concept of degrowth. As regards the more practical, political strategies, the Inclusive Green Economy (GE) and Green Growth (GG), also applying the previous concepts, must be emphasised. The concept of circular economy is also a crucial concept, and a system, which applies decoupling, is based on SCP, can operate within GE or GG and helps shift economies closer to SD. All of them represent practical approaches of moving closer towards SD. It is also concluded that in all the concepts related to SD, including sustainability, GE, GG, SC, CR economy, etc., which were not assessed as the alternative concepts to SD, if there has been formed a strong approach within these concepts, it usually gets closer to the alternative concept of degrowth, or some of its alternatives, including the more comprehensive concepts, than to SD.

It is essential to advance and improve the methodology of the measurement in the field of the SD and related concepts, which is a particularly challenging task. These concepts are inevitable for meeting the needs and maintaining the wellbeing of future generations, but also for the survival of humanity in general. However, the features of the analysed concepts include the multidimensionality of the concepts (involving at least three basic dimensions plus the institutional dimension for SD), flexibility and the resulting flexible application by different units, an

overall lack of clarity, ambiguity and vagueness, and the comprehensiveness and broadness of the concepts, among other features. All these aspects make the measurement and the practical application difficult. Hence, another crucial feature is the development of a number of alternative concepts, often in the form of practical counterparts of these concepts due to deficiencies in their practical application, or, on the contrary, more scientific concepts changing the philosophy of these concepts where it is considered by advocates of alternative concepts that sustainability/SD have deficiencies. Many alternative concepts and systems to the concept of SD/sustainability and their practical counterparts have arisen. Although an economic system influenced by alternative economic systems that supports wellbeing and quality of life and not increase in quantitative macroeconomic variables, such as GDP or employment, can be required, it is still and utopia. A significant change would be required, including that in moral and cultural values to move closer to the concept of degrowth or its local counterparts, such as Buen Vivir, or Ecological Swaraj.

A growing number of publications on sustainability/SD has led to the perception of sustainability science as a distinct field of science. Within sustainability science as well as in the practical application of sustainability/SD strategies, the challenges for the future include addressing crucial sustainability problems and advancing research, methodological aspects and the institutional background for putting the sustainability/SD concepts into operation, and on the basis of this thoughtfully responding to public sustainability concerns.

Future economic systems should encompass both capitalist and socialist characteristics and various economies can move closer to one or another, constantly evolving over time, taking into account the complexity of the interactions between the economy, people, and the environment. It cannot be assumed that any given system can be adopted uniformly across the world, and in a particular country, the system may remain static. It is highly likely that many indicators related to SD, wellbeing, and quality of life will change significantly following the current global situation. This includes economic (economic recession, inflation, economic problems generally etc.), social (especially with regard to health, poverty, and social inclusion), and environmental indicators (short-term and long-term impacts), as well as those indicators generally related to quality of life and wellbeing. The concepts of SD, wellbeing and quality of life, as well as policies towards them, must further take into account and engage with these aspects. They should be adjusted to the new development and challenges affecting these, related and alternative concepts.

References

1. ANDERSON D.A., 2013, *Environmental Economics and Natural Resource Management*, Taylor & Francis, New York.
2. ANDERSON D.A., 2010, *Environmental Economics and Natural Resource Management*, Routledge, Abingdon, Oxon.
3. ARUSHANYAN Y., EKENER E, MOBERG Å, 2017, Sustainability assessment framework for scenarios – SAFS, *Environmental Impact Assessment Review* 63: 23-34, DOI: 10.1016/j.eiar.2016.11.001.
4. AXELSSON R., ANGELSTAM P., ELBAKIDZE M., STRYAMETS N., JOHANSSON K. E., 2011, Sustainable Development and Sustainability: Landscape Approach as a Practical Interpretation of Principles and Implementation Concepts, *Journal of Landscape Ecology*, 4(3): 5-30, DOI: 10.2478/v10285-012-0040-1.
5. AYRES R.U., SIMONIS U.E. (eds), 1994, *Industrial Metabolism. Restructuring for Sustainable Development*, United Nations University Press, Tokyo, New York, Paris.
6. BAKER S., 2006, *Sustainable development*, Routledge, London, New York.
7. BARBIER E., 2012, The green economy post Rio+20, *Science* 338 (6109): 887-888.
8. BARBIER E., 1987, The Concept of Sustainable Economic Development, *Environmental Conservation*, 14(2): 101-110, DOI: 10.1017/S0376892900011449.
9. BEEKS J. C., 2016, *Which of the current diverse ideas on alternative Economics are the best for adequately and Comprehensively addressing the great Transition to climate, energy, and biodiversity Sustainability?*, California Institute of Integral Studies, San Francisco, CA.
10. BINA O., LA CAMERA F., 2011, Promise and shortcomings of a green turn in recent policy responses to the double crisis, *Ecological Economics* 70 (12): 2308-2316.
11. BOSSEL H., 1996, Deriving indicators of sustainable development, *Environmental Modelling and Assessment* 1(4): 193-218.
12. BOSSEL H., 1998, *Earth at a Crossroads. Paths to a Sustainable Future*, Cambridge University Press, Cambridge, UK.
13. BERKES F., FOLKE C., COLDING J., 2000, *Linking Social and Ecological Systems: Management Practices and Social Mechanisms for Building Resilience*, Cambridge University Press, Cambridge, UK.
14. BOYER R., PETERSON N., ARORA P., CALDWELL K., 2016, Five approaches to social sustainability and an integrated way forward, *Sustainability* 8:1-18, DOI: 10.3390/su8090878.
15. BROWN E., CLOKE J., GENT D., JOHNSON P.H., HILL C., 2014. Green growth or ecological commodification: debating the green economy in the global south, *Geografiska Annaler. Series B, Human Geography*, 96 (3): 245-259.
16. BROWN B. J., HANSON M. E., LIVERMAN D. M., MERIDETH R.W., 1987, Global sustainability: towards definition, *Environmental Management*, 11: 713-719, DOI: 10.1007/BF01867238.
17. CARLOWITZ H. C. von, 1713, *Sylvicultura oeconomica – Anweisung zur wilden Baumzucht*, Leipzig, (Reprint, Freiberg, 2000: 84).

18. CARTER K., MOIR, S., 2012, Diagrammatic representations of sustainability – a review and synthesis, *Proceedings of the 28th annual ARCOM conference*, ed. Smith S.D., 3-5 September, UK, Edinburgh: 1479-1489.
19. CATO M. S., 2009, *Green economics: An introduction to theory, policy and practice*, Earthscan, London.
20. CLARK W.C., 2007, Sustainability science: a room of its own, *Proceedings of the National Academy of Sciences USA*, 104(6): 1737–38.
21. CLARK T.W., 2002, *The policy process: A practical guide for natural resource professionals*, Yale University Press, New Haven, CT.
22. CLARK W.C., DICKSON N.M., 2003. Sustainability science: the emerging research program, *Proceedings of the National Academy of Sciences USA*, 100(14): 8059.
23. COMMON M., PERRINGS C., 1992, Towards an ecological economics of sustainability, *Ecological Economics* 6(1): 7-34.
24. CUSACK C., 2019, Sustainable Development and Quality of Life, *Multidimensional Approach to Quality of Life Issues*, ed. Sinha B., Springer, Singapore.
25. DALY H. E., 1991, *Steady-State Economics*, Second Edition with new Essays, Island Press, Covelo, Washington.
26. DALY H. E., 2008. *A steady-state economy. Opinion Piece for Redefining Prosperity*, Sustainable Development Commission, UK, http://www.sd-commission.org.uk/publications.php?id=775.
27. DALY H. E., COBB, J., 1989, *For the Common Good: Redirecting the Economy Towards the Community, the Environment and a Sustainable Future*, Beacon Press, Boston.
28. DANIELS S. E., WALKER G. B., 2001, *Working through environmental conflict – the collaborative learning approach*, Praeger, Westport, London.
29. DAWE N. K, RYAN K.L, 2003, The faulty three-legged-stool of sustainable development, *Conservation Biology* 17: 1458-1460, DOI: 10.1046/j.1523-1739.2003.02471.x.
30. DEATH C., 2015, Four discourses of the green economy in the global South, *Third World Quarterly*, 36:12, 2207-2224, DOI: 10.1080/01436597.2015.1068110.
31. DOVERS S., HANDMER J., 1992, Uncertainty, sustainability and change, *Global Environmental Change*, 2(4): 262-276.
32. DRASTICHOVÁ M., 2022, Sustainable Development and Sustainable Science. Where We Came From, Where We Are Now and Where We Are Heading? Part I: The History of the Concept, *Problemy Ekorozwoju/ Problems of Sustainable Development* 17(2): 7-18, DOI: 10.35784/pe.2022.2.01.
33. DRASTICHOVA M., 2018, *The Theory and Measurement of Sustainable Development*, SAEI, 52, VSB-TU Ostrava, Ostrava.
34. DRASTICHOVÁ M., FILZMOSER, P. 2019, Assessment of Sustainable Development Using Cluster Analysis and Principal Component Analysis, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 14(2): 7-24.
35. DU PISANI J. A., 2006, Sustainable development – historical roots of the concept, *Environmental Sciences*, 3: 83-96, DOI: 10.1080/15693430600688831.
36. EKINS P., SIMON S., DEUTSCH L., FOLKE C., GROOT R. De, 2003, A Framework for the practical application of the concepts of critical natural capital and strong sustainability, *Ecological Economics*, 44 (2-3): 165-185, DOI: 10.1016/S0921-3428009(02)00272-0.
37. EUROPEAN COMMISSION, 2011, Communication from the Commission to the European Parliament, the Council, the European Economic and Social Committee and the Committee of the Regions, COM(2011) 571 final, *Roadmap to a Resource Efficient Europe*, https://eur-lex.europa.eu/legal-content/EN/TXT/PDF/?uri=CELEX:52011DC0571&from=EN.
38. FERGUSON P., 2014, The green economy agenda: business as usual or transformational discourse?, *Environmental Politics*, DOI: 10.1080/09644016.2014.919748.
39. FELCE D., 1997, Defining and applying the concept of quality of life, *Journal of Intellectual Disability Research*, 41: 126-135.
40. FELCE D., PERRY J., 1995, Quality of life: Its definition and measurement, *Research in Developmental Disabilities*, 16(1): 51-74.
41. FELCE D., PERRY J., 1996, Adaptive behaviour gains in ordinary housing for people with intellectual disabilities, *Journal of Applied Research in Intellectual Disabilities*, 9(2): 101-114.
42. FISCHER-KOWALSKI M., 1996, Society's metabolism: on the childhood and adolescence of a rising conceptual star, *International Handbook of Environmental Sociology*, eds Redclift M., Woodgate G., Cheltenham, Edward Elgar Publishing, UK: 119-137.
43. FRITZ M., KOCH M., 2016, Economic development and prosperity patterns around the world: Structural challenges for a global steady-state economy, *Global Environmental Change*, 38(38): 41-48.
44. GINSBERG E., 1980, Man and his work, *Managing people at work, ed.* Beach D.S., Macmillan Publishing Co., New York.
45. GEORGESON L. MASLIN M., POESSINOUW M., 2017, *Geography and Environment,* 4(1), DOI: 10.1002/geo2.36.
46. GOODLAND R. 1995, The concept of environmental sustainability, *Annual Review of Ecology and Systematics*, 26: 1-24.
47. GROBER U., 2007, Deep roots: A conceptual history of 'sustainable development' (Nachhaltigkeit), *WZB Discussion Paper*, No. P 2007-002, Wissenschaftszentrum Berlin für Sozialforschung (WZB), Berlin.
48. GREENWOOD D. T., HOLT R. P. F., 2010, *Local economic development in the 21st century: Quality of life and sustainability*, M.E. Sharpe Inc., Armonk, New York.
49. HARTIG G., 1804: *Anweisung zur taxation und beschreibung der forste. zweyte, ganz umgearbeitete und stark vermehrte auflage*. Georg Friedrich von Heyer, Giessen und Darmstadt.

50. HEDIGER W., 2000, Sustainable development and social welfare, *Ecological Economics* 32(3): 481-492.
51. HEDIGER W., 1999, Reconciling 'weak' and 'strong' sustainability,. *International Journal of Social Economics* 26(7/8/9): 1120-1144.
52. HOWARTH R.B., NORGAARD R. B., 1990, Intergenerational resource rights, efficiency, and social optimality, *Land Economics*, 66(1): 1-11.
53. HUNTER M.L., 1996, *Fundamentals of conservation biology*, Blackwell Science, Cambridge, MA.
54. IISD International Institute for Sustainable Development, 2002, Summary of the World Summit on Sustainable Development, *Earth Negotiations Bulletin*, 22(51): 1-18.
55. IPCC, 2007, *Climate Change 2007: Impacts, Adaptation and Vulnerability*, Working Group II Contribution to the IPCC Fourth Assessment Report, IPCC Switzerland, Geneva.
56. JACKSON T., 2012, *Prosperity without growth: Economics for a finite planet*, Routledge, New York.
57. JACOBS M., 2012, Green Growth: Economic Theory and Political Discourse, *GRI Working Papers 92*, Grantham Research Institute on Climate Change and the Environment.
58. JERNECK A., OLSSON L., NESS B., ANDERBERG S., BAIER M., CLARK E., HICKLER T., HORNBORG A., KRONSELL A., LÖVBRAND E., 2011, Structuring sustainability science, *Sustainability Science* 6(1): 1-14.
59. JEVONS W.S., 1866, *The Coal Question. An Inquiry Concerning the Progress of the Nation, and the Probable Exhaustion of Our Coal-Mines by William Stanley Jevons*, second revised edition, Macmillan and Co., London.
60. LEE K.N., 1993, *Compass and Gyroscope: Integrating Science and Politics for the Environment*. Island Press, Washington D.C.
61. KAJIKAWA Y., OHNO J., TAKEDA Y., MATSUSHIMA K., KOMIYAMA H., 2007, Creating an academic landscape of sustainability science: an analysis of the citation network, *Sustainability Science* 2(2): 221-31.
62. KASTENHOFER K., BECHTOLD U., WILFING H., 2011, Sustaining sustainability science: the role of established inter-disciplines, *Ecological Economics*, 70(4): 835-43.
63. KALLIS G., 2011, In defence of degrowth, *Ecological Economics*, 70(5): 873-880, DOI: 10.1016/j.ecolecon.2010.12.007.
64. KATES R. W., CLARK W. C., CORELL R., HALL J.M., JAEGER C. C., LOWE I., MCCARTHY J. J., SCHELLNHUBER H.J., BOLIN B., DICKSON N.M., FAUCHEUX S., GALLOPIN G.C., GRÜBLER A., UNTLEY B., JÄGER J., JODHA N.S., KASPERSON R.E., MABOGUNJE A., MATSON P., MOONEY H., MOORE III B., O'RIORDAN T., SVEDIN U., 2001, Sustainability science, *Science* 292(5517): 641-2.
65. KAUFFMAN J., 2009, Advancing sustainability science: report on the International Conference on Sustainability Science (ICSS) 2009, *Sustainability Science* 4(2): 233-42.
66. KEEN M., BROWN V., DYBALL R., 2005, *Social Learning in Environmental Management: Towards a sustainable future*, James & James/Earthscan, London.
67. KERSCHNER CH., 2010, Economic de-growth vs. steady-state economy, *Journal of Cleaner Production* 18: 544-551.
68. KIDD C.V., 1992, The evolution of sustainability, *Journal of Agricultural and Environmental Ethics*, 5(1): 1-26.
69. KOMIYAMA H., TAKEUCHI K., 2006, Sustainability science: building a new discipline, *Sustainability Science*, 1(1): 1-6.
70. KOTHARI A., DEMARIA F., ACOSTA, A., 2014, Buen Vivir, Degrowth and Ecological Swaraj: Alternatives to sustainable development and the Green Economy, *Development* 57: 362-375, DOI: 10.1057/dev.2015.24.
71. KUHN T.S., 1962, *The Structure of Scientific Revolutions*, University of Chicago Press, Chicago IL, USA.
72. LOTFI S., FARAJI A., HATAMINEJAD H., AHMAD P., 2011. A study of urban quality of life in a developing country, *Journal of Social Sciences*, 7(2): 232-240.
73. LOZANO R., 2008, Envisioning sustainability three-dimensionally, *Journal of Cleaner Production* 16(17): 1838=1846, DOI: 10.1016/j.jclepro.2008.02.008.
74. MILLENNIUM ECOSYSTEM ASSESSMENT, 2005, *Ecosystems and Human Well-being: Synthesis*, Island Press, Washington, D.C.
75. MORI K,. CHRISTODOULOU A. 2012, *Review of sustainability indices and indicators: towards a new city sustainability index (CSI)*.
76. MARTÍNEZ-ALIER J., PASCUAL U., VIVIEN F., ZACCAI E., 2010, Sustainable degrowth: Mapping the context, criticisms, and future prospects of an emergent paradigm, *Ecological Economics*, 69(9): 1741-1747, DOI: 10.1016/j.ecolecon.2010.04.017.
77. MARTENS P., 2006, Sustainability: science or fiction?, *Sustainability: Science, Practice & Policy*, 2(1): 36-41.
78. NEUMAYER E., 1999, *Weak versus Strong Sustainability: Exploring the Limits of Two Opposing Paradigms*, Edward Elgar, Cheltenham, UK, Northampton, MA, USA.
79. NORTON B.G., 2005, *Sustainability: A philosophy of adaptive ecosystem management*, The University of Chicago Press, Chicago, IL.
80. NOWOTNY H., SCOTT P., GIBBONS M., 2001, *Re-thinking science: knowledge and the public in an age of uncertainty*, Polity Press, Cambridge, UK.
81. NUSSBAUM M., SEN A., 1993, *The Quality of Life*, Oxford University Press, DOI: 10.1093/0198287976.001.0001.
82. O'NEILL D. W., FANNING A. L., LAMB W. F. et al., 2018, A good life for all within planetary boundaries, *Nat Sustain*, 1: 88-95, DOI: 10.1038/s41893-018-0021-4.
83. O'NEILL D. W., 2012, Measuring progress in the degrowth transition to a steady state economy, *Ecological Economics*, Elsevier, 84(C): 221-231.
84. OECD, 2011, *Towards Green Growth*. *A Summary for Policy Makers*, OECD, Paris, France.

85. OECD, 2009, *Declaration on Green Growth Adopted at the Meeting of the Council at Ministerial Level on 25 June 2009*, C/MIN(2009)5/ADD1/FINAL.
86. OLAWUMI T.O., CHAN D.W. M., 2018, A scientometric review of global research on sustainability and sustainable development, *Journal of Cleaner Production*, 183: 231-250.
87. OPSCHOOR J. B., 1996, Institutional change and development towards sustainability, *Getting Down to Earth: Practical Applications of Ecological Economics*, eds. Costanza R., Segura O. Martinez-Alier J., Island Press, Washington D.C., Covelo, CA.
88. OSTROM E., 1990, *Governing the commons: the evolution of institutions for collective action*, Cambridge University Press, Cambridge.
89. PETERS B.G., 2000, Governance and comparative politics, *Debating governance: Authority. steering, and democracy*, ed. Pierre J., Oxford University Press, Oxford.
90. PIERRE J., 2000, Introduction: Understanding governance, *Debating governance: Authority. steering, and democracy*, ed. Pierre J., Oxford University Press, Oxford.
91. PURVIS B., MAO Y., ROBINSON D., 2019, Three pillars of sustainability: in search of conceptual origins, *Sustainability Science*, 14: 681-695, DOI: 10.1007/s11625-018-0627-5.
92. PAULI G., 2010, The blue economy, *Our Planet*, 1: 24-26.
93. PAROTTA J., AGNOLETTI M., JOHAN E., 2006, Cultural heritage and sustainable forest management: the role of traditional knowledge, *Ministerial Conference on the Protection of Forests in Europe*, Liaison Unit Warsaw.
94. PEARCE D. W, MARKANDYA A., BARBIER E. B, 1989, *Blueprint for a green economy*, Earthscan, London.
95. PEARCE D.W., ATKINSON G.D., DUBOURG W.R., 1994, The economics of sustainable development, *Annual Review of Energy and the Environment*, 19(1): 457-474.
96. PRETTY J., 2003, Social capital and the collective management of resources, *Science*, 302: 1912-1914.
97. RAMAKRISHNAN P.S., 2001, *Ecology and Sustainable Development*, National Book Trust of India, New Delhi.
98. RAPPORT D. J., 2007, Sustainability science: an ecohealth perspective, *Sustainability Science*, 2(1): 77-84.
99. RASKIN P.D., 2008, World lines: a framework for exploring global pathways, *Ecological Economics* 65(3): 461-70.
100. REBORATTI C.E., 1999, Territory, scale and sustainable development, *Sustainability and the social sciences: A cross-disciplinary approach to integrating environmental considerations into theoretical considerations*, eds. Becker E., Jahn T., Zed Books, London: 207-222.
101. RUZZENENTI F., VIVANCO D., GALVIN R., SORRELL S., WAGNER A., WALNUM H. J., 2019, The Rebound Effect and the Jevons' Paradox: Beyond the Conventional Wisdom, *Frontiers in Energy Research*,7: 90, DOI: 10.3389/fenrg.2019.00090.
102. SARTORI S., LATRÔNICO F., CAMPOS L. M. S., 2014, Sustainability and sustainable development: a taxonomy in the field of literature, *Ambiente & Sociedade*, 17(1): 01-22, DOI: 10.1590/1809-44220003491.
103. SEN A., 1999, *Commodities and capabilities*, OUP Catalogue.
104. SEN A., 1985, Well-Being Agency and Freedom: The Dewey Lectures 1984, *Journal of Philosophy*, 82(4): 169-221.
105. SLIMANE M., 2012, Role and relationship between leadership and sustainable development to release social, human, and cultural dimension, *Social and Behavioral Sciences*, 41: 92-99.
106. SOLOW R.M., 1986, On the intergenerational allocation of natural resources, *The Scandinavian Journal of Economics*, 88(1): 141-149.
107. SOLOW R.M., 1974, Intergenerational equity and exhaustible resources, *The Review of Economic Studies*, 41: 29-45.
108. SORRELL S., 2009, Jevons' Paradox revisited: The evidence for backfire from improved energy efficiency, *Energy Policy*, 37(4): 1456-1469, http://www.sciencedirect.com/science/article/pii/S0301421508007428.
109. SÖDERBAUM P., 2000, *Ecological Economics*, Earthscan, London, UK.
110. SPANGENBERG J., 2011, Sustainability science: A review, an analysis and some empirical lessons, *Environmental Conservation*, 38(3): 275-287, DOI: 10.1017/S0376892911000270.
111. SPANGENBERG J., 2002, Environmental space and the prism of sustainability: frameworks for indicators measuring sustainable development, Ecological Indicators, 2(3): 295-309.
112. SPANGENBERG J. H., O'CONNOR M., 2010, Sustainability science: a new mode of science, another step in the evolution of science paradigms, *Global Responsibility*, 61: 13-16.
113. STRANGE, T., BAYLEY, A., 2008, Sustainable development linking economy, society, environment, *OECD Insights*, OECD.
114. TANGUAY G. A., RAJAONSON J., LEFEBVRE J.-F., LANOIE P., 2010, Measuring the sustainability of cities: an analysis of the use of local indicators, *Ecological Indicators*, 10(2): 407-418, DOI: 10.1016/j. ecolind.2009.07.013
115. ten BRINK P., MAZZA L., BADURA T., KWTTUNEN M., WITHANA S.. 2012, Nature and its role in the transition to a green economy, *The Economics of Ecosystems & Biodiversity and the Institute for European Environmental Policy*, Geneva and London.
116. THOMPSON P. B., 2017, *The spirit of the soil: agriculture and environmental ethics*, 2nd edition, Routlege, New York.
117. TRAINER T., 2011, The radical implications of zero growth economy, *Real-World Economics Review*, 57(1): 71-82.
118. TURNER R.K., 1992. Speculations on weak and strong sustainability, *CSERGE Working Papers*, GEC: 92-26.

119. UNITED NATIONS, EUROPEAN COMMISSION, INTERNATIONAL MONETARY FUND, OECD, WORLD BANK, 2003, Handbook of national accounting. Integrated environmental and economic accounting, *Studies in Methods*, F(61), Rev.1.
120. UNDP, 2022, United Nations Development Programme, *Human Development Reports*, http://hdr.undp.org/en/humandev.
121. UNEP, 2016, *Rio Declaration on Environment and Development*, http://www.unep.org/Documents. multilingual/Default.asp?DocumentID=78&ArticleID=1163.
122. UNEP, 2011, *Towards a Green Economy: Pathways to Sustainable Development and Poverty Eradication*, Nairobi, United Nations Environment Programme, Nairobi.
123. UNEP, 2007, *GEO 4 Global Environment Outlook. Environment for Development*. Valletta, Malta, Progress Press.
124. UNITED NATIONS, EUROPEAN COMMISSION, INTERNATIONAL MONETARY FUND, OECD, WORLD BANK, 2003, Handbook of National Accounting. Integrated Environmental and Economic Accounting 2003, *Studies in Methods*, F(61), Rev.1.
125. VAN DEN BERGH J. C. J. M., 2011, Environment versus growth e a criticism of 'degrowth' and a plea for 'a-growth', *Ecological Economics*, 70: 881-890.
126. VAN DEN BERGH J. C. J. M., KALLIS G., 2012, Growth, A-Growth or Degrowth to Stay within Planetary Boundaries?, *Journal of Economic Issues*, 46:4: 909-920, DOI: 10.2753/JEI0021-3624460404.
127. VAN DEN HOVE S., 2007, A rationale for science-policy interfaces, Futures 39(7): 807-26.
128. WALS A. E. J., 2009, *Social learning towards a sustainable world*, Wageningen Academic Publishers, Wageningen.
129. WEAVER P. M., ROTMANS J., 2006, Integrated sustainability assessment: what is it, why do it and how?, *International Journal of Innovation and Sustainable Development*, 1(4): 284-303.
130. WEINSTEIN M.P., 2010, Sustainability science: the emerging paradigm and the ecology of cities, *Sustainability: Science, Practice, & Policy* 6(1): 1-5.
131. WCED, 1987, *Our common future*, Oxford University Press, New York.
132. VICTOR P.A., 1991, Indicators of sustainable development: Some lessons from capital theory, *Ecological Economics*, 4(3): 191-213.
133. VOS R. O., 2007, Defining sustainability: a conceptual orientation, *J Chem Technol Biotechnol*, 82: 334-339, DOI: https://doi.org/10.1002/jctb.1675.
134. WOOLCOCK M., 1998, Social capital and economic development: Towards a theorethical synthesis and policy framework, *Theory and society*, 27(2): 151-208.
135. ZIJP M. C, HEIJUNGS R., VAN DER VOET E. et al., 2015, An identification key for selecting methods for sustainability assessments, Sustainability, 7: 2490-2512, DOI: 10.3390/su7032490.

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Sustainable Development, Globalization, Non-antagonistic Development, Philosophical Environmentalism and Endangered Democracy

Zrównoważony rozwój, globalizacja, rozwój nieantagonistyczny, filozoficzny ekologizm i zagrożona demokracja

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Abstract

In this paper, one discusses the conditions favourable for sustainable development, limitations of it in the social reality and the sense of implementing it everywhere. The author points out that sustainable development has always taken place in nature thanks to the mechanisms of self-regulation and the laws of nature. However, what is new is the idea of sustainable development in the social reality. Balancing inequalities to the end, i.e. until the state of permanent equilibrium of social systems is achieved, leads to stagnation. Because the source of sustainable development is throwing off equilibrium, and stabilization kills development. He also indicates that the idea of sustainable development was not born out of ecological, but economic reasons, and still serves mainly economic, not ecological purposes. It works best in the sphere of the economy. Nevertheless, it is implemented everywhere with a better or worse result, because the world fashion for sustainable development and its mythologization has prevailed. One sees in it a panacea for all social problems. In fact, it is a tool of self-regulation in social systems that ensure the survival of them. There is a feedback loop between sustainable development and globalization. Sustainable development contributes to globalization, and globalization promotes sustainable development. However, only until one reaches some critical moment. Then, globalization begins to hinder sustainable development and eventually makes it unfeasible. The condition for the implementation of sustainable development is the freedom provided by the democratic system. Therefore, it works best in a liberal democracy. Unfortunately, this democracy is already collapsing. It has taken on a caricature form that makes difficult for people to live and for governments to exercise power. Therefore, one replaces it by totalitarian or fascist regimes, which for different reasons gives greater hope for a better functioning of the state. However, totalitarianism limits freedom significantly and fascism, in addition, raises legitimate fear due to negative historical experiences. There is no place for sustainable development in these regimes. That is why many researchers and politicians want to stop fascism and bring about sanitation of democracy with New Enlightenment, New Metanoia, and New Humanism. In such way, they want to enable further sustainable development.

Keywords: sustainable development, antagonizing the opposites, theory of non-antagonistic development, democracy, fascism, New Metanoia, New Enlightenment, New Humanism, culture of violence, philosophical environmentalism

Słowa kluczowe: zrównoważony rozwój, antagonizowanie przeciwieństw, teoria rozwoju nieantagonistycznego, demokracja, faszyzm, Nowa Metanoia, Nowe Oświecenie, Nowy Humanizm, kultura przemocy, filozoficzny ekologizm

1. Is sustainable development a human or nature's work?

People boast that they invented something brilliant in the last decade of the twentieth century that they have called sustainable development. They ignore the fact that such development always occurs in nature as universal regularity (Gumiński, n.d.). Asymmetrical, diverse and unstable phenomena, processes and systems have a tendency to achieve relative balance spontaneously in accordance with principles of conservation of energy, mass, momentum etc., discovered by physicists, chemists, geologists and other natural scientists. *All spontaneous processes in nature strive from the states of imbalances to the states of balance* (Trepl, 2012). Stability and equilibrium are usually short-term and transient states. In contrast, states of imbalance and processes of return to equilibrium states take much longer. Mother Earth has equipped the systems of nature with homeostatic mechanisms appropriate for them, by means of which they return to a state of equilibrium by themselves, without the intervention of man or supernatural forces. Thanks to this, they are relatively stable, as long as they do not experience perturbations in result of the interference of other systems of nature, and above all, of man, who is the greatest destroyer of the balance in nature. Thus, processes occurring in animate and inanimate nature, especially evolutionary ones, are spontaneously targeted towards equilibrium and therefore irreversible. Dissipative systems transform from disordered to ordered as they return to equilibrium.[1]In nature, there is also permanent or self-sustaining development thanks to appropriate self-regulating and adaptive mechanisms. Thanks to them, many species of flora and fauna lasted for millions of years. I believe that the idea of sustainable development of social systems was born because of observing nature. That is why one considers it probably as a work of human thought and culture. It was only in the last decades of the twentieth century that it began to be implemented and one creates various undertakings and appropriate equilibrium mechanisms in social systems of concern for their stability and ensuring the continuity of development and progress.

2. The idea of sustainable development for the needs of economy above all

It is commonly believed that the idea of sustainable development was born out of concern for the environment, and therefore for ecological reasons. He relies primarily on Carl Hans v. Carlowitz, an accountant and mining manager in the district of Freiberg (Saxony), who became famous for his book on the economics of forestry and the natural cultivation of wild trees (*Sylviculturaoeconomica…,* 2012).He wrote this book not for ecological reasons, but for economic reasons, because he saw that massive felling was progressing for the needs of rapidly developing mining and metallurgy in the area, which threatened with deforestation and the collapse of mining, and consequently mass unemployment and poverty. He called for the cessation of uncontrolled felling of trees and introduction of their rational breeding. This was to ensure the long-term use of trees. He thought about how to increase the extraction of coal, iron and silver ores to ensure greater profits for the owners of mines and steel mills. He was attributed primarily to ecological considerations and caring for the human ecosystem is a great exaggeration. Years later, Carlowitz's idea of managing forests in such a way as to prevent their complete destruction gave rise to thinking about economic benefits combined with concern for the environment.

Later, ecology that, in a sense, grew out of economics, and by no means care for the environment, coupled with the economy and became an important driver of economic growth. Now, after the commodification of many elements of the environment, no one doubts that it plays an important role in the economy, and is even a part of it, and that the economy is linked to the environment. It has already come to the point that the economy has merged with ecology into eco-economy. It was soon recognized that big business could be done on environmental protection and an intact environment. Many countries and regions live well and develop thanks to tourism to *ecological oases* i.e. places not degraded by industrialization and the progress of civilization. Many people make good money by producing, advertising and selling organic products and by organizing holidays on organic farms (agritourism).Healthy air, water, sand and food have become no less valuable commodities than gold.

By the way, apparently, the leader of the USSR, Nikita Khrushchev, during his visit to Bulgaria in 1956, while visiting the beach in Varna, showed the sand and told Todor Zhivkov, leader of the Bulgarian Communist Party: *This is your gold*. Soon after, in 1957, the building of the first luxury resort at the time, Golden Sands, was started, and then many other spas and resorts on the Black Sea, from to Sozopol. In the 1960s, resorts and tourist attractions began to be built in Florida, Hawaii and Alaska.

However, in times of turbulent industrialization, ecology and the value of the environment were disregarded as a result of the recognition of the absolute dominance of economic criteria over all others. All spheres of production were subjected to industrialization in order to achieve the maximum increase in the productivity of machines and people, and the maximum harvest from agricultural areas, disregarding the risks associated with it. Yet, as early as the 1930s, people were warned against the terrible consequences of the spontaneous and mindless industrialization of agriculture. Rachel Carson, an American specialist in marine biology, criticized farming methods. In

[1]A dissipative system is one that, as a result of the dissipation (dissipation) of internal energy, moves away from the state of equilibrium and becomes more and more disordered.

the book *Silent Spring*, she presented the details of the dangerous use of pesticides, which results in an increase in the amount of resistant pathogens, insects and weeds, disturbance of the balance of ecosystems, and pollution of the environment due to the accumulation of toxins (Carson, 1962).Sixty years later, we found that she was right, but they were not listened to because they were glad to see the growing crops. Now we suffer severely because of this. We have fallen into the trap of a hyper-optimism of mindless industrialization, which has resulted in increasing environmental degradation and the health of millions of people.
So, from its beginning, the idea of sustainable development referred to the sphere of the economy. It was and is addressed mainly to economists: *Manage so that, while striving for continued economic growth, do not consume all the world's resources now and allow future generations to meet their growing needs* (Dobrzański, 2011) . These sustainability imperative sounds beautiful, but not everyone person is guided by it. And the idea of sustainable development gradually turns into a myth and is often a tool of fraud (Sztumski, 2004).For example, despite the promises made by its promoters, global economic crises were not prevented - the financial crisis in 2008-2009, the crisis because of the corona virus pandemic in 2020 or the crisis caused by economic sanctions imposed on Russia in connection with the war in Ukraine since 2022, inscribed in the everyday life of economic activity. *Today, the crisis is perceived as a permanent element of the game* (Marek, Wieczorek-Szymańska, 2011). If this is true, then economic crises will have to appear regardless of the implementation of the idea of sustainable development. In addition, they will repeat themselves in ever-shorter cycles proportionally to the acceleration of changes in the social reality. *In the past, their rhythm was primarily determined by factors external to the economy: natural phenomena, such as a natural disaster, epidemic or crop failure, or political causes, such as war. With the development of the market economy, the course of the economic situation was less and less influenced by natural phenomena, while the importance of economic factors increased* (Morawski, 2003).
The idea of sustainable development is also addressed to other specialists, mainly for ecological reasons. Environmental protection has become the most important criterion and goal of sustainable development not only in the economic sphere, but also in other spheres. When it comes to sustainable construction and transport, sustainable tourism, sustainable cities, etc., sustainability is understood everywhere as not harming the environment, such as with non-toxic and energy-saving materials, unleaded petrol, and alternative energy sources, etc.

3. Pros and cons of sustainable development

One of the advantages of sustainable development is forcing people to think prospectively and *ecologically*. Prospective thinking is characterized by concern for the future of individuals and societies, to provide them with the conditions necessary for life, which should be no worse than those of the modern generation. *Ecological thinking* is characterized by concern for the current and future natural and social environment. Think and act in the context of the environment. Before someone does anything, he ought to think about the environmental effects of his work. Ecological thinking starts from the local narrow environment of a single human being and goes towards a wider and wider one – at last towards the cosmic environment. It is also anthropocentric because it ultimately aims at the good of human (Sztumski, 2016). One of the cons of such development is that it contributes to the continuous and accelerated economic growth, which results in increasing social, not only economic, stratification and the associated contradictions. The second downside is that it contributes to a spiral of overproduction and overconsumption, which entails an increasing waste of material and intellectual resources. This among other things shows the internal contradiction of sustainable development between deliberate reduction of demand and spontaneous growth of consumption. This leads to a waste of material and intellectual goods (Sztumski, 2015). In developed countries, people stopped saving because saving will not pay off. A thrifty man, *Homo frugi*, transformed into a wasteful man, *Homo prodigus* (Sztumski, 2013). The third cons is that the concept of sustainable development does not oppose the neo-liberal paradigm of economic development prevailing in the modern world, nor does it intend to eliminate it, but only extends and details it (Matysiak, 2015). Nota bene, establishing a different paradigm is not a simple matter, as it could take place because of a social revolution, that is, an immediate and radical reconstruction of the socio-economic formation. However, the retrograde ruling elite and conservatives, whose interest is to keep the status quo as long as possible, oppose it. On the other hand, no alternative development paradigm better than the previous ones has yet been developed. In addition, so far, attempts to implement hybrid paradigms have not proved successful.

4. Escalation of the idea of sustainable development

Quite good results obtained as a result of the implementation of the idea of sustainable development in the sphere of the economy inspired political decision-makers to apply this idea in other spheres of social activity – In construction, urban planning, tourism, education, culture, etc. They expected to achieve similar results of sustainable development in non-economic spheres. At the turn of the 20th and 21st centuries, there was a world tendency to balance everything, everywhere and quickly. Moreover, sustaining, enduring, and balancing devel-

opment have become magic words and spells. It was believed that with their help it would be possible to avoid all social crises, not only economic ones.

Two principles lie at the heart of this trend. One of them is the principle of economic determinism, according to which the economy is the most important, and the overall life and functioning of people is determined primarily by economic factors, i.e. the economic base.[2] Therefore, all efforts should be focused on the most effective development of this base, inter alia, because of its constant balancing. You need not take care of other spheres, because they, as if mechanically and by themselves, will be forced to keep up with the development of the economy. The problem is that this rule does not really work because the economy is not an isolated area and therefore its development depends on the development of other spheres. The economy, to a significant extent influences other spheres of social reality, if only because their development depends on the amount of financial expenditure.

The second principle is the rule of social automatism. It claims that some phenomena occurring in society can by themselves, *automatically*, without deliberate interference by the human factor, generate others. In that case, the sustainable development of the economy may spontaneously entail such development in other spheres. Unfortunately, this rule does not work in the social reality because nothing happens automatically there. Everything is done more or less consciously and intentionally solely by people. Those who believed in *social automatism* had disappointed. For example, decision-makers in socialist countries who, on the basis of historical materialism, believed in the automatic transformation of the feudal or capitalist superstructure into a socialist one as a result of the development of the socialist base. They also believed in the automatic transformation of *capitalist* (bourgeois) social consciousness into a socialist one in result of building a socialist social being. In fact, the social consciousness in socialist countries lagged far behind socialist social being. That is why it claimed that socialism is a good system, only society had not yet grown up to it. Some modern economists have also been disappointed in their belief in the automatic benefits of sustainable development. Relying on automatism released them from interfering with sustainable development – in deliberately controlling it depending on currently recognized priorities. Consequently, this development is driven more by its own mechanisms and therefore causes more harm than good in some areas and contributes to crises too. It also released them from responsibility for the implementation of the effects of sustainable development.

The implementation of the idea of sustainable development in other spheres of social activity is much more difficult than in the sphere of the economy, for at least three reasons. First, it is all the more difficult the more these spheres qualitatively differ from the economic sphere. Second, it is all the more difficult the less they are dependent on the economy. Third, it is all the more difficult the fewer quantitative criteria of development one can meaningfully applied in them.

5. Sustainable development and globalization

Globalization is understood as a set of processes leading to the integration of countries and societies on a global scale. Integration is more than uniting. Uniting is a feature of additive sets, and integration is a feature of mereological sets.[3]At best, unity leads to cooperation, and integration additionally leads to synergy of actions. Uniting occurs under the influence of external causes and *ad hoc* goals, and integration occurs for the internal causes to achieve the most important goals such as peace, survival in a drastically degraded environment, and the creation of survival conditions for future generations. The aim of globalization is to standardize, uniformize and homogenize societies to transform them finally into homogeneous *social plasma*. It cannot achieve these goals fully in the real world. However, one strives to achieve them through the abolition of state borders and various barriers between people, the liquidation of nation states, the growing importance of multinational corporations, the equalization of levels of economic development, the interpenetration of cultures, the reduction of ethnic languages into a single world one,[4] the transfer of technology, the It cannot achieve these goals fully in the real world.

[2]The economic base is the totality of material productive forces and the resulting from them productive relations, characteristic of a given social formation. The social superstructure includes all non-economic institutions, activities and forms of social awareness in a given society. It includes social ideas (political, legal, philosophical, moral, aesthetic, religious, etc.) and political, legal, cultural and other social institutions. Social being is the complex of material and social conditions of a given person's life (geographical location, climate, natural resources, cultivation conditions, population density, etc.) Social consciousness is the set of shared beliefs, ideas, and moral attitudes, which operate as a unifying force within society.

[3] An additive set is a simple sum or cluster of elements. It is, for example, a deck of cards. A mereological set is a composition or a superposition of elements, interacted and interrelated, so that they form an inseparable whole or a system. It is, for example, a planetary system.

[4]Every two weeks one language disappears from the world.The reasons for this are: the extinction of the language community, the mixing of local dialects as a result of migration, and the imposition of the dominant English language by the media.According to a 2011 UNESCO report, half of the world's six thousand languages are threatened with extinction.The disappearance of languages is the destruction of unique cultures and ways of perceiving the world.If nothing changes, the rate of language extinction could triple in the next 40 years.In the 21st century, we will stop hearing even 1,500 currently spoken languages (*Gazeta Wyborcza – Nauka*, 2021).

However, one strives to achieve them through the abolition of state borders and various barriers between people, the liquidation of nation states, the growing importance of multinational corporations, the equalization of levels of economic development, the interpenetration of cultures, the reduction of ethnic languages into a single world one, the transfer of technology, the convergence of political actions for pro-ecological activities. In this way, one achieves some partial goals of globalization, what does not eliminate the differentiation and social divergence that are the causes of many misfortunes and evils. In this way, one achieves some partial goals of globalization, what does not eliminate the differentiation and social divergence that are the causes of many misfortunes and evils.

Globalization is nothing new. It occurred always spontaneously. Population movements, mixing of cultures, ethnic languages and religions, transfer of knowledge and technology progressed constantly because of conquests, geographical discoveries, imperial wars, religious missions, colonization and the merging of ethnic groups into nations. However, since the second half twenty century, it occurs intentionally and in an organized manner. Its effects are more noticeable and pose a threat to the traditional social orders and values systems. The processes of globalization are progressing faster and faster as people move massively new territories and continents in order to find shelter from armed conflicts, genocide and to ensure the necessary conditions for their survival. People also emigrate from areas affected by drought and hunger, as well as for economic reasons. The revolution in the areas of social communication and transport played a major role. Due to ever faster moving vehicles and ever-faster communication, the perceived geometric and social distances have decreased significantly.

The mass media, television, mobile telephony, the Internet, various computer networks and social networks have a significant share in accelerating the globalization processes, thanks to which one can transmit information at the speed of light immediately to all corners of the world.

Sustainable development and globalization are not only interdependent, but, in addition, they are in feedback loop. On the one hand, sustainable development, most in the economic sphere, contributes to globalization. On the other hand, globalization promotes sustainable development. Both of these phenomena drive and support each other. However, until they reach a certain critical point. Once exceeded it, further globalization is already starting to hinder sustainable development and eventually making it unfeasible. The excessively progressing globalization is gradually killing sustainable development. Why? Because globalization tends to eliminate the opposites between living standards, economic potentials, unemployment rates, technological and cultural diversities, education levels, etc. in all countries. While the goal of sustainable development is not to eliminate these opposites, but to balance them to such an extent that they can no longer turn into contradictions, especially antagonistic ones. To balance the development of social systems is to bring them to a state of relative equilibrium, which guarantees their flexibility and, consequently, enables them to be changed, including developmental changes. After all, absolute balance and the elimination of opposites prevent any further development, including the sustainable development.

6. Sustainable development, collapse of democracy and fascization

Sustainable development, like any other, takes place in softly determined social systems, which are open, flexible and generally unbalanced.[5]Such systems are, for example, democratic countries. Their sustainable development consists in leveling various imbalances in the form of social inequalities, opposites and differences in potentials, views, beliefs, lifestyles, ways of thinking, images of the world, etc. – everything that is the driving force of social development. However, it is important to balance all these differences with moderation, never completely. Because when everything in a system is in complete equilibrium, there will be a stagnation of the system and its decline. This leads directly to its collapse.

Since the twentieth century, grows the opposite tendency to balancing. One creates intentionally, for political reasons, ever greater and sharper social divisions and antagonizes local and global social contradictions. Totalitarian states, such as Nazi Germany, Stalinist USSR, Mao Zedong's China, and many other countries on various continents that modeled on them excelled in materializing this tendency. There was known Stalin theory of the exacerbation of class contradictions as socialism was built, which contributed to the murder of millions of innocent people labeled as enemies of the people or socialism. Now, too, in authoritarian states, polarization is rapidly advancing, and social inequalities are exacerbating and transforming them into antagonistic contradictions. In this way, the governments of these countries are increasingly destroying democracy, although they hypocritically claim that their countries are democratic because *democracy* is still fashionable and important for a good image of the country in political marketing.

There is still a belief that antagonistic opposites are the driving force of social development. This derives from binary thinking and from Hegelian and Marxist dialectics, according to which the locomotive of development in

[5] One deals with soft determinism when one state of a system entails many others, or when one cause generates multiple effects. In such determinism, there is no strict principle of causality *one cause – one effect*. Therefore, in the development of soft determined systems, bifurcations appear that make prediction difficult.

the sensorial world are the opposites and the *struggle* between them. In this way, one justifies progressive social divisions and their antagonization. Only, neither Hegel nor Marx said that opposites must take the form of contradictions, much less antagonistic. Politicians opting for the antagonistic concept of social development are guided by the age-old maxim *divide and rule*, although it is now viewed negatively due to its destructive effects and anti-solidarity character. Moreover, they changed this rule in their own way: *Make more and more divisions so that you can rule longer*. They argue that social progress is proportional to the degree of antagonization of social divisions and contradictions. The antagonistic concept of development is harmful because it justifies and apotheoses all wars, even with the use of weapons of mass destruction. One clams that wars are necessary in the history of humankind because they arise from the biological nature of the man-warrior, and that one cannot change his nature (Bieleń, 2022). This is in the interest of supporters of the arms race, military lobbyists and military corporatocrats, i.e. those who are one of the *invisible hands* that rule the world and for whom war is a good business.[6]

More than twenty years ago, it appeared *the concept of non-antagonistic social development*, which claims otherwise: a society can develop quite well thanks to non-antagonistic opposites, i.e. not intentionally antagonized oppositions, by various institutions, ideologies or political groups (Kowalczyk, 1990). It recognizes wars as atavistic and anachronistic, because, according to behavioral psychology, human nature changes depending on changes in the external environment, including the cultural one. Man's biological nature, his consciousness and behavior are increasingly influenced by a culture that suppresses his warlike drive. However, not every culture. Certainly not today's *culture of evil* – the anti-culture built on the anti-values system, which is proper to Western civilization, propagated more and more forcefully and effectively by the mass media (Sztumski, 2016). This culture glorifies violence, rape, aggression, hostility, bestiality and crime. A generation of aggressors, murderers, hooligans, terrorists, bandits, paid killers, savages, Mafiosi and similar social scum grows like never before on its. Who needs it? Probably those who use such demoralized individuals for a criminal activity, from which they profit enormously. Also for those who make good money spreading this culture and depraving the masses. But there is also something else. It is about that people, who are in contact with such a culture daily in television, cinemas, the press, etc., get used to treating these perversions as something normal, especially war and its atrocities. The point is also to justify military interventions with the biological nature of man, not to blame wars on politicians who pursue their sick ambitions, or on warmongers who get rich in wars, no matter how many millions of victims. This culture is not useful to the formation of peaceful attitudes and peaceful solving of contradictions. On the contrary, it fuels bellicosity and the killing of enemies. The opponents of this civilization and culture opt for liquidating even sharpest conflicts peacefully and for replacing war with rivalry between conflicting countries. Opposed parties should compete for better political programs, economic models and judiciary, for better ideology, environmental protection, education and other goals. Instead of fighting each other, it is better to work together synergistically to achieve goals and solve problems without the force. If it would be so, then the war will soon be in the *dustbin of history* like many other relicts. A much greater benefit would be to spend multi-billion dollar not on armaments, maintaining the army, etc. but on fighting hunger, diseases, natural disasters, environmental protection, supporting the development of poor countries, etc. This idea is included in the concept of humanism and the civilization of life, both originated from philosophical environmentalism (Sztumski, 1997).

Therefore, firstly one should replace the *culture of evil and violence* with a *culture of tolerance and cooperation*. Secondly, one should do everything that is realistically possible to prevent wars – all of them are unfair – and apply peaceful methods of conflict solving. Thirdly, one should to try to erase the concept of war from the memory and consciousness of the masses.

After the Second World War, in the first phase of the Cold War, efforts to this end were undertaken by the Peace Defenders Movement, which gathered outstanding intellectuals from all over the world under the political leadership of the USSR. In the 1996 program, he had already openly declared himself a world mass movement to support liberation movements fighting against American imperialism. This pacifist movement enjoyed great success because it was attended by a generation that experienced the horrors of war first-hand. Nevertheless, it failed the test because it was aimed only at the military interventions of the USA. As a socialist movement, it eventually lost the support of most countries. So far, no alternative mass pacifist movement has emerged, although for many years, there have been local wars, recently also threatening world peace, and the number of victims long ago exceeded the number of victims of World War II. Why? Firstly, the modern generation knows war only from stories or films often falsified. Secondly, organized opposition to war is doomed to failure in advance in the civilization of the West known as the *Civilization of Death*. Third, local wars are not they seem as terrible as the world wars, because of the propagation of the *culture of evil*.

Therefore, firstly one should replace the *culture of evil and violence* with a *culture of tolerance and cooperation*. Secondly, one should do everything that is realistically possible to prevent wars – all of them are unfair – and

[6]In 2008, there were several hundred different enterprises dealing with military services around the globe.They appeared in almost 110 countries and their annual earnings were estimated at over $ 200 million.(Uesseler, 2008).

apply peaceful methods of conflict solving. Thirdly, one should to try to erase the concept of war from the memory and consciousness of the masses.

Despite this, some enlightened and *ecologically thinking* politicians are trying to revive such a movement. They appeal to the masses to finally o say *Stop!* to all the revolutions, wars, terrorism, ethnic cleansing and genocide that have taken the lives of millions people at the fault of greedy corporatocrates and their servants and stupid rulers – monarchs, dictators, chiefs, presidents and party leaders. They postulate that they should be removed from power as soon as possible and determinedly opposed to the madness of our time. It is highest time because the delay will multiply needless casualties and bring humanity closer to collapse. In addition, while Western civilization will not last forever, one should not wait for its natural collapse, but one ought to accelerate it. How? Thanks to *New Metanoia* that results of creative, courageous, pragmatic and future-oriented thinking derived from scientific knowledge. This *New Conversion* requires a New Enlightenment to overcome the resistance of conservatives, nationalists, neo-fascists and obscurants. Consequently, more and more researchers from different countries see that the implementation of an ultranationalist, orthodox-religious or neo-fascist model of democracy create fear that the era of democratization will soon end and the era of fascization will begin. To prevent this, they propose a Renaissance of the eighteenth-century Enlightenment, called *First Enlightenment*. They expect that in this way one avoid the collapse of democracy, which is a prerequisite for sustainable development of social reality. Unfortunately, already in some countries *Liberal democracies have largely discredited themselves by opening the gates to predatory capitalism; they are increasingly being rejected by the people* (*L'Insporations Politique*, 2021).

Beginning in antiquity, democracy went through a growth phase from Athenian one to modern during the formation of the capitalist economy, and reached its peak during the heyday of the liberal economy. After World War I, it has entered the declining phase of its development, which has been accelerating for about thirty years. The following phenomena prove that democracy is already in an advanced state of atrophy: the transformation of direct democracy into an increasingly indirect (representative) democracy, the management of the country by the chosen ones persons, increasing lawlessness and injustice, increasing social differentiation, increasing chaos, progressing alienation of power, lack of concern for the common good of the whole society, rule by ever stupider leaders, increasing clericalization and contempt for the basic values of democracy - life, freedom, equality, justice, peace and security (Sztumski, 2020).Democracy is on the verge of collapse in many countries, even in the stronghold of democracy that is the United States. The US president sees that his country's democracy is under threat mainly because of his predecessor Donald Trump, who supporters shook the foundations of the republic (Roth, 2022). According to the Economist Intelligence Unit's report, in 2020 there were the fewest *full democracies* in the world - 23, and the most *authoritarian regimes* - 57. *Hybrid regimes* - 35, and *defective democracies* - 52 (Borowska, 2021).

No wonder, that the inefficient democracy is replaced by more efficient fascism, even in the national or nationalist version, referring to such imponderables as state sovereignty, national identity, patriotism equated with nationalism or love to ruling party etc. The fascist system promotes the sustainable development much less than lame democracy. It does not multiply inequalities or opposites, but antagonizes them more and more. It introduces autocratic rule that ignores the interests and dignity of individuals. It is a system hated because of negative historical experience.

Marcel Fratzscher, professor of macroeconomics at Humboldt University in Berlin), reflecting on what the world will be like after the Covid pandemic, says there will be a New Consciousness, a New Humanism and a New Enlightenment. *Time for a new humanism! The coronavirus pandemic has plunged societies and economies into the deepest crisis since World War II. There is a great danger that it will further divide the world community. There are good reasons for pessimism, but there are also better reasons for optimism. The pandemic shows us the contradictions in our actions. This has led to a moral awareness that makes us, as a society; attach great importance to community and the protection of the weakest. This new humanism requires the reform of the welfare state so that all people have the opportunity to participate in society. Freedom, justice and humanism, the three ideals of the Enlightenment, are more important today than ever and will determine how the world and we as a society will get out of this pandemic, where we will go and what the world will look like after it* (Fratzscher, 2020).

Michelle Bawdily (professor at the University of South Australia, expert in behavioral economics) also calls for an immediate start to the New Enlightenment: *The last decade has been turbulent. The financial crisis and the uncertainty of the consequences of globalization and the technological revolution have led to the questioning of representative democracy and the free market. To materialize enormous potential for economic growth and the idea of prosperity for all as a result of the technical revolution, reduce discontent and pessimism, it need for a New Enlightenment. It is a long and complicated process, but the first steps (economic and legal reforms) can be taken immediately* (Baddeley, 2019).

In addition, Ernst Ulrich v. Weizsäcker wrote in the 2017 Report of the Club of Rome that *the modern generation is perhaps the last one that could prevent the collapse of our civilization and humanity* (von Weizsäcker, Wijkman, 2018).

Each of them and many others demand the restitution and materialization of the idea of the Enlightenment – the sovereignty of reason, freedom, justice, humanism, progress, tolerance and brotherhood. In addition, recognition of sense experience as the primary, but not the only, source of knowledge, the establishment of constitutional government, and the separation of church and state, since Christian values and other faiths values systems differ from democratic values.

The promoter of the New Enlightenment is Steven Pinker, a Canadian-American psychologist, professor of philosophy at Harvard University. He is opposed to ominous predictions about the impending end of history and the world, although he does not deny that the world faces more and more serious problems. He sees their solutions in the implementation of the ideals of the Enlightenment. In his book, *Enlightenment Now*, he urges people not to worry about the prophecies of doom and not be pessimistic, but to prevent them by using knowledge, science and reason (Pinker, 2019). Today it is difficult to predict if and when it will succeed. Because the implementation of the idea of the *New Enlightenment* meets with a massive and furious attack by obscurants and various political and church organizations under the sign of the swastika, cross, crescent, crescent, etc. and concern for the common good and its fair distribution, and in fact, they strive primarily for the selfish interests of their functionaries and activists who stuff their wallets because they *deserve it* due to exercising power, even if they have reached it dishonestly thanks to counterfeiting elections.

Conclusion

It is absurd to balance whatever you want just to be modern .For about twenty years there has been a fashion for sustainable development and that is why you want to balance everything without thinking, even the impossible, each domain of social reality and human activity preferably to the end, regardless of the negative effects. Fortunately, the concept of this sustainable development has not yet been fully materialized. (Nota bene, this is an oxymoron because equilibrium is the opposite of development.) However, if it did, there would be no development anymore, because it is an upsetting effect. *Sustainable development in the economy would conservation of institutions such as slavery* (Stodolak, 2020). In addition, if one could balance everything at once, there would be no progress.

The Brundtland Report defines sustainable development as *meeting today's needs without limiting the ability of future generations to meet their needs*. In fact, it is not known what the needs will have a more distant generation, maybe, different from the modern generation. In view of this what actually should be secured for future generations thanks to sustainable development?

Sustainable development works well in democratic systems, preferably in a liberal democracy, where, thanks to a high degree of freedom, society is highly diverse and conflicted. However, this democracy ends for various reasons, including balancing social inequalities and eliminating opposites. Perhaps it follows the Hegelian triad: the thesis (democracy) transforms through hybrid democracy into antithesis (fascism). Its place is taken by dictatorial and fascist regimes characterized by a low degree of freedom and little differentiation. They guarantee a greater social order than a democratic system. For this reason, they have more and more followers. Their disadvantage is the elimination of conditions for sustainable development, which turns out to be a temporary phenomenon in the history of humankind.

References

1. ADAMCZYK M., 2012, Współczesny kryzys finansowy - przyczyny i konsekwencje dla gospodarki światowej, *Prace i Materiały Instytutu Handlu Zagranicznego,* 31(1).
2. BADDELEY M., *2019, A Transcendent Decade: Towards a New Enlightment?,* ACC Publishing Group, Sydney.
3. BIELEŃ S., 2022,*Apoteoza wojny*,https://www.facebook.com/watch/?v=344912334378580.
4. BOROWSKA P. 2021,Demokracja na świecie w najgorszym stanie od lat,*EURACTIV.pl*, 6.02.
5. CARSON R., 1962, *Silent Spring*, Houghton Mifflin, Boston.
6. DOBRZAŃSKI P., 2011,*Wzrost zrównoważony a ochrona środowiska. Podstawowe aspekty polityki gospodarczej*, *Prace Naukowe Wydziału Prawa, Administracji i Ekonomii Uniwersytetu Wrocławskiego*, Wrocław.
7. FRATZSCHER M., 2020, *Die neue Aufklärung: Wirtschaft und Gesellschaft nach der Corona-Krise*, Berlin Vrl.
8. GAZETA WYBIRCZA – NAUKA, 2021,*W tym stuleciu może zniknąć nawet 1500 języków,* 29.12.
9. GUMIŃSKI K., n.d., *Podstawy termodynamiki fenomenologicznej,* http://www2.chemia.uj.edu.pl/~kozyra/dydaktyka/warsztat/termod_kg.html#_ftn1 (08.08.2022).
10. KOWALCZYK J., 1998, *Nieantagonistyczna teoria rozwoju*, ABIX.
11. L'INSPORATIONS POLITIQUE, 2021 *Face au retour de l'obscurantisme religieux et politique, bâtir un nouveau siècle des Lumières*, 21.05.
12. MATYSIAK A., STRUŚ M., 2015,Paradygmat rozwoju zrównoważonego,*Studia Ekonomiczne*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach.
13. MORAWSKI W., 2003,*Kronika kryzysów gospodarczych*, TRIO, Warsaw.
14. MAREK S., WIECZOREK-SZYMAŃSKA A.,2011, Przyczyny i przewidywane skutki kryzysu finansowego XXI wieku,*Zeszyty Naukowe Uniwersytetu Szczecińskiego*. *Studia* i *Prace Wydziału Nauk Ekonomicznych* i *Zarządzania*, 21.
15. PINKER S.A., 2019,*Enlightenment Now: The Case for Reason, Science, Humanism and Progress*, Penguin, London.

16. ROTH ., 2022,Joe Biden wirft Donald Trump Extremismusvor, *Die Zeit*, 02.09.
17. STODOLAK S., 2020,Tylko niezrównoważony rozwój może nas uratować. Przyrodę także,*Gazeta Prawna*,04.10.
18. *Sylviculturaoeconomica, oderhaußwirthlicheNachrichtundNaturmäßigeAnweisungzurwilden Baum-Zucht*, reprint d. Erstauflage von 1713, Leipzig), Norbert KesselVrl. Remagen-Oberwinter, 2012.
19. SZTUMSKI W., 2016, Wartości i antywartości, Idea przemiany. *Zagadnienia literatury, kultury, języka i edukacji*, vol. 4,eds. Sadowska E.,Duś M., t. 4, WSL, Częstochowa.
20. SZTUMSKI W., 1997, *Enwironmentalizm i cywilizacja życia*, Res-Type, Katowice.
21. SZTUMSKI W., 2020, Kres demokracji,*Sprawy Nauki*, 12.
22. SZTUMSKI W., 2015, Marnotrawstwo intelektualne,*Sprawy Nauki*, 8-9.
23. SZTUMSKI W., 2013,Od homo rationalis do homo prodigus,*Sprawy Nauki*, 1.
24. SZTUMSKI W., 2016, *Prolegomena do sozofilozofii społecznej* (manuscript).
25. SZTUMSKI W., 2004, Rozwój zrównoważony – konieczność, szansa czy mit?,*Filozoficzne, społeczne i ekonomiczne uwarunkowania zrównoważonego rozwoju*, ed. Pawłowski A.,Monografie Komitetu Inżynierii Środowiska PAN, 26.
26. TREPL L. 2012, Es gibt kein Gleichgewicht in der Natur,*Spektrum.de/Scilogs*, 04.06.
27. UESSLER R., 2008, *Wojna jako usługa. Jak prywatne firmy wojskowe niszczą demokrację*, Sic!, Warsaw.
28. WEIZSACKER E.U. von, WIJKMAN A., 2018, *Come On! Capitalism, Short-termism, Population and the Destruction of the Planet – A Report to the Club of Rome*, Springer, New York.

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Modelling Regional Sustainable Development in Ukrainian Crisis and War

Modelowanie zrównoważonego rozwoju regionalnego podczas kryzysu i wojnie w Ukrainie

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Abstract

The article investigates the impact of force majeure crisis factors that appeared in the Ukrainian economy as a result of the global recession, the events of 2014-2021 (annexation of Crimea, temporary occupation of part of the industrial territories of Donetsk and Luhansk regions, military operations in Donbas, during the fight against pandemic (COVID-19), war in 2022 on the stable development of regions. Based on the analysis of official indicators of the State Statistics Service of Ukraine, it was proved that the said factors create additional multiplier and acceleration effects that adversely affect the dynamics of the gross regional product in the crisis conditions. It has been determined that the result of these effects is the transformation of crisis signals from a proactive to an active phase. The construction of a heat map of GRP correlation indicators made it possible to determine the existence of a disbalance between the economic and social development of the regions. Building a model of linear regression, allowed us to draw conclusions about the existing disbalance of GRP regions during the crisis and war.

Key words: crisis factors, gross regional product, sustainable, war, economic development, multiplier effect, acceleration effect, transformation of crisis signals, heat correlation map

Słowa kluczowe: czynniki kryzysowe, produkt regionalny brutto, zrównoważony, wojna, rozwój gospodarczy, efekt mnożnikowy, efekt akceleracji, transformacja sygnałów kryzysowych, mapa korelacji ciepła

1. Introduction

A new paradigmatic formation of economic thought is taking place, marked by transformations in thinking, evolutionary and revolutionary changes. Significant changes are also taking place in the approaches determining the correctness and adequacy of new terms and categories. Specialists stress the positive direction of these changes, as they are based on a broader view and do not invalidate existing experience, but allow us to compare theoretical achievements with the empirical results obtained and outline the pragmatism of future developments. A special place in this process belongs to the study of the genesis of the crisis with all its manifestations and consequences for each subject of economic relations. It is worth noting that so far, we cannot fully predict the scale of the destructive impact of force majeure crisis on the world space as a whole and individual economic entity in particular. Number of global problems and noticeable changes in their usual environment, which became factors of increased attention to the problem of countries and regions functioning in crises, the nature of which is force majeure. The crisis has acquired a significant dimension and requires a careful approach to its analysis and forecasting. The growing losses from the impact of crisis factors of unpredictable nature pose a real threat to the economies of states and regions. Emergencies level the performance of even the most developed states in a very short period of time. The crises of recent years have sharpened the focus of the international community on the need for greater cooperation in finding and applying proactive crisis management not only at the enterprise level, but also at the regional and national levels, as the global manifestation of crisis phenomena prompts a search for common crisis management measures that would ideally form an emergent reality that would result in a new paradigmatic phase.

The presented article is dedicated to the study of the impact of crisis-forming factors on the sustainable development of Ukraine as a whole, and its regions, in particular. The basis of such development is the economic component, which ensures the maximum social effect and takes into account the ecological (Koziuk et al., 2020) orientation.

2. Research materials and methods

The problem of economic development of regions can be considered from the standpoint of both theoretical and empirical research. Theoretical research is based on the development of economic models that establish functional relationships between economic development and crisis-generating factors. Empirical research is based on the generalization of observations on changes in the impact of crisis-forming factors of force majeure on the economic development of the country (regions). At the same time, the obligatory basis of all empirical research is a set of theoretical preconditions that are reflected in modern concepts of economic development.

The concept of stability is important for the analysis of how quickly the system reacts to the manifestation of crisis phenomena of various nature, its possibilities for their overcoming/leveling and recovery. Because of this, this concept is increasingly used in economic geography, where more and more research results on regional sustainability appear.

The concept of sustainable development, as a long continuous process, entered the circulation of economic research in the last three decades – after the report of the UN Commission in 1987 (World Commission on Environment and Development. (1987), which is connected with the problems of limited resources. The basis of the theory is the provision of balanced growth rates of the national economy as a socio-economic system based on the harmonization of production forces (Voloshin, & Gordienko, 2000). This harmonization takes place by ensuring the economic stability of structural elements of the national economy – regions. At the same time, sustainable development is based on three main components – economic, social and ecological (Munasinghe, 1993), which, ideally, determine the further strategy of the state's development with the simultaneous implementation of tactical solutions at the regional level.

The basis of the economic component is the concept of income by J. Hicks (1975), which provides for increasing the efficiency of production through the use of advanced technologies, product life cycle management (Kozlovskyi & Fonitska, 2013), innovation, risk management, etc., which provide an opportunity for balanced economic growth in conditions of effective use of limited resources.

The social component is based on the fair distribution of resources and takes into account the development of human capital. At the same time, decision-making processes regarding sustainable development are carried out with direct human participation, through investments in human capital.

The ecological component ensures the stability of biological and physical systems and takes into account the consequences of the relationships between these systems. This is due to the need to reduce the negative impact of production on the environment by implementing an environmental management system.

The strategic vision of sustainable development of Ukraine (National Economic Development Strategy of Ukraine for the period until 2030) is based on ensuring national interests and fulfilling international obligations and involves solving a number of tasks, among which, within the framework of the study, it is worth highlighting such as:

- overcoming imbalances in the economic, social and environmental spheres;
- building a peaceful and safe, socially cohesive society with proper governance and inclusive institutions;
- ensuring partnership interaction of state authorities, local self-government bodies, business, science, education and civil society organizations;
- maintenance of the environment in proper condition, which will ensure quality life and well-being of present and future generations;
- decentralization and implementation of regional policy (Kreidych et al., 2018), which provides for a harmonious combination of national and regional interests.

At the same time, it is noted that each region of Ukraine is able to independently identify, realize and multiply its own potential to ensure a decent life for people living on its territory with the application of socio-humanitarian and ecological development (Kozlovskyi, 2010) priorities.

It may be unnecessary due to: introduction of high social standards of living; health care, implementation of healthy lifestyle standards; ensuring the rights of people with special needs and limited physical capabilities; guaranteeing the human right to a safe environment; compliance with the principles of gender equality; development of educational and scientific space; harmonization of inter-ethnic and inter-confessional relations; free access of broad sections of society to cultural assets and protection of cultural heritage; support of modern forms of artistic and intellectual creativity; development of dialogue between the state and civil society; formation of ecological thinking; environmental responsibility, achieving a state of the natural environment that is safe for human health; raising the level of public awareness on issues of environmental protection; improving the environmental situation and increasing the level of environmental safety; improvement of the system of integrated environmental management by including an environmental component in development programs of economic sectors; improvement of regional environmental policy, reduction of the negative impact of urbanization processes on the natural environment; ensuring ecologically balanced use of natural resources.

It can be seen that the presented tasks take into account all components of sustainable development, but the greatest attention is paid to the social and environmental sphere.

Along with this, taking into account the limited resources, including human and time, the economic component comes first as the foundation of sustainable development, which forms the appropriate financial support for the implementation of strategic goals and the anti-crisis potential for restoring the system from crisis shocks.

This work is devoted to the study of crisis-forming factors of force majeure on the economic component of sustainable development of the regions of Ukraine, which ensures maximum social and environmental effects. Special attention in the work is directed to the study of regional imbalances, regarding the implementation of the goals of sustainable development through ensuring effective planning of regional development; increasing the institutional capacity of local executive bodies, local self-government bodies and regional development agencies; ensuring effective financing of regional development.

The notion of resilience is important for analyzing how quickly a system responds to crises of different nature, its capacity to overcome and recover from them. Because of this, the concept is increasingly being used in economic geography, where more and more research on regional sustainability is emerging.

In the presented study, we pay the greatest attention to the economic sphere – as the foundation for the formation of anti-crisis capacity to restore the system from crisis shocks.

There are almost no scientific papers that would contain a comprehensive study of the economic essence of the processes of modeling regional development, taking into account the impact of crisis-causing factors of unpredictable nature.

The study of existing approaches to the interpretation of the essence of the crisis provides an opportunity to determine its main features and the impact of force majeure on the life of the country as a whole and its regions in particular.

R. Barton (1993) presents the crisis as an unpredictable event, usually having negative consequences and leading to a decline in production, employment, financial results.

Group of authors (G. Gandolfo (1991), D. Schottke, A. Pollak (2001), B. Wright (2014) D. MacDonald, (2016)) define the crisis as an extreme aggravation of contradictions in the socio-economic system, which threatens its viability in the environment. The crisis phenomenon from the point of view of A. Berumen (2013) is a constant deterioration of certain quantitative indicators of the state and its structural components.

The approach of I. Petruk (2020) to determining the impact of crisis phenomena on development is noteworthy. This approach is based on the initial definition of a crisis. This is any qualitative change in the process, the transition from the existing state to one that differs significantly in basic parameters. In this definition, a crisis is a transition from stability to deterioration, or a crisis situation in the development of the system.

The issue of the impact of the crisis on economic development through a study of the significance of the two cheeks - the collapse in trade and the sharp decline in financial flows – is addressed by O. Blanchard, M. Das, and H. Faruqee (2010), B. Gurtner (2010).

O. Pretorius et al. (2021) examined the ability of a regional economy to recover from the initial impact and lingering effects of crisis events, depending on the vulnerability of that economy to their impact.

The definitions made by experts in the field of crisis management reveal the essence of the crisis as a negative phenomenon in socio-economic development, which suddenly arises and leads to irreversible consequences.
Coombsa, T. & Lauferb, T. (2015) sees crisis management as a defined *set of factors designed to deal with crises and reduce the actual damage caused by the crisis*.
The work of I. Emilova (2022) brings up the requirements for crisis management as a system, as a set of mechanisms and processes, specific technologies and management styles.
The possibilities of enhancing the process of public crisis management in the context of domestic market destabilization, structural and social changes are considered in Taneja, Pryor, Sewell and Recuero (2014). The role of monetary policy, which ensures the stability of the currency and the balance of external payments to emerge from crisis situations, is defined in Trofymenko et al. (2021).
Khan et al., (2019) analyzed methods that can be applied in crisis management practices. The identification of threats and tracking their impact in the economic security system is reflected in the studies of Duceppe et al. (2017), Leva et al. (2017), O. Ilyash et al. (2021) and Munns et al. (2017). Identification and substantiation of the relationship and interdependence of factors of regional development on the quality of life of the population is based on the work of S. Hrynkevych (2020) and her colleagues.
The crisis, as a turning point in the life cycle of the country and its regions, involves the transition to qualitatively new characteristics, including positive ones. In addition, in modern conditions of development of innovative technologies and the existence of economic laws that form the principles of management (feedback law, the law of transparency of economic relations, the law of identity in most situations the crisis becomes predictable. However, the emergence of unpredictable crisis-forming factors of force majeure for Ukraine, including the annexation of Crimea, the temporary occupation of part of the industrial territories of Donetsk and Luhansk regions, hostilities in the Donbas, economic and social constraints in the fight against the COVID-19 pandemic (Frolova et al., 2021) to the essence of the crisis and its consequences for economic development.
In addition, special attention in the gradation of the crisis is paid to such concepts as the depth and scale of the crisis. These include: catastrophe, severe crisis, mild crisis. The depth of the crisis can be assessed through the diagnosis of regions on the following indicators: gross regional product, industrial production index, capital investment by region, foreign trade, basic and reverse subsidies. to conduct a SWOT-analysis of the potential for production development by individual regions and industries.
The economic nature of the crisis, providing an opportunity to identify the situation and apply appropriate anti-crisis management measures needed to mitigate the crisis and its consequences. Predicting the consequences of the crisis, determining the end result of the impact of crisis contingencies on the stability of economic development of the country (regions) is one of the main tasks facing anti-crisis management.
Although recent studies have extensively investigated the impact of crisis drivers on sustainable development, both national and regional, the processes of transforming the proactive stage of the crisis into an active one at the regional level have been seriously obscured. Also, little has been done to explain the impact of force majeure crisis factors on the main indicators of regional development.
Thus, the objectives of this paper are:

- to discuss theories of crisis and sustainable regional development.
- to identify and discuss the main crisis factors of a force majeure nature that hinder the sustainable development of the regions of Ukraine – revolution, pandemic, war.
- study the changes of basic regional development indicators as a result of force-majeure crises factors.
- to identify and discuss the main regional development strategies, taking into account the distribution of donors and recipients.

This paper consists of five sections – introduction, theories of economic development and crisis, results and discussion, as well as conclusions and implications for regional sustainable development, taking into account the transformational nature of the crisis.

3. Results and discussion

The regional indicators have been considered to provide an evidence base for the impact of the crisis on the economy. To identify and investigate the prioritization of the impact of the crisis-forming factors. The regions of Ukraine differ significantly from each other by the nature of the available resource potential, the degree of comparative importance for the state economy, the severity of socio-economic problems. As a result of the structural-dynamic analysis, we can say that the state of the economy of the regions reflects the national macroeconomic trends, revealing their contradictions. The disbalance of economic and social development of the regions, the imbalance of inter-budgetary relations remains an urgent problem. It should be noted that today, taking into account the action of crisis factors of force-major nature in Ukraine, the regional differentiation has reached a scale at which it generally becomes a factor of violation of economic security (Ukrainian Institute for the Future, 2022).

All this is directly reflected in the sustainable development of Ukraine and provides an opportunity to take regional imbalance into account during the development and implementation of anti-crisis measures based on the analysis of the main indicators reflecting the level of economic development of the regions.

3.1. The main crisis and war factors of a force majeure nature that hinder the sustainable development of the regions of Ukraine

The last twenty years in Ukraine are characterized by the presence of successive crisis phenomena of a force majeure nature, which was reflected in the sustainable development of the country. We include the Revolution of Dignity of 2014, the annexation of Crimea, the temporary occupation of part of the industrial territories of the Donetsk and Luhansk regions, hostilities in Donbas, economic and social restrictions in the fight against the COVID-19 pandemic, and the war with the Russian occupiers in 2022.

Until 2013, Ukrainian society was experiencing an identity crisis caused by certain conflicts, which were related to the problems of forming a national identity based on regional sub-identities with different dominant values. The Revolution of Dignity of 2014 became the force that united representatives of ethnic communities into a single whole, resulting in the ability to motivate to achieve socially significant goals and promote cultural, intellectual and economic upliftment, which corresponds to the goals of sustainable development.

At the same time, since 2014, Russia's external aggression, which resulted in the annexation of Crimea, the temporary occupation of part of the industrial territories of the Donetsk and Luhansk regions, as well as the hostilities in the Donbass, exposed a number of serious socio-economic and environmental problems of the country's sustainable development and at the same time gave rise to new moral, political and international aspects of this problem not only for Ukraine, but also for the modern system of international relations, which concern not only the European region, but also the world in general.

The most serious social problems of Ukraine have become: a rapid decline in the standard of living of the population, which in turn led to an increase in poverty, deepening inequality, an increase in internally displaced persons and the intensification of external migration from dangerous regions (due to direct losses and destruction in the industrial and social infrastructure) in order to preserve peace and appropriate level of well-being of their families. Economic depletion of Ukraine occurred due to resource losses of production infrastructure; depletion of the financial sphere, failure of reforms in the economic, social and other spheres of state activity. At the same time, the loss of Black Sea gas fields led to a deterioration in the energy sector.

As a result of the deterioration of the environment (increased emissions of harmful substances into the atmospheric air, discharges of untreated wastewater into natural water bodies, placement of waste from the coal, chemical industry, mining and metallurgical complex, which is the specialty of the Luhansk and Donetsk regions) due to the impact of projectiles and emergency violations the work of numerous enterprises led to significant environmental pollution and the destruction of life support infrastructure.

The COVID-19 pandemic, which swept the world in 2020, fundamentally changed the lives of people all over the world, primarily due to the feeling of financial difficulties, loss of work and income, changes in lifestyle, leisure and communication. The experts of the OECD (2022) are already emphasizing the negative consequences for the entire world community, which are expressed primarily in the slowdown of global economic growth (Kozlovskyi et al., 2020) against the background of the ongoing fight against the COVID–19 pandemic.

In February 2022, a war with the Russian occupiers began in Ukraine, as a result of which the country suffered significant losses, which jeopardizes the possibility of sustainable development not only for Ukraine, but also for the entire world order. Humanitarian and ecological catastrophes, the destruction of transport infrastructure, the increase in the cost of living due to the destructive effect of inflation due to the sharp increase in the cost of energy resources also threaten the food security of the world's poorest countries.

According to the data of the Kyiv School of Economics (Project on the collection, evaluation and analysis of information on the material losses of Ukraine from the war with Russia, 2022), as of the beginning of July 2022, the losses of the Ukrainian economy from damage to the physical infrastructure since the beginning of hostilities amounted to about $600 billion, in including, in case of complete destruction of objects - $103.9 billion. At the same time, the consequences of the attack on Ukraine for the world GDP in 2022 will be at least -1% of growth, or $1 trillion.

Table 1. Adjustment of forecasts of the dynamics of the world economy in 2022 after the start of hostilities in Ukraine, source: own author`s draft based on data from the Fitch Ratings, Moody`s, OECD, S&P (2022)

Organization	New forecast	Previous forecast
Fitch	3,5%	4,2%
Moody`s	3,6%	4,3%
OECD	2,4%	3,2%
S&P	3,4%	4,1%
Oxford Economics	3,8%	4,0%

In the energy sector, since the beginning of the war, 5% of generating capacities have been destroyed, 35% are located in the occupied territories; 50% of thermal capacities, 30% of solar, and more than 90% of wind generation have been disabled (NBU, Department of Monetary Policy and Economic Analysis, 2022). According to the UN (Situation Ukraine Refugee Situation 2022), as of May 21, the number of refugees from Ukraine exceeded 8 million, of which the largest number remained in Poland (almost 1.2 million) and Germany (0.8 million).
This means that now, in the conditions of the war and after it, first of all, regions and business should focus on an effective way to restore the economy based on a global approach based on the criteria of business sustainability – ESG (ecological, social and state management), which involves the formation of an ecosystem of partnership and interactions. This will enable the use of common resources and optimize costs, while increasing collective capabilities and potential.
The force majeure nature of crisis factors multiplies the negative consequences of crises of any economic nature, nullifies the obtained positive results, and exacerbates unresolved problems, both at the state and regional levels. War as a crisis of force majeure completely transforms the goals of the development of the system and brings it to the level of maximum conservation of resources, including human resources.

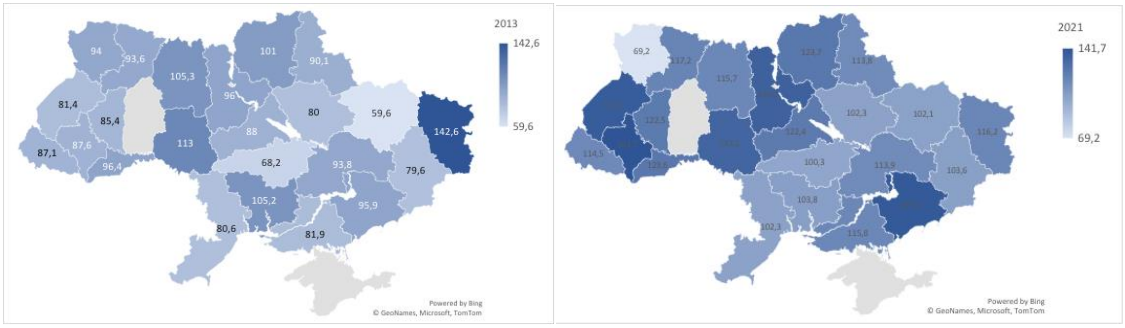
3.2. The Industrial Production Index
One of the main characteristics reflecting the level of economic development of Ukraine's regions and the country as a whole is the industrial production index (Fig. 1).

Figure 1. Volume indices of gross regional product for 2013-2020, at comparative prices,
source: own author`s draft based on data from the State Statistics Committee of Ukraine (2022)

The country experienced the greatest impact of force majeure crisis factors: in 2014-2015 (annexation of Crimea, loss of part of the industrial areas of Donetsk and Luhansk regions, harsh hostilities in Donbas), which resulted in some business closures or significant asset losses and in 2020 due to social restrictions that arose during the COVID-19 pandemic and led to bankruptcies/closures/full or partial income losses.
It can be stated that during the crisis of 2014-2015, Ukraine's industrial production index was 93.4% and 90.2%, respectively, and in 2020 the index was 96.2% (State Statistics Committee of Ukraine, 2021). Almost all regions of the country developed at roughly the same level, except Donetsk and Luhansk oblasts, which were most negatively affected by the military conflict.
Since 2016, the situation across the country has stabilized considerably and the industrial production index has almost levelled off across all regions. However, since the start of the pandemic, some regions have experienced a significant decrease in the index. In particular, Kirovograd and Mykolaiv Oblasts, which are characterized by low level of development of industrial infrastructure and transport and logistics networks, were the most negatively affected by the COVID-19 pandemic.

3.3. Capital investment by region
An equally important indicator of the impact of the crisis on development is capital investment (Kozlovskyi et al., 2013) by region, which is a key condition for economic development and growth given the technological compo-

sition of Ukrainian enterprises (Fig. 2 a, b). Moreover, increased investment is a foundation of anti-crisis potential of both the state and the regions.



a) capital investment indices by region, 2013 b) capital investment indices by region, 2021

Figure 2. Capital investment indices by region, 2013-2021, million UAH,
source: own author`s draft based on data from the State Statistics Committee of Ukraine (2022)

There are some dependencies and parallels 2014-2015 was a period of force majeure crisis factors, when the volume of capital investments decreased significantly. The period of influence of force majeure crisis factors, when the volume of capital investments decreased significantly. In the following years a certain intensification of investment activity, but investment activity has not been recovered pre-crisis volumes. The process of investment activity, due to the unstable political and economic situation. A chance to determine and prove the existence of a multiplicative effect of crisis factors, of their negative impact deepened the effect of others, which, before the crisis situation referred to the phase of *weak* signals of an active anti-crisis concept, but under the above conditions, they passed into the phase of *active signals*. These signals include:

1) growing regional disbalance; significant increase of transactional conditions of doing business;
2) unresolved issues of protection of investors' property rights;
3) growing migration processes resulting in outflow of inexpensive and qualified workforce; opportunity to obtain resources without investment due to lack of relevant duties and quota restrictions;
4) lack of systematic policies to encourage investment in the production sphere similar to those applied in other countries;
5) low investment interest.

3.4. External trade volume

Foreign trade acts as one of the most important means of increasing resources at the state level, which in case of crisis situations will be used to overcome them and rebuild the regions.

The external market is more dynamic and competitive than the internal market. Exports and imports are essential for the implementation of anti-crisis management of regional reconstruction. Exports provide opportunities for regional economic agents to develop their activities to a level beyond the domestic market demand (Mazhara & Kapustyan, 2022). Export orientation enhances the competitiveness of national products on the world market. Imports are a necessary feature of the functioning of any economic system, including regions. In the short term, importing certain products is more profitable than producing domestic counterparts. With the spread of globalization processes, increased imports, on the one hand, contribute to saturation of the market with a variety of goods. On the other hand, imports act as an impetus to increase the competitiveness and economic status of individual economic systems. By increasing imports, regional economic agents gain access to foreign technologies embedded in the means of production.

Therefore, it is possible to discern some trends that affect the speed of recovery of regions from crisis factors of force majeure nature. Namely, changes in the development of productive forces and production relations in the world economy; changes in the priorities of international trade towards high-tech and knowledge-intensive products; increased trade in services; and expansion of scientific-technical and investment-production cooperation.

The multiplicative effect of force majeure crisis factors and the analysis says the factors that deepened the crisis processes include: the lack of a coherent and balanced national paradigm and strategy for the development of international trade policy based on the preference for Ukraine's national interests and a programme for implementing priority tasks. Uncertainty in the areas of specialization of Ukrainian exports from the position of in addition, domestic exports have undergone significant transformation in recent years due to both European integration processes and political and military challenges. The European Union is currently the main foreign trade partner. But despite positive trends in foreign trade with the EU, the balance remains negative due to partial access to the European market, low competitiveness of national goods, structural weaknesses in products: low value-added and a backward technological component. They from crisis factors and leads to the loss of Ukraine's economic potential.

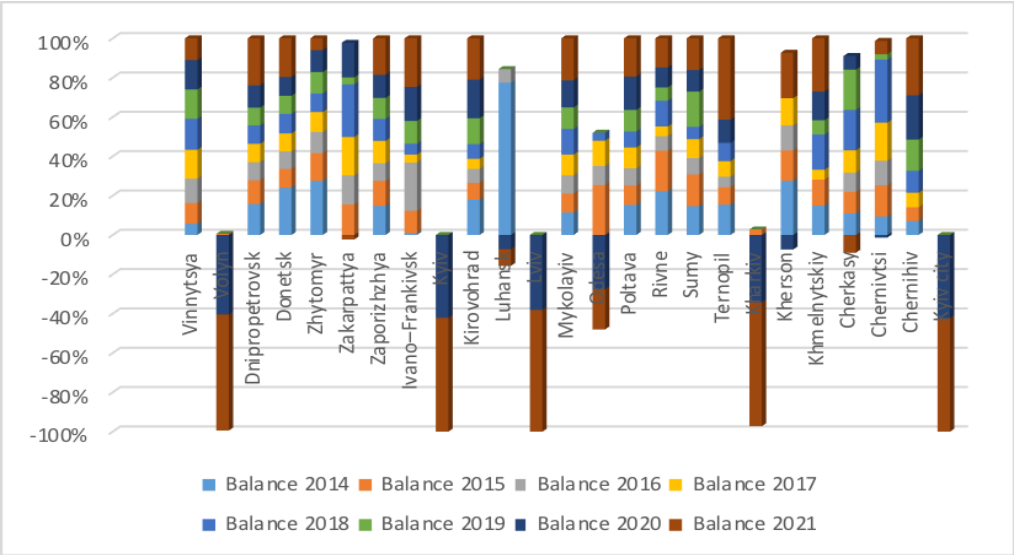


Figure 3. Balance of foreign trade in goods in 2014-2021,
source: own author`s draft based on data from the State Statistics Committee of Ukraine (2022)

3.5. Analysis of Ukraine's Regional Distribution into Donors and Recipients

The number of the latter has not changed positively (Fig. 4). The annexation of Crimea, the loss of part of the industrial areas of Donetsk and Luhansk oblasts, the hostilities in Donbas, all this has significantly affected the economic potential of our state.

Most of the regions remain subsidised, and are unable to provide an adequate level of income. Moreover, Ukraine's method of financial aid distribution is not adapted to the conditions of the crisis. The number of recipient regions will grow. Due to force majeure factors, the most profitable regions will lose their donor status, as average indicators will decrease, so the more unstable regions will pass into the category of recipients, purely statistically.

a) base subsidies, 2014-2021 b) reverse subsidies, 2014-2021

Figure 4. Base and reverse subsidies, 2014-2021,
source: own author`s draft based on data from the State Statistics Committee of Ukraine (2022)

As of 2021, only four regions (Kyiv, Dnipropetrovsk, Poltava and Zaporizhzhia) out of 24 are in the donor zone, while as of 2013 there were six (Kyiv, Poltava, Donetsk, Kharkiv, Zaporizhzhia and Crimea), (according to the Law of Ukraine On the State Budget of Ukraine for 2014 and 22).

The existing tendency to the multiplier effect of the impact of crisis factors on economic development, the potential of donor regions will be overestimated, due to which budget transfers may be incorrectly allocated, and therefore not all regions will receive the necessary financial assistance. A SWOT analysis of the production development potential of individual regions and industries is proposed for application (Table 2). The table shows only donor regions, which despite their high development potential remain technologically backward and have significant potential external threats.

The most pressing problem is the disbalance of economic and social development of the regions and the imbalance of interbudgetary relations. And given the force-majeure factors of the crisis in Ukraine, regional differentiation has reached a scale that makes it a factor of economic security disruption. This has a direct impact on Ukraine's anti-crisis potential.

Table 2. SWOT analysis of production development otential by selected regions and industries, *source: own author`s elaborations*

Region	Internal strengths (S)	Internal weaknesses (W)	Potential external opportunities (O)	Potential external threats (T)
Dnipropetrovsk	Favourable business environment, investor protection; high level of knowledge of graduates (qualified workforce)	Polluted environment; high concentration of metallurgical plants; depreciation of fixed assets	production Non-ferrous metal production; Machinery and energy, food, chemical industries	Dependence on natural resources, temporary fluctuations in Demand on markets; Increased risk of man-made hazards
Zaporizhzhya	Industrial infrastructure Engineering and technical personnel; Developed industrial sector sector	Significant level of depreciation of the main production assets	metallurgy; mechanical engineering, energy; food processing	Lack of financial resources, High level of competition
Kyiv	Developed infrastructure, proximity to Kiev	Low level of development of production infrastructure; Significant level of depreciation of main production assets	Engineering, power generation; wood processing, pulp and paper, light industry and food industry	High level of competition
Poltava	Availability of significant amount of productive agricultural land Strong agro-industrial complex; Significant reserves of minerals; Availability of land for an industrial park	Wear and tear of municipal engineering infrastructure, Weak implementation of high technologies, lack of innovation infrastructure, and low innovation activity; High energy and resource intensity of production Dependence of large enterprises on imported raw material suppliers and external conditions	Agriculture; food and chemical industry	Increased imports of agricultural products as a result of WTO accession
City of Kyiv	Developed infrastructure High level of High level of education. Concentration of capital of resources,	Severely deteriorated engineering and transport infrastructure; High operating costs	Development of the high-tech sector: engineering, information technology, precision engineering, electronics, pharmaceutical production, telecommunications. food industry	reduction investment in production

Given the effects of multiplier and acceleration effects on national income dynamics under crisis conditions, when there is a significant reduction in gross regional product for all regions, foreign trade and investment, intergovernmental fiscal relations are distorted and regional disparities increase, resulting in inappropriate allocation of financial resources (aid). For the most part, donor regions will receive insufficient financial assistance to get to the pre-crisis state. We consider it prudent to review the financial assistance provided to the recipient regions. In our view, in order to overcome the crisis manifestations, it should be more adequate to increase financial assistance to donor regions, as a foundation of the anti-crisis potential of the state.

That is why, in the (National Economic Development Strategy of Ukraine for the period until 2030) special attention is paid to the issues of effective financing of regional development and a number of indicators are highlighted that increase the regional imbalance: inconsistency of the targeted use of the State Fund for Regional Development and state investments; outdated inter-budgetary relations; lack of programs for the development of functional types of territories; lack of additional credit resources for local self-government bodies; inefficiency of industrial parks, which negatively affects the sustainable development of the country.

In order to determine the inter-regional correlation of economic development on the basis of this indicator we suggest to build correlation heat map with the indicator of regional development – gross regional product (Fig. 5).

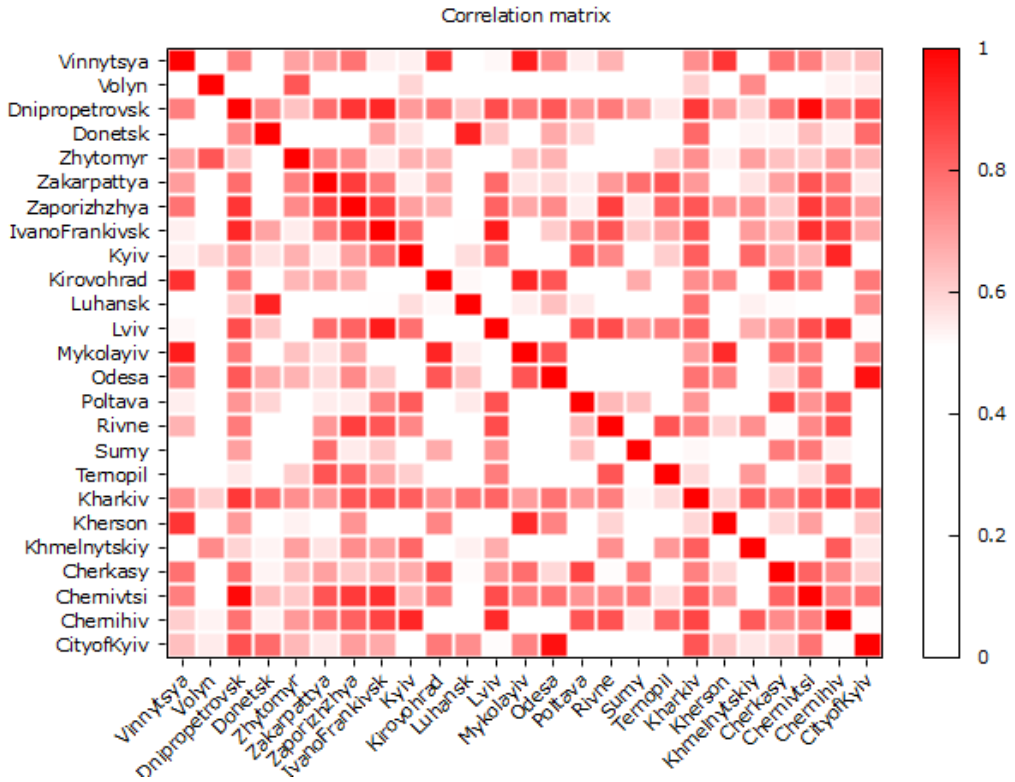


Figure 5. Correlation matrix for gross regional product. source: own author`s impression

A heat correlation index card indicates a *hotter* (more colored) stronger correlation that is close to 1. The existing correlation between the gross regional product indicator between the regions is weak (Vinnytsia and Ivano-Frankivsk regions), and sometimes absent (Volyn and Dnipropetrovsk regions), it is not systematic. There is a strong connection only between some oblasts, in particular (Mykolaiv and Kirovohrad, Lviv and Ivano-Frankivsk)

The linear multifactor regression of dependence of gross regional product of one region considers the dependence between the specified indicator of Kyiv region as a donor and other regions as recipients. For this purpose, the method of smallest squares was used (Table 3).

The least square method is a mathematical regression analysis used to determine the line of best fit for a set of data, providing a demonstration of the relationship between the data points. Each point of data represents the relationship between a known independent variable and an unknown dependent variable. In our case we use it to determine and describe the relationship between Kyiv oblast and 6 other regions, mentioned as Factors.

In order to do it we used Gretl software, which used all-known method mentioned above.

The main indicators for analysis are R-squared, t-ratio, p-value, and the model itself.

Let's observe them from the table and provide the analysis.

Table 3. Model 6: OLS, using observations 2013-2020 (T = 8) with dependent variable: Kyiv (Y), source: own author`s model based on data from Table 1

Factors	Coefficient	Std. Error	t-ratio	p-value
const	−35.5116	139.147	−0.2552	0.8409
Vinnytsia (x1)	−0.217073	1.19245	−0.1820	0.8854
Dnipropetrovsk (x2)	0.320651	3.01000	0.1065	0.9324
Donetsk (x3)	0.0582046	0.470614	0.1237	0.9217
Zhytomyr (x4)	0.875452	1.55431	0.5632	0.6734
Zakarpattya (x5)	−0.612108	2.05707	−0.2976	0.8159
Zaporizhzhya (x6)	0.940770	3.39982	0.2767	0.8281

Mean dependent var	100.6625		
Sum squared resid	67.98033	S.E. of regression	8.245019
R-squared	0.659142	Adjusted R-squared	-1.386007
F(6, 1)	0.322295	P-value(F)	0.871365
Log-likelihood	−19.91062	Akaike criterion	53.82123
Schwarz criterion	54.37732	Hannan-Quinn	50.07062
rho	−0.088375	Durbin-Watson	1.487929

Consequently, the resulting model will look like (Formula 1):
Y=-35,5-0,217x_1+0,321x_2+0,0582x_3+0,875x_4-0,612x_5+0,941x_6 (1)
The R-square value is the mean.
The p-value of all variables is not significant.
T-ratio of variables less when the table meaning (Table 4).

Table 4. Table meaning, source: authors own elaboration (statistic table)

right-hand probability	0.05
complementary probability	0.95
two-sided probability	0.1
Critical value	1.85955

The relationship of gross regional product by region is not significant, in spite of high R-square (which confirms the significance of the model). The regional income of Kyiv region does not depend on similar indicators of other regions. The studied factors have no multicollinearity and collinearity. The adequacy of the chosen model and the lack of interrelation of factors confirm the factors are not interrelated.
The impact of force majeure crisis factors has increased disbalance of economic and social development of regions, which confirms the phase of active crisis signals. The crisis impact has, in turn, highlighted the lack of a correct and adequate assistance strategy to the regions, which leads to a complete aberration in inter-budgetary relations and redistribution of budgetary resources.

Conclusion

The theories of crisis and sustainable development of regions have been studied. It was determined that the formation of the region's anti-crisis potential is based on its ability to quickly respond to changes in the external environment. As a result of the structural and dynamic analysis, it was proved that the regions of Ukraine differ significantly in the level of economic development and the severity of socio-economic problems, which directly affects the effectiveness of anti-crisis measures and the possibility of returning to the pre-crisis state.
The main crisis factors of a force majeure nature, which hinder the sustainable development of the regions, are considered. These include the annexation of Crimea, the loss of part of the industrial territories of the Donetsk and Luhansk regions, severe fighting in Donbas and the COVID-19 pandemic, the war with the Russian invaders in 2022.
The methodical toolkit of dispersion analysis of the selection of indicators was used to determine the consequences of the impact of force majeure crisis-forming factors on the development of regions due to their dynamics over the years. It was determined that:

- the country was most affected by such factors: in the period 2014-2015 (annexation of Crimea, loss of part of the industrial territories of Donetsk and Luhansk regions, severe fighting in Donbas) in 2020, as a result of social restrictions that arose during the fight against the COVID-19 pandemic (Kirovohrad and Mykolaiv regions were the most affected) and the war with the Russian occupiers in 2022 as a result of the destruction of social, economic and energy infrastructure throughout the country;
- under the influence of crisis factors, the regions of Ukraine are characterized by an increase in the imbalance of economic and social development and a violation of the balance of inter-budgetary relations;
- after the 2014-2015 period. there was a significant reduction in investment activity in the regions, which has not yet been restored due to the emergence of new crisis-forming factors of a force majeure nature (the COVID-19 pandemic) and the war with the Russian occupiers in 2022;
- the development of the region's anti-crisis potential depends on both exports and imports. As a result of the study, it was determined that the process of increasing the export component of foreign trade in goods with the highest added value does not depend on time and is always a priority direction for increasing the economic stability of the region, against the increase in import volumes, which is a priority only in the short term;
- for national producers, the European Union is the main foreign trade partner. However, the trade balance still remains negative due to partial access to the European market, low competitiveness of national goods, structural weakness of products, in particular, low added value and backward technological component;
- the existing correlation between crisis-forming factors increases the negative impact of *ordinary* crises, there is a transition of *weak* crisis signals to the *active* stage;
- due to the effects of multiplication and acceleration. the influence of crisis factors, which restrain the economic development of regions and significantly reduce their stability, increased.
- the construction of a hot map of the GRP correlation indicators confirmed the existence of an imbalance in the economic and social development of the regions, and the construction of a linear regression model made it possible to draw conclusions about the strengthening of the GRP imbalance of the regions during crisis events and the violation of inter-budget relations.

The analysis of the main development strategies of the regions, taking into account the allocation to donors and recipients, made it possible to determine that the drop in the gross regional product, the volume of foreign trade and investments violates the balance of inter-budgetary relations and the distribution of financial aid. Regions that are usually donors do not receive adequate financial assistance to accelerate the processes of exiting the crisis. Because of this, it is proposed to increase the financial assistance specifically to the donor regions, as the foundation of the anti-crisis potential of the state. The theories of crisis and sustainable development of regions were investigated. It has been established that the formation of the anti-crisis potential of a region is based on its ability to respond quickly to changes in the external environment. As a result of the structural-dynamic analysis it has been proved that Ukrainian regions significantly differ from each other by the level of economic development and the severity of socio-economic problems, which has a direct impact on the effectiveness of anti-crisis measures and the possibility of returning to pre-crisis state.

The main force majeure crisis factors preventing the sustainable development of the regions have been considered. These include annexation of Crimea, loss of a part of industrial areas in Donetsk and Luhansk oblasts, heavy fighting in Donbas, and the COVID-19 pandemic.

A methodological toolkit of dispersion analysis of indicator selection was used to determine the impact of force majeure crisis factors on regional development due to their dynamics year by year. It was determined that:

- the country experienced the greatest impact of such factors: during 2014-2015 (annexation of Crimea, loss of part of the industrial territories of Donetsk and Luhansk regions, harsh hostilities in Donbas) and in 2020 due to social constraints arising during the fight against the COVID-19 pandemic (Kirovograd and Nikolaev regions were the most affected);
- during the impact of the crisis factors, Ukrainian regions were characterized by a growing disbalance of economic and social development and an imbalance in inter-budgetary relations;
- after the period 2014-2015 there has been a significant reduction in investment activity in the regions, which has not yet been recovered due to the emergence of new crisis factors of force majeure nature (pandemic COVID-19);
- development of anti-crisis potential of the region depends on both exports and imports. As a result of the research, it was determined that the process of increasing the export component of the foreign trade in goods with the highest added value is independent of time and is always a priority in terms of increasing the economic resilience of the region against increasing the volume of imports, which is a priority only in the short term;
- for national producers, the European Union is the main foreign trade partner. However, the trade balance is still negative, due to partial access to the European market, the low competitiveness of national products, structural weaknesses in products, in particular – low added value and a backward technological component;
- the existing correlation between the crisis factors strengthens the negative impact of the *ordinary* crises, the *weak* signals of the crisis move towards the *active* ones;
- as a result of multiplication and acceleration effects. the impact of crisis factors has increased, constraining economic development of regions and significantly reducing their sustainability.
- the construction of a hot map of GRP correlation indicators has confirmed the existence of imbalances in economic and social development of regions, and the construction of a linear regression model, allowed to draw conclusions about the increasing disbalance of GRP regions during the crisis phenomena and the violation of inter-budgetary relations.

The analysis of the main strategies of regional development taking into account the distribution into donors and recipients allowed us to determine that the decline in gross regional product, foreign trade and investment disturbs the balance of inter-budgetary relations and the distribution of financial assistance. Regions, usually donors, do not receive adequate financial assistance to accelerate recovery processes. Therefore, it is proposed to increase financial assistance to donor regions as the foundation of the anti-crisis potential of the state.

References

1. BARTON R. M., 1993, *The Crisis Management*, Oxford Press Publishers, Oxford.
2. BERUMEN A., 2013, The Impact of the Crisis on the Economic Development of Mining Regions in Europe, *Problemas del Desarrollo*, 45(176): 83-106.
3. BLANCHARD O., MITALI D., HAMID F., 2010, Brookings Papers on Economic Activity, *Spring*: 263-323, https://www.brookings.edu/wpcontent/uploads/2016/07/2010a_bpea_blanchard.pdf.
4. COOMBSA T., LAUFERB T., 2015, Global Crisis Management – Current Research and Future Directions, *Journal of International Management*, https://tarjomefa.com/wp-content/uploads/2018/03/290-English-TarjomeFa.pdf.
5. DUCEPPE E., PARLOW J., MACDONALD P., LYONS K., MCMULLEN K., SRINATHAN S., SESSLER D., 2017, Canadian Cardiovascular Society guidelines on perioperative cardiac risk assessment and management for patients who undergo noncardiac surgery, *Canadian Journal of Cardiology*, 33: 17-32.
6. EMILOVA I., 2022, The Anti-Crisis Management in The Process of Global Integration, *Globalization, Innovation and Development, Trends and Prospects*, 45-50, DOI: 0.18662/lumproc/gidtp2022/05.

7. FITCH RATINGS, 2022, *Ukraine*, https://www.fitchra-tings.com/entity/ukraine-80442268.
8. FROLOVA L., YERMAK S., SMOLIAR L., ILYASH O., & BAVYKO O., 2021, Modeling of the economic system actors behavior in the crisis period of COVID-19 pandemic, *Actual issues of modern development of socio-economic systems in terms of the COVID-19 pandemic: scientific monograph:* 158-171.
9. GANDOLFO G., 1991, *Economic Dynamics*, Springer, 612 p.
10. GURTNER B., 2010, The Financial and Economic Crisis and Developing Countries, *International Development Policy*, 1: 189-213.
11. HICKS J. R., 1975, *Value and Capital: An Inquiry into some Fundamental Principles of Economic Theory*, Oxford University Press.
12. HRYNKEVYCH S., ILYASH O., ILICH L., KOZLOVSKYI S., BUHAICHUK N., 2020, Economic Assessment of the Relationship Between Housing and Communal Infrastructure Development Factors and Population Quality of Life in Ukraine, *Montenegrin Journal of Economics*, 16(3): 93-108.
13. ILYASH O., LUPAK R., VASYLTSIV N., TROFYMENKO O. and DZHADAN I., 2021, Modelling of the Dependencies of Industrial Development on Marketing Efficiency, Innovation and Technological Activity Indicators. *Ekonomika*, 100(1): 94–116. DOI: 10.15388/Ekon.2021.1.6
14. KABINET MINITRIV UKRAINY, 2021, National Economic Strategy Of Ukraine For The Period Up To 2030, https://www.kmu.gov.ua/npas/pro-zatverdzhennya-nacionalnoyi-eko-a179.
15. KHAN NU., LI S., SAFDAR MN, & KHAN ZU, 2019, The Role of Entrepreneurial Strategy, Network Ties, Human and Financial Capital in New Venture Performance, *Journal of Risk and Financial Management*, 12(1):41, DOI: 10.3390/jrfm12010041.
16. KYIV SCHOOL OF ECONOMICS, 2022, Project on the collection, evaluation and analysis of information on the material losses of Ukraine from the war with Russia, Official website of the Kyiv School of Economics, https://kse.ua/ua/russia-will-pay.
17. KOZIUK V., HAYDA Y., DLUHOPOLSKYI O, KOZLOVSKYI S., 2020, Ecological performance: ethnic fragmentation versus governance quality and sustainable development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 15(1): 53-64.
18. KOZLOVSKYI S. V., 2010, Economic policy as a basic element for the mechanism of managing development factors in contemporary economic systems, *Actual Problems of Economics*, 1(103): 13-20.
19. KOZLOVSKYI S., BILENKO D., KUZHELIEV M., LAVROV R., KOZLOVSKYI V., MAZUR H., TARANYCH A., 2020, The system dynamic model of the labor migrant policy in economic growth affected by COVID-19, *Global Journal of Environmental Science and Management*, 6 (Special Issue: Covid-19): 95-106.
20. KOZLOVSKYI S., FONITSKA T., 2013, Modern theoretical and methodological approaches to the budget management system forming, *Economic Annals-XXI*, 3-4: 35-37.
21. KOZLOVSKYI S. V., GERASYMENKO Y. V., KOZLOVSKYI V. O., 2010, Conceptual grounds for construction of support system for investment decision-making within agroindustrial complex of Ukraine, *Actual Problems of Economics*, 5(107): 263-275.
22. KREIDYCH I., ROSHCHYNA N., & KAZAK O., 2018, The application of monetary incentive policy in current economic conditions, *Baltic Journal of Economic Studies*, 4(5): 129-139.
23. LEVA M., BALFE N., MCALEER B., & ROCKE M., 2017, Risk registers: Structuring data collection to develop risk intelligence, *Safety Science*, 100: 143-156.
24. MACDONALD D., 2016, *Crisis Theory and Types of Crisis*, http://dustinkmacdonald.com/crisis-theory-types-crisis.
25. MAZHARA G., & KAPUSTYAN V., 2022, Modeling dynamic consumer behavior in the commodity market, *Financial and Credit Activity Problems of Theory and Practice*, *2*(43): 137-145.
26. MOODY`S, 2022, *Global forecasts slip with Russia's invasion on Ukraine,* https://www.moodys.com/ research/Moodys-Global-growth-forecasts-slip-with-Russias-invasion-of-Ukraine--PBC_1330081?cid=YJZ7YNGSROZ5414.
27. MUNNS W., POULSEN V., GALA W., MARSHALL S., REA A., SORENSEN, M., STACKELBERG K., 2017, Ecosystem services in risk assessment and management, *Integr. Environ. Assess. Manag*., 13: 62-73.
28. MUNASINGHE M., 1993, Environmental Economics and Biodiversity Management in Developing Countries, *Ambio*, 22(2/3): 126–135.
29. NBU, Department of Monetary Policy and Economic Analysis, 2022, Monthly Macroeconomic and Monetary Review, July, https://bank.gov.ua/admin_uploads/article/MM_2022-07_eng.pdf?v=4.
30. PETRUK I., 2020, Conceptual approaches to anti-crisis management of regional development, *Innovative economy*, 10(3-4): 105-112.
31. OECD, 2022, *Economic Outlook: The Price of War*, June, https://www.oecd.org/economic-outlook/.
32. OXFORD ECONOMICS, 2022, *Ukraine*, https://blog.oxfordeconomics.com/content/tag/ukraine.
33. PETRU M., 2013, On The Role Of Implementing A Database System In The Risk Communication Process, *Young Economists Journal*, 10(20): 255-258.
34. PRETORIUS O., DREWES, E., ASWEGEN M., MALAN G., 2021, Policy Approach towards Achieving Regional Economic Resilience in Developing Countries: Evidence from the SADC, *Sustainability*, 13: 2674.
35. SCHOTTKE D., & POLLAK A., 2001, *Emergency Medical Responder: Your First Response in Emergency Care*, American Association of Orthopaedic Surgeons. Jones & Bartlett: Suffolk, MA.
36. S&P Global, 2022, *S&P Global Official Website*, https://www.spglobal. com/en/.
37. STATE STATISTICS COMMITTEE OF UKRAINE, 2022, *Official Website*, http://ukrstat.gov.ua.
38. TANEJA S., PRYOR M., SEWELL S., RECUERO A., 2014, Strategic Crisis Management: A Basis for Renewal and Crisis Prevention, *Journal of Management Policy & Practice*, 15(1): 78-85, http://www.na-businesspress.com/JMPP/TanejaSWeb151.pdf

39. TROFYMENKO O., SHEVCHUK O., KOBA N., TASHCHEIEV Y., PAVLENCO T., 2021, Knowledge and Innovation Management for Transforming the Field of Renewable Energy, *Artificial Intelligence and Sustainable Computing for Smart City. AIS2C2 2021. Communications in Computer and Information Science*, 1434: 73-87.
40. UKRAINIAN INSTITUTE FOR THE FUTURE, 2022, *Economic Security Of The State And Scientific And Technological Aspects Of Its Provision*, https://drive.google.com/file/d/1bVEYJ4Zgj3f8XPHh1C2h99TvfLOh2snh/view.
41. UNHCR, 2022, *Ukraine Refugee Situation*, 2022, https://reporting.unhcr.org/ukraine-situation#:~:text=The%20Russian%20Federation's%20military%20offensive,forced%20to%20see.38k%20refuge%20abroad.
42. VOLOSHIN V., GORDIENKO N., 2000, *The concept of sustainable development of Ukraine* (in Ukrainian), *BMT*, 17 p.
43. WCED (WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT, 1987, *Our common future*, Oxford University Press, New York, https://sustainabledevelopment.un.org/ content/documents/5987our-common-future.pdf.
44. WRIGHT B., 2014, *The Cocoanut Grove Nightclub Fire Happened 72 Years Ago in Boston*, http://www.boston.com/news/local-news/2014/11/28/the-cocoanut-grove-nightclub-fire-happened-72-years-ago-in-boston.

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European Experience in the Construction of Territories with Special Economy Regime after an Armed Conflict: A Trajectory of Sustainability

Doświadczenia europejskie w budowie terytoriów o specjalnym reżimie gospodarczym po konflikcie zbrojnym: Trajektoria zrównoważonego rozwoju

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Abstract

This article is due to the presence of a unique situation in Ukraine associated with the armed aggression of the Russian Federation, which increases scientific interest in European cases on the restoration of territorial integrity, mitigation of adverse socio-economic conditions impact after an armed conflict. The article is devoted to the existing European experience research in the construction of territorial units with special functioning conditions through the prism of the sustainable development. This allowed the authors to structure the studied countries into two groups: countries that use special economic zones as a priority tool of state policy (Latvia, Lithuania, Poland) and countries that have experience in developing such territories after an armed conflict (Croatia, Bosnia and Herzegovina). The authors analysed the use of special economic zones in the countries of the first group as part of their state policy to strengthen the socio-economic potential of problem regions and presented the main results of this process. Particular attention is paid to the Balkan experience in the construction of priority development territories after the armed conflict in the context of the sustainable development implementation.

Key words: priority development territories, construction, European experience, armed conflict, sustainable development, Ukraine

Słowa kluczowe: Priorytetowe Terytoria Rozwojowe, budownictwo, Europejskie doświadczenie, konflikt zbrojny, zrównoważony rozwój, Ukraina

1. Introduction

The study of sustainable development determines the importance of the local socio-economic context in the process of development of territories that have survived armed conflicts. In the Ukrainian territories, the orientation in matters of restoring the economic potential of the territories affected by the armed conflict is focused on the construction of priority development territories as a new form of territorial organization. The intensification of Russian aggression at the end of February 2022 and the expansion of active military operations zone in Ukraine actualizes the need to develop effective state tools, which will help restore the competitiveness of the affected territorial units. This is especially important for those areas where the destruction of critical infrastructure facilities and the scale of external and internal migration are catastrophic. It seems possible to solve these issues thanks to the analysis of European cases on the construction of priority development territories or the introduction of other public policy instruments after the armed conflict in order to adapt this experience gained in the Ukrainian conditions. An analysis of recent studies and publications in the field of construction of priority development areas indicates a wide discussion of this issue in the world. Thus, scientists D. Zeng (Zeng, 2021), J. Chaisse and G. Dimitropoulos (Chaisse, Dimitropoulos, 2021), S. Frick, A. Rodriguez-Pose and M. Wong (Frick et al., 2019), K. Christensen and M. Raynor (Christensen, Raynor, 2004), M. Karimov, D. Ilyina, A. Akramov (Karimov et al., 2015) consider the territories of priority development from the of evolutionary point of view, highlighting the territories of management of the first, second and third generations. I. Klim (Klim, 2008), S. Boyenge (Boyenge, 2007) in their works explore the problems of classifying territories with special economic conditions and ensuring their economic, social and environmental development. Positively evaluating the scientific achievements, we should note the discrete level of research into the European experience in the construction of priority development territories after an armed conflict to ensure their restoration and sustainable development, which requires significant improvement and determines the purpose of this scientific work.

2. Using special economic zones as a tool of public policy to strengthen the socio-economic potential of problem regions

The analysis of normative and literary sources of modern European practice on the functioning of territories with freedom in the regime of economic issues and/or with a special administrative regime, preferential conditions of activity, is reduced mostly to the use of different definitions with one content, emphasizing significant gaps and confusion in the application of the conceptual elements and categorical apparatus of the regional economy. It is understood that almost all analysed European countries have experience in the areas creation and construction called *territories with special conditions for economic activity* or *priority development territories, special areas, free economic zones, special economic areas, free trade zones, territories of advanced development*, but in essence these territories are special (free) economic zones, which in turn have several subtypes: *special economic zones (SEZ), free trade zones (FTZ), free economic zones (FEZ),* and *integrated industrial free zones (IIFZs)* (United Nations Conference on trade and development, 2019).
Most often, in the EU there is a mixed form of territories, which has the characteristics of both the first and second group of preferential territories. In addition, in several states there are specific prerequisites for the delimitation of territories characterized by certain functioning features from the territories to which the state should apply special incentives for reconstruction and development, but it requires more detailed study.

2.1. Latvia

The Republic of Latvia example demonstrates the widespread use of Special Economic Zones (SEZs) as a tool for regional development that can ensure sustainable development of backward areas where social and economic components play a crucial role in helping to employ large numbers of people knowledge in the regions.
As of October 1, 2022, there are three special economic zones in Latvia (Liepaja, Latgale, Rēzekne) and two free ports (Riga and Ventspils), on the territory of which the procedure for applying indirect and direct tax benefits is established in accordance with the Law On Taxation in Free Ports and Special Economic Zones. All five zones have the same common goals within the social and economic component of sustainable development: attracting investment, developing infrastructure and production, creating new jobs, promoting export and industrial growth, which in turn improves economic development in the regions (Korpus prava, 2022). However, different business areas are concentrated in the free zones and such differentiation in economic activities requires environmentally responsible decisions and appropriate administrative support in the implementation of the concept of sustainable development of SEZs, and the lack of environmental component only enhances one-sided decision-making and upsets the balance between sustainable development components for weak areas of Latvia. Thus, the administrative-territorial units of the Latgale zone have the lowest level of socio-economic development among other zones, unfavourable environmental situation and, as a consequence, the status of problem areas, so the Latvian government has high hopes that the special economic zone improve the basic indicators of their condition.

To this end, the Latvian government relies on a stable inflow of foreign investment, so the entry of foreign business in the special economic zone of Latvia gives some preferences:
Direct tax benefits:

- business entities that have such organizational and legal forms as a capital company (a legal entity in which the fixed capital consists of shares of fixed capital or the total nominal value of shares; divided into limited liability companies and joint stock companies) (Korpus prava, 2022) or commercial companies (whose activities have received the status of licensed commercial activities) are entitled to direct tax benefits in the amount of 35-55% during the assessment period. This term envisages the process of forest inventory, which ensures the collection and documentation of information on forest lands in accordance with the regulations of the Republic of Latvia, which indicates fragmentary steps towards ensuring the environmental component of sustainable development in the country;
- a certain percentage of reduction (35%, 45% or 55%) is applied in the form of benefits from corporate income tax and real estate;
- special benefits for the payment of real estate tax and income tax (in the amount of 80% of the accrued amount) apply to enterprises with large investment projects (more than 50 million euros).

Indirect tax benefits: capital companies are subject to a zero rate of value added tax and exemption from excise tax on petroleum products.
Until December 31, 2021, the maximum allowable share of state support for a large enterprise in the special economic zone of Latvia was 35% of the accumulated amount of costs, for a medium-sized enterprise - 45%, for a small enterprise - 55%. With the amendments to the Law On Taxation in Free Ports and Special Economic Zones, the amount of basic support from the state has decreased and now stands at 30%. At the same time, the intensity of support can be increased up to twice a year and by 10% in those regions where the population decreased by more than 10% from 2009 to 2020, i.e., assistance in Rēzekne SEZ, Latgale SEZ, Liepaja SEZ and Ventspils Free port can be further increased by 10%, but in the context of ensuring only the social and economic components of sustainable development of territories, leaving the issues of environmental security and construction of priority development areas open.

2.2. Lithuania

The Republic of Lithuania also has the experience of mistaken identification of special (free) zones with territories of priority development, which in the country have the unofficial name *special purpose areas* (Ambroziak, Hartwell, 2018). There are seven such territories in Lithuania, but their official name is still *free economic zones* (FEZ). The first two FEZs in Lithuania were established in Kaunas (1998) and Klaipeda (2002), while the others were established in 2011-2015. Klaipeda FEZ is located on the coast with access to the Baltic Sea, and the other six territories are located within the country.
An important fact for this study is that only some FEZs (Kaunas, Klaipeda and Kėdainiai) are located in regions with relatively low unemployment, while others have much worse social and economic development than the national average and are considered weak. That is, mainly FEZ of Lithuania is located in areas with relatively low income, which need to ensure priority economic development, so the Lithuanian government considers them as areas of priority development (Navickas et al., 2021).
In terms of incentives and incentives, Lithuanian FEZs offer only economic incentives that are determined by the state and approved by the European Commission:

- individuals and legal entities that have invested at least € 1 million are exempt from income tax for all businesses during the first ten years of operation in the Lithuanian FEZ. After the next six years, the corporate income tax is 7.5%, which is half of the total tax (15%);
- for the same category of individuals and legal entities there is a full exemption from real estate taxes and dividends, which is currently indefinite.

It is vital to note that Lithuanian FEZs have a different governance system, where economic incentives are provided by the state, but the activities of special purpose entities are controlled by private companies, without focusing on balancing the sustainable development of these areas. Based on the public tender process, the government selects private FEZ management companies to lease part of the zone's land to the government. Such companies are responsible for general management of the territory, attracting investors and issuing permits for activities that allow them to receive income from subleasing land to investors, as well as from receiving rent for the use of infrastructure and other services they provide in the FEZ. In addition, private companies should to some extent contribute to the FEZ infrastructure at a decent level, which does not relieve Lithuania of the need to invest in these areas (total costs for the FEZ development amounted to 69 million euros in 2005-2020, of which 64% were funded by the EU, 30% - by the Lithuanian government, 6% - by private companies). As private companies, they can often act quickly and flexibly, which encourages investors to get started quickly in the area, but the lack of a clear action plan to ensure its development through sustainable development is increasingly discouraging foreign investors.

3. Poland

Another country that widely uses special economic zones as a tool for building weak and depressed regions is Poland, where as of October 1, 2022 there are 14 SEZs (Ministry of Development and Technology of Poland, 2022), which are located throughout the country. Until 2018, SEZs covered only 0.1% of Poland's area in certain places, but the new regulations on the operation of special zones in 2018 expanded these zones to cover all corners of the country and provide state aid to enterprises regardless of their actual location. The Polish SEZs, which were established between 1995 and 2001, are conceived as interregional entities containing different subzones in different regions of the country and operating until 2026.

Polish SEZs are state-owned companies owned by the relevant treasury or regional authority, which is responsible for managing a specific area. With their permission, investors are provided with certain parts of the zone for economic activities, taking into account the following social and economic incentives:

- exemption from taxes on income and real estate of individuals and legal entities operating in the area. These incentives are used to cover an entity's capital expenditures or to create new jobs that last for at least five years for large businesses and for at least three years for SMEs. Exemption from taxation lasts 10-15 years, depending on the socio-economic condition of the region where the SEZ is located;
- receiving targeted state aid to businesses at the level of 25-50% for large companies, 35-60% for medium-sized companies and 45-70% for small companies.

The amount of state aid and the number of years of its provision also depend on the socio-economic condition of the region in which the SEZ is located (Dorozynski et al., 2021).

The implementation of these incentives is closely linked to the priority recovery of the regions lagging behind in terms of socio-economic development, while the ecological potential of the territory in this regard is usually taken into account in fragments or not considered at all. Despite the non-compliance with the key principles of the concept of sustainable development and shifting the emphasis on the restoration and development of weak areas in the socio-economic direction, the experience of Latvia, Lithuania and Poland has the features of priority development with appropriate successes and failures (Table 1).

Table 1. The main results of the construction of special economic zones to strengthen the socio-economic potential of problem regions, built by authors

Country	*Elements of experience*	
	Major successes	*Major miscalculations*
Latvia	• a successful system of tax incentives, which contributed to attracting investment and increasing the volume of transported goods; • increasing export diversification; • new acquired competencies, knowledge and dissemination of technologies; • mitigation of asymmetries of regional development, transformation of problem regions into new centres of economic activity.	• insufficient level of infrastructure development, which increases uncertainty for potential investors and reduces their interest in the country; • insufficient number of jobs and attracted investments in absolute numbers and relative to the size of the regions where they are located.
Lithuania	• significant amount of attracted investments; • a large number of new jobs, increasing the number of highly skilled labor; higher wages; • quality infrastructure and institutional support; attractive value for money; • significant financial incentives; • new acquired competencies, knowledge and dissemination of technologies; • promoting the economic growth of problem areas (by choosing local suppliers, speed of production start-up, significant reduction of bureaucratic procedures, support of the ecosystem at a high level, constant expansion of opportunities for creation and development of innovative products).	• a fairly high level of initial investment (in the amount of 1 million euros), which provokes a significant number of foreign investors to choose FEZ of other countries; • excessive pragmatism (decisions are made in favour of the employer and potential profits, often without taking into account the public interest).
Poland	• significant amount of attracted investments; • a large number of new jobs, increasing the number of highly skilled workers, including in problem regions; • quality infrastructure; • increasing the share of economically viable small and medium-sized enterprises; • a high degree of concentration of exports of enterprises, which increases the level of their competitiveness; more significant impact from the SEZ is observed on the development of the least developed regions, reducing their unemployment rate.	• deepening regional disparities due to the lack of catch-up of poor regions in terms of growth rates of their more successful neighbours.

Thus, the analysed European countries use special economic zones as a priority tool of public policy, which are effective in terms of social and economic components of territorial development. Latvia, Lithuania and Poland have gained significant success in using SEZs as a priority policy tool to restore the economic potential of problem regions, while ignoring the issue of complementary support for the sustainable development of such areas.
Undoubtedly, the practice of using SEZs and introducing appropriate incentives has the right to be implemented, but it does not promote a balance between the components of sustainable development and does not turn weak regions into priority development territories, the content of which is more complex and complex.

3. Balkan experience in constructing priority development territories after armed conflict in the context of implementing the sustainable development concept

3.1. Croatia

The overall structure of Croatia's regional economy has changed significantly over the last 30 years: since the 1960s, the local population has left rural areas due to the declining share of the agricultural sector in the national economy. This trend accelerated significantly in the 1990s due to the war for independence and integrity of the state against the aggression of the united Greater Serbia forces – Serbian extremists in Croatia, the Federal Yugoslav People's Army and Serbia and Montenegro (Wikipedia, 2022), forcing thousands of families to flee and migrate in Zagreb, Split and Rijeka.
By approving the Law On Local Self-Government and Administration in April 2001, the Croatian government recognized that effective local development begins *from below*. However, this normative legal act lacks specifics on the structural, organizational and administrative features of local development. In fact, municipalities (communities), cities, villages, settlements continue to develop their own individual development plans based on local budgets, which are only enough to cover the minimum current costs, leaving funding for important development projects largely dependent on the state budget or assistance. UN agencies and international non-governmental organizations.
During 2001-2002, the decentralization reform developed a pool of strategic legal acts in favour of new social and economic goals on the ground, which formed the preconditions for the implementation of sustainable development concept in local territorial units.
The idea of decentralization of Croatian power was continued and embodied in several international project instruments implemented in the post-conflict territories from 2001 to 2010, among which the five-year strategy of financial assistance to Croatia by the European Commission - CARDS (The CARDS Country Strategy Paper) 2002-2006 (Horopakha, 2018) and the Strategic Project for Social and Economic Recovery of Croatia in 2002 and 2005 (World Bank Group, 2022) (SPSER) of the World Bank, the EU and the Government of Croatia, which were implemented in parallel, almost at the same time, laying a solid foundation for a comprehensive security and socio-economic issues of deoccupied areas.
The identification of particular concern territories to the state was first implemented under Croatian law in 1996 as an attempt to compensate and stimulate economic development in war-affected areas to return the local population (displaced persons and refugees). Thus, back in 1996, the Law On Territories of Special State Aid was adopted (Zastupnicki Dom Sabora Republike Hrvatske, 1996), which allowed local governments to realize the inevitability of developing areas affected by armed conflict through the introduction of special incentives. Despite the fact that the law was adopted much earlier than the CARDS strategy and the SPSER, the norms of these documents laid the foundation for the restoration of deoccupied territories, and later (in 2008) a new version of the Law On Territories of Special State Aid, some provisions of which remain in force today (Zastupnicki Dom Sabora Republike Hrvatske, 2008).
The drafters of the SPSER regulations relied on the experience of a pilot project previously provided for the creation of a post-conflict fund in the Šibenik-Knin and Zadar regions to accelerate the development and socio-economic situation of areas affected by the armed conflict. The pilot project combined demand-driven social and economic revitalization mechanisms with territorial cohesion to restore broken personal and territorial ties due to the conflict, facilitating and accelerating the transition of these regions to market economies and addressing administrative fragmentation.
The rather successful implementation of the SPSER provisions has laid a solid foundation for restoring the socio-economic potential of Croatia's territories and, at the same time, pointed to the need to amend the existing legal framework for rehabilitating areas affected by armed conflict equate to the development of other regions of the country.
As noted, in 1996, representatives of state and local authorities have already noted the need to identify war-affected areas at the legislative level, which is embodied in the critical Law On Territories of Special State Aid (Zastupnicki Dom Sabora Republike Hrvatske, 1996). The purpose of highlighting these territorial units was to focus on addressing the effects of the war in their specific areas and communities, encouraging displaced persons and refugees to return home, and introducing incentives for socio-economic development. It was determined that the territories of special state aid are created to eliminate the 1991-1995 war, the rapid return of displaced persons and refugees,

to encourage demographic and economic progress, to achieve the most balanced development of all regions of the Republic of Croatia.

Subsequently, in 2008 this law was substantially updated, its provisions provided incentives for demographic renewal of affected areas, return and stay of the population living in the above territories before the 1991-1995 war and settlement of citizens of the Republic of Croatia of all professions, especially those who could contribute to the economic and social development of the territories of special state aid. Also, the return, stay and settlement of people in the territories of special state aid was encouraged by free or discounted housing in the following options:

- rent of a family house or apartment of state property;
- rent of a damaged family house of state property and provision of construction materials;
- donation of state-owned land plots and construction materials for the construction of a family house;
- transfer of construction materials for repair, reconstruction and modernization of a family house or apartment, i.e., construction of a family house on a construction site;
- transfer of state-owned land plots and construction materials for the construction of a residential block in an apartment building;
- donation of a family house or public apartment (Zastupnicki Dom Sabora Republike Hrvatske, 2008).

In addition, the provisions of the Law On Territories of Special State Aid provided for some tax incentives to be implemented in the occupied territories, including:

1. The tax on the transfer of immovable property shall not be payable by citizens who acquire the right to immovable property located in areas of special state aid, provided that they actually reside in these territories.
2. Corporate taxpayers who carry out economic activities related to agriculture and fishing in the territory of special state importance and employ more than five employees for an indefinite period of time, and more than 50% of them live in these areas are not less than nine months pay the tax as follows:
    a) the tax is not paid on the territory of communities and cities belonging to the first group of territories of special state aid;
    b) the tax is paid in the amount of 25% on the territory of communities, cities and towns belonging to the second group of territories of special state aid;
    c) the tax is paid in the amount of 75% on the territory of communities and cities belonging to the third group of territories of special state aid.

Besides, the provisions of Article 24 of this law provided for a separate procedure for payment of income tax for economic entities that carried out economic activities in areas of special state aid, except for agriculture and fisheries, provided employment of more than five employees. more than 50% lived permanently in the occupied territories.

A successful solution for Croatia was the implementation of a comprehensive approach to the definition of *affected areas, occupied territories, post-conflict areas, areas in need of special state supervision/special state care)*, the content of which was combined into a single complex concept *territories of special state aid*, to which in 2008 all territorial units that directly or indirectly suffered from the armed conflict of 1991-1995 were legally included. This helped to pay more attention to the social and economic components of territorial development during 2008-2020, which later repealed the law of the same name, except for those articles that classify these units into three groups (today they still have legal force).

Instead, the imperfect institutional basis of this process in 1996 significantly delayed the process of rebuilding war-torn areas, and prioritizing the social and economic components of development, without considering the environmental potential of regions and communities, led to one-sided administrative decisions. The first important step in rebuilding the territory should be security guarantees for the return of local residents, but they were immediately offered houses and apartments, which was too early because people were afraid to return to their area due to the large number of mined areas. The ill-conceived and premature policy on post-conflict development provided by the 1996 law did not lead to any improvement or tangible effect on the recovery of affected communities, cities and towns, the situation changed only after the implementation of the CARDS and SPSER components.

3.2. Bosnia and Herzegovina

During the four years of protracted war and conflict, Bosnia and Herzegovina has experienced almost complete destruction of its socio-economic system, critical infrastructure, and negative environmental impacts. As of April 1992, when Bosnia and Herzegovina declared independence from Yugoslavia, the country was torn apart by a fierce international war that led to falling production, rising unemployment, inflation and migration. In general, the territorial units were severely damaged, and some areas were completely devastated (Hasic, 2004).

The signing of the Dayton Accords in 1995 divided the country into two semi-autonomous regions, the Republika Srpska and the Federation of Bosnia and Herzegovina, and Brcko County became a buffer zone for the partition of the Republika Srpska (now an entity of Bosnia and Herzegovina). (All three sides in the military conflict lived there – Bosnians, Bosnian Serbs and Croats). After the war, the parties could not agree on the status of Brcko

(which includes the city of Brcko and 57 other villages and settlements), so the Dayton Accords defined the territory de jure part of both the Republika Srpska and the Federation of Bosnia and Herzegovina, controlled by neither one nor the other. There is a special High Representative with a UN mandate in the region, appointed by the guarantors of the agreement, so de facto and de jure this international overseer has more power and authority than local politicians.

The top priority on the post-war reconstruction of the district and the country as a whole was the massive housing reconstruction for the rapid return of refugees and internally displaced persons, road repairs, rehabilitation of housing and communal services, job creation and small business promotion. To this end, the head of the Brcko district went by providing microcredits of 15-20 thousand US dollars, issued without strict conditions and financed by the United States Agency for International Development (USAID). During 1995-2000, EU-funded bridges over the Sava River were rebuilt, and 11 barracks were rebuilt into district courts and schools.

According to foreign scholars (Leese, 2006), the total funding of the US government for the restoration and development of the county from 1999 to 2005 amounted to about 73 US dollars, 45 million of which was spent during 1999-2002.

During 1996-2006, fragmentary steps towards restoring the socio-economic potential of Brcko County and ensuring its sustainable development had positive results, but this was not enough to address the return of displaced persons to the district. In addition, Brcko's artificial alienation from the political and socio-economic spheres of life in Bosnia and Herzegovina has provoked new discontent among all sections of the population: Bosnians, Bosnian Serbs and Croats.

There have been no major developments in this regard, which has helped the authorities of Bosnia and Herzegovina understand the inevitability of change and special measures to rebuild Brcko County, which has suffered most from the 1992-1995 Bosnian war as a zone of ongoing inter-ethnic conflict. In March 2006, the issue of post-conflict economic recovery in the Brcko district was resolved by the Law On the Promotion of Economic Development in the Brcko District of Bosnia and Herzegovina (Skupstina Brcko Districta Bosne I Hercegovine, 2006), which was established under the Brcko District of Bosnia and Herzegovina Law (Skupstina Brcko Districta Bosne I Hercegovine, 2001), in 2001, the implementation of which in itself did not yield significant results. Today, both acts are complementary, effective, they determine the status, possible forms of foreign investment, as well as regulate the establishment, management and termination of enterprises by foreign and local entities.

In order to increase the overall competitiveness of the Brcko district in the single market of Bosnia and Herzegovina, to ensure its development on the principle of sustainability through viable economic development, to stimulate the development of small and medium enterprises, the following preferences were provided:

a) encouraging domestic and foreign investment in Brcko, as well as the export activities of enterprises in order to ensure the social and economic development of the district, increase employment, increase productivity of productive and material resources, professional potential of the available workforce and competitiveness;
b) stimulation of any economic, social, cultural and ecological progress in all spheres of Brcko's life;
c) providing strengths and weaknesses of fiscal and non-fiscal nature.

The largest section of this law contained incentives for foreign investors: first, they were provided with the same rights and responsibilities in the district as local individuals and legal entities, excluding any discriminatory acts against this category of investors, including their nationality, place of residence, religion or country of origin of the investment, which was extremely important given the residence in Brcko of representatives of all parties to the military conflict; secondly, the right to invest and reinvest funds in any sector of economic and non-commercial activities in the district was ensured in the same form and under the same conditions as was determined for domestic investors (residents of Bosnia and Herzegovina). The only exceptions were foreign shares in the capital of enterprises engaged in the production of weapons, ammunition and military explosives in the Brcko district, their size may not exceed 49%.

As well, the provisions of regulations provide for the introduction of incentives and benefits of non-financial and financial nature, designed to improve the business environment in the district, which can be used by business entities subject to their creation and registration in the prescribed manner, location of their head office district, as well as the presence of at least 50% of employees of the enterprise who are permanent residents of Brcko district.

Bosnia's experience in constructing priority territories after the armed conflict also demonstrates steps of a socio-economic nature, leaving the environmental component of sustainable development of the affected areas, mostly de jure.

Today, more than 25 years after the end of the Bosnian war, the country's domestic and foreign policy priorities are still the process of attracting investment, rather than ensuring the sustainable development of weak territories. The military consequences, numerous conflicts and difficulties in labour and pension legislation, lack of a single economic space, ineffective judicial and regulatory protection, and general bureaucratization of political and socio-economic processes are far from a complete list of reasons holding back investment in Bosnia and Herzegovina. The 1992–1995-armed conflict complicated the administrative-territorial system and, as a result, effectively halted opportunities for regional and community development. As a result, Bosnia and Herzegovina has a multilevel

regulatory framework, which is duplicative and contradictory, which does not promote the interest of foreign investors (Sozinova, 2016) and does not accelerate its accession to the European Union (formally submitted in 2016), as the country still needs political reforms.

Thus, over the years of implementation of regulations aimed at rebuilding the affected areas of Croatia and Bosnia and Herzegovina as priority development entities, restoring their social and economic potential, a number of significant results have been achieved in the transformation of territorial units (Table 2).

Table 2. The Balkan experience results in the construction of priority development territories after the armed conflict, built by authors

Country	*Elements of experience*	
	Major successes	*Major miscalculations*
Croatia	• successful implementation of international program tools; • in-depth study of strategic planning; • creation of a significant number of new jobs, emphasis on the development of small businesses and cooperatives; • formation of a single concept of *territory of special state aid*, which included similar in content concepts, which significantly expanded the opportunities for all regions of the country; • active use of incentives for special state aid territories and their effectiveness; implementation of the concept of local economic development to restore social and economic cohesion of the population.	• imperfect institutional basis for the development of the affected regions in 1996 and prematurely proposed incentives for territorial development, which did not live up to expectations due to fears of people returning to their mined areas. Only after the implementation of the program components in 2002-2005, it became possible to gradually restore the economic and social potential of the affected areas.
Bosnia and Herzegovina	• the key role of international donors in rebuilding post-conflict areas; • adoption of separate laws to regulate business activities and encourage the economic development of the post-conflict district of Brcko, effectively giving it the status of a priority development area; • return of refugees, restoration of the infrastructure destroyed during the war and revival of the economy of the Brcko region as a territory of priority development against the background of active financial infusions of international organizations; • gaining experience of modern economic and administrative practices from international experts, which have contributed for some time to a slight reduction in corruption; • faster demining of the affected areas, demarcation of the warring parties, resolving issues with the movement of weapons.	• inability to refuse the help of international donors, dependence on external financial support; • restraining the inflow of investment flows due to the consequences of conflict and complexity in the norms of labour and pension legislation, ineffective judicial protection; • lack of an independent partnership on the territory of Brcko; the territory is isolated from the Bosnian political and socio-economic system; • increasing bureaucratic and corrupt practices, leading to new outbreaks of conflict; • issues of political, economic, social and physical reconstruction of post-conflict areas were unsystematic.

First of all, it concerns the return of refugees, the reconstruction of the infrastructure destroyed during the war and the revival of the region's economy, but this happened against the background of active financial assistance from international organizations. An indisputable achievement was the introduction of modern economic and administrative practices, the experience of which was shared by international experts, but the implementation of the concept of sustainable development in the practice of strategizing the affected areas is still in the moderate stage (Zablodska et al., 2021).

However, the Balkan experience of constructing priority development territories after the armed conflict is characterized by both positive and negative sides, which may be useful for Ukraine to follow a similar path after the war. But in this context, it is extremely important to develop or adapt existing strategies for sustainable development of areas that have survived armed conflicts precisely in terms of the priority of their development in comparison with other territorial units of the country. This applies not only to increasing the competitiveness of post-conflict areas (although this is important), but also to paying more attention to setting priorities and goals not only social and economic but also environmental and balancing these components for effective development of priority territories. This process can be seen as a strategy of collegial economic adaptation of the territories affected by the armed conflict and even as a survival strategy, which is vital in an unstable economic situation provoked by hostilities in Ukraine. Therefore, it is fatefully to intensify or expand existing ideas about the construction of priority development territories and, taking into account the analysed European cases, extrapolate it to the most affected regions of our country (Donetsk, Zaporizhzhia, Kyiv, Luhansk, Mykolaiv, Kharkiv, Kherson, Chernihiv, Sumy regions) as an effective tool of the state regional policy for the restoration and sustainable development of deoccupied territories.

4. Conclusions

Analysis of the results of foreign research on the construction of priority development territories shows a significant amount of experience in the practice of special legal regimes as a tool of public policy aimed at restoring the economic potential of depressed (weak, problematic) regions. Instead, European cases often use the tools of special (free) economic zones for this purpose, which proves its fragmentary effectiveness, as it is able to solve only some problems of weak regions. Unfortunately, the implementation of these tools is not enough to restore the economic potential of territories that have been negatively affected by force majeure and undermined their development potential (especially armed conflicts), which confirms the impossibility of socio-economic transformation and diversification of such areas.

The unique situation in our country related to the armed aggression of the Russian Federation increases scientific interest in European cases on the restoration of territorial integrity, mitigation of adverse socio-economic conditions and development of territories after the armed conflict, which summarizes the existing experience of territorial development entities with special operating conditions in the European Union and structure the studied countries into two groups: countries that use special economic zones as a priority tool of public policy to restore the economic potential of problem regions (Latvia, Lithuania, Poland), and countries with experience in construction such territories after the armed conflict (Croatia, Bosnia and Herzegovina).

Countries that use special economic zones as a priority tool of public policy demonstrate the effectiveness of such practices to restore the economic potential of problem regions: Latvia, Lithuania and Poland show much more positive aspects of this process than negative ones. However, the analysis of normative and literary sources of modern European practice on the functioning of territorial units with a special legal regime indicates the introduction of special tax benefits in such regions, which does not automatically make them a priority area, the content of which is more complex and complex.

Countries with experience in developing priority areas after the recent armed conflicts include Croatia and Bosnia and Herzegovina (Balkan states). The Croatian experience is considered one of the most successful in the restoration of deoccupied territories, hampered by one major factor: an imperfect institutional framework for rebuilding affected regions in 1996. On the other hand, the Bosnian experience in the Brcko region is characterized by major miscalculations, the key of which is the inability to refuse international donors, the country's dependence on external financial support, which still far exceeds investment and the success of developing priority territories.

References

1. AMBROZIAK D., HARTWELL C., 2018, The impact of investments in special economic zones on regional development: the case of Poland and Lithuania, *Regional studies*, 52(10): 1322-1331.
2. BOYENGE S.J.P., 2007, ILO database on export processing zones (Revised), ILO Working Papers, International Labour Office, Geneva, https://www.ilo.org/public/libdoc/ilo/2007/107B09_80_engl.pdf (25.10.2022).
3. CHAISSE J., DIMITROPOULOS G., 2021, Special Economic Zones in International Economic Law: Towards Unilateral Economic Law, *Journal of International Economic Law*, 24 (2): 229–257, DOI: 10.1093/jiel/jgab025.
4. CHRISTENSEN K.M., RAYNOR M.E., 2004, *Solving the problem of innovation in business: how to create a growing business and successfully support its growth*. Alpina Business Books, Moscow.
5. DOROŻYŃSKI T., ŚWIERKOCKI J., DOBROWOLSKA B., 2021, Governance of special economic zones and their performance: Evidence from Poland, *Entrepreneurial Business and Economics Review*, 9(3): 149-167, DOI: 10.15678/EBER.2021.090310.
6. FRICK S.A., RODRÍGUEZ-POSE A., WONG M.D., 2019, Toward Economically Dynamic Special Economic Zones in Emerging Countries, *Economic Geography*, 95 (1): 30-64, DOI: 10.1080/00130095.2018.1467732.
7. HASIC T., 2004, *Reconstruction Planning in Post-Conflict Zones. Bosnia and Herzegovina and the International Community*, Doctoral Dissertation, Royal Institute of Technology, Stockholm, http://www.diva-portal.org/smash/get/diva2:14256/FULLTEXT02.pdf (20.10.2022).
8. HOROPAKHA S., 2018, Republic of Croatia in the European Integration Process (1992-2005), *Evropský politický a právní diskurz*, 5(5): 28-34.
9. KARIMOV M., ILYINA D., AKRAMOV A., 2015, *State and prospects for the development of free economic zones in the Republic of Uzbekistan.* Institute for Forecasting and Macroeconomic Performance, UNDP, Tashkent.
10. KLIM I.V., 2008, Free economic zone as an institution of innovative development of the economy, *Foreign economic bulletin*, 4: 26-32.
11. KORPUS PRAVA, 2022, Comparative Analysis of Organizational and Legal Forms in Latvia, http://www.korpusprava.com/ru/publications/analytics/sravnitelniy-analiz-organizacionno-pravovih-form-v-latvii.html (29.10.2022).
12. LEESE A.N.Z., 2006, *Extended engagement: US development police in Brcko, Bosnia and Herzegovina*, Baltimore, Maryland, https://jscholarship.library.jhu.edu/bitstream/handle/1774.2/32462/etd-plt-050.pdf (20.10.2022).
13. MINISTRY OF DEVELOPMENT AND TECHNOLOGY OF POLAND, 2022, *Two million zł from the FEZ for humanitarian aid to Ukraine*, https://www.gov.pl/web/rozwoj-technologia/2-miliony-zlotych-od-SSE-na-pomoc-humanitarna (12.10.2022).
14. NAVICKAS V., PETROKĖ I., BAČIULIENĖ V., 2021, Impact of free economic zones on regional economic development: the case of Klaipeda free economic zone in Lithuania, *International Journal of Entrepreneurial Knowledge*, 9(1): 97-111, DOI: 10.37335/ijek.v9i1.120.

15. SKUPŠTINA BRČKO DISTRIKTA BOSNE I HERCEGOVINE, 2006, *O podsticaju privrednog razvoja u Brčko distriktu Bosne I Hercegovine, 2006, Zakon od 29 mart 2006*, http://www.podaci.net/_gBiH/propis/Zakon_o_podsticanju/Z-pprazv05v0613-1017.html (22.10.2022).
16. SKUPŠTINA BRČKO DISTRIKTA BOSNE I HERCEGOVINE, 2001, *O produžecima Brčko Distrikta Bosne I Hercegovine, Zakon od 11 jula 2001 (sa izmjenama i dopunama od 29 novembra 2011 godine)*, https://skupstinabd.ba/3-zakon/ba/Zakon%20o%20preduzec-ima%20Brc--ko%20Distrikta%20BiH/000%2049-11%20Zakon%20o%20preduzec-ima%20Brc--ko%20distrikta%20BiH%20prec--is--c-en%20tekst.pdf (25.10.2022).
17. SOZINOVA E.I., 2016, Architectonics of economic transformations in South-Eastern Europe in the context of the EU enlargement process, *Economic space*, 106: 45-57.
18. UNITED NATIONS CONFERENCE ON TRADE AND DEVELOPMENT, 2019, *Special Economic Zones: World Investment Report*, United Nations, Geneva, https://unctad.org/system/files/official-document/wir2019_en.pdf (25.10.2022).
19. WIKIPEDIA. FREE ENCYCLOPEDIA, 2022, *Croatia's war for independence*, https://uk.wikipedia.org/ (30.10.2022).
20. WORLD BANK GROUP, 2022, *Croatia - Social and Economic Recovery Project*, Washington D.C., http://documents.worldbank.org/curated/en/ 998481468770749877/Croatia-Social-and-Economic-Recovery-Project (25.10.2022).
21. ZABLODSKA I., MELNYKOVA O., ROMAKHOVA O. ET AL., 2021, Territorial Dimension for Sustainable Development of Infrastructure Enterprises: Information and Administrative Component, *Management Theory and Studies for Rural Business and Infrastructure Development*, 43(3): 354-362, DOI: 10.15544/mts.2021.32.
22. ZASTUPNIČKI DOM SABORA REPUBLIKE HRVATSKE, 1996*, O područjima posebne državne skrbi, Zakon od 17. svibnja 1996*, https://narodne-novine.nn.hr/clanci/sluzbeni/full/1996_06_44_854.html (24.10.2022).
23. ZASTUPNIČKI DOM SABORA REPUBLIKE HRVATSKE, 2008, *O područjima posebne državne skrbi, Zakon od 15. srpnja 2008*, https://www.zakon.hr/z/471/Zakon-o-podru%C4%8Djima-posebne-dr%C5%BEavne-skrbi (24.10.2022).
24. ZENG D.Z., 2021, The Past, Present, and Future of Special Economic Zones and Their Impact, *Journal of International Economic Law*, 24 (2): 259–275, DOI: 10.1093/jiel/jgab014.

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Challenges of Sustainable Development in International Public Opinion

Wyzwania zrównoważonego rozwoju w międzynarodowej opinii społecznej

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Abstract

The article examines the respondents' opinions on issues related to sustainable development and environmental protection. The analysis is based on the data from the International Social Survey Program, Environment 2022, which covers 14 countries (mainly in Europe and Asia). The findings show that health care, economy and the natural environment are the most important issues for the respondents. Environmental problems that are most frequently selected include: climate change, air pollution, chemicals and pesticides, and using up natural resources. The view that economic growth is necessary to protect the natural environment is relatively common (although those who disagree with this opinion also constitute a large group).

Key words: sustainable development, environment, International Social Survey Program, public opinion

Słowa kluczowe: rozwój zrównoważony, środowisko naturalne, International Social Survey Program, opinia społeczna

Introduction

Sustainable development is based on *three pillars*: society, economy and the environment, which need to be considered together. More in-depth analyses take into account also technical, legal and political dimension of sustainable development (Pawłowski, 2011). Nevertheless, the main idea is the same – people, the environment and the economy are all interrelated. A society that struggles with anxieties, poverty and diseases will not develop in the long run: social welfare and economic prosperity complement each other, and they both depend on a healthy biosphere. In June 1992, representatives of 179 countries gathered together in Rio de Janeiro to participate in the United Nations Conference on Environment and Development, commonly known as the Rio Earth Summit. One of the main documents signed during this conference was an action plan called Agenda 21, which set out the first steps towards sustainable development at local, national and international levels. The signatories declared to continue their actions regarding, among others, the social dimension (e.g.; combating poverty, promoting sustainable urban planning, strengthening the role of local governments and non-governmental organizations) and the environmental dimension (e.g.; protecting and managing ocean resources, combating deforestation). The Rio Summit was followed by other meetings that took place in 2002 and 2012, among others. In 2015, the 2030 Agenda for Sustainable Development was adopted at the UN Sustainable Development Summit. The Agenda includes 17 Sustainable Development Goals (Strange, Bayley, 2008).

To achieve the sustainable development goals, it is necessary to take actions that require making appropriate decisions at various levels of social and economic structure. These decisions are conditioned by many factors. One of these factors that is of great importance is the social component. On the one hand, the decisions that are taken concern and respond to real social needs and problems, and on the other hand, they are made in a specific social

and political context. It is impossible to solve any social problem if there is no public consent to undertake some actions aiming at solving this problem, but also the decision-makers will not be willing to take actions if these will have negative political consequences for them. Therefore, public opinion plays an important role in implementing the sustainable development goals, as actions that do not resonate with the public will not bring the expected results. Public opinion polls are crucial at every level (macro, meso and micro-social) of implementing the sustainable development goals.

Taking a broader perspective, it can be noted that one purpose of public opinion polls (in democratic societies) is to inform public policy making. Opinion polls provide a mechanism for succinctly presenting the views of the public to government leaders who make decisions that will affect society. Leaders often monitor the public pulse when making policy decisions, especially those decisions that have political implications (Paletz et al., 2012).

Public opinion polls on the sustainable development goals have been conducted both by individual researchers and by institutions (e.g., recently by Bain et al., 2019; IPSOS, 2021). These polls fit in with the earlier and much more extensive research on the public's views on the natural environment and ecological attitudes. As a serious scientific activity, research on environmental attitudes dates back to the 1970s. The first studies focused on policies that aimed at measuring the public's environmental concern and support for environmental policies formulated and implemented in most European countries in the late 1960s and early 1970s. Initially, sociologists were interested mainly in the socio-demographic background and political views of *ecologists*. The 80s and early 90s saw a significant development of the research on attitudes towards the natural environment. As global environmental problems started to grow, researchers focused on the multidimensional nature of social attitudes, the role of *environmental knowledge*, conditions for changing behaviors in order to protect the environment, and the public's consent to specific environmental policies. The key issue was a discrepancy between people's declared concern for the environment and their reluctance to become more engaged in pro-ecological behaviors (Rüdig, 2001).

The Sustainable Development Goals include: (1) ending poverty in all its forms everywhere, (2) ensuring healthy lives and promoting well-being for all at all ages, (3) ensuring inclusive and equitable quality education and promoting lifelong learning, (4) reducing inequality within and among countries, (5) making cities and human settlements inclusive, safe, resilient and sustainable, (6) restoring and promoting sustainable use of terrestrial ecosystems, sustainably managing forests, combating desertification, and halting and reversing land degradation and biodiversity loss, (7) promoting peaceful and inclusive societies for sustainable development, and (8) providing access to justice for all and building effective, accountable and inclusive institutions at all levels (Huck, 2022).

The aim of this article is to answer the following research questions: (1) what is (in the public opinion) the most important issue in their country today? (2) what is (in the public opinion) the most important environmental problem in their country today? (3) to what extent do these views differ from country to country? (4) what is the public opinion on the relationship between economic growth and protection of the environment? (5) to what extent do these opinions differ from country to country?

Methodology

The article is based on the most recent data from the International Social Survey Program (ISSP) – Environment. The data comes from the surveys conducted between 2019 and 2021 and was made available in the fall of 2022.

The ISSP is an international comparative research project carried out annually in many countries worldwide. The main idea of the project is to measure variables covering a broad scope of social life, on a regular basis. The ISSP thematic modules are repeated every few years, which enables to observe changes in the selected phenomena. One of the ISSP modules is the ISSP Environment, which was implemented in the years: 1993, 2000, 2010, and between 2019 and 2021 (with most surveys conducted in 2020 and 2021).

14 countries took part in the current edition of the ISSP Environment. These were: Austria, Taiwan, Denmark, Finland, Germany, Hungary, Iceland, Japan, New Zealand, Philippines, Russia, Slovenia, Switzerland, and Thailand (listed in the order of the data set). In total, the research sample consisted of 21,718 respondents. Table 1 shows sample sizes for each country taking into account the year of the survey. The following research methods and techniques were used to collect the data: face-to-face interview: computer-assisted (CAPI / CAMI), telephone interview, self-administered questionnaire: paper, self-administered questionnaire: web-based (CAWI), web-based interview, face-to-face interview: paper-and-pencil (PAPI). The obtained sample is a multi-stage random sample. Most respondents were over 18 years old, except for those in Denmark (who were 18 and over 18) and Finland (over 15) (ISSP, 2022).

A question may be asked about what population is represented in the survey results. Certainly, the sample is not representative of the worldwide population, as the respondents come only from Europe and Asia. This is a methodological problem. That is why, despite the random selection of samples, we use the terminology referring to the structure of particular samples rather than to the population.

Table 1. Sample of ISSP Environment 2019-2021 by country and year of research

Country		2019	2020	2021	Total
Austria	n	0	0	1261	1261
	%	0.0%	0.0%	100.0%	100.0%
Taiwan	n	0	1820	2	1822
	%	0.0%	99.9%	0.1%	100.0%
Denmark	n	0	1198	0	1198
	%	0.0%	100.0%	0.0%	100.0%
Finland	n	0	1137	0	1137
	%	0.0%	100.0%	0.0%	100.0%
Germany	n	0	0	1702	1702
	%	0.0%	0.0%	100.0%	100.0%
Hungary	n	1001	0	0	1001
	%	100.0%	0.0%	0.0%	100.0%
Iceland	n	0	308	842	1150
	%	0.0%	26.8%	73.2%	100.0%
Japan	n	0	1491	0	1491
	%	0.0%	100.0%	0.0%	100.0%
New Zealand	n	0	0	993	993
	%	0.0%	0.0%	100.0%	100.0%
Philippines	n	0	0	1500	1500
	%	0.0%	0.0%	100.0%	100.0%
Russia	n	0	0	1583	1583
	%	0.0%	0.0%	100.0%	100.0%
Slovenia	n	0	966	136	1102
	%	0.0%	87.7%	12.3%	100.0%
Switzerland	n	0	4280	0	4280
	%	0.0%	100.0%	0.0%	100.0%
Thailand	n	0	0	1498	1498
	%	0.0%	0.0%	100.0%	100.0%
Total	n	1001	11200	9517	21718
	%	4.6%	51.6%	43.8%	100.0%

Results

The issues that respondents were asked about included: health care, education, environment, crime, terrorism, poverty, and immigration (*which of these issues is the most important for your country today?*). They are related to the sustainable development goals mentioned in the introduction.

Overall, health care topped the list of the most important issues, with over 37% responses in total (Table 2). It was most often indicated by inhabitants of Hungary, Slovenia, Austria and Iceland (approx. 48-55%), as well as in Germany and the Philippines (approx. 40-42%). Even in those countries where health care was not considered to be a very important issue (Taiwan, Denmark and Japan), it was still selected by no fewer than 25% of respondents. The second most important issue for respondents was economy (approx. 20% in total). Economy was most often selected by inhabitants of Japan, Thailand and Finland (approx. 36-40%) and the least often by those living in Switzerland, Germany and Hungary (approx. 8-10%). Third in importance was the environment (approx. 13% in total). The environment was most often ranked as the most important issue in Switzerland (approx. 26%), Denmark and Germany (approx. 21-22%). Residents of the Philippines, Russia and Thailand, but also those living in Hungary and Slovenia were the least likely to rank environment as the most important issue (less than 2% and approx. 2.7% respectively). Approx. 12% of respondents chose education as the most important issue. These were most often residents of Taiwan and the Philippines (approx. 27%) and the least often – residents of Slovenia (2.7%), Finland (5.3%), and Austria, Thailand and Russia (approx. 7-8%). 9.5% of respondents saw poverty as the most worrying or pathological issue. This problem was selected as the most important one by approx. 22-23% of residents in Russia and Thailand and 13-17% of residents in Hungary, New Zealand, Slovenia and the Philippines. Inhabitants of Taiwan, Denmark and Switzerland were the least likely to view poverty as the most worrying issue (approx. 2-5%). Another social issue was immigration, which was viewed as top concern by 5% of respondents – most often in Denmark and Switzerland (approx. 10%), and the least often in Taiwan, the Philippines and Thailand (0.1-0.3%). Crime was rated as the most important issue by 2.5% of respondents in total, with inhabitants of Taiwan most likely to rank it as the top issue (approx. 8%), and inhabitants of Finland, Iceland and Thailand being the least likely to choose it (0.2-0.5%). Terrorism was at the bottom of the list with only 0.7% responses in total. It was selected relatively frequently by respondents in Russia (approx. 2%).

Table 2. Opinions on most important issue today by country

Country		Health care	Education	Crime	Environ-ment	Immigration	Economy	Terrorism	Poverty	None of these
Austria	n	603	84	49	122	75	228	12	68	9
	%	48.2%	6.7%	3.9%	9.8%	6.0%	18.2%	1.0%	5.4%	0.7%
Taiwan	n	453	455	144	200	6	417	19	42	19
	%	25.8%	25.9%	8.2%	11.4%	0.3%	23.8%	1.1%	2.4%	1.1%
Denmark	n	306	127	26	251	116	279	8	34	12
	%	26.4%	11.0%	2.2%	21.7%	10.0%	24.1%	0.7%	2.9%	1.0%
Finland	n	411	59	5	117	51	403	1	46	14
	%	37.1%	5.3%	0.5%	10.6%	4.6%	36.4%	0.1%	4.2%	1.3%
Germany	n	650	218	28	337	100	167	14	72	19
	%	40.5%	13.6%	1.7%	21.0%	6.2%	10.4%	0.9%	4.5%	1.2%
Hungary	n	542	87	35	26	63	99	9	129	3
	%	54.6%	8.8%	3.5%	2.6%	6.3%	10.0%	0.9%	13.0%	0.3%
Iceland	n	595	81	6	124	20	181	0	86	9
	%	54.0%	7.4%	0.5%	11.3%	1.8%	16.4%	0.0%	7.8%	0.8%
Japan	n	372	138	48	153	18	593	14	97	16
	%	25.7%	9.5%	3.3%	10.6%	1.2%	40.9%	1.0%	6.7%	1.1%
New Zealand	n	289	100	28	138	32	224	1	138	11
	%	30.1%	10.4%	2.9%	14.4%	3.3%	23.3%	0.1%	14.4%	1.1%
Philippines	n	624	384	23	20	2	174	4	256	5
	%	41.8%	25.7%	1.5%	1.3%	0.1%	11.7%	0.3%	17.2%	0.3%
Russia	n	588	123	55	26	56	307	28	361	11
	%	37.8%	7.9%	3.5%	1.7%	3.6%	19.7%	1.8%	23.2%	0.7%
Slovenia	n	538	29	31	29	51	195	3	142	48
	%	50.5%	2.7%	2.9%	2.7%	4.8%	18.3%	0.3%	13.3%	4.5%
Switzerland	n	1455	474	48	1093	429	338	18	210	81
	%	35.1%	11.4%	1.2%	26.4%	10.3%	8.2%	0.4%	5.1%	2.0%
Thailand	n	413	118	3	24	1	584	11	316	1
	%	28.1%	8.0%	0.2%	1.6%	0.1%	39.7%	0.7%	21.5%	0.1%
Total		7839	2477	529	2660	1020	4189	142	1997	258
		37.1%	11.7%	2.5%	12.6%	4.8%	19.8%	0.7%	9.5%	1.2%

Respondents were also asked about the most important environmental problem in their country (as a whole). They were most likely to choose (total data for all countries participating in the survey): climate change (approx. 30%) and air pollution (approx. 17%), slightly less likely – chemicals and pesticides, and using up natural resources (approx. 10%), domestic waste disposal (approx. 9%), and water pollution (approx. 7%) (Table 3).

Climate change as the top environmental problem was selected most often in Japan, Iceland, Finland and Germany (approx. 43-49%) and slightly less often – by inhabitants of Switzerland, Austria and Denmark (approx. 33-38%). Russians were the least likely to rank climate change as the top environmental problem (approx. 7%). Inhabitants of Taiwan (approx. 50%), as well as respondents from Thailand (approx. 37%) and the Philippines and Russia (approx. 23%) were most likely to select air pollution as the key environmental problem in their country whereas residents of New Zealand, the Philippines, Finland and Switzerland were the least likely to consider this issue as the most important environmental problem in their country (approx. 5-8%). Chemicals and pesticides were viewed as the most important environmental problem by inhabitants of Switzerland, Denmark, Slovenia and Thailand (approx. 13-19%), while the problems related to depletion of natural resources were most often reported by inhabitants of Iceland, Switzerland, Finland and Germany (approx. 12-16%). Residents of the Philippines, Russia, Slovenia and Thailand were the most likely to view domestic waste disposal as the top environmental problem (approx. 16-20%). Water pollution was most often mentioned by inhabitants of New Zealand (approx. 20%), as well as in Slovenia, Denmark and Finland (approx. 13-15%).

Another two problems concerned the public's opinion on the relation between economic growth and environmental protection. Respondents were asked two questions: *How much do you agree or disagree with the statement that in order to protect the environment your country needs economic growth?* and *How much do you agree or disagree with the statement that economic growth always harms the environment?* These two related questions reflect the complexity of the analyzed issues.

Table 3. Opinions on most important environmental problem today by country

		Air pollution	Chemicals and pesticides	Water shortage	Water pollution	Nuclear waste	Domestic waste disposal	Climate change	Genetically modified foods	Using up our natural resources	None of these
Austria	n	117	124	57	80	76	85	473	93	123	8
	%	9.5%	10.0%	4.6%	6.5%	6.1%	6.9%	38.3%	7.5%	10.0%	0.6%
Taiwan	n	859	101	60	129	81	136	185	47	99	11
	%	50.3%	5.9%	3.5%	7.6%	4.7%	8.0%	10.8%	2.8%	5.8%	0.6%
Denmark	n	97	164	39	157	13	59	417	46	122	13
	%	8.6%	14.6%	3.5%	13.9%	1.2%	5.2%	37.0%	4.1%	10.8%	1.2%
Finland	n	78	80	5	147	37	46	500	32	142	26
	%	7.1%	7.3%	0.5%	13.4%	3.4%	4.2%	45.7%	2.9%	13.0%	2.4%
Germany	n	111	162	134	72	107	45	697	82	196	16
	%	6.8%	10.0%	8.3%	4.4%	6.6%	2.8%	43.0%	5.1%	12.1%	1.0%
Hungary	n	181	126	61	89	57	82	262	55	66	9
	%	18.3%	12.8%	6.2%	9.0%	5.8%	8.3%	26.5%	5.6%	6.7%	0.9%
Iceland	n	160	69	2	19	10	145	468	24	151	38
	%	14.7%	6.4%	0.2%	1.7%	0.9%	13.4%	43.1%	2.2%	13.9%	3.5%
Japan	n	81	35	11	29	369	97	717	25	70	18
	%	5.6%	2.4%	0.8%	2.0%	25.4%	6.7%	49.4%	1.7%	4.8%	1.2%
New Zealand	n	48	66	131	193	10	123	261	24	66	13
	%	5.1%	7.1%	14.0%	20.6%	1.1%	13.2%	27.9%	2.6%	7.1%	1.4%
Philippines	n	339	52	72	66	59	289	411	15	151	13
	%	23.1%	3.5%	4.9%	4.5%	4.0%	19.7%	28.0%	1.0%	10.3%	0.9%
Russia	n	360	123	30	180	115	287	103	155	169	27
	%	23.2%	7.9%	1.9%	11.6%	7.4%	18.5%	6.6%	10.0%	10.9%	1.7%
Slovenia	n	192	143	14	160	31	174	168	97	76	15
	%	17.9%	13.4%	1.3%	15.0%	2.9%	16.3%	15.7%	9.1%	7.1%	1.4%
Switzerland	n	341	779	116	234	288	109	1362	204	659	66
	%	8.2%	18.7%	2.8%	5.6%	6.9%	2.6%	32.8%	4.9%	15.8%	1.6%
Thailand	n	541	190	140	17	5	231	150	5	97	80
	%	37.2%	13.0%	9.6%	1.2%	0.3%	15.9%	10.3%	0.3%	6.7%	5.5%
Total		3505	2214	872	1572	1258	1908	6174	904	2187	353
		16.7%	10.6%	4.2%	7.5%	6.0%	9.1%	29.5%	4.3%	10.4%	1.7%

Table 4. Opinions on the statement: *in order to protect the environment of the country needs economic growth* by country

		Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly
Austria	n	71	321	367	315	115
	%	6.0%	27.0%	30.9%	26.5%	9.7%
Taiwan	n	67	954	132	570	27
	%	3.8%	54.5%	7.5%	32.6%	1.5%
Denmark	n	136	333	258	169	103
	%	13.6%	33.3%	25.8%	16.9%	10.3%
Finland	n	66	273	279	301	95
	%	6.5%	26.9%	27.5%	29.7%	9.4%
Germany	n	114	405	407	461	149
	%	7.4%	26.4%	26.5%	30.0%	9.7%
Hungary	n	80	324	335	192	22
	%	8.4%	34.0%	35.2%	20,1%	2.3%
Iceland	n	50	223	379	279	121
	%	4.8%	21.2%	36.0%	26.5%	11.5%
Japan	n	226	467	528	87	47
	%	16.7%	34.5%	39.0%	6.4%	3.5%
New Zealand	n	85	313	294	197	57
	%	9.0%	33.1%	31.1%	20.8%	6.0%
Philippines	n	276	872	252	79	12
	%	18.5%	58.5%	16.9%	5.3%	0.8%
Russia	n	611	422	248	157	94
	%	39.9%	27.5%	16.2%	10.2%	6.1%
Slovenia	n	94	333	339	209	58
	%	9.1%	32.2%	32.8%	20.2%	5.6%
Switzerland	n	116	623	1152	1572	569
	%	2.9%	15.5%	28.6%	39.0%	14.1%
Thailand	n	297	686	221	147	42
	%	21.3%	49.2%	15.9%	10.6%	3.0%
Total		2289	6549	5191	4735	1511
		11.3%	32.3%	25.6%	23.4%	7.5%

Taking into account the opinions of all respondents – no matter what country they came from, it can be concluded that approx. 11% of them strongly agree with the statement that their country needs economic growth in order to protect the environment (Table 4). Approx. 32% of respondents agree with this statement, 23.4% – disagree, and 7.5% – strongly disagree. Overall, nearly 44% agree that their country needs economic growth in order to protect

the environment, whereas approx. 31% disagree (approx. 26% of respondents neither agree nor disagree with this statement). Thus, the majority of respondents support the opinion that economic growth is necessary for protecting the natural environment. The difference in opinions, however, is not large and amounts to approx. 13%.

Table 5. Opinions on the statement *economic growth harms the environment* by country

		Agree strongly	Agree	Neither agree nor disagree	Disagree	Disagree strongly
Austria	n	85	392	418	251	58
	%	7.1%	32.6%	34.7%	20.8%	4.8%
Taiwan	n	124	1092	106	424	11
	%	7.1%	62.2%	6.0%	24.1%	0.6%
Denmark	n	50	145	227	301	228
	%	5.3%	15.2%	23.9%	31.7%	24.0%
Finland	n	42	195	282	403	127
	%	4.0%	18.6%	26.9%	38.4%	12.1%
Germany	n	98	355	387	561	144
	%	6.3%	23.0%	25.0%	36.3%	9.3%
Hungary	n	90	354	311	185	26
	%	9.3%	36.6%	32.2%	19.2%	2.7%
Iceland	n	29	88	359	430	142
	%	2.8%	8.4%	34.3%	41.0%	13.5%
Japan	n	110	319	650	184	100
	%	8.1%	23.4%	47.7%	13.5%	7.3%
New Zealand	n	30	154	318	377	75
	%	3.1%	16.1%	33.3%	39.5%	7.9%
Philippines	n	101	438	418	460	58
	%	6.8%	29.7%	28.3%	31.2%	3.9%
Russia	n	255	284	376	394	200
	%	16.9%	18.8%	24.9%	26.1%	13.3%
Slovenia	n	60	235	394	300	61
	%	5.7%	22.4%	37.5%	28.6%	5.8%
Switzerland	n	305	1276	1206	1120	175
	%	7.5%	31.3%	29.5%	27.4%	4.3%
Thailand	n	374	643	191	145	44
	%	26.8%	46.0%	13.7%	10.4%	3.1%
Total		1753	5970	5643	5535	1449
		8.6%	29.3%	27.7%	27.2%	7.1%

Inhabitants of the Philippines (approx. 77%), Thailand (approx. 70%) and Taiwan (approx. 58%) express the strongest support for the statement that economic growth is necessary for environmental protection (answers *definitely yes* and *yes* combined), whereas those who disagree with this statement (answers *definitely not* and *no* combined) live mainly in Switzerland (approx. 53%), Finland, Iceland and Germany (approx. 38-40%).

On the other hand, many respondents see negative effects of economic growth on the natural environment. This view is strongly supported by 8.6% of respondents, supported by 29.3%, 27.2% disagree with this opinion, and 7.1% strongly disagree (Table 5). In total, the view that economic growth harms environment is favored by approx. 38%, whereas 34.3% of respondents disagree with it (approx. 28% of respondents neither agree nor disagree with this statement).

The opinion about the negative impact of economic growth on environmental protection is mostly favored (answers *definitely yes* and *yes* combined) in Taiwan (approx. 73%) and Thailand (approx. 70%). On the other hand, most opponents of this view (answers *definitely not* and *no*) can be found in Denmark (approx. 56%) and Finland (approx. 51%), as well as in Iceland and New Zealand (approx. 45-47%).

Conclusions

(1) Health protection, (2) economy, and (3) the natural environment top the list of the most important issues for inhabitants of the countries participating in the survey. Asked about the most important environmental problems, the respondents most often select: (1) climate change, (2) air pollution, (3) chemicals and pesticides, and (4) using up natural resources. Inhabitants of the countries in the survey relatively often (approx. 44%) believe that economic growth is necessary to protect the natural environment (approx. 33% disagree with this opinion). However, many

respondents (approx. 38%) see the negative effects of economic growth on the natural environment. What is interesting is that the percentage of respondents who believe that economic growth does not have a negative impact on the natural environment is almost the same (approx. 34%).

This last finding requires some comment. It seems that we are dealing here with a situation where the object of the attitude which is difficult to assess, gives rise to ambivalent reactions. Pro-ecological attitudes are fairly well-established in contemporary societies; however, juxtaposing the environmental option with the demands of the economy may lead to seemingly contradictory opinions. The high percentage of respondents who believe that economic growth has a negative impact on the environment, compared to the high percentage of those who claim that economic growth is needed to protect the environment, can be interpreted in the categories of trying to solve the Gordian knot; i.e., to answer the question: how to protect what should be protected and not compromise much on the economy? This is a dilemma that contemporary societies treated as wholes and not reduced to attitudes expressed by individuals, are facing. Such an approach is necessary when making decisions that affect the whole societies.

There are also significant differences in public opinion across countries. Not going into details (which were discussed earlier), we can observe differences between the views held by inhabitants of Europe and Asia, and between the views expressed by respondents from the Scandinavian countries (sometimes including Switzerland) and those living in other European countries. In Asia, opinions also vary from country to country, but they cannot be grouped to form any reasonably consistent pattern. Undoubtedly, many difficulties in interpreting the results can be attributed to a much smaller number of countries that the current ISSP Environment survey covers as compared to its previous editions. In the future, other countries are to be added to the ISSP Environment 2022 data set; however, it is not known yet which countries will be added and when exactly the data set will be updated. This may give rise to concerns as to whether combining data that covers a few (or in fact, many) years in one data set will not result in analyses focusing on the dynamics of changes rather than describing the existing state. These concerns are especially justified in view of a dynamic world situation that we are experiencing nowadays.

References

1. BAIN P.G., KROONENBERG P.M., JOHANSSON L.O. et al., 2019, Public Views of the Sustainable Development Goals across Countries, *Nature Sustainability* 2: 819–825.
2. HUCK W., 2022, *Sustainable Development Goals Article-by-Article Commentary*, Nomos Verlagsgesellschaft.
3. ISSP RESEARCH GROUP, 2022, *International Social Survey Programme: Environment IV – ISSP 2020. GESIS, Cologne. ZA7650 Data file Version 1.0.0*, DOI: 10.4232/1.13921.
4. IPSOS, 2021, U.N. Sustainable Development Goals in 2021: Public Opinion on Priorities and Stakeholders' Commitment, 28-Country Ipsos survey for The World Economic Forum, p. 1-5.
5. KANAZAWA M., 2018, *Research Methods for Environmental Studies. A Social Science Approach*, Routledge, p. 72-94.
6. LOPEZ R. D. (ed.), 2019, *Societal Dimensions of Environmental Science. Global Case Studies of Collaboration and Transformation*, Taylor & Francis Group, p. 2-6.
7. PALETZ D.L., OWEN D., COOK T.E., 2012, *21st Century American Government and Politics*, https://2012books.lardbucket.org/books/21st-century-american-government-and-politics/index.html.
8. PAWŁOWSKI A., 2011, *Sustainable Development as a Civilizational Revolution. A Multidisciplinary Approach to the Challenges of the 21st Century*, Taylor & Francis Group, p. 85-179.
9. RÜDIG W., 2001, Western European Studies: Environment, in: Neil J. Smelser, Paul B. Baltes (eds.), *International Encyclopedia of the Social & Behavioral Sciences*, Pergamon, p. 16464.
10. STRANGE T., BAYLEY A., 2008, *Sustainable Development. Linking Economy, Society, Environment*, OECD.

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Is Globalization Driving the Use of Renewable Energy? A Global Macro Perspective

Czy globalizacja sprzyja rozwojowi energii odnawialnej? Globalna makro-perspektywa

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Abstract

The contemporary world has become increasingly interdependent in terms of economic, social and political development. These various forms of interdependence, usually termed globalization, help disseminate ideas, information, products, and services around the world. Increase in globalization has also increased path-dependence, affecting economic, social, and institutional development and completing some industries, products and technologies to grow in line with the global demand and changing standards. While the role of globalization in economic growth, technology transfer and institutional development is established in literature, the role of globalization in reversing environmental deterioration is not explored yet. The current study looks at how globalization has affected renewable energy use in high, upper middle and lower middle income countries. The empirical results based on a fixed effects model show that countries differ in terms of taking advantage of different types of globalization, i.e., economic, social and political, while transitioning towards renewable energy (RE) projects. Economic globalization has a positive influence on RE usage in the case of high and lower middle income countries, Social globalization in case of high and upper middle income countries. Contrary to the positive impacts of economic and social globalization, political globalization has a negative impact on RE usage in the case of high income countries. In addition to globalization, the effect of government effectiveness, GDP per capita and CO_2 vary across the groups of countries.

Key words: globalization, renewable energy, government effectiveness, GDP per capita, CO_2

Słowa kluczowe: globalizacja, energia odnawialna, skuteczność rządu, PKB per capita, CO_2

Introduction

Globalization is a worldwide phenomenon that impacts many facets of human existence, including social, political, and economic issues (Muhammad & Khan 2021). Industrialization, technology transfer, international trade, and investment are all aided by globalization (Etokakpan et al. 2020; Ibrahiem & Hanafy 2020). For a variety of reasons, rising levels of globalization have the potential not only to boost economic activity but also accelerate the transition to Renewable Energy (RE) technologies, which is in compliance with sustainable development programme and especially fulfil UN Sustainable Development Goal no 7: Affordable and clean energy. The economic, political and social interdependence of countries help to approach the issues of RE technology adoption from multi-pronged strategies. The issue and RE technology adoption entails corporate pressures, financial feasibility issues, public acceptance, political pressure and old-infrastructure that hamper its progress. This multifaceted issue is being resolved through global cooperation and cross-cutting approaches. Some countries, mainly developed and

industrialized, have greater levels of engagement and cooperation in addressing the issues related to RE energy projects in addition to their own capacity to invest and innovate.

Industrialized countries are in a better position to rapidly adopt RE because it necessitates technological advancements allowing for increased output and/or lower unit costs of production from solar and wind sources (Cheon & Urpelainen 2012; Bayer et al., 2013). Given the high degree of innovation required in the generation of renewable energy, highly industrialized countries have historically been the primary source of technological advancements in the field. As the use of fossil-based energy is increasingly becoming costly in addition to negative externalities, the primary focus has been on reducing per unit cost and making the RE projects financially feasible. In this regard, a lot of incentives have been provided by industrialized countries, mainly because these policy incentives are relatively easier to finance and administer in industrialized countries (Awerbuch and Sauter 2006; Lee et al., (2009).

Economic globalization alone supports growth in the renewable energy sector through facilitating investment in infrastructure, international trade, and improvement in technology transfer regulations. Foreign direct investment in renewable energy reached record-high levels –with over USD 23 billion of cross-border investments during the first quarter of 2020 (FDI Markets, 2020). Despite uncertainty during the COVID-19 period, these considerably higher cross-border investments relative to investments in fossil fuels indicate growing investor confidence and the resilience of the renewable energy sector. This also indicates that financing RE projects is becoming less challenging as new financing instruments, international trade and foreign direct investment have turned the renewable energy sector into a driver of economic growth, especially in emerging and developed countries. In this regard, technology transfer regulations are improving to introduce some form of unity, especially through various legislations, such as a global regulatory framework (Koskina et al., 2020; Bin, & Ji 2021).

RE sector was expected to attract lesser investments due to economic turndown during COVID-19 period as significantly low prices of fossil fuel products, the competition is not in favor of RE that generally require more investment in R&D and infrastructure. However, some recent literature that has found positive impact of pandemic on investment in RE sector have highlighted that the decline in prices, employment and supply destruction combined has compelled governments to consider RE projects that are stable, localized and more reliable compared to fossil fuels (Shekhar et. al., 2021; Amir & Khan, 2021; Nawaz & Riaz, 2020). Particularly, the energy importing countries have increased investments in RE sectors during pandemic despite decrease in demand for energy – indicating that in the long-term the governments intend to change their energy mix more towards renewable energy.

Information sharing and cultural closeness are part of social globalization. Information flowing across borders have the ability to enlighten and promote a home country's desire to adopt global best practices in various sectors, including the energy industry. Access to information regarding the implementation of renewable energy projects and their success in replacing non-renewable energy resources not only increases their acceptability in the home country, but it also makes them easier to replicate and build on already developed RE technology. This might lead to significant changes in the home country's energy policy, with a focus on expanding the use of renewable energy and to minimize CO_2 emissions.

Finally, political globalization refers to a country's participation in international treaties as well as the existence of embassies. Given the rising concern about the effects of climate change and its inclusion in agendas of many intergovernmental panels and agreements, it is projected that a more politically globalized country will join global climate change accords and groupings. According to Shahbaz et al., (2018), given recent concerns about environmental sustainability, the flow of information, regulatory frameworks, sanctions, and confidence built through membership in international organizations, countries that join these organizations are more likely to sign treaties addressing mutual interests such as climate change and CO_2 emissions. Furthermore, because RE innovation is vulnerable to environmental externalities, environmental agreements will help to increase RE innovation investments by safeguarding property rights in a way that a single country would not.

Effective environmental governance is also considered an important determinant of Renewable energy consumption (lyulyov et al., 2021; Nchofoung et al., 2021). Generally, a pro-environment government may be more interested and inclined toward policies that boost renewable energy consumption, whereas the liberal capitalist government may not be eco-friendly but rather priorities wealth generation (Murshed et al., 2021). Policies regarding energy consumption from non-renewable resources have dire consequences on the environment and lead to higher levels of pollution. Government initiatives to improve the environment through various policies such as environmental tax that can control the behavior of both consumers and producers, can play an important role in discouraging ecologically harmful activities (Baloch et al., 2021; Nawaz et al., 2021). Moreover, increase in the quality of governance leads to inflow of green investment in the economy and building of renewable energy plants (Adedoyin & Soykan, 2020) On the contrary, some of the studies suggest that strict government regulations in the energy sector led to an outflow of green investments, which limit the extension of renewable energy (Boute, 2020). Overall government effectiveness is important to not only formulate different policies but also effectively implement rules and regulation to encourage RE consumption.

GDP per capita and renewable energy consumption is evident to have a bidirectional relationship (Matei, 2017) as higher GDP per capita tends to increase energy demand it also tends to increase reliance on RE energy sources on other hand the infrastructure investment for renewable energy projects also drive overall economic growth (Awodumi & Adewuyi, 2020; Abbasi et al., 2020A, 2020B). According to the hypothesis of the Environmental Kuznets Curve (EKC), the increase in GDP per capita tends to increase the environmental degradation but in the long run environmental deterioration decreases as the economy grows further indicating that a higher real GDP per capita moves the economy towards more sustainable options and thus more renewable energy consumption (Shahbaz et al., 2018). This argument is supplemented by the fact that renewable energy consumption offers efficient solutions to the problem of climate change and energy security. Moreover, the emerging economies seem to increase the consumption of renewable energy in the wake of issues of energy security (Peng, 2021).
In this study we explore the impact of globalization on renewable energy consumption whereby different aspects of globalization, i.e., economic, social and political globalization is considered separately. This helps us understand the extent to which each type of globalization is important for enhancing RE energy consumption in high, upper middle and lower middle income countries. Moreover, other factors such as GDP per capita, government effectiveness and levels of CO_2 emissions are also used as control factors as these factors also determine the extent to which a county can progress in increasing RE energy consumption. Next section provides details on research methods followed by results and discussions, and conclusion.

1. Research Method

The present study used the panel fixed effects technique to analyze the impact of globalization on renewable energy consumption. The fixed effects model is well behaved in a way that it captures the cross-country differences. For this purpose, this study used the dummy variable for each country because each country has a different level of energy consumption. Thus, we can write equations for the Fixed Effects model as

$$lnRE_{it} = \beta_i + \beta_1 lnEG_{it} + \beta_2 lnSG_{it} + \beta_3 lnPG_{it} + \beta_4 GE_{it} + \gamma_j lnGPC_{it} + \gamma_j lnCO2_{it} + \mu_{it}$$

Where RE is renewable energy consumption, EG is economic globalization, SG is social globalization, PG is political globalization, GE is government effectiveness. GPC is GDP per capita and CO_2 is GDP per capital are control variables used in the model. β_i serve the purpose of capturing the cross-country differences for all countries included in the sample, *ln* represents the variables are in log form.
However, it may always be true that the cross-country differences are captured through separate intercepts. For this case, we need to include an error term along with a common intercept. This approach is suggested by the proponents of the random effects model or the error correction model. It has the feature of identifying intercept separately for each country, that is intercept is of random nature with fixed mean and a random component having mean zero and variance σ^2.

2. Data and Variable Description

The present study uses the time series data from 1996 to 2018 to check the impact of globalization on renewable energy in lower middle, upper middle, and high income countries (a list of countries is provided in the appendix A). The KOF globalization index, developed by Dreher, Axel (2006), is utilized. Economic globalization is measured by the trade flows with other countries, FDI, and portfolio investment, and restrictions on these inflows and outflows. The Social Globalization index is measured by personal contact, information flows, and cultural nearness. Political globalization is measured by the number of embassies in other countries, international organisations membership, UN Security Council missions' meeting membership, and the number of treaties signed with other countries.
There is no evident association between RE use and economic globalization, according to the scatter plot (see figure 1-3). The link is influenced by confounding variables such as the size of the economy, population size, and the consequent overall energy consumption. As a result, economic globalization has a clear positive relationship with the fraction of renewable energy consumption in total energy consumption and RE consumption per capita. Economic globalization levels range significantly between high-income, upper-middle-income, and lower-middle-income countries. Even within these groupings, there is a favourable relationship between economic globalization and renewable energy usage per capita, for example in lower middle-income countries.
In terms of political globalization, there isn't much of a distinction between lower middle and upper middle income countries (figure 4-6).
The scatter plots of RE use, per capita consumption, and share of energy consumption in overall energy consumption demonstrate a clear positive relationship with political globalization. Despite minimal political globalization, Latavia and Iceland have significantly greater RE consumption, per-capita RE consumption, and RE consumption shares in total energy use among developed countries. These countries have low political globalization when compared to the number of lower-middle-income and upper-middle-income countries; this could be because other causes such as economic or social globalization are the main drivers of growing RE consumption.

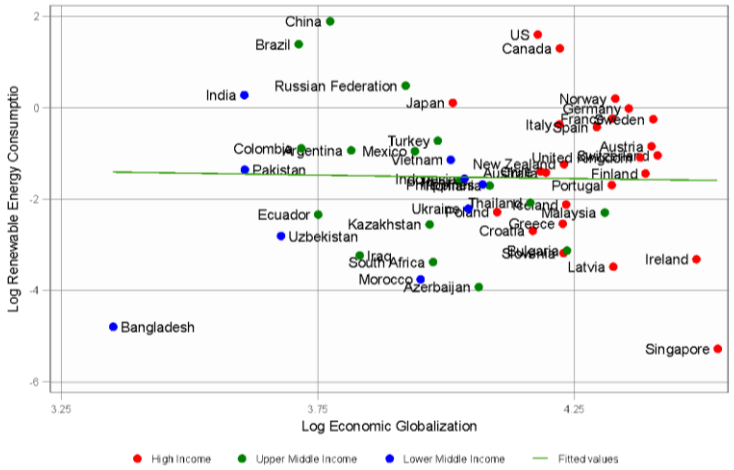

Figure 1. RE consumption and economic globalization

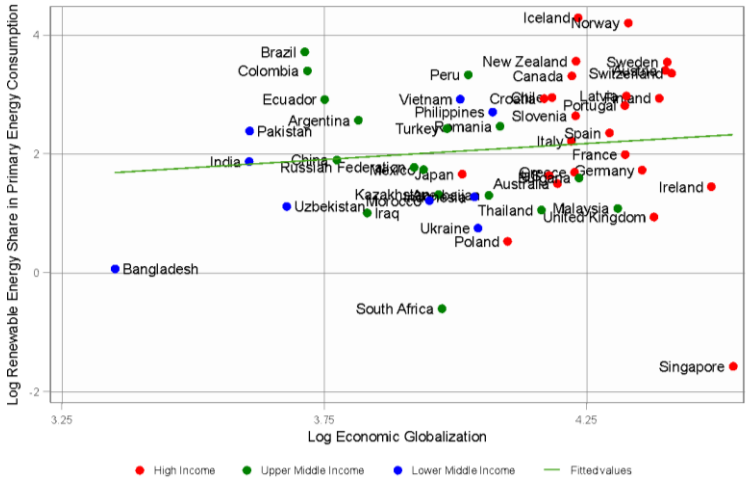

Figure 2. RE share and economic globalization

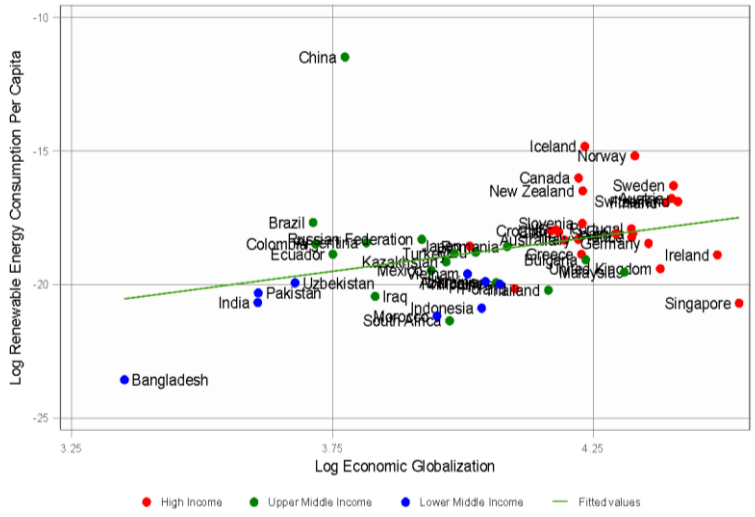

Figure 3. RE consumption per capita and economic globalization

Similarly, social globalization also has positive association with RE consumption (see figure 7-9). Again, lower middle-income countries have lower social globalization compared to middle income countries and high-income countries. Singapore is an outlier in this case, with very low RE energy usage despite having a higher level of social globalization.

This study also takes into account the government role in increasing the renewable energy consumption and for that purpose the government effectiveness is taken as a proxy of government performance. The data of government effectiveness is taken from World governance indicators. GDP per capita, Emission (CO_2) and population are used

as a control variable and data of these variables are taken from the World Bank (2021). The data of Renewable Energy Consumption and Primary Energy (PE) Consumption in exajoules are taken from the International Energy Agency.

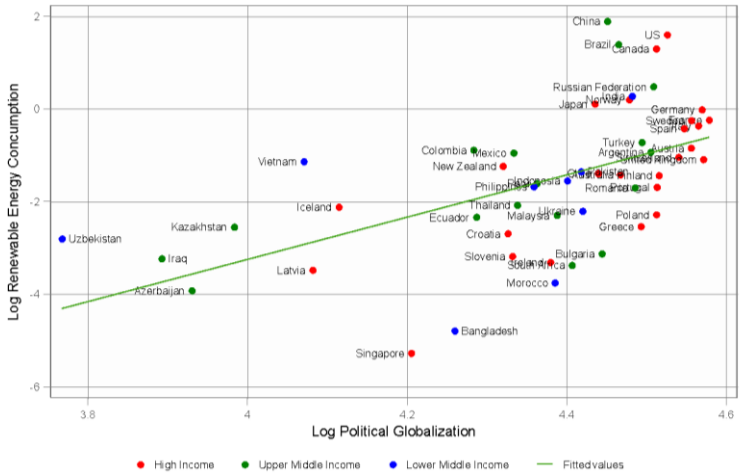

Figure 4. RE consumption and Political globalization

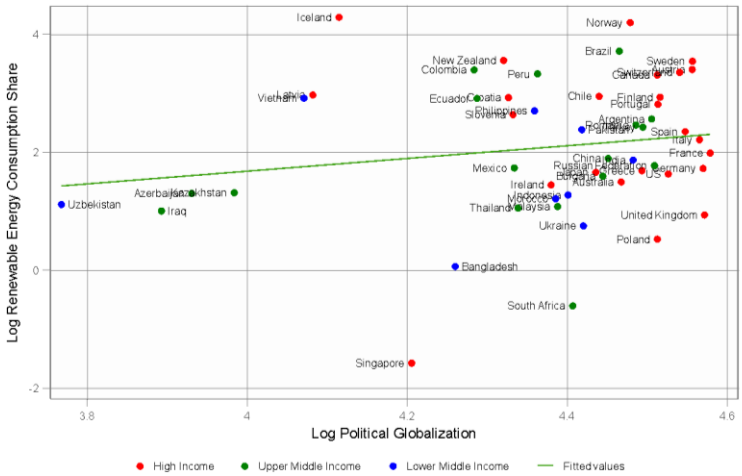

Figure 5. RE consumption share and Political globalization

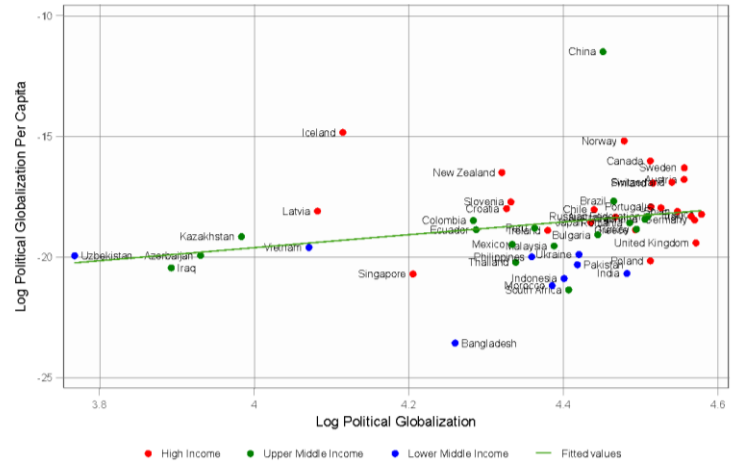

Figure 6. RE consumption per capita and Political globalization

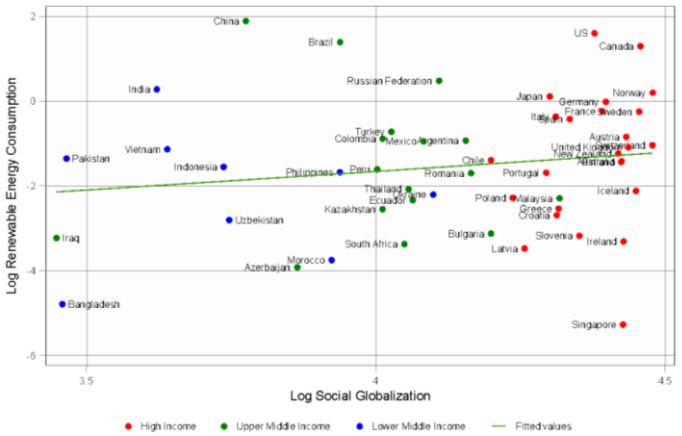

Figure 7. RE consumption and social globalization

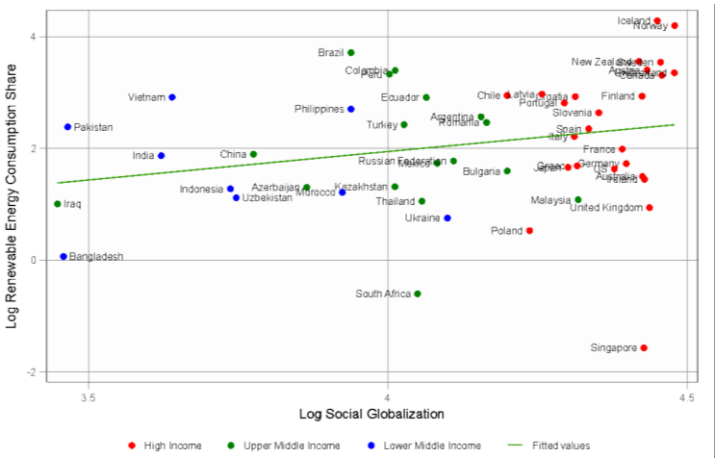

Figure 8. RE consumption share and social globalization

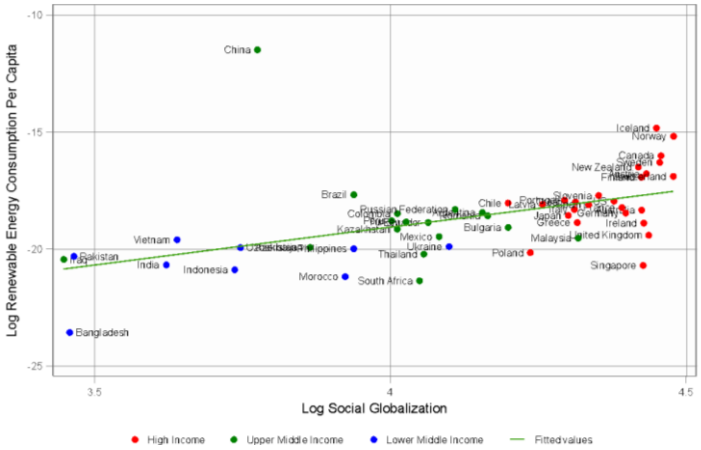

Figure 9. RE consumption per capita and social globalization

3. Results and Discussion

This study investigated the impact of three facets of globalization, i.e. economic, social, and political globalization on the renewable energy consumption relative to primary energy consumption in a panel data of 51 countries. The countries were grouped into high income, upper middle income and lower middle income countries based on world bank classifications and panel fixed effects were employed to achieve our objective. The list of countries is reported in Appendix A.

The descriptive statistics is portrayed in the appendix section. The table (Table 2A) describes the mean, standard deviation, minimum and maximum values of the proposed variables for High income, Middle income and lower middle-income countries. The average value of CO_2 emissions for High income, Middle income and lower middle-income countries are recorded as 0.44 Mtons, 0.632 Mtons, and 0.298 Mtons. The maximum value of CO_2 emission for High income, Middle income and lower middle-income countries are recorded as 5.892 Mtons, 9.653 Mtons and 2.449 Mtons respectively and this indicates a higher value for middle income countries. Economic, Social and Political Globalization for High income countries show an average value of 73.3, 79.9, 86.1, upper middle income countries show an average value of 53.4, 57.0, 77.2 and Lower middle-income countries show an average value of 47.1, 44.08, 74.35 respectively. Similarly, the average values of GDP per capita for High income, Middle income and lower middle-income countries show 33.815 thousand USD, 8.137 thousand USD, and 1.503 thousand USD respectively. The average values of government effectiveness for High income, Middle income and lower middle-income countries show 1.427, -0.074 and -0.406, respectively.

Table 1 presents the results for panel fixed effects. The findings for the combined panel are reported in model 1. Economic and social globalization promote the use of RE relative to PE, with a 1% increase in the economic and social globalization index increasing RE/PE consumption by 0.228% and 1.279%, respectively. On the other hand, political globalization and government effectiveness reduce the RE/PE ratio by 0.297% and 0.291%, respectively. The size of the economy (GDP) and CO_2 emissions have a significant negative relationship with RE/PE use of -1.424% and -1.101%, while their square terms have a significant positive effect of 0.0864% and 0.0257%, respectively. Model 2 reports the same trend for all coefficients except for CO_2 emissions, when only high-income countries are considered. An increase in carbon emissions increases consumption of RE relative to PE in high income countries, while the square term depicts a negative relationship by 0.163%. In model 3, the impact of globalization on RE use in upper middle-income countries is reported. Results reveal that economic and social globalization significantly increased RE/PE utilization by 0.470% and 0.572%, respectively. With increased government effectiveness, RE/PE usage is reduced by 0.326%. Moreover, GDP and CO_2 emissions have a significant negative relationship with RE/PE consumption by 1.619% and 0.707%, respectively; their respective square terms are positively associated by 0.976% and 0.0237%. In the case of low income countries, as reported in model 4, economic globalization and government effectiveness have a significant positive effect on RE/PE use by 0.312% and 0.316%, respectively. Increases in GDP and CO_2 emissions significantly reduce RE usage relative to PE by 2.541% and 0.760%, with their square terms depicting a significant positive association of 0.178% and 0.0646%, respectively.

According to the findings, economic globalization has a positive impact on increasing RE consumption relative to PE usage in all high, upper middle, and low-income countries. The inflow of FDI allows host countries to not only establish businesses and reap profits, but also to become acquainted with advanced energy-efficient production techniques. As a result, economic globalization in the form of FDI inflows, domestic investment, and technological spillovers caused by international trade can play a critical role in extending RE demand (Murshed et al., 2022; Gozgor et al., 2020; Shahbaz et al., 2018; Kutan et al., 2018). Social globalization has a positive and significant association with RE usage relative to PE usage in the overall sample as well as in high and upper middle income countries. This effect, however, is negative but insignificant in low-income countries. The results are similar to Padhan et al. (2020) who postulated that social norms of globalization promote use of RE in OECD countries. Surprisingly, political globalization reduces RE consumption relative to PE consumption in the total sample and high-income countries, though the relationship is insignificant in middle-income countries. Our findings suggest that economic and social globalization are among the main drivers of RE consumption. Moreover, soft power of nations in terms of personal contacts, information dissemination and cultural ties have far reaching repercussions in persuading countries to opt for cleaner and sustainable technologies rather than formal treaties and political connections.

As GDP rises in all groups of countries, consumption of RE relative to PE decreases at an increasing rate. As the economy grows, so does the demand for energy, and countries must rely on both renewable and non-renewable energy sources to meet this increased demand (Ergun et al., 2019; Paramati et al., 2016; Mehrara et al., 2015). Furthermore, in middle and high income countries, government effectiveness has a significant negative relationship with RE use, whereas in lower income countries, the effect is positive. A possible explanation could be that in the low- income countries, successful implementation of government regulations like tax credits on RE production, rebates on installations of RE structures, RE portfolio standards, and establishment of markets for RE certificates encourages the adoption of efficient RE systems (Bowden and Payne, 2010).

Carbon emissions produced by countries have a negative and significant relationship with the use of renewable energy relative to primary energy, and as CO_2 emissions increase, the use of renewable energy relative to primary energy decreases at an increasing rate for middle and low income countries. These countries clearly didn't show much apprehensions about usage of RE compared to PE and could not implement regulations to curb CO_2 emissions (Paramati et al., 2016; Mehrara et al., 2015). On the other hand, as carbon emissions rise, RE consumption relative to PE rises at a slower rate in high-income countries. Concerns about environmental protection grow as

CO_2 emissions rise, encouraging high-income countries to develop and use cleaner RE sources (Omri and Nguyen, 2014).

Table 1. Impact of globalization on Renewable Energy consumption

	(1)	(2)	(3)	(4)
Variables	Overall	High Income Countries	Upper Middle-Income Countries	Lower-Income Countries
lGe	0.228**	0.206	0.470***	0.312**
	(0.111)	(0.247)	(0.151)	(0.156)
lGs	1.279***	4.134***	0.572**	-0.0677
	(0.144)	(0.412)	(0.234)	(0.206)
lGp	-0.297**	-1.709***	-0.119	0.304
	(0.141)	(0.270)	(0.178)	(0.300)
lGdp	-1.424***	-0.720	-1.619***	-2.541***
	(0.159)	(0.504)	(0.418)	(0.595)
lGdp_sqr	0.0864***	0.0372	0.0976***	0.178***
	(0.00847)	(0.0244)	(0.0249)	(0.0405)
Gov_eff	-0.291***	-0.229***	-0.326***	0.316***
	(0.0518)	(0.0745)	(0.0736)	(0.116)
lCO_2	-1.101***	0.163	-0.707***	-0.760***
	(0.159)	(0.409)	(0.253)	(0.236)
lCO_2_sqr	0.0257*	-0.163***	0.0237	0.0646***
	(0.0151)	(0.0433)	(0.0265)	(0.0214)
Constant	3.067***	-6.521***	3.284**	5.969**
	(0.765)	(2.216)	(1.515)	(2.326)
Observations	1,173	575	391	207
R-squared	0.318	0.597	0.230	0.277
Number of countries	51	25	17	9

Standard errors in parentheses, *** p<0.01, ** p<0.05, * p<0.1

Conclusion

An investigation of the impacts of globalization on the usage of renewable energy sources in high, upper-middle, and lower-middle-income countries is presented in this research. Economic, social, and political dimensions of globalization are all considered independently. The fixed effects model results suggest that economic gobalization has positive impact on renewable energy utilisation in upper and lower middle countries. However, it is inconsequential in the case of high income countries. The social globalization has major advantageous effect on renewable energy utilisation in high and upper middle income countries. Nonetheless, the political globalization has adverse impact in high income countries and proven negligible in the upper medium and lower middle income countries. These results show that economic and social globalization is among the key drivers of RE use. Moreover, soft power of nations in terms of human relationships, information distribution and cultural linkages have long-reaching effects in influencing countries to choose cleaner and sustainable technology rather than formal treaties and political connections.

The adverse impact of political globalization in case of high-income countries reflect the current world political system where formulation and execution of rules regarding environmental problems are mainly driven by high-income countries. High income countries that are generally politically strong put relatively more pressure on low-income countries to undertake more responsibilities or at least equal to high income countries in environment protection. Although high income countries are the mainly responsible for current global environmental issues, through the political influence they protect their economic interest, continue low-cost albeit harmful production methods. Correspondingly, in high and upper middle-income countries, government effectiveness negatively affects renewable energy consumption, whereas in lower middle-income countries, it has a positive link.

The relationship between growing income and emissions levels is examined across three groups of countries, and it shows that the effect varies. In low-income countries, the successful implementation of government regulations like tax credits for renewable energy production, rebates for the installation of renewable energy structures, standards for renewable energy portfolios, and the establishment of markets for renewable energy certificates may encourage the adoption of efficient renewable energy systems. As nations' carbon emissions rise, so does their usage of renewable energy relative to primary energy, and in countries with medium and low incomes, this trend is accelerating. These countries showed less concern about the use of RE in comparison to PE and were unable to put rules in place to reduce CO_2 emissions. On the other hand, when carbon emissions grow, RE consumption

relative to PE climbs at a slower pace in high-income countries. Concerns about environmental protection increase as CO_2 emissions rise, driving high-income countries to develop and employ cleaner RE sources.
It is more vital than ever to achieve economic success, and globalization is playing a significant part in economic growth. Our findings suggest that nations should place a priority on renewable energy sources in addition to reaping the advantages of globalization for economic growth. Furthermore, this study recommends that the government should not only focus on increasing renewable energy generation but also motivate consumers to decrease the use of non-renewable energy through various incentives that encourage switching to renewable energy (e.g. Hybrid Car, roof top solar panels, etc.).
In the future research it could be very interesting to find out, what changes brought to the subject COVID-19 pandemic.

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References

1. ABBASI M. A., PARVEEN S., KHAN S., KAMAL M. A., 2020, Urbanization and energy consumption effects on carbon dioxide emissions: evidence from Asian-8 countries using panel data analysis, *Environmental Science and Pollution Research*, 27(15): 18029-18043.
2. ABBASI K., JIAO Z., SHAHBAZ M., KHAN A., 2020, Asymmetric impact of renewable and non-renewable energy on economic growth in Pakistan: New evidence from a nonlinear analysis, *Energy Exploration & Exploitation*, 38(5): 1946-1967.
3. ADEDOYIN O. B., SOYKAN E., 2020, Covid-19 pandemic and online learning: the challenges and opportunities, *Interactive learning environments:* 1-13.
4. AMIR M., KHAN S. Z., 2021, Assessment of renewable energy: Status, challenges, COVID-19 impacts, opportunities, and sustainable energy solutions in Africa, *Energy and Built Environment*.
5. ANTWEILER W., COPELAND B. R., TAYLOR M. S., 2001, Is free trade good for the environment? *American economic review*, 91(4): 877-908.
6. AWERBUCH S., SAUTER R., 2006, Exploiting the oil-GDP effect to support renewables deployment, *Energy Policy*, 34(17): 2805-2819.
7. AWODUMI O. B., ADEWUYI A. O., 2020, The role of non-renewable energy consumption in economic growth and carbon emission: evidence from oil producing economies in Africa, *Energy Strategy Reviews*, 27: 100434.
8. BAYER P., DOLAN L., URPELAINEN J., 2013, Global patterns of renewable energy innovation, 1990-2009, *Energy for Sustainable Development*, 17(3): 288-295.
9. BIN, L., JI, H., 2021, Energy security and economic development in large energy user countries. International Journal of Social Sciences and Sustainability, 1, 4.
10. BALOCH Z. A., TAN Q., KAMRAN H. W., NAWAZ M. A., ALBASHAR G., HAMEED J., 2022, A multi-perspective assessment approach of renewable energy production: policy perspective analysis, *Environment, Development and Sustainability*, 24(2): 2164-2192.
11. BOUTE A., 2020, Regulatory stability and renewable energy investment: The case of Kazakhstan, *Renewable and Sustainable Energy Reviews*, 121: 109673.
12. BOWDEN N., PAYNE J. E., 2010, Sectoral analysis of the causal relationship between renewable and non-renewable energy consumption and real output in the US, *Energy Sources, Part B: Economics, Planning, and Policy*, 5(4): 400-408.
13. CHEON A., URPELAINEN J., 2012, Oil prices and energy technology innovation: An empirical analysis, *Global Environmental Change*, 22(2): 407-417.
14. DREHER A., 2006, Does Globalization Affect Growth? Evidence from a new Index of Globalization call made, *Applied Economics* 38, 10: 1091-1110.
15. ERGUN S. J., OWUSU P. A., RIVAS M. F., 2019, Determinants of renewable energy consumption in Africa, *Environmental Science and Pollution Research*, 26(15): 15390-15405.
16. ETOKAKPAN M. U., SOLARIN S. A., YORUCU V., BEKUN F. V., SARKODIE S. A., 2020, Modelling natural gas consumption, capital formation, globalization, CO_2 emissions and economic growth nexus in Malaysia: Fresh evidence from combined cointegration and causality analysis, *Energy Strategy Reviews*, 31: 100526.
17. GOZGOR G., MAHALIK M. K., DEMIR E., PADHAN H., 2020, The impact of economic globalization on renewable energy in the OECD countries, *Energy Policy*, 139: 111365.
18. IBRAHIEM D. M., HANAFY S. A., 2020, Dynamic linkages amongst ecological footprints, fossil fuel energy consumption and globalization: an empirical analysis, *Management of Environmental Quality: An International Journal*.
19. KOSKINA A., FARAH P. D., IBRAHIM I. A., 2020, Trade in clean energy technologies: sliding from protection to protectionism through obligations for technology transfer in climate change law, or Vice Versa?, *The Journal of World Energy Law & Business*, 13(2): 114-128, DOI: 10.1093/jwelb/jwaa013.
20. KUTAN A. M., PARAMATI S. R., UMMALLA M., ZAKARI A., 2018, Financing renewable energy projects in major emerging market economies: Evidence in the perspective of sustainable economic development, *Emerging Markets Finance and Trade*, 54(8): 1761-1777.
21. LEE H. S., SHEPLEY M., HUANG C. S., 2009, Evaluation of off-leash dog parks in Texas and Florida: A study of use patterns, user satisfaction, and perception, *Landscape and urban planning*, 92(3-4): 314-324.
22. LYULYOV O., PIMONENKO T., KWILINSKI A., DZWIGOL H., DZWIGOL-BAROSZ M., PAVLYK V., BAROSZ P., 2021, The impact of the government policy on the energy efficient gap: The evidence from Ukraine, *Energies*, 14(2): 373.

23. MATEI I., 2017, Is there a Link between Renewable Energy Consumption and Economic Growth? A Dynamic Panel Investigation for the OECD Countries, *Revue d'economie politique*, 127(6): 985-1012.
24. MEHRARA M., REZAEI S., RAZI D. H., 2015, Determinants of renewable energy consumption among ECO countries; based on Bayesian model averaging and weighted-average least square, *International Letters of Social and Humanistic Sciences*, 54: 96-109.
25. MUHAMMAD B., KHAN S., 2021, Understanding the relationship between natural resources, renewable energy consumption, economic factors, globalization and CO_2 emissions in developed and developing countries, *Natural Resources Forum*, 45(2): 138-156.
26. MURSHED M., ELHEDDAD M., AHMED R., BASSIM M., THAN E. T., 2022, Foreign direct investments, renewable electricity output, and ecological footprints: do financial globalization facilitate renewable energy transition and environmental welfare in Bangladesh?, *Asia-Pacific Financial Markets*, 29(1): 33-78.
27. MURSHED M., AHMED Z., ALAM M. S., MAHMOOD H., REHMAN A., DAGAR V., 2021, Reinvigorating the role of clean energy transition for achieving a low-carbon economy: evidence from Bangladesh, *Environmental Science and Pollution Research*, 28(47): 67689-67710.
28. NAWAZ, S. M. N., RIAZ, T., 2021, Examining People Behavioral Responses to COVID-19: The Role of Socioeconomics, Risk Perceptions, and Media in Pakistan. International Journal of Social Sciences and Sustainability, 1(1).
29. NAWAZ, S. M. N., ALVI, S., AKMAL, T. (2021). The impasse of energy consumption coupling with pollution haven hypothesis and environmental Kuznets curve: a case study of South Asian economies. *Environmental Science and Pollution Research, 28*(35), 48799-48807.
30. NCHOFOUNG T. N., ACHUO E. D., ASONGU S. A., 2021, Resource rents and inclusive human development in developing countries, *Resources Policy*, 74: 102382.
31. Omri A., Nguyen D. K., 2014, On the determinants of renewable energy consumption: International evidence, *Energy*, 72: 554-560.
32. PADHAN H., PADHANG P. C., TIWARI A. K., AHMED R., HAMMOUDEH S., 2020, Renewable energy consumption and robust globalization (s) in OECD countries: Do oil, carbon emissions and economic activity matter?, *Energy Strategy Reviews*, 32: 100535.
33. PARAMATI S. R., UMMALLA M., APERGIS N., 2016, The effect of foreign direct investment and stock market growth on clean energy use across a panel of emerging market economies, *Energy Economics*, 56: 29-41.
34. PENG X., LIU Z., JIANG D., 2021, A review of multiphase energy conversion in wind power generation, *Renewable and Sustainable Energy Reviews*, 147: 111172.
35. SHAHBAZ M., SHAHZAD S. J. H., MAHALIK M. K., SADORSKY P., 2018, How strong is the causal relationship between globalization and energy consumption in developed economies? A country-specific time-series and panel analysis, *Applied Economics*, 50(13): 1479-1494.
36. SHEKHAR J., SURI D., SOMANI P., LEE S. J., ARORA M., 2021, Reduced renewable energy stability in India following COVID-19: Insights and key policy recommendations, *Renewable and Sustainable Energy Reviews*, 144: 111015.

Appendix

Table 1. List of High Income, Middle and Lower middle income countries

HIC	MIC	LMIC
Australia	Argentina	India
Austria	Azerbaijan	Indonesia
Canada	Brazil	Morocco
Chile	Bulgaria	Pakistan
Croatia	Colombia	Philippines
Finland	Ecuador	Ukraine
France	Iraq	Uzbekistan
Germany	Kazakhstan	Vietnam
Greece	Malaysia	Bangladesh
Iceland	Mexico	
Ireland	Peru	
Italy	Romania	
Japan	South Africa	
Latvia	Thailand	
New Zealand	Turkey	
Norway	Russian Federation	
Poland	China	
Portugal		
Singapore		
Slovenia		
Spain		
Sweden		
Switzerland		
United Kingdom		
USA		

Table 2. Descriptive Statistics

Countries	Carbon Dioxide Emissions (M.tons)				Globalization E			
	Mean	St.Dev	Min	Max	Mean	St.Dev	Min	Max
Australia	0.381	0.024	0.024	0.415	66.34	2.29	61.13	70.04
Austria	0.066	0.005	0.005	0.075	81.45	1.50	1.50	83.98
Canada	0.549	0.020	0.020	0.578	68.16	1.51	1.51	71.08
Chile	0.072	0.015	0.015	0.094	66.18	7.45	7.45	74.65
Croatia	0.018	0.002	0.002	0.022	65.13	6.70	6.70	74.84
Finland	0.058	0.008	0.008	0.075	80.52	2.02	2.02	83.22
France	0.357	0.030	0.030	0.390	75.47	1.85	1.85	79.21
Germany	0.816	0.048	0.048	0.872	77.96	2.30	2.30	81.02
Greece	0.094	0.014	0.014	0.113	68.64	3.45	3.45	73.83
Iceland	0.003	0.000	0.000	0.004	69.03	2.83	2.83	75.31
Ireland	0.042	0.004	0.004	0.048	88.88	1.06	1.06	91.07
Italy	0.403	0.050	0.050	0.470	68.09	2.06	2.06	72.79
Japan	1.230	0.047	0.047	1.297	55.70	6.59	6.59	67.72
Latvia	0.008	0.000	0.000	0.009	75.75	4.67	4.67	81.98
New Zealand	0.035	0.002	0.002	0.038	68.69	1.39	1.39	71.55
Norway	0.037	0.001	0.001	0.039	75.89	1.36	1.36	78.33
Poland	0.314	0.014	0.014	0.324	61.33	9.87	9.87	73.27
Portugal	0.056	0.005	0.005	0.065	75.42	2.47	2.47	80.38
Singapore	0.154	0.044	0.044	0.229	92.67	1.52	1.52	94.63
Slovenia	0.015	0.001	0.001	0.017	69.00	6.34	6.34	77.48
Spain	0.311	0.035	0.035	0.381	73.26	2.30	2.30	77.32
Sweden	0.056	0.007	0.007	0.065	81.75	2.01	2.01	84.35
Switzerland	0.042	0.002	0.002	0.046	82.46	2.43	2.43	86.94
United Kingdom	0.526	0.061	0.061	0.585	79.69	1.57	1.57	82.02
US	5.486	0.280	0.280	5.892	65.28	1.79	1.79	68.21
Argentina	0.158	0.026	0.118	0.193	45.73	5.75	35.85	53.60
Azerbaijan	0.036	0.005	0.027	0.043	58.89	9.01	39.43	72.04
Brazil	0.375	0.074	0.273	0.508	41.20	4.42	31.01	47.47
Bulgaria	0.047	0.004	0.041	0.057	69.38	6.71	58.18	78.06
Colombia	0.068	0.014	0.052	0.093	41.45	4.96	32.76	48.93
Ecuador	0.030	0.006	0.022	0.040	42.73	4.21	37.03	53.35
Iraq	0.112	0.032	0.064	0.171	46.36	4.76	40.20	53.56
Kazakhstan	0.173	0.045	0.104	0.255	53.15	5.62	40.14	60.99
Malaysia	0.188	0.052	0.101	0.258	74.37	1.69	70.42	77.03
Mexico	0.422	0.057	0.315	0.486	51.62	5.33	43.25	60.00
Peru	0.036	0.012	0.025	0.057	56.21	5.60	47.83	64.28
Romania	0.089	0.015	0.070	0.126	60.33	10.34	41.64	72.22
South Africa	0.428	0.045	0.357	0.476	53.61	6.17	35.20	58.69
Thailand	0.231	0.047	0.164	0.300	64.35	2.58	55.94	67.25
Turkey	0.264	0.070	0.175	0.397	53.75	2.41	50.04	58.00
Russian Federation	1.530	0.054	1.445	1.606	50.52	2.91	44.15	55.29
China	6.552	2.535	3.163	9.653	43.77	4.52	34.47	51.88
India	1.474	0.530	0.817	2.449	37.91	8.40	21.19	46.31
Indonesia	0.392	0.111	0.216	0.575	56.92	6.55	48.52	70.76
Morocco	0.044	0.011	0.028	0.062	52.19	5.26	44.04	60.44
Pakistan	0.131	0.033	0.085	0.198	36.98	2.89	33.61	43.89
Philippines	0.082	0.021	0.062	0.134	58.72	3.89	52.56	64.63
Ukraine	0.297	0.053	0.188	0.366	57.36	6.55	42.93	66.01
Uzbekistan	0.111	0.007	0.098	0.125	39.85	5.04	32.91	56.92
Vietnam	0.105	0.060	0.032	0.241	55.27	4.79	46.94	61.27
Bangladesh	0.046	0.022	0.018	0.089	28.87	4.39	20.98	34.94
Australia	83.58	4.10	75.43	88.22	87.13	1.74	83.12	89.17
Austria	84.22	3.24	3.24	88.15	95.20	0.62	0.62	96.04
Canada	86.32	3.20	3.20	90.21	91.13	0.75	0.75	92.42
Australia	83.58	4.10	75.43	88.22	87.13	1.74	83.12	89.17

Countries	Globalization S				Globalization P			
	Mean	St.Dev	Min	Max	Mean	St.Dev	Min	Max
Austria	84.22	3.24	3.24	88.15	95.20	0.62	0.62	96.04
Canada	86.32	3.20	3.20	90.21	91.13	0.75	0.75	92.42
Chile	66.99	6.57	6.57	75.06	84.80	2.68	2.68	87.89
Croatia	74.98	6.51	6.51	82.94	76.64	9.90	9.90	85.79
Finland	83.49	3.07	3.07	87.19	91.45	1.17	1.17	93.65
France	80.90	5.04	5.04	87.00	97.37	0.69	0.69	98.06
Germany	81.47	5.44	5.44	87.99	96.50	0.75	0.75	97.90
Greece	75.12	5.72	5.72	82.83	89.42	1.72	1.72	92.04
Iceland	85.61	1.91	1.91	89.76	61.43	4.54	4.54	69.73
Ireland	83.89	4.25	4.25	89.51	79.81	1.13	1.13	81.53
Italy	74.69	4.78	4.78	80.56	96.09	1.86	1.86	97.97
Japan	73.92	4.70	4.70	80.22	84.43	2.43	2.43	88.26
Latvia	71.09	7.82	7.82	80.50	60.04	9.06	9.06	77.27
New Zealand	83.09	3.43	3.43	86.70	75.24	1.89	1.89	77.57
Norway	88.15	2.66	2.66	91.19	88.11	1.27	1.27	89.91
Poland	69.53	6.73	6.73	78.31	91.15	1.07	1.07	93.59
Portugal	73.54	5.69	5.69	81.08	91.22	1.52	1.52	93.18
Singapore	83.79	3.75	3.75	88.70	67.19	4.18	4.18	72.86
Slovenia	77.76	4.51	4.51	83.40	76.61	6.27	6.27	83.71
Spain	76.54	5.32	5.32	82.92	94.39	1.99	1.99	96.96
Sweden	86.10	2.31	2.31	89.75	95.23	0.76	0.76	96.43
Switzerland	88.10	2.55	2.55	91.72	93.72	1.07	1.07	95.62
United Kingdom	84.62	4.52	4.52	89.51	96.68	0.40	0.40	97.64
US	79.84	5.05	5.05	86.56	92.39	0.30	0.30	92.89
Argentina	64.22	7.60	49.78	72.68	88.08	11.94	33.40	91.47
Azerbaijan	48.67	9.82	32.51	59.62	52.08	10.94	33.75	73.03
Brazil	52.07	8.90	36.61	63.09	86.95	2.64	83.49	90.54
Bulgaria	67.24	9.18	51.79	77.33	85.16	1.77	80.38	87.94
Colombia	55.61	6.46	46.55	62.89	72.77	6.42	61.58	79.78
Ecuador	58.69	7.67	44.38	67.11	73.03	6.35	60.81	78.00
Iraq	32.05	6.37	23.16	41.03	49.16	3.51	44.29	54.91
Kazakhstan	56.10	10.01	42.61	68.69	55.00	12.00	37.38	70.76
Malaysia	75.33	7.17	62.91	83.40	80.57	4.24	72.47	84.88
Mexico	59.75	7.40	44.50	67.22	76.43	5.84	68.48	87.76
Peru	55.24	7.57	39.87	62.82	78.74	6.45	65.12	84.32
Romania	65.21	10.52	46.85	76.32	88.75	2.11	85.25	91.07
South Africa	57.82	7.53	46.83	67.20	82.58	9.37	58.02	89.66
Thailand	58.37	8.50	44.73	69.63	76.71	4.71	65.94	81.29
Turkey	56.79	9.05	41.62	66.85	89.54	2.59	84.42	92.70
Russian Federation	61.54	8.84	47.23	72.14	90.83	1.62	87.91	92.69
China	45.10	10.99	22.55	57.82	85.81	4.13	77.47	90.28
India	39.03	11.13	21.61	51.89	88.49	3.49	81.36	92.24
Indonesia	42.80	8.51	28.66	53.02	81.62	4.27	75.20	87.60
Morocco	51.35	8.97	36.55	65.10	80.71	8.31	63.61	87.11
Pakistan	33.20	8.74	17.33	42.61	82.96	2.43	78.05	85.32
Philippines	51.63	5.77	39.18	61.45	78.46	6.53	62.46	83.35
Ukraine	61.04	9.69	45.77	72.77	83.25	5.06	71.56	88.56
Uzbekistan	42.63	4.73	30.97	51.13	43.65	5.67	32.85	50.19
Vietnam	41.09	15.31	18.60	61.55	59.16	8.54	49.43	73.76
Bangladesh	33.98	12.05	16.63	48.12	70.84	2.69	65.82	74.11
Australia	40.74	17.32	19.49	68.15	1.71	0.11	1.54	2.01
Austria	39.94	10.03	10.03	51.72	1.76	0.19	0.19	2.04
Canada	37.48	11.08	11.08	52.67	1.85	0.10	0.10	2.03

Countries	GDP (000 USD)				Government Effectiveness			
	Mean	St.Dev	Min	Max	Mean	St.Dev	Min	Max
Chile	9.85	4.25	4.25	15.89	1.17	0.08	0.08	1.28
Croatia	10.62	3.77	3.77	16.30	0.46	0.16	0.07	0.71
Finland	39.44	10.05	10.05	53.55	2.10	0.11	0.11	2.26
France	34.67	7.72	7.72	45.33	1.55	0.16	0.16	1.84
Germany	36.93	8.42	8.42	47.96	1.61	0.12	0.12	1.89
Greece	20.11	5.75	5.75	32.00	0.54	0.20	0.16	0.82
Iceland	47.13	13.81	13.81	74.47	1.81	0.30	0.30	2.34
Ireland	46.94	15.34	15.34	79.07	1.55	0.14	0.14	1.74
Italy	30.47	6.40	6.40	40.78	0.58	0.19	0.19	0.80
Japan	38.69	4.33	4.33	49.15	1.40	0.24	0.24	1.82
Latvia	9.80	5.19	2.97	17.85	0.67	0.23	0.23	1.09
New Zealand	29.09	10.66	10.66	44.57	1.78	0.09	0.09	1.96
Norway	68.17	23.45	23.45	102.9	1.91	0.07	0.07	2.08
Poland	9.57	3.98	3.98	15.47	0.56	0.11	0.11	0.75
Portugal	18.34	4.48	4.48	24.85	1.10	0.11	0.11	1.33
Singapore	39.52	15.21	15.21	66.68	2.12	0.16	0.16	2.44
Slovenia	18.84	5.80	5.80	27.48	0.99	0.12	0.12	1.19
Spain	24.77	6.57	6.57	35.37	1.33	0.39	0.39	1.92
Sweden	45.36	11.44	11.44	61.13	1.92	0.14	0.14	2.12
Switzerland	65.13	18.98	18.98	91.25	1.98	0.09	0.09	2.18
United Kingdom	38.07	7.16	7.16	50.44	1.72	0.17	0.17	1.95
US	45.72	8.95	8.95	63.06	1.51	0.22	0.22	2.00
Argentina	9.01	3.50	2.59	14.61	-0.02	0.21	-0.32	0.48
Azerbaijan	3.44	2.72	0.41	7.89	-0.67	0.27	-1.01	-0.16
Brazil	7.34	3.45	2.83	13.25	-0.09	0.15	-0.45	0.20
Bulgaria	5.06	2.78	1.36	9.43	0.08	0.11	-0.20	0.25
Colombia	4.71	2.15	2.21	8.22	-0.16	0.15	-0.46	0.07
Ecuador	3.91	1.76	1.45	6.38	-0.71	0.25	-1.10	-0.26
Iraq	3.40	2.17	0.50	7.08	-1.55	0.38	-2.26	-1.10
Kazakhstan	6.23	4.40	1.13	13.89	-0.50	0.30	-0.96	0.02
Malaysia	7.24	2.93	3.26	11.38	1.03	0.17	0.54	1.27
Mexico	8.34	1.82	4.41	10.93	0.17	0.12	-0.16	0.36
Peru	4.09	1.98	1.92	6.96	-0.32	0.24	-0.73	0.17
Romania	6.23	3.76	1.58	12.40	-0.21	0.17	-0.57	0.16
South Africa	5.15	1.67	2.50	8.01	0.54	0.20	0.29	1.02
Thailand	4.07	1.79	1.85	7.30	0.31	0.10	0.09	0.46
Turkey	7.95	3.42	3.05	12.61	0.12	0.19	-0.26	0.41
Russian Federation	7.56	4.89	1.33	15.97	-0.39	0.18	-0.73	0.00
China	44.61	28.76	15.65	93.02	1.09	0.33	0.39	1.47
India	1.02	0.55	0.40	2.00	-0.05	0.12	-0.21	0.28
Indonesia	2.14	1.26	0.46	3.89	-0.31	0.22	-0.71	0.18
Morocco	2.32	0.72	1.33	3.23	-0.13	0.07	-0.28	0.00
Pakistan	0.90	0.35	0.45	1.48	-0.56	0.20	-0.82	-0.17
Philippines	1.90	0.85	0.97	3.25	-0.05	0.14	-0.31	0.19
Ukraine	2.14	1.17	0.64	4.03	-0.62	0.13	-0.88	-0.41
Uzbekistan	1.22	0.79	0.38	2.62	-0.96	0.28	-1.40	-0.55
Vietnam	1.13	0.76	0.32	2.57	-0.28	0.19	-0.58	0.07
Bangladesh	0.75	0.41	0.39	1.70	-0.70	0.13	-0.91	-0.32

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Research on The Path of Carbon Emission Trading in China Under The Double Carbon Background

Badanie ścieżki handlu uprawnieniami do emisji dwutlenku węgla w Chinach w kontekście podwójnego węgla

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Abstract

With the continuous development of the global economy, the rapid deterioration of the global ecological environment has caused a huge impact on the future development of the world. In order to solve the problem of global warming and enhance the self-development capacity of all countries, based on the concept of sustainable development, China has set the ambitious goal of *dual carbon*. To this end, China is actively promoting the establishment of a national carbon emissions trading system. In response to low price competitiveness, such as nonstandard trading system, the influence of the development of the carbon emissions trading system in the future, should not only attach importance to enrich and strengthen the basic function of the carbon market, also continue to carbon pricing system and in-depth reform of the fiscal and taxation system, clear up the thoughts to the carbon market trading rules, is on its relevant rights and obligations, firmly adhere to steadily promote carbon market links between countries. Currently, China's carbon emission trading is still in its infancy, and its effect is still limited in specific practice. Meanwhile, carbon emission trading markets in developed countries such as the United States and the United Kingdom have begun to implement *carbon tariffs* and other means to maintain their carbon borders. Therefore, the construction of carbon emission trading is necessary for development, but also for the sustainable development of the country. The lag of China's carbon emission market leads to the worsening of the problem of carbon excess emissions of industries in the regions not covered, and the increased economic burden caused by the carbon barriers of other countries in foreign trade. Of course, this requires China take the path of sustainable development to continue to strengthen the system construction of carbon emission rights and promote the further optimization of their functions.

Key words: Double Carbon, carbon emission rights, trading market, sustainable development, zrównoważony rozwój

Słowa kluczowe: Podwójny węgiel, uprawnienia do emisji dwutlenku węgla, rynek obrotu, zrównoważony rozwój

1. Aims and Background

Double carbon target is based on promoting the construction of a community of human destiny China bear responsibility and to realize the inherent requirement of sustainable development and a major strategic decision, showed China to cope with global climate change, new efforts and contribution, embodies the firm support of multilateralism, for the international community provided strong impetus overall effective implementation of the *Paris agreement*, The revival of confidence and hope for global climate action demonstrates China's firm determination to actively address climate change, follow the path of green and low-carbon development, promote common development of mankind, and achieve harmonious coexistence between man and nature. At present, China's carbon emission trading is still in its infancy, and its effect is still limited in specific practice. Meanwhile, the carbon emission trading market of the United States, The United Kingdom and other developed countries has begun to implement *carbon tariff* and other means to maintain their carbon boundary. The impact of carbon trading pilot

policies on China's economy and environment has always been a hot issue for scholars (Liu et al., 2022). Carbon emission trading has become one of the important factors to ensure the sustainable development of enterprises and promote the transformation of industrial energy structure. It is a key system of low-carbon economy in various countries and a strategic method of carbon emission reduction game among countries (Zhao, 2021).
During the 14th Five-Year Plan period, the sustainable development of China's ecological civilization has entered a critical period of focusing on carbon reduction as the strategic direction, promoting the synergistic effect of pollution reduction and carbon reduction, promoting the comprehensive green transformation of economic and social development, and realizing the improvement of ecological and environmental quality from quantitative to qualitative change. Due to the lag of China's carbon emission market, the problem of carbon excess emissions of industries in the regions not covered is worsening, and the economic burden is increased due to the carbon barriers of other countries in foreign trade. Of course, this requires China to continue to strengthen the system construction of carbon emission rights and promote the further optimization of their functions.

2. Literature Review

Carbon trading policies attempt to control carbon emissions by setting a price on carbon emissions and establishing a corresponding carbon trading market (Wang et al., 2022). Currently, researches on carbon emission right market can be roughly divided into two categories: the first category focuses on whether carbon emission right trading pilot policy can promote high-quality development of regional economy, and how to promote high-quality development of regional economy, represented by Jing Guowen (2022). The second group, represented by Zheng Yunjian, Wu Shijuan (2022) believes that carbon emission trading is a critical way to achieve carbon emission control and is of great practical significance to achieve high-quality economic development and promote green and low-carbon technological innovation. Previous studies have focused on the economic impact of carbon emission permits or regarded them as a means or approach of ecological carbon emission reduction. This paper will analyze the existing problems from the system construction of the current carbon emission trading market and promote economic and ecological coordination and win-win situation, and discuss the direction of China's carbon emission trading market as well as the expansion of functions and paths.

3. Experimental

3.1. Theory Expouding

Carbon emission right is based on the theory of atmospheric environmental capacity, and the right takes atmospheric environmental capacity as the object (Wang, 2010). Emissions trading is one of the three main mechanisms defined by the Kyoto Protocol. The basic principle of its operation is the efficient allocation of scarce air environment capacity by market mechanism. Therefore, in theory, the concept of carbon emission trading should contain two levels: first, the market should play a decisive role in the allocation of space and resources, and effectively achieve the purpose of emission reduction through the impact of marginal costs. Second, carbon emissions trade is a policy tool to promote global climate governance, which helps countries to fulfil their commitments, avoid international accountability and promote global climate governance. At present, global sustainable development finance continues to gain momentum, and China is emerging as a new force. At present, global sustainable development finance continues to gain momentum, and China is emerging as a new force.

(1) Market mechanism reduces the cost of carbon emission reduction

As an important theoretical model of environmental economics, *Tragedy of the Commons* clearly shows us the public goods attribute of *environment* as a public resource (Deng, 2008). In solving the problem of negative externality, Pigou and Coase give two different approaches from the perspective of internalization of external influence. On the one hand, Pigou advocates that the state should use taxation to deal with external problems. On the other hand, Coase advocated the introduction of the theory of property rights. In Mr Coase's view, a clear definition of ownership reduces transaction costs and improves efficiency. If there is no clear division of ownership, resources will be wasted and destroyed. Dales, an American economist, introduced the concept of property rights into the field of pollution control in his book Pollution, Property and Price published in 1968, and proposed the concept of emission trading for the first time (Zeng and Wan, 2010), thus promoting the development of Coase theorem.

(2) Fulfil international carbon emission reduction obligations and promote global climate cooperation

The external negative problems caused by carbon emissions can be divided into three aspects: First, the negative externalities caused by carbon dioxide emissions in the region; Second, the negative externalities caused by carbon emissions in the world; Third, negative intergenerational external problems caused by the accumulation of carbon emissions. Compared with the mandatory emission responsibility stipulated in the Kyoto Protocol, the Paris Agreement attaches more importance to the autonomy and international cooperation of the contracting parties. Trade in carbon emissions, based on market technology and centered on self-decision making, conforms to the *bottom-up* implementation trend of the Paris Agreement, and has important practical significance for expanding the regional and legal framework of global climate management.

3.2. Research Expounding

(1) Problems and causes of current carbon emission trading in China

Carbon trading is a market-based emission mechanism aimed at further reducing carbon emissions to further enhance the overall level of sustainable development through efficient and stable development momentum. Compared with conventional methods such as *command-and-control*, it is cheaper, more efficient and more flexible, as well as more economical and market flexibility. However, there are still many problems in the carbon trading system as a cap-and-trade system due to the fact that carbon trading has not yet entered the *balanced* stage, the imperfect development of market economy, the unfinished economic transformation and other objective reasons. A rigorous and reasonable institutional design is the prerequisite for the carbon financial market to play its role (Li, 2022).

1) Existing problems

First, the pricing mechanism is not perfect. In terms of coverage, the current market only includes power generation, while industries with high carbon emissions, such as concrete, various forms of transportation and construction are not considered. Due to the reduction of market size, the price of carbon emission trading is also restricted to a certain extent. By October 2021, although the total volume of Carbon emission trade in China has exceeded 18.7 million tons, the cumulative total has reached 845 million yuan. With the continuous adjustment of climate change and European climate-related policies, the carbon market in Europe will further rise, therefore, the *price difference* between China and the EU will further expand. Prior to the official operation of the national carbon emission market in 2021, China has established regional carbon emission trading markets in eight provinces and cities: Chongqing, Shenzhen, Hubei, Beijing, Shanghai, Tianjin, Guangdong and Fujian (Liu et al., 2021).

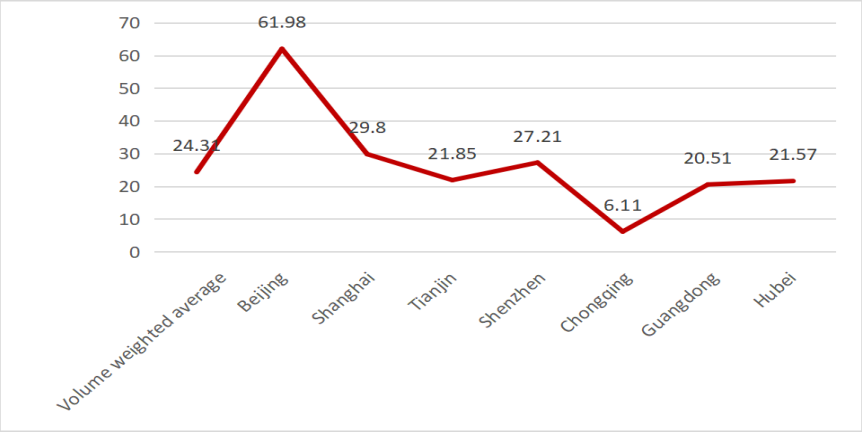

Figure 1. Average price of carbon trading market and overall carbon trading in China (unit: yuan/ton), source: based on forward looking Industry Research Institute

As can be seen from Figure 1, the pilot carbon trading markets in China are not balanced enough. The weighted average price in Shanghai, Beijing and other cities is significantly higher than that in other cities and the overall average price. This indicates that the pricing mechanism in China still has some problems and needs to be further improved. Of course, due to different resource endowments and carbon emissions of different regions, the formulation of carbon emission price should be market-oriented on the one hand and should take measures according to local conditions on the other hand (Shi and Li, 2021).

Second, market rules are not clear. The definition of property rights involves the establishment of regulatory system, relief system and other aspects, which is very important for the establishment of carbon emission trading market. For the construction of carbon market rules and the definition of rights and responsibilities of trading subjects, it is necessary to clarify carbon market trading rules. The clear definition of rules is not a deliberate evasion of interests, but a long-term solution to stimulate carbon market trading and promote low-carbon transition. In addition, the trend of policy fragmentation due to excessive implementation is also a worrying issue in emissions trading. This situation also appears in the implementation of carbon trade controls. The fundamental purpose of carrying out system reform is to deal with environmental problems in our country. It is necessary for the government to improve market efficiency and ensure the coordinated development of China's pilot carbon emission trading market and the national carbon emission trading market (Xiao, 2022).

Third, inadequate risk prevention. Unilateral carbon price systems, such as emissions trading and related taxes and fees, operate by regulating the carbon emissions of domestic companies, so as to achieve the goal of reducing emissions. Because of the high degree of autonomy and regional characteristics of carbon trading, countries that trade carbon emissions worldwide or adopt high restrictions will suffer higher greenhouse gas emissions than other

countries that are free riders. In practice, European countries use it as a basis to advocate a *Green New Deal*. The European Union applies *carbon border regulation*, or what academics call *carbon tariffs*, to specific industries.

2) The main reasons for the problems existing in China's carbon emission trading

First, the distribution of the industry is relatively single. At present, there are still few participants in China's carbon trading market, among which the vast majority of 2225 companies listed in the national key list are enterprises in the electric power industry, which illustrates a problem – homogenization. As a result, the carbon trade is either too crowded or too empty to sustain a stable and sustainable trade. This will have a direct impact on emissions from other industries.

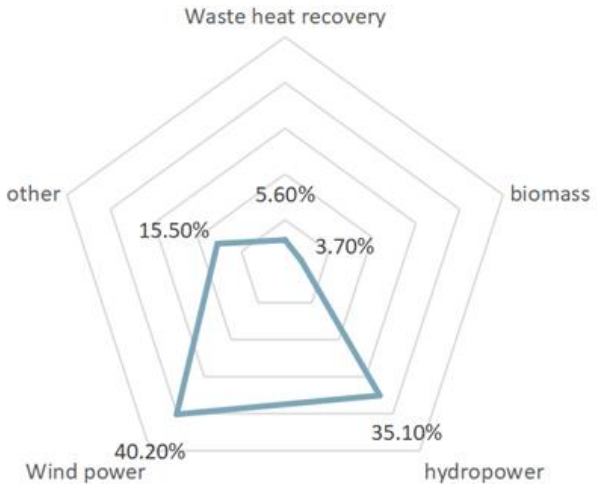

Figure 2. types of CDM projects registered in China by the end of 2020 (unit: %),
source: based on forward looking Industry Research Institute of China government network

As can be seen from Figure 2, there are fewer CDM project types in China as a whole, and they are mainly concentrated in hydro power and wind power industries, with unbalanced market share classification. Therefore, in the actual operation of the whole market, it is inevitable that carbon trading in the power industry will not be hot while other industries are too cold.

The second is the company's inexperience in the carbon market. At present, most companies in the power industry have not participated in carbon trading before, so they do not know much about the trading process and rules. However, many companies in China are facing the same problem, so many companies are still holding a wait-and-see attitude towards this emerging carbon emission trading market. So, the desire to trade in carbon markets needs to be strengthened.

Third, the ratio of free carbon dioxide emissions is too high. According to the implementation plan, the 2019-20 quota will be issued free of charge and the allocation of equipment held by each major emission unit will be calculated based on a baseline method. More free distribution means that companies with large quotas have no intention of participating in the carbon market, and their emissions have already been met, so they do not need to participate in the carbon trading.

Fourth, the lack of speculative need for liquidity. Since many domestic carbon transactions are carried out with a large amount of demand without the participation of any institutions or individuals, it indicates that there is a lack of speculative activities to make up for and improve the liquidity of the market at the present stage. In addition, when considering their own carbon trading, many companies will take into account their own trading of carbon emissions and decide whether to buy and sell emissions allowances accordingly. It may even lead to an oversupply and a shortage of funds in the market.

Fifth, there is no perfect security mechanism, the enthusiasm of investment in the financial market is not high. In the international environment, a number of relatively developed countries have introduced a carbon futures as the leading derivative products, control companies through this way to avoid trading risks, thus greatly improving the investment enthusiasm of companies. In China, not only has not formed a complete carbon emission system, but also the enthusiasm of the financial market is very low.

3) Utility expansion of China's carbon emission trading system

According to the above analysis, there is still a long way to go between the framework planning of China's carbon trading market mechanism and the expected diversified functions of the system. Therefore, it is the top priority to build a carbon emission trading system by developing and innovating the functions of the existing system.

1) Information centralization

Fundamentally, solving the problem of negative externalization of greenhouse effect is an economic problem in nature. Environmentalists, led by Pigou and Coase, have proposed three mechanisms to solve this problem. One is the traditional command-and-control approach. Second, through carbon tax and other means to control prices.

The third is the quantitative system based on carbon emission trading. In contrast, carbon sink trading based on quantity management has obvious intelligence advantages and higher benefits because it can reflect the carbon sink price and development dynamics of point sources in real time.

2) Ability integration

Carbon emissions trading, as a kind of artificial guide the construction of the market, in order to solve the negative external effect due to carbon emissions, this particular feature makes it become a kind of pure rely on factors such as environment and resources of the relevant laws and regulations to promote external product, its sustainable development and the implementation of the rules and regulations formulated by the state are closely related. In order to play the role of settling disputes, it is urgent to clarify the legal attributes of carbon emission rights, the cornerstone of carbon market system construction, in the field of carbon emissions (Tian, 2018). people will give full play to the innovation-driven role and, as some scholars have pointed out, make solid progress in rapid of basic and major technologies in the energy sector (Wang, 2022).

3) Platform Internationalization

The popularity of carbon tariff scheme in Europe is influenced by many factors, including the influence of European social trend and political party changes on climate policy, but more importantly, the EU's anxiety about the hollowing out of regional manufacturing industry in the post-industrial era (Han, 2021). As a charter regulating the global climate governance order in the post*-Kyoto era*, Paris Agreement provides a legal basis for international carbon emissions trading (Cao, 2016).

(3) China's carbon emission trading path

In the final analysis, the function expansion of carbon right trading still lies in the institutional design that can cope with both endogenous defects and exogenous challenges. Therefore, in the following long period of time, China's carbon market related system design and development should be carried out from the following three aspects.

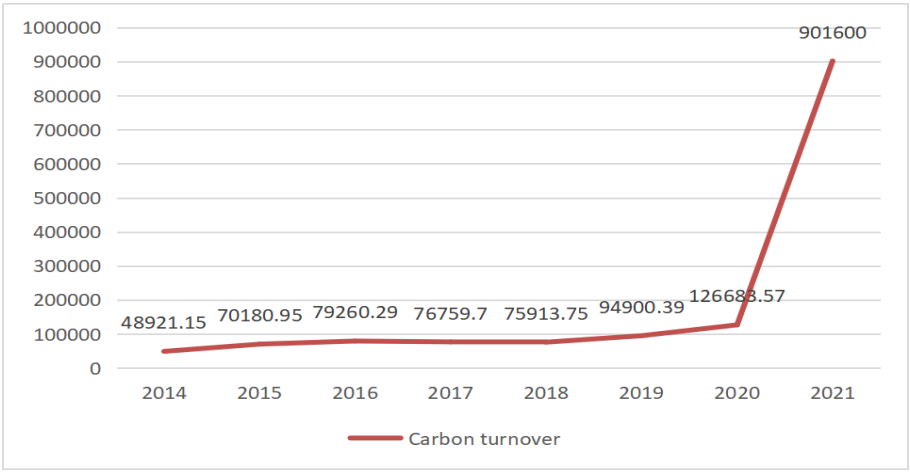

Figure 3. carbon turnover of China's carbon trading market from 2013 to 2021 (unit:10000 yuan) source: based on China carbon trading network forward looking Industry Research Institute

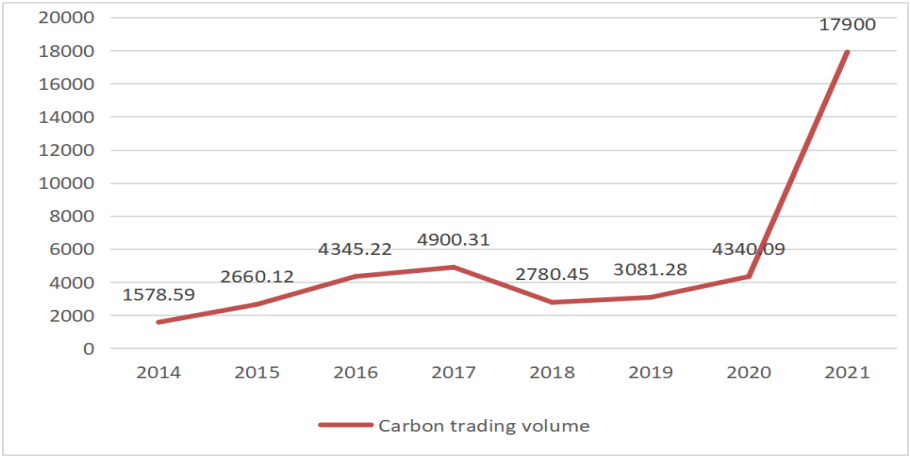

Figure 4. carbon trading volume of China's carbon trading market from 2013 to 2021 (unit: 10000 tons), source: based on China carbon trading network forward looking Industry Research Institute

Based on the analysis of Figure 3 and Figure 4, it can be seen that China's carbon trading market has a broad prospect. The capacity of the carbon trading market in the future is huge and has a great space for development.

However, under the premise of huge opportunities, there are also many problems, for which specific measures should be formulated to solve them. The national carbon market started relatively late and is still immature compared with developed countries and regions. People should follow the problem-oriented and goal-oriented principles, adhere to progress while maintaining stability, and promote the continuous improvement of carbon market construction in the development process (Li et al., 2022).

1) Deepen reform of pricing mechanisms and fiscal and tax systems

In the initial allocation of low-carbon quota, China adopts an industry benchmark allocation model with intensity control as the theme (Ministry of Ecology and Environment), which is basically to establish an initial carbon sink transaction and try to balance the environmental management and carbon emission companies' tolerance. In the short term, this approach is more suitable for our actual situation. However, as the field of carbon trading expands, the shortcomings of this free distribution will become more and more obvious. It is more suitable for China to adopt the mixed allocation mode of *free + competitive bidding*. For industries with high emissions and difficult technology conversion, such as iron and steel, the method of free distribution is implemented to strengthen the control of free distribution. In future development, the allocation of free quotas will be gradually reduced until all free allocations are competitive. The standardization of laws is the source to ensure the smooth financing process of carbon emission right pledge (Qiu et al., 2022). From the perspective of micro regulation and macro regulation, institutional guarantee is provided to give full play to the efficiency advantage of carbon market in the allocation of emission reduction resources (Liu, 2021).

2) Clear legal attributes and division of rights and responsibilities

Compared with the practice of integrating property ownership and usufruct in common law system, the dual practice of ownership and usufruct in civil law system makes the national ownership of atmospheric environmental capacity resources coexist with the usufruct enjoyed by carbon emission subjects (Zhang, 2014). Because carbon trading is built on the basis of public power, it is the most reasonable legislative option to assign ownership to carbon trading from the perspective of interpretation. The behavior of each stakeholder in utilization and income is its main component. Respect the internal law of population development, and at the same time, based on the city's functional positioning, cultivate differentiated leading industries, and build green and low-carbon cities through the coordinated development of population structure and employment structure (Long et al., 2022).

3) Promote the link of international carbon market and master the right to speak on rules

As the link of the international carbon market has high requirements on the compatibility of the certification standards of the existing market, and the EU-- Switzerland and Canada-Quebec-Ontario, which have established the link of the carbon market, all adhere to the industry benchmark (Dang and Zeng, 2019). Finally, the integration of the trading rules of the carbon market is faced with many challenges and constraints of practical factors. Realize links with other carbon market in the near future the possibility of a smaller (Gao et al., 2019), in reference to the existing experience and the new international environment under the premise of management measures, determine the selection criteria of the mechanism, so as to establish worldwide have a greater say in the future to provide a theoretical basis for fulfilling the obligation to protect the sustainable development of the environment in the community with a shared future for mankind.

4. Results and Discussion

China aims to be carbon neutral by 2060. It will take hard work, but we will do our best. This is a major strategic decision made by China to fulfil its responsibility for building a community with a shared future for mankind and to achieve sustainable development. For the research on the construction path of China's carbon emission trading, the following conclusions are drawn on how to develop the market according to the actual situation at home and abroad.

1) Establish and improve the policy control system of the national carbon trading market. Current national carbon trading market development has entered a new stage, but the laws and regulations of the national carbon trading market and the imperfection of the supervision system, carbon emissions quota allocation is not enough scientific, management level is not complete, give full play to the government in the regulation of carbon trading process and auxiliary function, in carbon trading market, for protection, through the competition mechanism and price mechanism to promote carbon emissions;

2) Scientific development of carbon emission quota allocation mechanism. At present, China's carbon trading market is still in the early stage of development, and the carbon quota allocation method for enterprises is mainly free quota given by the government to enterprises. China's carbon trading market is in its early stage of development and needs to establish a scientific carbon emission quota allocation mechanism. Unify the quota allocation method and clarify the appropriate emission quota of each enterprise;

3) Establish and improve the price regulation mechanism of the carbon trading market. Through the analysis of the fluctuation characteristics of the carbon trading price and return rate in China, it is found that there is no asymmetry in most of the carbon trading pilots in China, and there is no risk premium in the carbon trading market, so the market will not compensate for the fluctuation of the return rate. When subjected to external shocks, the

relevant enterprises involved in carbon trading will face very big risks. After the launch of the national carbon trading market, it is necessary to establish a perfect price control mechanism.
4) Develop carbon financial derivatives innovatively. As the national carbon trading market is still in the early stage of development, it mainly focuses on carbon spot trading and the financial degree is not high. Some carbon trading pilots have introduced carbon financial products, but the transaction scale is small. From the perspective of traditional finance, carbon trading market also belongs to financial market, so the State Council should issue regulations as soon as possible to clarify the financial nature of carbon trading market, as well as strengthen the innovative development of carbon financial market, encourage the innovation of carbon financial products, and increase the variety of carbon trading.

5. Conclusion

The creation of an emissions trading system is not simple, but it is an important force for long-term change. The ETS will play an important role in making the EU and China carbon neutral by 2050 and 2060, respectively. In view of the problems that need to be paid attention to in future carbon market trading and construction, from the domestic perspective, attention should be paid to the collaboration between carbon market and green and low-carbon technology development and promote the research and development of innovative technologies and accelerate the application of technological achievements through carbon market. From an international perspective, people should steadily promote the effective implementation of carbon markets and publicize them and play an active role in leading international climate governance.
Around the world, in promoting the green low carbon transformation, China has a huge market advantages, comprehensive industry advantage and advanced system advantage, in the realization of the second goal of the campaign in one hundred, driven by innovation and green drive, the goal of construction of Chinese modernization will be realized in the *double carbon* goals, people will make great contributions to mankind's response to climate change, sustainable development, and the building of a community of life between man and nature, and leave a clean and beautiful world to future generations.

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References

1. LIU Y., SUN W., ZHU Z., 2022, The influence of carbon market on low-carbon transformation of energy structure and its action path, *China environmental science:* 1-16. DOI: 10.19674/j.carolcarrollnkiissn1000-6923.20220602.001.
2. ZHAO Z., 2021, International convergence and characteristic construction of Accounting standards for carbon emission rights in China, *An accountant registered in China,* (4):122-124. DOI: 10.16292/j.carolcarrollnkiissn1009-6345.2021.04.024.
3. WANG X., HUANG J., LIU H., 2022, Can China's Carbon Trading Policy Help achieve Carbon Neutrality? A Study of policy Effects from the Five-sphere Integrated Plan Perspective, *Journal of Environmental Management,* 305:114357.
4. WANG M., 2010, On the quasi property right and development right attribute of carbon emission right, Law Science, 06:92-99, DOI:10.14111/j.cnki.ZGFX2010.06.015.
5. DENG H F., 2008, *Pollutant Discharge Rights: An Interpretation based on The Context of Private Law,* Peking University Press, Beijing: 36-37.
6. ZENG G., WAN Z., 2010, Carbon emission trading: a review of theoretical and applied research, *Financial review,* 2(04):54-67, 124-125.
7. LI S R., 2022, Analysis of legal attributes of carbon emission permits--Also on the relationship between carbon emission permits and carbon emission quotas, *China Southern Finance,* 03:91-99.
8. LIU Z., MA X., XIE Y., 2021, A Study on the interaction between carbon market, energy market and financial market – a comparative perspective before and after the launch of the National carbon emission trading market, *Securities Market Guide:*1-11.
9. SHI D, LI P., 2021, Industrial carbon emission structure simulation and policy impact under 'dual carbon' target, *Reform,* 12: 30-44.
10. XIAO Z., 2022. *Time varying spill over among pilot carbon emission trading markets in China[J]*. Environmental science and pollution research international, 2022:1-16.

11. TIAN D., 2018, Legal attribute and institutional review of China's carbon emission rights, *Journal of China University of Political Science and Law*, 03:75-88, 207.
12. WANG S., 2022, Energy development trend and suggestions for low-carbon transition in China during the 14th Five-Year Plan period, *Environmental protection*, 50(08): 36-41, DOI: 10.14026/j.carol carroll nki.0253-9705.2022.08.017.
13. HAN L., 2021, EU carbon tariff policy and its impact, *International Relations*, 31(4): 95-117.
14. CAO M., 2016, China's Legal Position and Strategy in international climate Governance: From the perspective of Climate justice, *Jurisprudence of China*, 01: 29-48, DOI: 10.14111/j.carolcarrollnkiZGFX.2016.01.002.
15. LI G., ZHOU C., LI N., LI S., LI L., 2022, Build perfect the national carbon emissions trading market suggestion, *Journal of environmental protection*, 50(08): 45-49, DOI: 10.14026/j.carolcarrollnki.0253-9705.2022.08.013.
16. MINISTRY OF ECOLOGY AND ENVIRONMENT, 2021, To expand the coverage of carbon market by formulating quota allocation schemes for different industries,*Yunnan Electric Power Technology*, 49(03): 35.
17. QIU D Y, WU M Y., 2022, China's carbon emission right pledge loan under the 'dual carbon' target: current situation, shortage and optimization path, *Southwest Financial*, 03: 68-80.
18. LIU M., 2021, Achievements, deficiencies and countermeasures of China's carbon emission trading practice, *Journal of Anhui normal university (humanities and social science edition)*, 49(03): 119-124, DOI: 10.14182/j.carolcarrollnkij.a nu. 2021.03.014.
19. ZHANG L., 2014, The Property right attribute and institutionalized Dilemma of greenhouse Gas Emission Right – Reflection on Harding's 'Tragedy of the Commons' Theory, *Law and social development*, 20(01): 101-110.
20. LONG H., LI J., LIU H., 2022, Internal migration and associated carbon emission changes: Evidence from cities in China, *Energy Economics*:110.
21. DANG S F, ZENG W G., 2019, Challenges and impacts of the new trend of carbon trading mechanism under Paris Agreement on China, *Chinese BBS of science and technology*, (01): 181-188, DOI: 10.13580/j.carolcarrollnkiFSTC. 2019.01.025.
22. GAO S, LI M Y, DUAN M S, WANG C., 2019, International carbon market mechanisms under the Paris Agreement: Basic forms and prospects, *Climate change research*, 5(03): 222-231.

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Sustainability of EU Labour Markets During the Coronavirus Crisis

Zrównoważoność rynków pracy UE podczas kryzysu związanego z koronawirusem

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Abstract

The world's labour markets were significantly affected by the coronavirus spread and lockdowns and deaths caused by it. Policy-makers tried to mitigate the consequences of the COVID-19 pandemic on the labour market by imposing different measures and aid packages. Having in mind all activities for combating the COVID-19 pandemic's effect on the labour market in 2020 and 2021, the question arose how resilient are labour markets to the effects of the COVID-19 pandemic compared to the year before the pandemic? Therefore, this study attempts to answer this question by creating a composite index of ten labour market indicators using the MOORA ranking method. The research sample is made up of 27 European Union (EU) countries. In the first step, countries' composite indexes were compared on a year-to-year basis (2019-2020, 2019-2021 and 2020-2021) and no significant discrepancies were observed. In the second step, differences in geographical clusters of countries were captured while comparing their composite indexes for 2020 and 2021. The study results indicate that aid packages restricted the COVID-19 pandemic's effects on the EU labour markets and strengthened their sustainability. The downturn in EU labour market indicators was retained thus making divergence between geographical clusters inherited from the previous periods. The research results indicate the importance of joint EU policies in crisis periods for encouraging the sustainability of the EU labour markets and the need to make a balance among EU labour markets under normal conditions.

Key words: sustainability, labour market, EU members, coronavirus, MOORA method

Jel Classification Codes: E24, J21, J4

Słowa kluczowe: zrównoważoność, rynek pracy, państwa UE, koronawirus, metoda MOORA

Introduction

Numerous economic parameters are affected by the coronavirus (COVID-19) pandemic and various measures were taken by countries to combat the epidemic. In doing so, many of these measures have hit the labour market directly or indirectly. Isolation measures have closed not only the borders between the countries but also the entire sectors of the economy such as hotels, retail facilities, offices, etc. Numerous effects have occurred on determinants of the labour market – labour force, employment, unemployment, mode of work (teleworking) and working hours, labour productivity, net earnings, youth and female employment, business communication and business relations, as labour market and business dynamism are interconnected (Milanović et al., 2020). Many companies were forced to suspend operations, lay off workers or shorten working hours, which directly affected the reduction of labour in many sectors. This particularly affected accommodation facilities, service activities, hourly-paid workers and young people. So, the policy responses must have been focused on stimulating labour demand in many sectors. In such conditions, investments in new labour programmes, the adaptation of existing skills through training and retraining programs, and support for young people and people who are less paid and whose occupations are particularly affected in the context of the coronavirus crisis and are the key importance in mitigating the existing crisis conditions. Therefore, public policymakers are forced to use certain measures to influence both supply and demand in the labour market.

Despite several policy measures to retain jobs within the European Union (EU), the labour market in the Eurozone has been hit hard by the pandemic. There was a significant decline in employment and the average number of working hours. As a result, the labour force fell by about 5 million in the first half of 2020 (Anderton et al., 2021). A large number of job losses is comparable to the conditions of the 2008/9 recession (Wilson et al., 2020). Job retention schemes have played and continue to play a key role in many countries in mitigating the consequences of the pandemic labour market. It is a policy to support the labour market at the EU level, which is aimed at keeping jobs through shortening working hours and temporary layoffs (Mayhew & Anand, 2020). All countries globally are facing economic challenges and the need to respond to the impact of the coronavirus crisis on the labour market.

Changes in the labour market are key to reducing gross domestic product at the macro level and the income of many families globally (Lemieux et al., 2020). The governments have tried to support these incomes with aid packages in order to maintain demand at a certain level and enable the normal life of people in crisis conditions caused by the virus. Without targeted state support in the form of financial and other forms of assistance (for example subsidized loans and tax waivers) to certain sectors of the economy, which are especially vulnerable - retail and hospitality, it is unlikely that there will be a recovery of the labour market and favourable trends in employment and unemployment rate.

This paper aims to develop a composite index based on the labour market indicators in order to test the differences on a year-to-year basis by comparing indices of the EU countries in 2019, 2020 and 2021. In this way, the sustainability of the EU labour markets will be assessed and the difference between the two periods of analysis captured. What makes this analysis state-of-the-art is the development of a composite index using the MOORA method for the purpose of the research. The authors tend to give the answer to the research question: Are the EU countries' labour markets resilient to the COVID-19 pandemic outbreak? Additionally, the disparities between geographical clusters of the EU countries were analysed using the created index. The paper is structured as follows: After the introduction, in the first part of the paper, a literature review concerning existing research results on the labour market features is presented. In the second part, data and methodology are shown. The third section reveals the study results which is followed by their discussion. Finally, concluding remarks are pointed out.

1. Literature review

Coronavirus first led to a global crisis in human health, which then spilt over into the economy (Lee et al., 2020, p. 11). The pandemic has caused a deeper labour market crisis than the 2009 global financial crisis due to isolation measures. The deepest consequences were felt by middle-income economies, while certain sectors (sectors that require face-to-face communication), especially the service sector and work of youth, specifically females, were more negatively affected during 2020. The COVID-19 pandemic has negatively affected several indicators of the functioning of the labour market. Unlike previous crises, the pandemic has led to a greater increase in inactivity than unemployment (Verick et al., 2022, p. 125). Lee et al. (2020, p. 15) highlight that the female workforce is particularly affected by this crisis because a higher percentage of women than the percentage of men work in the sectors most affected by the coronavirus. Women represent more than 70% of employees in health and social work institutions. This means that these women are most of the workers on the *front line* who face direct virus risks. Within the closed sectors – sectors of the economy most affected (such as restaurants and accommodation facilities), the proportion of females in the EU28 is 56%, which is even higher in Poland and Germany (Fana et al., 2020b).

First of all, many sectors – especially retail, tourism and transport – have been forced to reduce their workforce or reduce their working hours in order to save their businesses from collapse. Many businesses were compelled to lay off large numbers of people, who then found it difficult to find a job in the same sector during a pandemic (Mayhew & Anand, 2020). Losses of jobs and employment caused by the pandemic can lead to a long-term decline in the overall employment-population ratio (Wachter, 2020, p. 549). Measures aimed at combating the pandemic caused a decline in both supply and demand for goods and services, already in the second quarter of 2020. On the supply side, there were disruptions in global supply chains, but there was some recovery in the last quarter of 2020 and the first quarter of 2021. On the demand side, the consumption of many goods and services has been significantly reduced - especially restaurants, recreational facilities, retail facilities, etc. The demand shock was further exacerbated by job and revenue losses, and a high level of uncertainty, which further hampered spending and investment decisions (Verick et al., 2022). These shocks caused direct changes in the labour market and the labour force.

Measures of social distancing have limited geographical mobility both within and between countries, affecting workers whose jobs require travel and migration. Many countries have implemented the measure of abolishing work visas, which has deepened the crisis in the global labour market, especially bearing in mind that international labour migration is a very important segment of the global economy. In addition, it is estimated that tens of millions of migrants were 'stuck' abroad without a job during the pandemic (Barker et al., 2020).

Namely, the pandemic brought shocks to the labour market and the global job crisis. At the global level (observing Europe and Central Asia, Americas, Africa, Arab States, Asia and the Pacific), in the first quarter of 2020, it was estimated a decline of 5.4% in working hours (including inactive people, unemployment, temporary suspension, shorter working hours), and in the second quarter of 2020, there was a decline of 14% which is equal to 400 million full-time jobs. The largest decrease in the first quarter was in upper-middle-income countries (9.3%), while in the second quarter, the largest decline was recorded lower-middle-income countries (16.1%) (Lee et al., 2020).

In 2020, there was a significant increase in unemployment rates within OECD countries. In the UK, the initial increase was more modest than in some other countries. The unemployment rate in Germany also grew relatively slowly, in contrast to the United States, where unemployment rose to over 30 million in just over a month. In France, the number of unemployed increased at the fastest rate ever (Mayhew & Anand, 2020). Young people (aged 18–29) are particularly affected by the COVID-19 crisis. Unemployment is 13.6% of the youth workforce. This crisis affects young people in several ways: limitations in the education of young people, their training and learning at work (face-to-face communication is limited), special difficulties for young people looking for work, loss of income with deteriorating quality of youth employment (Lee et al., 2020).

Demena, Floridi and Wagner (2022) investigated the short-term impact of the COVID-19 pandemic on the labour markets, on the example of developed and developing countries. They came to the conclusion that no significant effects on the labour market can be seen when it comes to formal employment. On the other hand, Costa Dias et al. (2020) concluded that the COVID-19 pandemic did not lead to a slowdown in economic activity in these countries, but a radical decline in activity in the short term. In many sectors, there was a sharp drop in labour demand, while in other sectors supply was reduced. Fana et al. (2020a) concluded that Europe, after Asia, was most affected by the pandemic in 2020.

The EU labour market has been hit by lockdown due to the coronavirus pandemic – closed workplaces, retail, borders, as well as deteriorating human health and pandemic measures. There was a stronger decline in employment and working hours than these parameters in the economic recession of 2008 (the sharpest decrease was achieved in the second quarter of 2020 – 5.2 million fewer employees than at the end of 2019, which is a decline of 3.2%), while unemployment grew somewhat more slowly due to the application of the job retention schemes. A negative aggregate demand shock is considered to be responsible for about 1/4 of the reduction in total working hours. During this pandemic, compensation per employee at the Eurozone level also dropped significantly. In addition, in the first half of 2020, record low employment growth was observed in the EU area. It is interesting that at the EU level, labour productivity per employee decreased significantly during the pandemic, while hourly labour productivity increased, albeit slightly. In the first half of 2020, there was a sharp decline in labour productivity per employee, while hourly labour productivity increased by 2.6% annually, in the second quarter of 2020. This discrepancy arose due to the intensive use of retention schemes by Member States (Anderton et al., 2021).

The policies of different countries varied from country to country, but all had an impact on the labour market and certain categories of workers. Governments that have used wage subsidies more intensively than other forms of income support have managed to reduce labour market volatility. In addition, the pandemic has exacerbated gender inequality in the labour market (Weber et al., 2020; Soares & Berg, 2021). To avoid large redundancies and a sharp rise in the number of unemployed, many EU countries have introduced policies with the same goal – support for the labour market, through leave schemes, subsidized work, part-time work or other forms of support for employers. These countries include France, Germany, the Netherlands, Portugal, Sweden, and Spain (Fujita et al., 2020).

Within the countries of the EU, five types of sectors can be distinguished given the impact of pandemic measures on the workforce and sustainability of labour market (Fana et al., 2020a): *1) essential and fully active sectors – for example food production, utilities and health (most of the workforce continued to work normally); 2) active but via telework – it includes education, public administration, finance/insurance and telecommunications (work from home – teleworking); 3) mostly essential and partly active, not teleworkable – retail and manufacturing of chemicals, paper and manufacturers of other products that are important in epidemic conditions (active even in conditions of strict measures); 4) mostly non-essential and partly active, not teleworkable – activities that do not require direct interaction such as the majority of manufacturing not previously mentioned, computer repair activities and construction (normal functioning under strict conditions); 5) closed – hotels, restaurants, accommodation, estate/travel agencies, leisure and recreation facilities*.

The consequences of social distancing measures in the EU due to the COVID-19 pandemic are mostly felt by vulnerable labour groups – women, older employees, foreigners, the less educated, those who work longer (people about to retire) and employees in micro-sized jobs, especially since the highly educated have conditions for working from home. It has been determined that around 45 million jobs in the EU-27 labour market, which is 23% of the total number of employees in the EU-27, face a very high risk of COVID-19 disruption (Pouliakas & Branka, 2020). Teleworking played an important role in the initial period of the pandemic in many sectors, especially for highly educated workers, and contributed to the sustainability of the labour market. Therefore, it can be said that the pandemic has had a positive impact on the digital transformation of the EU economy – teleworking supports the intensive application of digital technologies (Anderton et al., 2021).

The pandemic has further deepened the problem of youth unemployment in the EU countries, which existed even before the coronavirus crisis and was an important determinant of the sustainability of the labour market. Greece, Spain and Italy had the highest youth unemployment rates before the crisis within the EU, and the Czech Republic, the Netherlands, Poland and Slovenia achieved the lowest. However, in the countries with the lowest youth unemployment rate before the crisis, it doubled during the crisis due to measures against the pandemic. The most vulnerable countries in this regard are the Czech Republic – the unemployment rate at the end of 2020 rose 2.19 times above the level at the end of 2019, and Estonia – youth unemployment rose compared to the previous year by a factor of 2.5, followed by Lithuania, Latvia and Ireland. In 2020, youth unemployment rose the least in Hungary, Italy and Belgium (Lambovska et al., 2021).

Some research shows that the biggest negative consequences on the labour market institutions and the strongest negative impact on unemployment in the conditions of coronavirus were suffered by countries whose labour markets were the most vulnerable before the pandemic (high unemployment, temporary employment contracts). Namely, it includes Spain, Italy and the UK, which are also the countries that have felt the greatest negative consequences for human health, bearing in mind that they were the first to be affected by the virus in Europe, after the occurrence, with the highest number of deaths (Fana et al., 2020b).

2. Data and research methodology

Determining the impact of the coronavirus pandemic on the sustainability of the labour market was done by creating a composite index and comparing the values of composite indices in the years before and during the pandemic. The creation of composite indices for quantification of labour market performance was performed by a two-step procedure, wherein in the first step, the weighting coefficients of criteria were determined using the Entropy method, while in the second step the aggregation of criteria was performed using the MOORA method.

2.1. Data

Data from the Eurostat database were used to calculate composite labour market performance indices. Ten indicators were selected that reflect the characteristics of the country's labour market.

A comparative analysis of the descriptive statistics (Table 2) of the criteria in 2019, 2020 and 2021 indicates that there was an increase in unemployment in 2020 (the average value in 2019 is 6.1519), but with a decrease in variability between countries (smaller standard deviation in 2020), while in 2021 there was a decrease of the unemployment rate but it was still above the level of unemployment rate in 2019 (the average value in 2021 is 6.6370) with further reduction in variability between countries. On the other hand, the average annual salary in 2021 increased compared to 2019 and 2020, while the disparity between countries also increased (the standard deviation increased in 2021 compared to 2020 and 2019). The average percentage of people in the labour force has decreased in 2020 but decreased in 2021, with increasing variability between countries in 2020 but with reduced variability between countries in 2021. In 2020, a reduction in average long-term unemployment is noticeable (probably the unemployed died because they did not have access to health care), while in 2021 an increase in average long-term unemployment is observed (probably due to the measures to suppress the coronavirus pandemic, such as the lockdown). In 2020, there was a decrease in average real labour productivity, with a significant increase in disparities between countries, while in 2021 average real labour productivity increased above the levels

before the pandemic, but with a further increase in disparities between countries. The percentage of people working part-time has decreased slightly, while the percentage of the NEET population has increased in 2020 compared to 2019, but decreased in 2021. Finally, the percentage of recent job leavers and jobless households increased in 2020 compared to 2019 but decreased in 2021.

Table 1. Definition of criteria, source: authors' presentation

Criteria label	Criteria name	Definition
C1	Unemployment	Percentage of population in the labour force (from 15 to 74 years)
C2	Annual net earnings	Total money earned in a span of 12 months after specific subtractions are done from your gross income (a single person without children earning 100% of the average earning)
C3	Persons in the labour force	The ratio between the number of active persons aged from 15 to 64 (occupied labour force and the unemployed) and the corresponding total population
C4	Long-term unemployment	Percentage of unemployed people who have been unemployed for 12 months or more
C5	Real labour productivity	Real output per unit of labour input (measured by the total number of hours worked)
C6	Persons outside the labour force	Persons aged from 15 to 74 years who are neither employed nor unemployed (i.e. they are neither working nor seeking work) during the reference period
C7	Employed persons working part-time	Percentage of people in employment aged from 15 to 64 years (whether employees or self-employed) who usually work less than 30 hours per week in their main job
C8	NEET	Percentage of young people aged from 15 to 29 neither in employment nor in education and training
C9	Recent job leavers	Percentage of unemployed people who quit or otherwise voluntarily left their previous job and immediately began looking for new employment
C10	Jobless households	Share of persons aged 18-59 who are living in households where no one works

Table 2. Descriptive statistics, source: authors' calculation

	2019	**2020**	**2021**	**2019**	**2020**	**2021**
C1	2.00	2.60	2.80	17.90	17.60	14.80
C2	6093.02	6612.77	6952.14	42650.78	44374.32	45786.60
C3	63.30	63.50	64.50	82.90	82.50	83.70
C4	0.60	0.60	0.80	11.30	10.50	9.20
C5	95.94	88.38	95.31	120.56	120.51	137.34
C6	26.60	26.70	26.20	44.70	44.80	44.10
C7	1.90	1.80	1.50	50.20	50.80	38.70
C8	5.70	5.70	5.50	22.30	23.50	23.10
C9	.40	.40	.40	6.30	5.60	5.50
C10	3.80	4.10	4.30	13.60	13.50	13.10
	Mean			**Std. Deviation**		
	2019	**2020**	**2021**	**2019**	**2020**	**2021**
C1	6.15	6.96	6.64	3.36	3.27	2.89
C2	20845.38	21237.83	22055.47	11296.01	11521.74	11798.64
C3	74.27	73.85	74.86	4.71	5.05	4.74
C4	2.37	2.28	2.49	2.21	1.99	1.85
C5	105.50	101.82	107.19	5.79	8.31	10.96
C6	34.62	35.15	34.36	4.66	4.99	4.81
C7	14.51	14.06	13.15	11.04	10.73	9.21
C8	11.59	12.70	11.99	4.18	4.21	4.20
C9	2.40	2.46	2.19	1.31	1.23	1.22
C10	7.94	8.41	8.18	2.21	2.44	2.40

2.2. Entropy method

The entropy method enables the measurement of the intensity of the relative contrast of criteria. Determining the weights of criteria is based on quantifying the uncertainty of information within a data set. The mutual contrast of individual values of indicators is the basis for determining the set of weighting coefficients (Stanković et al., 2021).

Determining the weighting coefficients of the indicator is done in three steps.
Step 1: Normalization of individual values of indicator x_{ij} using the relation:

$$r_{ij} = \frac{x_{ij}}{\sum_{i=1}^{n} x_{ij}} \quad (1)$$

Step 2: Determining the entropy value e_j based on the relation:

$$e_j = -k \sum_{i=1}^{n} r_{ij} \ln r_{ij}, \quad j = 1,2, \dots m \quad (2)$$

where $k = \frac{1}{\ln n}$ is a constant whose goal is to reduce the value of e_j to the interval [0, 1].
Step 3: Determining the degree of divergence d_j using the relation:

$$d_j = 1 - e_j, \quad j = 1,2 \dots . m \quad (3)$$

where d_j is a measure of the contrast intensity of the indicator C_j. The greater discrepancy between the initial values of a certain indicator leads to a higher value of the contrast intensity, based on which, it is concluded that the importance of that indicator for the defined multi-dimensional problem is higher. On the other hand, balanced values of a certain indicator indicate less importance of that indicator for a given multidimensional problem.
Step 4: Determination of weight coefficients of indicators by additive normalization using the relation:

$$w_j = \frac{d_j}{\sum_{j=1}^{m} d_j} \quad (4)$$

Since the weights of the indicators are derived directly from the data of the observation units, it can be concluded that the entropy method provides objective weights that eliminate the problems that the involvement of stakeholders can bring.
Based on the above algorithm, it can be confirmed that the entropy value of each criterion is inversely related to its dispersion (variation) between observation units, and therefore, more weight is given to criteria with larger variations per observation unit, and conversely, less weight is given to criteria with smaller variations. In other words, the greater the variation of an indicator, the greater the value of its entropy and the greater the amount of information it provides. If a particular criterion does not vary by observation, it does not discriminate and does not provide any information on the importance of the criterion. Consequently, its entropy takes a maximum value of one and, accordingly, its degree of importance becomes zero. That is, if all observation units have approximately the same results in relation to a given criterion, then such criterion will be considered irrelevant in the evaluation process.
The main advantages of entropy in the construction of composite indicators are as follows (Karagiannis & Karagiannis, 2020): first, it results in a set of common weight coefficients for all observation units which allows complete comparison and ranking; and secondly, the entropy algorithm is not too demanding and this technique is easy to implement. Compared to the equal weighting scheme, which assigns the same weighting factor to all indicators, the entropy-based weighting scheme provides greater discriminatory power.

2.3. MOORA method

MOORA method (Multi-Objective Optimization Method by Ratio Analysis) is a method of multi-criteria analysis based on the process of simultaneous optimization of two or more criteria, which are often in conflict with each other. The method algorithm consists of the following steps (Brauers & Zavadskas, 2006):
Step 1: Forming a decision matrix $X_s = [x_{ij}]$, where *n* is the number of criteria, *m* is the number of alternatives, x_{ij} is the value of the *i*th alternative realized by the *j*th criterion.
Step 2: Normalize the decision matrix. Normalization in MOORA methods is performed as follows:

$$x_{ij}^{N} = \frac{x_{ij}}{\sqrt{\sum_{i=1}^{m} x_{ij}^2}} \quad (5)$$

Step 3: Optimize the multicriteria problem. It is done by adding the normalized criteria values of the revenue criteria and subtracting the normalized criteria values of the expenditure criteria. Then the optimization problem can be set as:

$$y_i = \sum_{j=1}^{g} x_{ij}^{N} - \sum_{j=g+1}^{n-g} x_{ij}^{N} \quad (6)$$

where *g* is the number of revenue type criteria, and *n* is the number of expenditure type criteria.
However, it is often necessary to include information on the relative importance of the criteria in the optimization process. Then the normalized criterion values are multiplied by the corresponding criterion weight coefficients and the following optimization relation is obtained:

$$y_i = \sum_{j=1}^{g} w_j \cdot x_{ij}^{N} - \sum_{j=g+1}^{n-g} w_j \cdot x_{ij}^{N} \quad (7)$$

Step 4: Depending on the weighted values of the revenue and expenditure criteria, the value of y_i can be positive or negative. Determination of preference is done based on ranking alternatives by y_i value where the best alternative has the highest $y_i$value, while the worst alternative has the lowest $y_i$value.

3. Results and discussion

Based on the applied methodology, sets of values of composite indices for 2019, 2020 and 2021 were determined. The results are given in Figure 1.

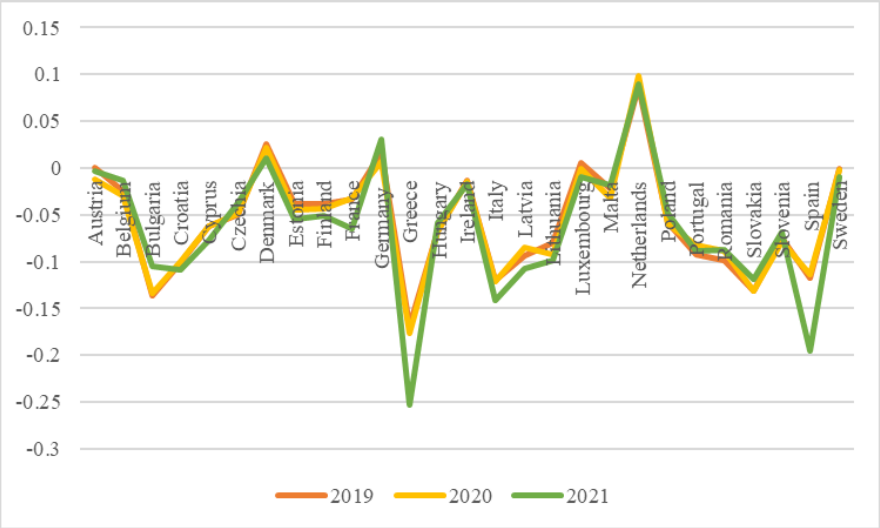

Figure 1. Values of composite indices in 2019, 2020 and 2021, source: authors' presentation

Overall, at the level of the EU, there is no statistically significant difference between the performance of the labour market before and during coronavirus pandemics. However, if separate geographical regions within the EU are observed for 2020 and 2021, as the years faced with the coronavirus pandemic, differences can be noted. Following geographical clusters were analysed (Figure 2):

- Northern Europe: Sweden, Finland, Denmark;
- Western Europe: Belgium, Netherland, Luxemburg, France, Germany, Austria, Ireland;
- Central and Eastern Europe (CEE): Hungary, Poland, Czech Republic, Slovakia, Slovenia, Lithuania, Latvia, Estonia, Bulgaria, Romania, Croatia;
- Southern Europe: Greece, Italy, Spain, Portugal, Cyprus, Malta.

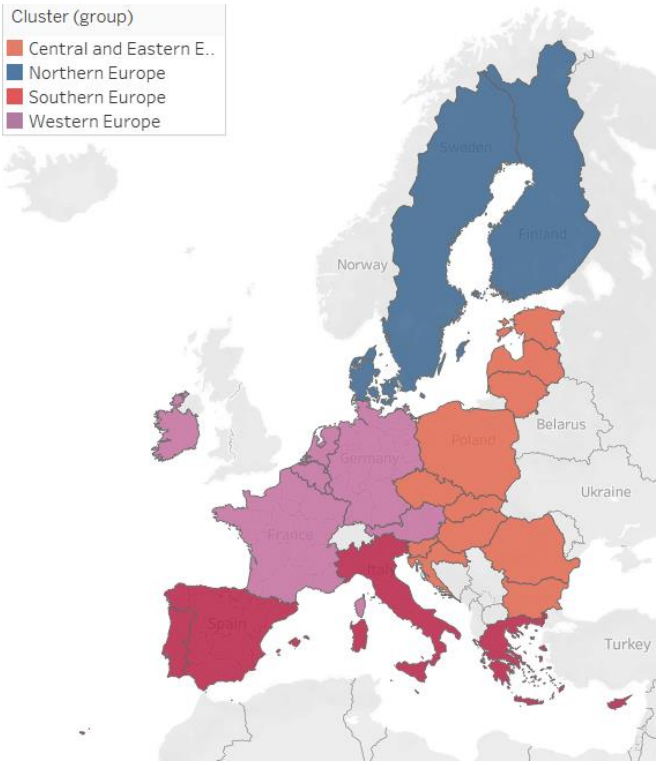

Figure 2. Geographical clusters, *source:* authors' presentation

In 2020, significant differences in labour markets between Western Europe and Southern Europe, Western Europe and CEE, and CEE and Southern Europe were noticed. No difference between Western Europe and Northern Europe was recorded (Table 3).

Table 3. Differences between clusters of EU countries in 2020, source: authors' calculation

2020		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig.
WE → SE	Equal variances assumed	3.608	.084	2.750	11	.019
	Equal variances not assumed			2.647	8.050	.029
WE → CEE	Equal variances assumed	.916	.353	-2.238	16	.040
	Equal variances not assumed			-2.014	8.982	.075
CEE → SE	Equal variances assumed	15.671	.001	2.168	15	.047
	Equal variances not assumed			1.701	5.806	.141
WE → NE	Equal variances assumed	.237	.639	-1.119	8	.295
	Equal variances not assumed			-1.248	4.990	.267

Note: WE – Western Europe, SE – Southern Europe, NE – Northern Europe, CEE – Central and Eastern Europe

In 2021, significant differences in labour markets between Western Europe and Southern Europe, Western Europe and CEE also existed. However, in 2021 there were no significant differences between CEE and Southern Europe (Table 4). Bearing in mind that the average score of the labour market composite indices of the countries of CEE in 2020 was statistically significantly higher than the average score of the labour market composite indices of the countries of Southern Europe, as well as that in 2021 there was a decrease in the average values of the aforementioned average scores, it can be concluded that in 2021, there was a deterioration in the labour market of the countries of CEE. Regarding Western Europe and Northern Europe, no difference was recorded.

Table 4. Differences between clusters of EU countries in 2021, source: authors' calculation

2021		Levene's Test for Equality of Variances		t-test for Equality of Means		
		F	Sig.	t	df	Sig.
WE → SE	Equal variances assumed	2.798	.123	3.484	11	.005
	Equal variances not assumed			3.332	7.562	.011
WE → CEE	Equal variances assumed	.630	.439	4.643	16	.000
	Equal variances not assumed			4.150	8.788	.003
CEE → SE	Equal variances assumed	10.149	.006	1.736	15	.103
	Equal variances not assumed			1.338	5.616	.232
WE → NE	Equal variances assumed	.283	.609	-.601	8	.565
	Equal variances not assumed			-.716	5.952	.501

Note: WE – Western Europe, SE – Southern Europe, NE – Northern Europe, CEE – Central and Eastern Europe

It is perceived that the COVID-19 pandemic had disruptive effects not only on the global economy but also on the labour market. Unemployment was retained at the level of the Global Financial Crisis, but the decrease in total working hours was sharp (Ando et al., 2022). According to Barbier-Gauchard et al. (2021) countries' labour market policies differed from each other during the crisis in choosing to lay off employees (i.e., extensive margin adjustment) or to decrease their daily engagement in work (i.e., intensive margin adjustment). While the COVID-19 labour market crisis, the downturn in employment in the EU was mostly mitigated by job retention schemes (JRS), while the crisis manifested its effects in the total worked hours where decreases on sectoral levels were notable (i.e., transport and tourism). Therefore, the study tried to quantify the impact that the COVID-19 pandemic had on the EU countries' labour markets, but from the point of view of multiple indicators to assess the level of labour market resilience before and during the COVID-19 pandemic. The calculation of one comprehensive index merged various labour market indicators such as unemployment, long-term unemployment, recent job leavers, persons in the labour force, employed persons working part-time, real labour productivity per person, annual net earnings, people aged 18-59 living in jobless households, persons outside the labour force, young people neither in employment nor in education and training (NEET) using the MOORA ranking method. The results indicate that the EU countries did not change their position when it comes to this multidimensional indicator, meaning that the year-to-year index of labour market performances stayed stable in the volatile circumstances. Moreover, the results point out that all EU countries were hit by the pandemic and that negative shocks in previously mentioned indicators did not result in significant differences when it comes to their individual ranking, while differences between countries were more than obvious. EU countries' scores of unemployment rates were not drastically increased due to JRSs and one other phenomenon – a decrease in labour market participation rates (Sazmaz et al., 2021). People that lost their jobs also lost their will to search for a job in the conditions of a great health crisis so the two effects compensated and the overall pandemic's effect on the labour market was diminished. In the line

with these effects, EU countries implemented short-time work programmes targeted at the workforce, whose sectors slowed down and reduced working hours. In this way, they stayed employed and an employer got a subsidy for their salaries (Eyméoud et al., 2021).
Significant differences in the defined index for this research purpose were captured between geographical clusters of countries. Specifically, noteworthy differences were identified between labour markets of Western Europe and Southern Europe, Western Europe and CEE, and CEE and Southern Europe for 2020, while in 2021 differences were captured between Western Europe and Southern Europe and Western Europe and CEE. No difference between Western Europe and Northern Europe was recorded in 2020, while in 2021 there were no differences between Western Europe and Northern Europe and CEE and Southern Europe. These results are an extension of the previous notation that according to the developed index, individual EU labour markets did not change their overall position. Therefore, it is reasonable to assume that the differences between clusters of countries are inherited and that labour markets in the EU have more than clearly shown resilience to the shocks caused by the Covid-19 pandemic by withholding disparities among clusters. Although significant support was provided through EU countries' participation in the budget intended to mitigate unemployment, named *Support to Mitigate Unemployment Risks in Emergency (SURE)*, the measures defined under the JRS resulted in the upbringing of labour market resilience while the economic downturn was much bigger. The majority of JRSs were withdrawn by France, Germany, Italy, Spain (Ando et al., 2022) and Luxembourg (Barbier-Gauchard et al., 2021). Therefore, the unemployment rates did not change in these countries through 2020, with exception of Spain, which faced a major increase followed by France. Compared to the United States and their labour market policy without short-term work programmes, EU countries successfully maintained their employment rates during the pandemic (Eyméoud et al., 2021). EU represented by countries France, Italy and Germany did have unprecedented success in curbing unemployment but the number of working hours decreased as in the US. Differences between EU countries, in the case of labour market indicators, such as the unemployment rate, could be connected to the influence of the number of COVID-19 cases. While COVID-19 cases could not be related to the unemployment in France and Spain, the cluster of Germany, Italy and the UK was faced with the strong influence of COVID-19 cases on the unemployment rate. On the other hand, in Italy and UK deaths caused by COVID-19 are also connected to unemployment (Su et al., 2021). When it comes to Poland, Bulgaria, Slovakia, Finland and Czech Republic, the JRSs were much less used in these countries. Moreover, some countries such as Italy even before the COVID-19 pandemic had used JRSs for a worker in the industrial sector, while, for example, the Czech Republic introduced this scheme in 2020 and shortly after in spring 2022 terminated the program (Pavolini et al., 2022). Therefore, the identified differences in the composite index of geographical clusters of countries are expected in two representative periods and, as previously stated, they are the result of inherited labour market disparities rather than caused by coronavirus consequences.
The COVID-19 pandemic again shed the light on the disparities that exist between EU countries in the context of the labour market and social protection systems. The SURE program and its budget for mitigating crisis effects in some countries were combined with national social protection systems for unemployed workers. Once more, the question of the necessity of social protection systems harmonisation within EU countries arose (Barbier-Gauchard et al., 2021). Differences were also observed in the way of tackling the negative effects of the COVID-19 crisis. Specifically, the majority of countries were implementing JRSs, but some countries used wage subsidies to protect against labour hoarding (such as Bulgaria, Croatia, Latvia, Lithuania, and The Netherlands) (Ando et al., 2022).

Conclusion

The COVID-19 pandemic has raised a vast number of problems in all economic sectors and markets, and one of them is the labour market. Therefore, the authors of this paper investigated the differences between EU countries by calculating a composite index made of ten labour market indicators in order to assess the differences between labour markets before and during the COVID-19 crisis and to conclude about the sustainability of this market. For this purpose, the MOORA method of composite indexes' development was applied. The research has revealed that, when it comes to EU labour markets, differences comparing three years' labour market indexes were not proven, while the differences on a country level were noted. On the other hand, significant differences were found among groups of EU countries that belong to the same geographical cluster. Western Europe and Southern Europe, Western Europe and CEE, and CEE and Southern Europe were identified as different in terms of the developed composite index for 2020, and only between Western Europe and Southern Europe and Western Europe and CEE when it comes to the composite index for 2021.
These differences probably were not caused by the COVID-19 pandemic but may have been encouraged by the use of JRSs and wage subsidies as reactive measures for curbing negative labour market effects during the pandemic. Even though these common measures emerged as positive for the overall EU labour market and the EU unemployment rate increase was restrained by them, on the individual level, the countries have used different programmes (JRSs, wage subsidies or both) and withdrove different amounts of budget for social protection systems. The beneficial effects of employees' retainment and not laying them off because of the crisis are that workers

and firms retain their performances and human capital while negative consequences of unemployment are by-passed. Moreover, the cost of firing employees and afterwards their recruitment, selection and socialisation when the crisis is over, are significantly decreased by the JRSs implementation (Barbier-Gauchard et al., 2021). Besides positive effects and the developed resilience to the COVID-19 labour market effects, the labour market indicators, and the composite index developed on their basis, are pointing out that there is a need for one harmonised EU labour market policy and social protection system that will mitigate labour market disparities and crisis effects in the long run. By doing this, EU countries will lessen the problem of workers' migration caused by unfavourable labour market conditions in order to contribute to the sustainability of the EU labour market.
Although the study results are rather indicative, the study has its shortcomings. Further research on this topic could be expanded and new labour market indicators introduced in order to increase the representativeness of the results. Additional forms of research can be directed to the application of comparative methods of composite indices' calculation in order to confirm the results obtained in this study.

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References

1. ANDERTON R., BOTELHO V., CONSOLO A., DA SILVA A.D., FORONI C., MOHR M., 2021, The impact of the COVID-19 pandemic on the euro area labour market, *Economic Bulletin Articles*, 8.
2. ANDO S., BALAKRISHNAN R., GRUSS B., HALLAERT J., JIRASAVETAKUL L. F., KIRABAEVA K., KLEIN N., LARIAU A., LIU L. Q., MALACRINO D. QU H., SOLOVYEVA A., 2022, European Labor Markets and the COVID-19 Pandemic: Fallout and the Path Ahead, *Departmental Papers*, 2022(004), A001, https://www.elibrary.imf.org/view/journals/087/2022/004/article-A001-en.xml (5.08.2022).
3. BARBIER-GAUCHARD A., DAI M., MAINGUY C., SAADAOUI J., SIDIROPOULOS M., TERRAZ I., TRABELSI J., 2021, Towards a more resilient European Union after the COVID-19 crisis, *Eurasian Economic Review*, 11(2): 321-348, DOI: 10.1007/s40822-021-00167-4.
4. BARKER N., DAVIS C.A., LÓPEZ-PEÑA P., MITCHELL H., MOBARAK A.M., NAGUIB K., REIMÃO M.E., SHENOY A. VERNOT C., 2020, Migration and the labour market impacts of Covid-19, *WIDER Working Paper*, No. 2020/139, The United Nations University World Institute for Development Economics Research (UNU-WIDER), Helsinki.
5. BRAUERS W. K., ZAVADSKAS E. K., 2006, The MOORA method and its application to privatization in a transition economy, *Control and cybernetics*, 35(2): 445-469.
6. COSTA DIAS M., JOYCE R., POSTEL-VINAY F. XU X., 2020, The challenges for labour market policy during the COVID-19 pandemic, *Fiscal Studies*, 41(2): 371-382, DOI: 10.1111/1475-5890.12233.
7. DEMENA B.A., FLORIDI A., WAGNER N., 2022, The Short-Term Impact of COVID-19 on Labour Market Outcomes: Comparative Systematic Evidence, *COVID-19 and International Development*, ed. Papyrakis, E., Springer, Cham: 71-88, DOI: 10.1007/978-3-030-82339-9_6.
8. EYMÉOUD J. B., PETROSKY-NADEAU N., SANTAEULÀLIA-LLOPIS R., WASMER E., 2021, Contrasting US and European Job Markets during COVID-19, *FRBSF Economic Letter*, 2021(05): 01-05.
9. FANA M., TOLAN S., TORREJÓN S., BRANCATI C.U. FERNÁNDEZ-MACÌAS E., 2020a, *The COVID confinement measures and EU labour markets*, Publications Office of the European Union, Luxembourg, DOI: 10.2760/079230, JRC120578.
10. FANA M., TORREJÓN PÉREZ S., FERNÁNDEZ-MACÍAS E., 2020b, Employment impact of Covid-19 crisis: from short term effects to long terms prospects, *Journal of Industrial Business Economics*, 47(3): 391-410, DOI: 10.1007/s40812-020-00168-5.
11. FUJITA S., MOSCARINI G., POSTEL-VINAY F., 2020, *The Labour Market Policy Response to COVID 19 must Save Aggregate Matching Capital*, VOX CEPR Policy Portal.
12. KARAGIANNIS R., KARAGIANNIS G., 2020, Constructing composite indicators with Shannon entropy: The case of Human Development Index, *Socio-Economic Planning Sciences*, 70, 100701, DOI: 10.1016/j.seps.2019.03.007.
13. LAMBOVSKA M., SARDINHA B. BELAS JR J., 2021, Impact of the COVID-19 pandemic on youth unemployment in the European Union, *Ekonomicko-manazerske spektrum*, 15(1): 55-63, DOI: 10.26552/ems.2021.1.55-63.
14. LEE S., SCHMIDT-KLAU D., VERICK S., 2020, The labour market impacts of the COVID-19: A global perspective, *The Indian Journal of Labour Economics*, 63(1): 11-15, DOI: 10.1007/s41027-020-00249-y.
15. LEMIEUX T., MILLIGAN K., SCHIRLE T., SKUTERUD M., 2020, Initial impacts of the COVID-19 pandemic on the Canadian labour market, *CLEF Working Paper Series 26*, Canadian Labour Economics Forum (CLEF), University of Waterloo.
16. MAYHEW K., ANAND P., 2020, COVID-19 and the UK labour market, *Oxford Review of Economic Policy*, 36(S1): 215-224, DOI: 10.1093/oxrep/graa017.
17. MILANOVIĆ S., MARKOVIĆ M., MARJANOVIĆ I., 2020, Relationship between labour market and business dynamism: Case of European countries, *EKONOMIKA*, 66(2): 93-102, DOI: 10.5937/ekonomika2002093M.

18. PAVOLINI E., FULLIN G., SCALISE G., 2022, Labour market dualization and social policy in pandemic times: an in-depth analysis of private consumption services in Europe, *International Journal of Sociology and Social Policy*, ahead-of-print, DOI: 10.1108/IJSSP-03-2022-0074.
19. POULIAKAS K., BRANKA J., 2020, EU Jobs at Highest Risk of COVID-19 Social Distancing: Will the Pandemic Exacerbate Labour Market Divide?, *IZA Discussion Paper* No. 13281.
20. SAZMAZ E. B., OZKOK I., SIMSEK H., GULSEVEN O., 2021, *The Impact of COVID-19 on European Unemployment and Labor Market Slack*, SSRN 3766376, DOI: 10.2139/ssrn.3766376.
21. SOARES S., BERG J., 2021, The labour market fallout of COVID-19: Who endures, who doesn't and what are the implications for inequality, *International labour review*, 161(1): 5-28, DOI: 10.1111/ilr.12214.
22. STANKOVIĆ J. J., MARJANOVIĆ I., PAPATHANASIOU J., DREZGIĆ S., 2021, Social, economic and environmental sustainability of port regions: MCDM approach in composite index creation, *Journal of Marine Science and Engineering*, 9(1): 74, DOI: 10.3390/jmse9010074.
23. SU C. W., DAI K., ULLAH S., ANDLIB Z., 2021, COVID-19 pandemic and unemployment dynamics in European economies, *Economic Research-Ekonomska Istraživanja*, 35(1): 1752-1764, DOI: 10.1080/1331677X.2021.1912627.
24. VERICK S., SCHMIDT-KLAU D., LEE S., 2022, Is this time really different? How the impact of the COVID-19 crisis on labour markets contrasts with that of the global financial crisis of 2008-2009, *International Labour Review*, 161(1): 125-148, DOI: 10.1111/ilr.12230.
25. WACHTER T., 2020, Lost Generations: Long-Term Effects of the COVID-19 Crisis on Job Losers and Labour Market Entrants, and Options for Policy, *Fiscal Studies*, 41(3): 549-590, DOI: 10.1111/1475-5890.12247.
26. WEBER T., HURLEY J., BISELLO M., AUMAYR-PINTAR C., CABRITA J., DEMETRIADES S., PATRINI V., RISO S., VARGAS L., O., 2020, COVID-19: Policy responses across Europe, *Eurofound*, Publications Office of the European Union, Luxembourg.
27. WILSON T., COCKETT J., PAPOUTSAKI D., TAKALA H., 2020, *Getting back to work: Dealing with the labour market impacts of the Covid-19 recession*, Institute for Employment Studies, Report, 54.

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Sustainability of EU Labour Markets During the Coronavirus Crisis

Zrównoważoność rynków pracy UE podczas kryzysu związanego z koronawirusem

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Abstract

The purpose of this article is to explore the differences that exist between the exercise of the right to work by refugees and migrant workers under EU law, and to examine the existing differences between these categories under international law. The leading method of research used in the article is the method of comparison. It was used to analyze the differences in the legal regulation and implementation of the right to work by refugees and migrant workers in the EU. The article analyzes the peculiarities of the definition and legal regulation of the terms refugee and migrant worker. The author defines the classification of types of migration and proves the conclusion that economic motives are the most frequent reason for migration. At the same time, the author argues that refugees and labor migrants are different concepts in terms of labor legislation. Therefore, they have different legal status and, accordingly, different frameworks for exercising their rights. Besides, the author as an example considered Polish legislation, which regulates both the issues of labor migration and realization of labor rights of refugees, especially in the context of war in Ukraine, which is also reflected in the results of work and conclusions to the article. The materials obtained as a result of the study can be used in law-making activities to improve the national labor legislation of Ukraine on the example of the considered legal acts, as well as taking into account the European vector of development of Ukraine.

Key words: labor law, refugees, migrant workers, right to work, labor relations, third country nationals

Słowa kluczowe: prawo pracy, uchodźcy, pracownicy migrujący, prawo do pracy, relacje w pracy, obywatele krajów trzecich

1. Introduction

It is worth noting that the movement of people around the world is a phenomenon that has been with us for a long time and has probably existed throughout human history. There are even states in the world whose populations consist entirely of migrants (e.g. the United States, Canada, Australia). Migration processes around the world have now assumed incredible proportions, requiring increasing attention to this phenomenon by international legal regulation. The reasons for the increase in migration are many, but among the main ones are historical developments, globalisation, integration and active international cooperation. It is worth highlighting that migrants have different objectives, depending on which type of migration is distinguished. This can be classified according to its causes: political (political events, discrimination on various grounds, etc.); military (evacuation, military

events); social (marriage, health, etc.); environmental (technogenic and natural disasters); economic (employment, search for higher income, etc.); other (ethical, religious, etc.).
Labour migration is economically motivated. For example, *The 2030 Agenda for Sustainable Development* recognized well-governed labour migration can contribute to sustainable development for countries of origin, transit and destination, and can provide benefits and opportunities for migrant workers and their families by balancing labour supply and demand, helping develop and transfer skills at all levels, contributing to social protection systems, fostering innovation and enriching communities both culturally and socially (ROAF, 2021). As noted by Ukrainian academics S. Fomishyn, A. Rybchuk and A. Rumiantseva (2011) environmental and economic reasons are the most common today. Similar views are held by researchers such as B. Dmytruk and N. Svetlova (2016), who point out that the current era of economic reforms in the global economy is dominated by migration, as evidenced by the dominance of economic factors as the main causes of migration. It can therefore be argued that labour migration is now a very widespread phenomenon. The relevance of the theoretical understanding of the problem of refugees is also indicated by the fact that in recent years it has been actively discussed, both from the rostrum of the United Nations and in other international organizations.
Moreover, the search for more effective ways to protect forced migrants and provide them with practical assistance continues. Undoubtedly, the scientific development of the problem of refugees is relevant and Ukraine, which is of great importance to it, both socially and politically. This problem was especially pronounced in connection with the armed aggression of the Russian Federation in Ukraine and the encroachment on its sovereignty and territorial integrity. The widespread violation by Russian troops of the laws and customs of war, as well as fundamental human rights, has forced a large number of Ukrainian citizens to save their lives on EU territory. In addition, they are forced to exercise their fundamental rights, including the right to work, on the territory of their host countries. The EU has a broad legal regulation of the peculiarities of labor of legal labor migrants, but the situation in Ukraine was the impetus for organizing labor and refugees, in particular from Ukraine. In addition, most of the known works on the problems of refugees and internally displaced persons are mainly focused on the study of general economic, social, cultural, psychological and other aspects, rather than on the study and consideration of the legislative and political mechanism for regulating the problems of refugees and internally displaced persons.
At the same time, the topic of refugees' exercise of the right to work is often insufficiently studied, especially now that European legislation is changing under the influence of the current situation in the world. Researchers also rarely compare the rights of labor migrants and refugees to work and the specifics of employment. All this in aggregate and a number of other objective reasons caused the necessity to study the problem of refugees and their influence on the socio-political situation in the EU as an object of analysis within the cognitive possibilities of political science, as well as the study of their labor rights and the limits of their realization.

2. Methodological Framework

Methods of research is a system of general scientific, philosophical and special methods, the use of which provides the reliability of the results, achieving the formulated goals and objectives of the study. The main method that the author applied during the study is the method of comparison. It was used in all paragraphs of the article, namely for the analysis of differences in the legal regulation and implementation of the right to work by refugees and migrant workers. Also the comparative method was applied in the analysis of the relevant EU legislation in these issues. In addition, the author used the comparative method in the context of considering relevant issues using the example of Polish law. The use of the comparative method made it possible to identify how the same topical issues are regulated differently by the participants in international relations and which ways are the most advantageous. In addition, the comparative method was used by the author in analyzing the concepts of labor migrant and refugee and their use in different norms.
The formal-legal method was applied at all stages of the analysis of legislation. It was used when considering the legal regulation of the peculiarities of the concept of refugee and labor migrant, as well as the regulation of protection of these categories of persons in the acts of international law. In addition, the use of this method allowed to analyze the normative-legal content of international legal documents adopted in the framework of international organizations, the European Union and the national legislation of the countries of the world under study. Thus, the use of the formal-legal method enabled the author to study the regulation of labor legal relations and certain aspects of protection of the right to work in the EU law and the Polish legislation.

The systematic method that the author applied during the research provided an opportunity to generalize and systematize scattered information about the labor rights of refugees and migrant workers. In addition, the application of the systematic method provided an opportunity to classify labor migration according to the reasons for its implementation:

- political (political events, discrimination on various grounds, etc.);
- military (evacuation, military events);
- social (marriage, health status, etc.);
- environmental (technogenic and natural disasters);

- economic (employment, search for higher income, etc.);
- others (ethical, religious, etc.).

Also on the basis of the systematic method the author distinguished two constituent elements: the labor activity itself (or paid activity), i.e. the fact of employment of an individual; moving to the territory of another state, i.e. compulsory employment abroad. The author also applied the method of analysis and synthesis. Its application provided an effective analysis of the framework of realization of the right to work by refugees and migrant workers under EU and Polish law. In addition, the method of analysis and synthesis was used to identify the differences between the categories under study. Thus, based on this method, the author came to the conclusion that migrant workers and refugees differ significantly in the following categories: the reason for arrival in the host country; legal status; protection by international law; and legal procedures for moving.

Therefore, at the EU level there are legal acts that help distinguish these two categories in accordance with universal international law and ensure (as far as possible) by such persons the realization of the right to work. Also in the course of research the author applied methods of scientific cognition, which were used to study the features and signs of migration, labor migration, as well as the peculiarities of these phenomena. The results of scientific-cognitive activity with the use of the above method provided the need to clarify the existing differences between the two categories of persons under consideration in the context of the right to work.

3. Results

3.1. Theoretical and legal approaches to the concepts of labor migrant and refugee

The concept of labour migration itself is defined as the process of moving citizens to the territory of another state for the purpose of working and exercising their labour rights and interests (Volosko, 2016; Galkin et al., 2020). The UK research team J. Simon, N. Kiss and A. Łaszewska (2015) noted that labour migrants are considered as such if they look for work or are employed in the host country or have previously looked for work or worked, but have not continued working in the host country. However, it should be noted that in all the above definitions, two constituent elements are used by scholars as the defining criterion of labour migration:

1) the labour activity itself (or paid activity), i.e. the fact of an individual's employment;
2) moving to the territory of another state, i.e. compulsory employment abroad (Sardak et al., 2021).

If we turn to the instruments of international law governing this concept, we should note the International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families (UN General Assembly, 1990), which stipulates that the term migrant worker should be used in relation to persons who would be engaged, are engaged or have been engaged in gainful employment in a State of which they are not nationals. The provisions of Art. 2 of the Convention 1990 define categories of migrant workers: seasonal worker; frontier worker; seafarer; salaried worker; relocated worker; project worker; worker employed on a fixed coastal installation; non-salaried worker.

In International Labor Organisation (1949) Convention No. 97 on Migrant Workers, article 11 defines the term migrant worker as a person who migrates from one country to another for the express purpose of employment and applies to any person who has the status of a migrant worker by law The provisions of ILO Convention No. 97 do not apply to frontier workers, professionals, seamen and entertainers who have entered for short periods. Comparing these two definitions, it should be noted that despite the different wording, they are quite similar. Nevertheless, the definition in the ILO Convention has a certain feature that distinguishes it from the 1990 Convention.

The ILO Convention says: *recognized by law as a migrant worker, that is, in this case there is a reference to the legislation of the receiving state*. On this basis, we can conclude that the ILO Convention applies to those foreign workers who are legally present in the territory of the receiving State. By contrast, the provisions of the Convention 1990 apply to all migrant workers. In this aspect it can be argued that the provisions of the Convention 1990 have a wider scope, which is a positive feature in the aspect of human rights protection. Ukrainian researcher O. Triukhan (2015), referring to the work of English scholar P. Stoker, notes that it is appropriate to distinguish five categories of foreign workers, among them: settlers, contract workers, skilled professionals, irregular labour migrants and asylum seekers/refugees.

Therefore, the author suggests that refugees should be classified as a sub-category of migrant workers. Of course, this view is valid, as refugees can also exercise their right to work. However, the author of this article believes that refugees and migrant workers should still be separated, if only because they have different legal statuses. A refugee has the right to work just like any other person and can exercise that right. However, the difference lies in the foreigner's original reason for coming to the territory of the host state (Britchenko et al., 2020). Whereas a migrant worker initially comes to a foreign country in search of work (as indicated above - employment is the main factor that characterises a migrant worker), a refugee arrives in the same country because of the threats that await him in his country of origin and only after some time can he find employment. Thus, we argue that these are two different categories, although they may share a common set of labour rights.

Considering the features of the concept of refugee, we note that if we turn to international law, we should pay attention to the UN Convention Relating to the Status of Refugees (UN General Assembly, 1951), which defines a refugee as a person who, due to well-founded fear of becoming a victim of persecution for on the grounds of race, religion, citizenship, membership of a particular social group or political opinion, is outside the country of his nationality and is unable to enjoy the protection of that country or is unwilling to enjoy such protection as a result of such fear; or, having no particular nationality and being outside the country of his/her former residence as a result of such events, is unable or unwilling to return to it as a result of such fear. In the International Protocol relating to the Status of Refugees (UN General Assembly, 1966), the concept of refugee is detailed on the basis of time. These documents are the main ones that internationally define the term refugee and enshrine the rights and status of refugees.

According to Art. 1(2)(A) of the Convention Relating to the Status of Refugees (UN General Assembly, 1951), the basic condition for qualifying as a refugee is a well-founded fear of persecution on the grounds of race, religion, nationality, membership of a particular social group or political opinion. This condition comes into play if the person has already crossed the border, i.e. is outside of his state of origin. Most often refugees appear as a result of military conflicts (both international and domestic). The phenomenon of refugees is determined primarily by a forced and undesirable for a citizen change of place (country) of his residence. the concept of refugee includes two criteria:

1) a positive criterion, i.e. a set of attributes, in the presence of which a person can be recognized as a refugee;
2) a negative criterion, i.e. a set of characteristics, in the presence of which a person cannot be recognized as a refugee or loses his/her refugee status (Bezpalova, 2017; Lytvynenko et al., 2022).

Refugees in the territory of the country of their stay on an equal basis with other categories of the population (citizens of the state of stay, foreigners, stateless persons) enjoy all human rights, which are universal and enshrined at the international level, including the right to work. By virtue of this, they can exercise their own rights through employment in the state of residence.

At the same time, they do not become migrant workers. Guaranteeing the respect and protection of these human rights is both a way to solve the problem of refugees and a way to prevent its occurrence Thus, let us summarize that labor rights of refugees and migrant workers, although they originate from a single inalienable right to work, but they are realized in different ways. It is connected with the difference in their legal statuses and peculiarities of legislation of the receiving country.

3.2. Legal regulation of the rights of migrant workers in the EU

The competence of the European Union with regard to internal labor migration expanded with the adoption of the Amsterdam Agreement in 1999 in the direction of developing a policy on labor migrants from third countries. Although the EU's founding treaties are intended to regulate various aspects arising in the creation, operation and functioning of the Union and its citizens, a separate provision concerning third-country nationals is contained in Art. 15 of the EU Charter of Fundamental Rights. Its provisions presuppose those migrant workers who have received a work permit should be provided with the same working conditions as EU citizen workers. The provisions of Art. 45 of the Charter suggest that freedom of movement and residence may be granted to workers who are third-country nationals but are in the EU legally (*Consolidated versions…,* 2012).

The basis of the legal regulation of migrant labor is laid down in secondary legal acts of the EU, which include Regulations, Directives, and Decisions. Third-country nationals are not subject to the freedoms enjoyed by EU citizens. Ukrainian researcher O. Darmoris (2010) notes that the current directives mainly regulate the status of long-term residents, the right to family reunification, and the right to study. However, most issues, in particular the question of entry, obtaining residence permits and employment of migrant workers from third countries, legal regulation of labor of workers under fixed-term employment contracts, self-employed workers is determined by the discretion of each member state. The specific features of the employment of migrant workers are reflected in EU instruments such as:

- Directive 2003/109/EU on the status of third-country nationals who are long-term residents (Council of the EU, 2003a);
- Commission Decision of 8 July 1985 setting up a prior communication and consultation procedure on migration policies in relation to non-member countries (The Commission of the European Communities, 1985);
- Council Directive 2003/86/EU of 22 September 2003 on the right to family reunification (Council of the EU, 2003b);
- Council Directive 2009/50/EU of 25 May 2009 on the conditions of entry and residence of third-country nationals for the purposes of highly qualified employment (Council of the EU, 2009);
- Council Resolution of 20 June 1994 on limitation on admission of third-country nationals to the territory of the Member States for employment (Council of the EU, 1994);

- Directive 2011/98/EU of 13 December 2011 on a single application procedure for a single permit for third-country nationals to reside and work in the territory of a Member State and on a common set of rights for third-country workers legally residing in a Member State (European Parliament & Council of the EU, 2011b);
- Recommendation No. 151 concerning Migrant Workers (International Labour Organization, 1975), etc.
- In addition, there are a number of legal acts that regulate specific issues of the employment relationship, for example:
- Directive 2014/36/EU of 26 February 2014 on the conditions of entry and stay of third-country nationals for the purpose of employment as seasonal workers (European Parliament & Council of the EU, 2014a) – about seasonal workers;
- Directive 2014/66/EU of 15 May 2014 on the conditions of entry and residence of third-country nationals in the framework of an intra-corporate transfer (European Parliament & Council of the EU, 2014b) in some aspects of intra-corporate transfer;
- Directive (EU) 2017/2397 of 12 December 2017 on the recognition of professional qualifications in inland navigation and repealing Council Directives 91/672/EEC and 96/50/EC, 2017 about recognition of professional qualifications in inland navigation and repealing (European Parliament & Council of the EU, 2017);
- Council Directive 2009/50/EU of 25 May 2009 on the conditions of entry and residence of third-country nationals for the purposes of highly qualified employment (Council of the EU, 2009), etc.

The author proposes to pay attention to some of the most important of these legal acts. Among these acts is Directive 2014/36 (European Parliament & Council of the EU, 2014a) on the conditions of entry and residence of third-country nationals for the purpose of employment as seasonal workers. This Directive aims to regulate a separate category of migrant workers from third countries. According to it, seasonal workers have the right to legally stay in the EU for five to nine months (depending on the legislation of a Member State) and carry out seasonal activities, while maintaining their main place of residence in the territory of a third country.

The Directive, among other things, establishes a list of rights that migrant workers are entitled to. The Directive also regulates the issue of the employment contract to be concluded with the worker and establishes mandatory aspects to be covered. In our opinion, the adoption of the Directive regulating the specifics of employment of seasonal workers is an important step, because this category of workers should be subject to separate regulation, taking into account the peculiarities inherent in seasonal work, in particular, the time of its performance. It is also worth paying attention to the fact that migrant workers from third countries, who work officially in the EU for a long time, can obtain the status of long-term resident. The relevant issue is regulated by the Directive 2003/109/EU (Council of the EU, 2003a) on the status of third-country nationals residing on a long-term basis since 2003 and according to its provisions a migrant worker from a third country legally residing permanently in the territory of an EU member state for 5 years is entitled to obtain long-term resident status.

Such residence must be legal and continuous in order to show that the person is rooted in the EU member state concerned. The directive also stipulates that in order to obtain long-term resident status, a third-country national will have to prove that he or she has sufficient resources and health insurance so as not to create a burden on the member state. When member states assess the availability of stable and regular resources, they may take into account factors such as contributions to the pension system or meeting tax obligations. According to the author, the right of labor migrants to family reunification is also important. This is generally regulated at the universal international legal level and is an inalienable right. Accordingly, the EU could not ignore such an important issue and in 2003 adopted the Council Directive 2003/86/EU (European Parliament & Council of the EU, 2003) on the right to family reunification.

The Directive notes that family reunification is a necessary means to make family life possible. It contributes to the creation of socio-cultural stability, which facilitates the integration of third-country nationals in the Member States and also promotes economic and social cohesion. Measures concerning family reunification must be taken in accordance with the obligation to protect the family and respect family life enshrined in many international legal instruments. The Directive stresses the need to establish a system of procedural rules governing the application process for family reunification and the entry and residence of family members.

The relevant procedures must be effective and manageable in relation to the normal workload of the administrative authorities of the Member States, as well as transparent and fair in order to provide the persons concerned with an adequate level of legal security. Thus, by adopting the relevant Directive, the EU has tried not only to regulate family reunification, but also to lay the foundation for the harmonization of legislation of member states in this area, as well as to regulate the procedural issues involved. In general, the issue of family relations is also important in the context of the rights of EU workers. Such regulation is conditioned by international legal standards on the protection of family relations and family reunification, as well as necessary for a normal family life of migrant workers.

Therefore, it can be argued that the EU has regulated at the legislative level a number of issues that relate to certain aspects of the employment of third-country nationals. In more detail, the issue of labor migration between EU

member states and third countries is regulated at the bilateral level by concluding separate agreements on labor and social issues. We consider bilateral cooperation to be one of the most effective because it takes into account the interests of both parties and the specific problems that need to be solved between the two parties, focusing on the current state of their relations. In our opinion, bilateral cooperation between EU member states and third countries on labor migration will expand, given that the issue of labor migration belongs to the competence of EU member states and the high efficiency of bilateral legal regulation.

As an example, let us consider the legal regulation of the issue of labor rights of migrants in the legislation of Poland. This state was not chosen randomly, as today Poland is one of the countries that received a huge number of refugees and Ukraine, and before that many labor migrants went there. Therefore, its example in the regulation of third-party employment will be most relevant. In recent years, Poland has seen rapid economic growth, which leads to a deepening of the labor market's need for labor, both for low-skilled jobs and employment in areas such as science, IT, construction, etc. That is, in those sectors that need highly qualified specialists. Poland is attractive for employment of citizens of third countries (especially Ukrainians and Belarusians) for a number of reasons. Among the visible reasons are, firstly, quite close territorial location. Secondly, the similarity of the language, which does not cause such difficulties for labor migrants as employment in other EU member states.

According to Art. 37 of the Constitution of the Republic of Poland (National Assembly of the Republic of Poland, 1997): *Everyone under the authority of the Polish State shall enjoy the freedoms and rights guaranteed by the Constitution. Exceptions to this principle with respect to foreigners shall be defined by law*. That is, decisions on any issues of the rights and obligations of foreigners are not regulated by constitutional norms, but are referred to the sphere of regulation of individual normative legal acts.

The foundations of the regulation of legal relations with foreigners are laid by the Act on foreigners (Polish Parliament, 2013). The law establishes the principles and conditions governing the entry, transit, residence and departure from the territory of the Republic of Poland of foreigners, as well as the procedure and authorities competent in these matters. Among other things, the law defines a number of features concerning the employment of foreigners, in particular: the peculiarities of obtaining permits, the right to legally carry out business activities, the regulation of the employment of temporary workers and highly qualified workers. It can be summarized that this law establishes the basis for the regulation of the stay of foreigners in Poland, paying significant attention to migrant workers.

The main law regulating the principles related to the performance and performance of work by foreigners in the Republic of Poland is the Employment Promotion and Labor Market Institutions Law 2004 (hereinafter referred to as the Polish Act 2004) (Polish Parliament, 2004). According to Art. 2 of the Polish Act, 2004, its provisions apply to Polish citizens and foreigners. At the same time, the relevant article clearly defines the categories of foreigners covered by the law. They are:

- nationals of other EU Member States;
- nationals of states with which the EU has concluded agreements on freedom of movement;
- persons with refugee status in the Republic of Poland;
- persons who have officially applied for refugee status, but failed to obtain it for objective reasons; persons with residence permits in the Republic of Poland;
- persons granted the status of family member of a foreigner; persons enjoying temporary protection regime in the Republic of Poland;
- foreign persons who are family members of Polish citizens; foreign persons who are granted (Polish Parliament, 2004).

For the purposes of the law, any person who does not have Polish citizenship is considered a foreigner. In other words, the concept of foreigner includes not only citizens of third countries, but also citizens of other EU member states (Polish Parliament, 2004). However, in our case it is the regulation of labor of third-country nationals that is of interest. Nevertheless, taking into account the fact that the law regulates the specifics of employment of foreigners, and by foreigners we mean both persons who are EU citizens and citizens of third countries, it can be stated that the Polish Law, 2004 actually equalized the conditions for employment of EU citizens and citizens from third countries. However, an important condition for the legality of employment of a migrant worker from a third country is the availability of a work permit. These facts confirm the principle expressed in the provisions of Polish law, according to which the work performed by a foreigner is legal only if the foreigner is legally present in the Republic of Poland.

However, as of January 1, 2018, a law of amending the Act of 20 July 2017 to amend Act on promotion of employment and on labour market institutions and some other acts (Polish Parliament, 2017) and some other laws entered into force. The main purpose of the changes was to implement Directive 2014/36/EU (European Parliament & Council of the EU, 2014a) on conditions for the entry and stay of third country nationals for the purpose of employment as seasonal workers from 2014. The changes are also aimed at counteracting the abuses that occur, to better manage labor migration, as well as to improve labor standards for foreigners. In particular, the provisions on work permits were changed and a new type of work permit was introduced for seasonal work performed by foreigners.

It should also be noted that in 2018 the Polish law provided for simplified conditions of employment for certain categories of migrant workers. As noted in the Decree of the Ministry of Family, Labor and Social Policy (2018) amending the regulation on the definition of cases in which a work permit for a foreigner is issued regardless of the detailed conditions for issuing a work permit to a foreigner from 2018, the list of positions for which the foreigner does not need to wait for confirmation that they are not applied for by local workers is established. The simplification applies to 38 groups of occupations. These include electricians, engineers, construction professions, IT specialists, doctors, nurses, road workers, bus and truck drivers, social workers and a number of other professions.

In general, having analyzed the specifics of Polish legislation in the context of employment of third-country nationals, one can state that unlike EU law, which clearly distinguishes the specifics of employment of EU citizens and non-EU citizens, Polish national legislation equates both citizens of other EU member states and labor migrants from third countries with foreigners The main condition for them is legality of stay in the country and permission for employment. The introduction of softening for certain categories of workers also becomes an important advantage, guaranteeing for labor migrants from third countries a simplified procedure of employment and a higher level of income than in the state of their citizenship.

3.3. Ensuring and protecting the labor rights of refugees in the EU and on the territory of individual EU member states

Along with the regulation of labor rights of foreign workers, EU legislation also contains norms that regulate obtaining refugee status, including the exercise by such persons of their labor rights. It is worth highlighting a number of normative legal acts that are aimed at protecting the rights of refugees, among its:

- Directive 2013/33/EU of 26 June 2013 laying down standards for the reception of applicants for international protection (recast) (European Parliament & Council of the EU, 2013a);
- Council Directive No.2001/55/EU of 20 July 2001 on minimum standards for giving temporary protection in the event of a mass influx of displaced persons and on measures promoting a balance of efforts between Member States in receiving such persons and bearing the consequences thereof (Council of the EU, 2001);
- Directive No. 2003/86/EU of September 22 on the right to family reunification (Council of the EU, 2003b);
- Directive No. 2011/95/EU from December 13, 2011 on the qualification standards and status of third-country nationals and stateless persons as recipients of international protection, the uniform status of refugees or persons entitled to subsidiary protection, as well as the content of the protection granted (new edition) (European Parliament & Council of the EU, 2011a);
- Directive No. 2013/32/EU of June 29, 2013 on general procedures for granting and revoking international protection (new edition) (European Parliament & Council of the EU, 2013b) and other.

Therefore, by analogy with the legal regulation of labor rights of migrants, the EU defines the general directions and establishes the peculiarities of the regulation of labor rights of refugees. But the legislation of member states contains basic norms concerning refugees and they differ from country to country. In applications for refugee status, the applicant must bear the burden of establishing the truthfulness of his or her allegations and the accuracy of the facts on which his or her application is based. Very often the applicant is unable to back up his or her claim with documentary or other evidence, and cases in which the applicant can produce any evidence in support of his or her claim are the exception rather than the rule, since in most cases, a person fleeing persecution, moving to a country of asylum in a difficult situation often exists without any documentation.

Both the applicant and the decision-maker are directly involved in determining the truthfulness of the evidence submitted by the applicant pertaining to the application and making an appropriate fact-based decision, since the latter's obligation is to establish and evaluate the facts presented on the application. This is achieved to a large extent by the fact that the decision-maker is familiar with the objective situation in the applicant's country of origin, is aware of the relevant publicly known issues, and directs the applicant to provide the necessary information, and this is accordingly confirmed and substantiated alleged facts (Kukhtyk & Derkachenko, 2018).

Earlier, the author considered Poland as an example of labor regulation and protection of the rights of migrant workers. In this paragraph we also propose to consider Poland, but in the context of its legal regulation of protection of labor rights of refugees. First of all, it is worth mentioning the Act of 13 June 2003 on granting protection to aliens within the territory of the Republic of Poland (Polish Parliament, 2003). This law contains articles which establish the principles, conditions and procedure for granting protection to foreigners on the territory of the Republic of Poland. In addition, this law specifies the state authorities which have powers in the matters of refugee protection. According to Art. 3 of this law, a foreigner can receive one of the following forms of protection in Poland: refugee status; asylum; tolerated stay permit; temporary protection.

However, in the context of protecting the rights of refugees, among which is the right to work, amendments to Polish legislation adopted in connection with Russia's armed aggression against Ukraine deserve special attention. Thus, in March 2022, the Law of Poland on Assistance to Citizens of Ukraine in Connection with the Armed

Conflict on the Territory of that State (Polish Parliament, 2022) was adopted. The provisions of this law apply specifically to refugees who are citizens of Ukraine. Nevertheless, we should pay attention to it, because its adoption shows the relevance of refugee protection in the specific situation in the world. The relevant Act defines, among other things, a detailed framework for legalizing the stay of Ukrainian citizens (as well as their men/wives who do not have Ukrainian citizenship) who arrived in Poland due to military actions on the territory of that state. We are also talking about persons with the Pole Card, who, together with their closest relatives, arrived in the territory of Poland because of those actions. In the context of protecting the labor rights of refugees, it is worth noting that the Act provides access to the labor market.

The law provides a clear procedure for employment of citizens of Ukraine. Thus, an employer intending to employ a Ukrainian must, within 14 days, log on to the official state portal (praca.gov.pl.) and find there the relevant Employment Center and inform it that he/she has employed a foreigner. Citizens of Ukraine will be able to take advantage of the services provided in the Polish labor market. In particular, they can apply to Employment Centers, Professional Counseling Centers, and take advantage of courses - on equal terms with Polish citizens. In addition, Ukrainian citizens can engage in business activities on the same principles as Polish citizens - the condition is to obtain a personal number PESEL. The PESEL is a numerical mark of eleven digits that identifies an individual. It includes the date of birth, serial number, gender designation and a control digit. The analogue of this code in Ukraine is the individual taxpayer number (Polish Parliament, 2022).

So, it can be argued that Poland has generally regulated the protection of the rights of refugees in accordance with the requirements of international law, and has taken many steps to meet the needs of Ukrainian refugees and protect their rights, in particular the right to work, because it is one of the fundamental human rights.

3.4. Difference in the exercise of the right to work by refugees and migrant workers

Despite the fact that both labor migrants and refugees have the same inalienable human rights and have the right to realize their right to work, they have different legal statuses, which affect such realization. First of all it should be noted that a labor migrant makes a decision to change the country of residence in order to improve economic conditions. He is not forced to flee from some disaster, he moves to a country where he can be provided with higher wages, which he can send back home. At the same time, a foreign worker usually completes all the formalities of moving from one country to another and obtains the necessary permits required in the host country. In addition, migrant workers mostly try to use legal procedures to exercise their rights.

Refugees, in turn, are people forced to leave their country because of an obvious threat to their lives and health. That is, they are not seeking to improve their economic conditions, but are trying to ensure a basic human right – the right to life. Refugees receive assistance and provision from the host state. Employment is not their main purpose of arrival in a foreign country, unlike labor migrants. But at the same time, regardless of the reasons for his arrival, he can also get a job. In this case, unlike a labor migrant, employment will not be their main purpose of stay in the receiving state, but it can be realized by a refugee.

Under international law, the state has an obligation to offer protection to a refugee, but there is no such obligation with respect to a migrant. This distinction is important because when we call a refugee a migrant, we incorrectly assume that he is simply seeking economic advantage rather than being forced to leave in order to flee conflict or persecution. Thus, it can be argued that migrant workers and refugees exercise their right to work in different ways. Due to the existing differences between these categories, the EU and the Member States regulate the issue of their implementation of labor rights in different ways.

4. Discussion

General theoretical features of the implementation of the rights of migrant workers in her work studies O. Triukhan (2015). She notes that the causes of labor migration can be various factors: political, religious, national, environmental and others. However, most scholars recognize the economic origin of labor migration and attribute it to the following factors: significant differences in working conditions, wages, living standards, business conditions, lack of quality jobs, lack of proper incentives to work, etc. It is also worth paying attention to J. Simon, N. Kiss and A. Łaszewska (2015), who study ILO and peculiarities of its legal norms in the context of protection of rights of labor migrants. They also focus on the peculiarities of the definition of a labor migrant, noting that labor migrants are persons who are seeking work or are employed in the host country, or who have previously sought work or are employed but are unable to continue working and remain resident in the host country regardless of their documents. To estimate how many migrants are labor migrants, some use legal status, some use motivation, and others use total employment.

In the issue of refugee status assessment, the opinion of O. Bezpalova (2017), who in her article focuses attention on the fact that an effective mechanism for ensuring the rights of refugees must be developed at the international level, which should include a range of subjects authorized to take measures to create conditions for refugees to realize the rights granted to them (including control and oversight functions). She also analyzes the relevant

international instruments and legislation of individual states and identifies the characteristic features of the mechanism to ensure the rights of refugees.
Interesting conclusions about the specifics of the regulation of the rights of migrant workers from third countries in the EU are in the work of O. Darmoris (2010). She emphasizes that the EU legislation in the field of working conditions covers a wide range of issues - from working hours to the legal regulation of the work of part-time workers and fixed-term employment contracts. A characteristic feature of this institution is that most of the directives governing these or other issues of working conditions were formed as a result of the activities of the European social partners (legal regulation of part-time workers, fixed-term employment contracts, leave for parents with children, working hours for seafarers on ships).
An in-depth analysis of the peculiarities of the protection of individual rights of refugees. The authors considered the preconditions for the emergence of advocacy, immigration, their theoretical sources and practical principles. The scientific work reflects the main provisions of legal systems on legal activities related to the rights of refugees and internally displaced persons. In addition, the authors analyzed the norms of national and international law, their interaction in solving the problems of refugees and internally displaced persons (Kukhtyk & Derkachenko, 2018; Galkin et al., 2021).
Certain aspects of the legal regulation of the labor rights of migrants and refugees have been raised in their works by such researchers: B. Dmytruk and N. Svetlova (2016), S. Fomishyn, A. Rybchuk and A. Rumiantseva (2011), Ya. Volosko (2016), and other. Despite the fact that the issue of labor rights of refugees, as well as migrant workers, has been raised many times in the scientific literature and is sufficiently studied, however, recent events in the world related to the armed aggression of the Russian Federation have caused an increase in the number of refugees, which, as a consequence, has caused a new interest in the study of this topic. In addition, we believe that it is important to thoroughly understand the differences between the implementation of labor rights of refugees and migrant workers, as they have different legal status and their regulation of their employment is different.

5. Conclusion

Therefore, we can conclude that labor migration has accompanied people at all stages of the development of mankind. Migration can be classified according to its causes: political (political events, discrimination on various grounds, etc.); military (evacuation, military events); social (marriage, health, etc.); environmental (technogenic and natural disasters); economic (employment, search for higher income, etc.); others (ethical, religious, etc.). International labor migration is economically motivated. To interpret its essence, it is necessary to distinguish two constituent elements: the labor activity itself (or paid activity), i.e. the fact of an individual's employment; moving to the territory of another state, i.e. compulsory employment abroad. It is external labor migration that it is reasonable to define as the movement of persons across the border of one or more countries on a permanent or temporary basis for the purpose of employment. International labor migration can be divided by the purpose of crossing the border into two types: labor migration as the primary purpose and as a derivative one.
In the first case it is classical labor migration, when a person crosses the border of another country for the purpose of employment. In the second case, regarding international labor migration as a derivative goal, it can be traced in the movement of refugees and migrants whose move was caused by reasons other than employment (for example, military events, political system, persecution, low level of economic development of the state, low standard of living of the population, etc.), but having made the move to a foreign country, the person tries to find a job. Accordingly, such persons have different legal status in accordance with the norms of international law and the legislation of the receiving state.
Having analyzed the concept of migrant worker in the international legal acts of the universal and regional level, it can be argued that its definition has acquired a positive transformation, which in general serves as evidence of positive trends in the regulation of the rights of migrant workers at the international level. As for the sources of legal regulation of labor migration of third-country nationals in the EU, it is regulated by the acts of secondary legislation of the EU, which provides a general basis for the observance of the rights of foreign workers, but to a greater extent is still revealed in the provisions of the member states. For the most part, the legal acts in force in the Union regulate long-term resident status, the right to family reunification, non-discrimination, and intra-corporate transfer. Third-country nationals have the right to employment in the territory of EU member states, in particular, it lies in the need to obtain special permits. The establishment of special procedures is related to the EU protection of jobs for its own citizens.
In general, the issue of migration policy and labor migration is one of the main institutions in EU law, the regulation of which has been established for a long time. EU refugee law has been influenced by international refugee law, as well as by practical problems that have arisen in the course of EU development due to the large number of such persons. Existing legal norms regulate the procedures for accepting, protecting and integrating refugees into society, as well as their enjoyment of human rights. As in the case of migrant workers, EU regulations lay down only the basis for regulating refugee status, while member states expand and develop these norms in their national laws. We have seen this in both cases in Poland. Labor migrants and refugees differ significantly in the following

categories: the reason for arrival in the host country; legal status; protection by norms of international law; and legal procedures for moving. Therefore, at the EU level there are legal acts which help to distinguish these two categories in accordance with universal international law and to ensure (as far as possible) by such persons the exercise of the right to work.

References

1. BEZPALOVA O., 2017, Peculiarities of the Definition of Refugee Rights in International Legislation. In *Implementation and Protection of the Rights of Internally Displaced Persons: International Scientific-Practical Conference* (Uzhhorod, April 2017), TOV RIK-U , Uzhhorod: 10-19.
2. BRITCHENKO I., SAVCHENKO L., NAIDA I., TREGUBOV O., 2020, Areas and Means of Formation of Transport Regional Complexes and Mechanisms for Managing Their Competitiveness in Ukraine, *Ikonomicheski Izsledvania*, 29(3): 61-82.
3. CONSOLIDATED VERSIONS OF THE TREATY ON EUROPEAN UNION AND THE TREATY ON THE FUNCTIONING OF THE EUROPEAN UNION, 2012, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A12012E%2FTXT.
4. COUNCIL OF THE EU, 1994, *Resolution of 20 June 1994 on Limitation on Admission of Third-Country Nationals to the Territory of the Member States for Employment*, https://eur-lex.europa.eu/legal-content/LT/TXT/?uri=CELEX:31996Y0919(02).
5. COUNCIL OF THE EU, 2001, *Directive No. 2001/55/EU of 20 July 2001 on Minimum Standards for Giving Temporary Protection in the Event of a Mass Influx of Displaced Persons and on Measures Promoting a Balance of Efforts Between Member States in Receiving Such Persons and Bearing the Consequences Thereof*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32001L0055.
6. COUNCIL OF THE EU, 2003a, *Directive No. 2003/109/EU on the Status of Third-Country Nationals Who Are Long-Term Residents*, https://www.europarl.europa.eu/legislative-train/package-new-policy-on-legal-migration/file-status-of-long-term-resident-3rd-country-nationals-%E2%80%93-possible-review .
7. COUNCIL OF THE EU, 2003b, *Directive No. 2003/86/EU of 22 September 2003 on the Right to Family Reunification*, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2003:251:0012:0018:en:PDF.
8. COUNCIL OF THE EU, 2009, *Directive No. 2009/50/EU of 25 May 2009 on the Conditions of Entry and Residence of Third-Country Nationals for the Purposes of Highly Qualified Employment*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32009L0050 (02.10.22).
9. DARMORIS O., 2010, *Formation and Development of the Labor Law of the European Union*, National University Odesa Law Academy, Odesa.
10. DMYTRUK B., SVETLOVA N., 2016, World Migration Processes: Motivation, Types and Consequences of Countries of Departure and Host Countries, *Vestnik of the Eastern European University in Economics and Management*, 1(20): 18-27.
11. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2003, *Directive No. 2003/86/EU of September 22 on the Right to Family Unity*, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32003L0086 (02.10.22).
12. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2011a, *Directive No. 2011/95/EU from December 13, 2011 on the Qualification Standards and Status of Third-Country Nationals and Stateless Persons as Recipients of International Protection, the Uniform Status of Refugees or Persons Entitled to Subsidiary Protection, as Well as the Content of the Protection Granted (New Edition)*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=legissum:4314891 (02.10.22).
13. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2011b, *Directive No. 2011/98/EU of 13 December 2011 on a Single Application Procedure for a Single Permit for Third-Country Nationals to Reside and Work in the Territory of a Member State and on a Common Set of Rights for Third-Country Workers Legally Residing in a Member State*, https://eur-lex.europa.eu/LexUriServ/LexUriServ.do?uri=OJ:L:2011:343:0001:0009:EN:PDF (02.10.22).
14. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2013a, *Directive No. 2013/33/EU of 26 June 2013 Laying Down Standards for the Reception of Applicants for International Protection (Recast)*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=celex%3A32013L0033. (02.10.22).
15. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2013b, Directive No. 2013/32/EU of June 29, 2013 on General Procedures for Granting and Revoking International Protection (New Edition). https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32013L0032 (02.10.22).
16. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2014a, *Directive No. 2014/36/EU of 26 February 2014 on the Conditions of Entry And Stay of Third-Country Nationals for the Purpose of Employment as Seasonal Workers*, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=CELEX%3A32014L0036 (02.10.22).
17. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2014b, *Directive No. 2014/66/EU of the European Parliament and of the Council of 15 May 2014 on the Conditions of Entry and Residence of Third-Country Nationals in the Framework of an Intra-Corporate Transfer*, https://eur-lex.europa.eu/legal-content/EN/ALL/?uri=celex%3A32014L0066 (02.10.22)
18. EUROPEAN PARLIAMENT, COUNCIL OF THE EU, 2017, *Directive (EU) No. 2017/2397 of 12 December 2017 on the Recognition of Professional Qualifications in Inland Navigation and Repealing Council Directives 91/672/EEC and 96/50/EC (Text with EEA Relevance)*, https://eur-lex.europa.eu/legal-content/EN/TXT/?uri=CELEX%3A32017L2397 (02.10.22)
19. FOMISHYN S., RYBCHUK A., RUMIANTSEVA A., 2011, *International Economy: Teaching Manual*, Novyi svit, Lviv.
20. GALKIN A., POPOVA Y., KYSELOV V., . KNIAZIEVA T., KUTSENKO M., SOKOLOVA N., 2020, Comparison of Urban Conventional Delivery and Green Logistics Solutions, *Proceedings – International Conference on Developments in eSystems Engineering*, DeSE, 2020-December: 95-99, 9450776.

21. GALKIN A., ZAYTSEV V., SHYSHKIN V., OBOLENTSEVA L., POPOVA Y., 2021, Patterns of the Distribution of the Demand of End-Consumers Among Retailers in the Zone of Their Residence, *Foundations of Management*, 13(1): 145-158.
22. INTERNATIONAL LABOR ORGANISATION, 1949, *Convention No. 97 Migration for Employment*, https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::p12100_instrument_id:312242 (02.10.22).
23. INTERNATIONAL LABOUR ORGANIZATION, 1975, *Recommendation No. 151 Concerning Migrant Workers*, https://www.ilo.org/dyn/normlex/en/f?p=NORMLEXPUB:12100:0::NO::P12100_INSTRUMENT_ID:312489 (02.10.22).
24. KUKHTYK S., DERKACHENKO Y.U., 2018, *Immigration and Advocacy for the Rights of Refugees and Internally Displaced Persons: Textbook*, Publishing House Holembovska O.A., Kyiv.
25. LYTVYNENKO S., TREGUBOV O., PRYKHNO Y., YAKYMOVA N., PANCHENKO I., POPOVA Y., 2022, Transformation of the Paradigm of Entrepreneurial Activity Innovative Development in the Pandemic Conditions, *International Journal of Agricultural Extension*, 10(Special issue 1): 147-156.
26. MINISTRY OF FAMILY, LABOR AND SOCIAL POLICY, 2018, *Decree of the Ministery of Family, Labor and Social Policy Amending the Regulation on the Determination of Cases in which a Work Permit for a Foreigner Is Issued Regardless of the Detailed Conditions for Issuing Permits to Work for Foreigners*, http://prawo.sejm.gov.pl/isap.nsf/download.xsp/WDU20180001264/O/D20181264.pdf (02.10.22).
27. NATIONAL ASSEMBLY OF THE REPUBLIC OF POLAND, 1997, *Constitution of the Republic of Poland*, https://www.sejm.gov.pl/prawo/konst/angielski/kon1.htm (02.10.22).
28. POLISH PARLIAMENT, 2003, *Act of 13 June 2003 on Granting Protection to Aliens within the Territory of the Republic of Poland*,. https://www.asylumlawdatabase.eu/sites/www.asylumlawdatabase.eu/files/aldfiles/en%20-%20granting%20protection%20to%20aliens%20within%20the%20territory%20of%20the%20Republic%20of%20Poland%20.pdf (02.10.22).
29. POLISH PARLIAMENT, 2004, *Employment Promotion and Labor Market Institutions Law 2004*, https://www.ilo.org/dyn/natlex/natlex4.detail?p_lang=en&p_isn=68870 (02.10.22)
30. POLISH PARLIAMENT, 2013, Act on Foreigners of 12 December 2013. https://ec.europa.eu/migrant-integration/librarydoc/act-on-foreigners-of-12-december-2013 (02.10.22).
31. POLISH PARLIAMENT, 2017, *Act of 20 July 2017 to Amend Act on Promotion of Employment and on Labour Market Institutions and Some Other Acts*, https://ec.europa.eu/migrant-integration/librarydoc/act-on-foreigners-of-12-december-2013 (02.10.22).
32. POLISH PARLIAMENT, 2022, *Act of March 12, 2022 on Assistance to Ukrainian Citizens in Connection with an Armed Conflict in the Territory of that State*, https://isap.sejm.gov.pl/isap.nsf/DocDetails.xsp?id=WDU20220000583 (02.10.22).
33. ROAF, 2021, *Labour Migration and Migrant Workers in the 2030 Agenda for Sustainable Development*, https://www.ilo.org/wcmsp5/groups/public/---africa/documents/publication/wcms_682938.pdf (21.11.22)
34. SARDAK, S., BRITCHENKO, I., VAZOV, R., KRUPSKYI, O.P., 2021, Life Cycle: Formation, Structure, Management, *Ikonomicheski Izsledvania*, 30(6): 126-142.
35. SIMON J., KISS N., ŁASZEWSKA A., 2015, *Health Evidence Network Synthesis Report*, No. 43. https://www.ncbi.nlm.nih.gov/books/NBK379428/ (02.10.22).
36. THE COMMISSION OF THE EUROPEAN COMMUNITIES, 1985, *Decision of 8 July 1985 Setting Up A Prior Communication And Consultation Procedure On Migration Policies In Relation To Non-Member Countries*, https://eur-lex.europa.eu/eli/dec/1985/381/oj. (02.10.22).
37. TRIUKHAN O., 2015, The right of migrant workers to employment: International standards and Ukrainian legislation, *Journal of Civics*, 19: 178-183.
38. UN GENERAL ASSEMBLY, 1951, *Refugee Convention*, https://www.unhcr.org/4ca34be29.pdf (02.10.22)
39. UN GENERAL ASSEMBLY, 1966, *Protocol relating to the Status of Refugees, General Assembly Resolution 2198 (XXI)*, https://www.ohchr.org/en/instruments-mechanisms/instruments/protocol-relating-status-refugees (02.10.22).
40. UN GENERAL ASSEMBLY, 1990, *International Convention on the Protection of the Rights of All Migrant Workers and Members of Their Families. General Assembly Resolution No. 45/158*, https://www.ohchr.org/en/instruments-mechanisms/instruments/international-convention-protection-rights-all-migrant-workers (02.10.22).
41. VOLOSKO, YA., 2016, *Administrative-Legal Regulation of Labor Migration in the Conditions of Transformation of the Economy of Ukraine*, Lviv Polytechnic National University, Lviv.

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Resilient Openness of Eastern European Cities in the Conditions of Sustainable Development

Trwała otwartość miast Europy Wschodniej w warunkach zrównoważonego rozwoju

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Abstract

This article is devoted to the research of the resilience category, which is now one of the best safety catalysts of each state and its cities. The authors consider the resilience of cities and European countries in terms of preserving the vector of their sustainable development and successful confrontation with external and internal challenges, political and intellectual elite's efforts to anticipate and neutralize these challenges. This material is disclosed in scientific and practical approaches to openness of countries (cities), as well as through analysis of results of resilience estimation on large cities of Eastern Europe in sustainable development conditions. The article emphasized importance of ratings and methods that reflect the results of the transparency assessment of the city councils' activities in order to ensure their social, economic and environmental development. For the purposes of the article the authors presented main assessment results of pollution and comfort of residence in cities of Eastern Europe, which allowed to carry out comparative assessment analysis of openness and transparency of the Ukrainian cities in the context of their resolution under sustainable development conditions.

Key words: resilience, cities of Eastern Europe, safety, sustainable development, rating, transparency, openness, comfort of residence

Słowa kluczowe: resilencja, miasta Europy Wschodniej, bezpieczeństwo, zrównoważony rozwój, ocena, przejrzystość, otwartość, komfort zamieszkania

1. Introduction

The world's resilience is now one of the best security catalysts for every state and its cities. Therefore, countries and cities should be stable or resilient, able to overcome constructive ways of stress and difficult periods. That is, it is a strategy that can sustain the sustainable development of countries and cities and successfully confront external and internal challenges, political and intellectual elite's efforts to anticipate and neutralize these challenges. From the point of view of modern international practice, the resilience is the ability of Eastern European countries

(cities) to counter hybrid threats. The resilience is a sense and a goal of security of any country (cities), and failure to take into account the threats, that leads to real economic, ecological, humanitarian crises, hopeless delay from more effective and powerful countries.
Equally important for Eastern European countries is the openness and transparency of sustainable development in interaction between residents and local authorities, as well as for self-organization of citizens. That is another pole of resilience. The openness of cities is intended to make communication between the authorities and residents easier, the activity of communal enterprises more transparent, and also to give residents and public organizations the opportunity to unite efforts to solve urgent problems of the city with the purpose of comfortable living. Therefore, the results of studies related to the openness of countries and cities are very important in this context, given the introduction of the concept of sustainable development, which is based on this article, which belongs to foreign scientists (Allwood J.M., Cullen J.M., Carruth M.A., 2012; Bramezza I., 1996; Jones S., Tee C., 2017; Gunasekara C., 2008; Fothergill S., 2008; Milan-Garcia J., Uribe-Toril J., Uiz-Real J.L., Valenciano D.J., 2019; Munasinghe M., 2020; Šipilova V., Ostrovska I., Jermolajeva E. et al., 2017; Skowronski A., 2006) as well as to the Ukrainian scientists (Rohozian Yu., Hrechana S., Kuzmenko O., 2020; Roleders V., Oriekhova T., Zaharieva G., 2022; Shults S., Lutskiv, O., Simkiv, L. et al., 2021; Zablodska I., Sieriebriak K., Kolomytseva O. et al., 2019).
Therefore, the resilience research of large cities in Eastern Europe in sustainable development conditions is relevant and based on popularization of positive experience and use of the obtained achievements by cities of Ukraine, which will promote the development of democracy and governance, effective use of budgets, raising living standards of Ukrainians and realization of principles of sustainable development.

2. Research Methodology

The purpose of this work is to study the openness indices of large cities in Europe, which are aimed at determining the resilience of these cities and countries in the context of sustainable development. This scientific work is based on the Numbeo world's largest information base), which is a global base of data and contains the measurement results on comfort of residence among population in cities and countries of the world and other statistical data. In addition, the authors used the Transparency International Ukraine and Transparency Cities data.
The methodological basis of the article is a combination of methods and principles of scientific knowledge, general and special methods and techniques used during the research. The basic provisions of the regional economy, the theory of economic analysis, statistics, and the concept of sustainable development are the basis of theoretical researches. To obtain solid conclusions, the authors relied on scientific work of leading scientists and economists on the issues of the intensive openness of large cities in the conditions of sustainable development.
The following methodical basis was used to achieve the research purpose: authors used the criterion approach, index method, ranking and mapping method to assess the resilience of large cities of Eastern Europe in conditions of sustainable development, which are based mainly on the evaluation of the controlled subsystem of the management system. Methods of scientific knowledge of dual purpose (for use at the empirical and theoretical levels of knowledge) are also used: the thought experiment, abstraction, analysis and synthesis, indouxation and deduxation, modelling, comparative analysis, visualization. Such methodological choice based on economic specificity and basic abstract concepts, which authors investigate through openness and transparency of sustainable development of cities in Eastern Europe.

3. Scientific and practical approaches to resilience of countries (cities) in conditions of sustainable development

The most successful strategy of countries resilience in conditions of sustainable development is ahead of challenges and threats. Such a strategy allows to realize and prepare countries (cities) in time with the purpose of minimization of political and material losses, which can be catastrophic for the interests of the state.
The modern world lives in an era of hybrid warfare and pandemics, so the dramatic openness of countries (cities) should take into account the following features:
First, in the modern world, global economic cooperation has yielded to a place of political and security, which causes the crisis of the essence of globalization as a result of the economic expansion of the advanced countries and transnational corporations.
Secondly, in the modern world interests are clearly dominant over values. In other words, today's world is a world of egotism and situational alliances.
Third, in the modern world, the established systems of international order and collective subjectivity are being taken over, and sometimes even destroyed. Getting and preserving the subject becomes more and more an individual matter (Bozhok E., 2021).
The above features and make a fundamentally important resilience as a strategy of challenges and threats ahead in sustainable development conditions.
Scientists stress that the resilience strategy of countries in with sustainable development components provides for

constant analysis of external and internal challenges and threats. For their monitoring, first of all, countries (allies of countries) whose national interests are crossed should be singled out – realized in the same direction or run counter to one another. At least such players as the US, NATO, the European Union, Russia and China are allocated on the current geopolitical arena. Their interests intersect to the greatest extent (Zablodska I., Sieriebriak K., Kolomytseva O. et al, 2019; Nesterovych V.F., 2016.).

Analysis of both external and internal challenges and threats of the country reveals economic, social, political, legal, military, spiritual and cultural, educational-scientific and network-information resolution. However, from the point of view of openness and transparency of cities, the resilience of mass communications, which requires assessment of the information environment (primarily mass media, social networks, the Internet) for the presence of challenges and ability to effectively counter them, is decisive. The network-information level of the resilience should be singled out especially – development of social networks in the Internet and communication in them in the XXI century became a factor of change both in economic, political, and even spiritual and cultural spheres (Bozhok E., 2021)

Ukrainian scientists stress the importance of mass communications resilience. For instance, Nesterovych V.F. considers that openness and transparency are important in the activity of state authorities as prerequisites for the establishment of democracy (Nesterovych V.F., 2016.). The openness and transparency of the city is connected with information activity of the Verkhovna Rada of Ukraine, the scientist Dorohykh S.O. noted this. He defined the basic principles of openness and transparency, starting with problems of access to public information (Dorohykh S.O., 2018).

The transparency rating of the 100 largest cities is being built annually in Ukraine, which reflects the assessment results of the transparency of the city councils' activities in the conditions of sustainable development. To this end, a set of indicators is used to assess the readiness of the city authorities to overcome existing corruption risks and can be applied irrespective of the size of the city or community taking into account the components (economic, social and ecological) of sustainable development. Then the rating is formed, which is based on the total sum of points collected by the city for 88 indicators in 13 spheres. The maximum number of points a city can receive is 100. In case of the same total number of points the city gets the same position in the rating. Among the indicators of evaluation are both simple and complex, and the corresponding scale, table 1 is used.

Table 1. Transparency scale of cities in conditions of sustainable development, built by authors according to (Transparency International, 2020)

Transparency level	Points
Transparent city	80-100 points
Mostly transparent city	60-79 points
Partly transparent city	40-59 points
Mostly non-transparent city	20-39 points
Non-transparent city	0-19 points

Usually, the following are used for evaluation:

- primary data (poll of representatives of city councils): city councils receive applicants, who fill in the authorized representatives. The applicant includes only those indicators for which the method of assessment is the *official response of the city Council*;
- secondary data (city council documents; information published on the sites): analysts estimate the transparency of cities on the basis of data available in the public (on the official web sites of councils, other specialized web resources).

As for the scientific approach to the assessment of the openness and transparency for cities in the conditions of sustainable development, which is applied in the world, it was used the information of the Numbeo database, which is a global database of data on different spheres of life of society, with the help of corresponding indices. Data collected by users and data collected manually from authoritative sources (supermarket websites, taxi companies' websites, government agencies, newspaper articles, other surveys, etc.) are used to collect the data from the numbers. Data collected manually from verified sources is entered twice a year. Automatic and semi-automatic filters for filtering of noise data are also performed. User behaviour studies are used. There are more than 30 complex filters among them – rating and ranking.

The availability of different scientific and practical approaches to the assessment of the countries (cities) resilience in conditions of sustainable development allows to carry out qualitative assessment.

4. Analysis of the assessment results on resilient openness of the large cities in Eastern Europe in the conditions of sustainable development

Many indicators and indices are used to assess the resilient openness of large cities in Eastern Europe in a sustainable environment, but it is impossible to study all at the same time within the framework of this work. Therefore, we will consider some, to understand the general trends, for example – comfort of residence in the city. Usually, problems of comfort of residence are connected with pollution of large cities that depends on environmental component of sustainable development.

With the help of Numbeo it is possible to get information about comfort of living in cities all over the world. The following indicators of sustainable development are used to assess the comfort of living in cities of Eastern Europe:

- satisfaction of air quality;
- quality and availability of drinking water;
- water pollution (general);
- pleasure of garbage removal;
- do people think the city is clean and clean;
- noise pollution and light at night in the city;
- green and parks in the city;
- feeling of comfort to spend time in the city.

Table 2 shows the indices of pollution and comfort of residence in cities of Eastern Europe and their ranking. The more the index – the worse.

Table 2. Randy of pollution and comfort of residence index in cities of Eastern Europe in early 2022, built by authors based on data (Numbeo database, 2022)

Rank	*City*	*Izk*	*Izk exp*
1	Chelyabinsk, Russia	88.06	159,39
2	Krasnoyarsk, Russia	84.08	161,57
3	Dnipro, Ukraine	80,37	142,77
4	Bucharest, Romania	75,53	135.19
5	Yekaterinburg, Russia	73,79	129,37
6	Novosibirsk, Russia	70,55	123,68
7	Cracow, Poland	70.07	138,80
8	Sofia, Bulgaria	68,93	128.07
9	Kyiv, Ukraine	65.31	114.06
10	Chisinau, Moldova	63,77	110,87
11	Odesa, Ukraine	62,44	108,36
12	St. Petersburg, Russia	62.30	106,52
13	Wroclaw, Poland	61,83	114,67
14	Varna, Bulgaria	61,55	107.19
15	Plovdiv, Bulgaria	60.14	109,76
16	Warsaw, Poland	59,92	112,80
17	Iași, Romania	58.28	101.17
18	Poznan, Poland	57,63	101,69
19	Kharkiv, Ukraine	57.21	97,99
20	Timișoara, Romania	56.18	96,79
21	Moscow, Russia	56.12	97,32
22	Budapest, Hungary	53,79	96.03
23	Gdansk, Poland	49,35	81,77
24	Lviv, Ukraine	49.11	82.22
25	Cluj-Napoca, Romania	44.05	73,76
26	Brno, Czech Republic	42,82	71,92
27	Minsk, Belarus	41,99	69,74
28	Bratislava, Slovakia	39,79	67.24
29	Prague, Czech Republic	33,97	57,85
30	Brașov, Romania	33.04	52,68
31	Nizhny Novgorod, Russia	32.08	50,98

Pollution and comfort of residence index is an estimate of the general pollution and comfort of residence in the city. The greatest weight is given to air pollution than pollution/availability of water, two main factors of pollution. Low weight is given to other types of pollution (*Izk*).

Pollution Exp Scale uses an exposure scale to show very high numbers for very dirty and uncomfortable cities and very low numbers for unpolluted and comfortable cities. Therefore, the calculation uses an eccentric function to determine the index (*Izk exp*).
Thus, the worst and the best indices (*Izk, Izk exp*) in Russia. The worst in Chelyabinsk – 88.06, and the best in Nizhny Novgorod – 32.09. As for Ukraine, the worst indices (*Izk, Izk exp*) in Dnipro (80,37), and the best in Lviv (49.11). The general assessment of Eastern European countries is presented in Figure 1.

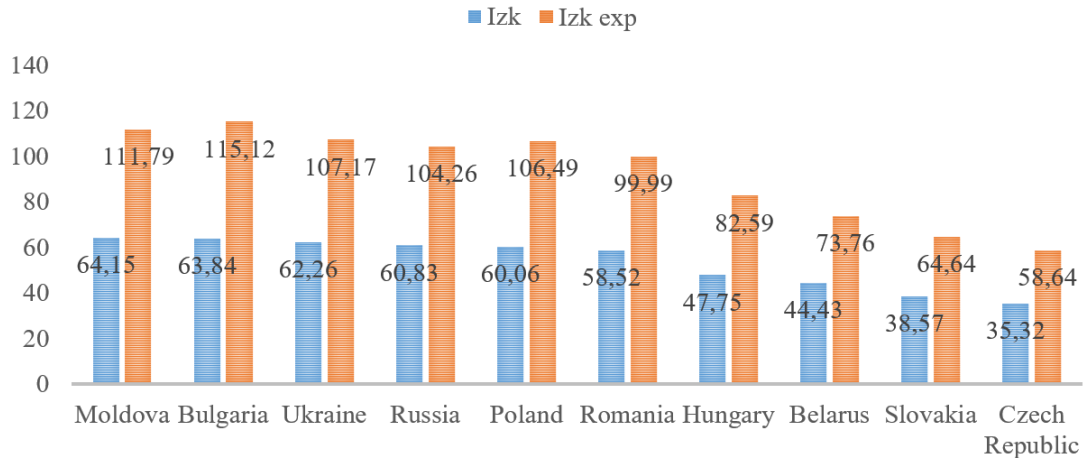

Figure 1. Assessment results of pollution and comfort of residence in cities of Eastern Europe in early 2022, built by authors based on data (Numbeo database, 2022)

Moldova and Bulgaria are the most polluted countries with low comfort living in cities. In the Czech Republic – the best situation.
As to the assessment of the transparency and openness of cities in Ukraine, which promotes comfort of residence, the survey of this aspect was conducted in 2021 for 2020 throughout Ukraine, before the war, which intensified on February 24, 2022. Fig. 2 demonstrates the visualization of Ukrainian cities on the map where the assessment was conducted.

Figure 2. Visualization of Ukrainian cities on the map where the assessment was conducted, *built by authors*

The transparency and openness assessment of cities in Luhansk, Donetsk regions and the Autonomous Republic of Crimea was not conducted due to the occupation of these territories by Russia in 2014. In other Ukrainian cities, the assessment was carried out with the help of 13 indicators in relation to the spheres of sustainable development:
Economic sphere:
Procurement - Iz, Financial and material assistance, grants - If, Investment and economic development - Ii;
Environmental sphere:
Land use and construction policy - Izb, Communal enterprises - Ik;
Social sphere:
Housing policy - Ig, Social services - Is, Personnel issues - Ikp, Anti-corruption policy and professional ethics -

Ia, Communal property - Ikm, Education - Io, Information about the work of local self-government body - Iims, Access and participation - Id, See figure 3.

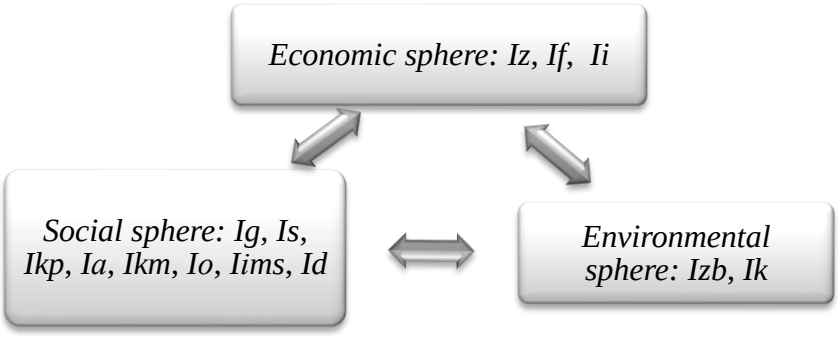

Figure 3. Indicators of sustainable development assessment in the context of openness and transparency of cities in Ukraine, built by authors

The annual rating of cities (Transparency International, 2021) is formed according to the results of the indicators assessment. However, due to Russia's full-scale invasion of Ukraine in early 2022, the assessment for 2021 was not carried out.

In 2020, for the first time during the measurement of transparency, two cities were included in the category of *transparent* — Mariupol and Lviv, which scored 86,6 and 85,2 points out of 100 respectively. The cities also took the first two steps of the reporting rating of 50 cities of Ukraine with results of 32 and 22 points from 100 respectively. A noticeable gap between transparency and accountability is observed in the assessment of other cities as well. For instance, the average reporting rate of 50 city councils is only 12,5 points out of 100 possible, while the average transparency of these cities is 54,4 points out of 100. In the top-5 rating of transparency cities also included Drohobych (78,1 points), Vinnitsa (76,7 points) and Ternopil (75,2 points).

Volodymyr-Volynsky became the leader in the transparency rating in 2020, adding 22 points to the 2019 indicators. Such growth allowed the city to enter the top ten rating. The city Council has improved the results in most areas from 1 to 3 points per year, in particular in *Communal enterprises* by 8 points (0,9→9,0), and in "Housing policy" by 0 to 6 points. At the same time, indicators in the areas of *Communal Property* and *Access and participation* fell by several decades.

In the five most accountable cities of Ukraine in 2020, except Mariupol and Lviv, as well as Pokrov (22 points), Bila Tserkva (21 points) and Chernivtsi (20 points).

Among the 100 cities estimated, only two non-transparent (0–19 points) — Izmail (18,3) and Novomoskovsk (14,8). Novomoskovsk falls into this category for the third time in 4 years of evaluation. Transparency is growing, but the pace is slowing. In 2018, the overall level of transparency in 100 cities increased by 38,5%, in 2019 by 10,4%, and in 2020 by 4,4%. In the rating of transparency in 2020, 57 cities showed a positive increase in points. The average reporting rate of 50 cities is four times lower than the transparency rate of these cities (54,4 vs. 12,5). In the reporting rating, only 5 out of 45 cities entered the category "mostly unaccountable" (20-39 points) – Mariupol, Lviv, Pokrov, Bila Tserkva and Chernivtsi. The rest of the cities have scored less than 20 points and have the status of unaccountable (Transparency International, 2020a).

In addition, Ukraine has the *Open City* project, which is a crowdsourcing Internet platform for interaction of residents with local authorities and communal enterprises, as well as for self-organization of citizens. For this purpose, there are two sections on the site:

Problems – gives an opportunity to create a report on the problem of sustainable development, which will be directed to the appropriate organization for the solution;

Useful objects – a map of the city on which portal users can apply different kinds of useful objects, such as hospitals, schools, parking lots, tourist objects, Free Wi-Fi zones, battery reception points, other (Platform of electronic democracy *Edem*, 2022).

However, in order to understand the correlation of the assessment results on openness and transparency of Ukrainian cities in the context of their resilience as well as in the conditions of sustainable development, which contributes to the comfort of residence with the help of the Numbeo database, Transparency International Ukraine (accredited representative of the global movement Transparency International) and Transparency Cities it is appropriate to conduct comparative analysis of the received estimates, Table 3.

Table 3. Comparative analysis of assessments on openness and transparency of Ukrainian cities in the context of their resilience in the sustainable development conditions, built by authors

Ukrainian cities	*Izk*	*Izk exp*	***Rating***	***Transparency International Ukraine (max 100 points)***	***Rating***	***Transparent Cities*** *(max 100 points)*	***Rating***
Dnipro	80,37	142,77	**5**	**71,9**	**2**	**84,20**	**2**
Kyiv	65,31	114,06	4	68,2	3	**59,10**	**3**
Odesa	62,44	108,36	3	61,6	3	**57,60**	**3**
Kharkiv	57,21	97,99	**2**	**48,9**	**4**	**52,70**	**5**
Lviv	49,11	82,22	**1**	**85,2**	**1**	**85,50**	**1**

The built rating shows that Lviv is the best in comfort of residence and that stands in the first-place rating by all the results of the rating. Odesa also has the same result of openness and transparency assessment of Ukrainian cities in the context of their resilience and sustainable development regarding comfort of residence (3). All other cities have excellent places in ratings. However, it should be noted that Kyiv also keeps one level (4 or 3 place in the rating). Dnipro and Kharkiv have fluctuations in evaluations and ratings, places from 2 to 5. Scientists and practitioners developed special recommendations for resilience openness of large cities of Ukraine in the conditions of sustainable development as Eastern European countries:

1. Implement electronic tools to ensure community participation in management processes to conduct public hearings with the help of video communication, to provide the possibility of remote questioning on the eve of local self-government meetings, to use the system of online registration. Use available resources that can simplify the implementation of digital sustainable development solutions.
2. Make websites more accessible, in particular to provide intuitive access to key sections, a convenient system for searching documents and news. Make websites exclusive, in particular create a version for people with visual impairments. Timely publication of the decisions and full agenda of the city Council and executive Committee meetings, especially in the context of sustainable development.
3. To announce public events and meetings of local self-government bodies in advance and to update plans of their work taking into account principles of sustainable development. Ensure unimpeded access to local government meetings for citizens and journalists with respect to quarantine requirements. To provide online broadcasting (with preservation of video record) of meetings of local self-government bodies, competitive commissions, public discussions and hearings.
4. To publish information about the public budget (participation budget), in particular, the status of realization of the winning projects. Promote the implementation of the winning objects during the calendar year after the competition.
5. Create an electronic registration system for housing applications. Publish current data on housing and housing, which is in communal ownership, in particular on free premises, provision of office housing, withdrawal from the status of service and privatization.
6. Register the office on the portal of public procurement DOZORRO and adopt an act which obligates the customers to respond to the appeals and responses of citizens. Monitor the implementation of this Act.
7. Record complaints received by public funds and city Council regarding procurement, conduct internal audits and publish results on the official website.
8. Adopt an ethical code (or a corresponding section in another normative-legal act) of deputies of the city Council, as well as officials of local self-government and employees of communal enterprises. The Code of Ethics should contain principles of non-discrimination and gender equality, as well as provide sanctions in case of violation of norms by its subjects.
9. Create a geoportal of the city where to publish interactive maps with general plan, zone plans, detailed plans of territories, as well as location of advertising structures and complex scheme of temporary structures.
10. Conduct public discussions on issues important to the community, such as the budget, tariffs for utilities and other regulatory acts on sustainable development. To publish the actual reports of municipal enterprises and to present the reports publicly. Publish information about contracts and payments on the Single Website of Public funds use. Develop regulations and appoint managers of communal enterprises on the basis of open competitions.
11. Publish data in formats to be automatically read and processed (Transparency International, 2020a).

These arguments prove that Ukraine as a country of Eastern Europe has all the prerequisites for the implementation of the resilient openness strategy for countries (cities) in sustainable conditions. The strategy should be determined by the innovative direction of sustainable urban development, based on active use of knowledge and scientific achievements, stimulation of innovation activity, creation of favourable investment climate, updating of production funds, formation of high-tech activities and branches of economy, increase of energy efficiency of production, stimulation of balanced economic growth, which requires further scientific research in this field.

5. Conclusions

The conducted research of the resilient openness of large cities in conditions of sustainable development allowed to come to the following conclusions.

The modern world lives in an era of hybrid warfare and pandemics, so the rapid openness of countries (cities) in conditions of sustainable development has a strategy of meeting challenges and threats, preservation and development of real sovereignty and independence. Analysis of both external and internal challenges and threats of the country reveals economic, social, political, legal, military, spiritual and cultural, educational-scientific and network-information resolution. However, from the point of view of openness and transparency of cities the resilience of mass communications is dominant.

The importance of mass communications resilience of open cities is emphasized by Ukrainian scientists and practices, which refer to the assessment of transparency and openness of 100 largest cities of Ukraine. For this purpose, a set of indicators is used, among which are both simple and complex. A set of estimates based on primary and secondary data is used. However, the worldwide approach is based on the information from the Numbeo database, which is a global database of data on different areas of sustainable development, with the help of relevant indices. With the help of the Numbeo platform scientists will get information about pollution and comfort of residence in cities of the whole world, according to the following indicators: satisfaction of air quality; quality and accessibility of drinking water; pollution of water (general); satisfaction of garbage removal; whether people consider the city clean and safe; six pollution and light at night in the city; green and parks in the city; feel comfortable to spend time in the city.

In the paper the authors give some results of ranking indices (*Izk, Izk exp*) in cities of Eastern Europe in the beginning of 2022. The worst condition of pollution and comfort of residence in Chelyabinsk, and the best in Nizhny Novgorod. As for Ukraine, the worst condition of pollution and comfort of residence in the Dnipro, and the best in Lviv. Moldova and Bulgaria are the most polluted countries with low comfort living in cities. In the Czech Republic – the best situation.

The results of the transparency and openness assessment for cities in Ukraine, which contributes to the comfort of living, cover thirteen indicators of sustainable development, which are set into three groups: economic, ecological and social. In 2020, two cities fell into the category of *transparent* – Mariupol and Lviv, but Volodymyr-Volynsky became the leader in the rating of transparency of openness. Among the 100 cities evaluated, only two cities are opaque Izmail and Novomoskovsk. Also, in Ukraine is being implemented the "Open City" project, which is a crowdsourcing Internet platform for interaction of residents with local authorities for sustainable development.

In order to understand the correlation of the assessment results on openness and transparency of Ukrainian cities in the context of their resilience and sustainable development, the authors demonstrated comparative analysis of the received assessments by different stakeholders. This allowed to establish that a comfortable city for living is Lviv, which stands in the first place by all estimates. In order to enhance the resilient openness of large cities in Ukraine in the conditions of sustainable development, such as Eastern Europe, scientists and practitioners gave some recommendations, which implementation will contribute to the emergence of a high-quality strategy of the resilient openness of large cities as it is vital for the further restoration of the cities of Ukraine affected by Russian military aggression.

References

1. ALLWOOD J.M., CULLEN J.M., CARRUTH M.A., 2012, *Sustainable materials: With both eyes open*, UIT Cambridge Ltd, Cambridge.
2. BOZHOK E., 2021, *Resilience: A strategy for survival in conditions of hybrid threats*, https://www.ukrinform.ua/rubric-society/3265105-rezilentnist-strategia-vizivanna-v-umovah-gibridnih-zagroz.html (01.10.2022).
3. BRAMEZZA I., 1996, *The competitiveness of the European city and the role of urban management in improving the city's performance*, Tinbergen Institute, Rotterdam.
4. DOROHYKH S.O., 2018, *Openness and transparency in the information activities of the Verkhovna Rada of Ukraine: organizational and legal aspects*, K.: ArtEk Publishing House, 160 p.
5. FOTHERGILL S., 2008, *The Most Intractable Development Region in the UK*, http://www.iwa.wales/wp-content/uploads/2016/03/valleys-with-crop-marks.pdf (30.03.2020).
6. GUNASEKARA C., 2008, Network Governance amidst Local Economic Crisis, *Australian Journal of Political Science*, 43(2): 207-223.
7. JONES S., TEE C., 2017, *Experiences of Structural Change, Economic Roundup*, The Treasury, Australian Government, https://treasury.gov.au/publication/p2017-t213722b/ (05.10.2022).
8. MILÁN-GARCÍA J., URIBE-TORIL J., RUIZ-REAL J.L., VALENCIANO D.J., 2019, Sustainable local development: an overview of the state of knowledge, *Resources*, 2019, 8(1): 1-18, DOI: 10.3390/resources8010031.
9. MUNASINGHE, M., 2020, COVID-19 and sustainable development, *International Journal of Sustainable Development*, 23(1/2): 1-24, DOI: 10.1504/IJSD.2020.112182.

10. NESTEROVYCH V.F., 2016, The principles of openness and transparency in the activities of state authorities as a prerequisite for the establishment of participatory democracy, *Philosophical and methodological problems of law*, 2 (12): 67-76.
11. NUMBEO DATABASE, 2022, *Eastern Europe: Current Pollution Index by City*, https://www-numbeo-com.translate.goog/pollution/region_rankings_current.jsp?region=151&_x_tr_sl=en&_x_tr_tl=uk&_x_tr_hl=ru&_x_tr_pto=wapp (01.10.2022).
12. PLATFORM OF ELECTRONIC DEMOCRACY 'EDEM', 2022, *'Open City' project,* https://opencity.e-dem.ua/about (03.10.2022).
13. ROHOZIAN YU., HRECHANA S., KUZMENKO O. et al., 2020, Sustainable Development Management of Local Territories in the Eastern Ukraine in Conditions of Military Conflict: Identification Criteria, *European Journal of Sustainable Development*, 9(3): 425-442, DOI: 10.14207/ejsd.2020.v9n3p425.
14. ROLEDERS V., ORIEKHOVA T., ZAHARIEVA G., 2022. Circular Economy as a Model of Achieving Sustainable Development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(2): 178-185, DOI: 10.35784/pe.2022.2.19.
15. SHULTS S., LUTSKIV O., SIMKIV L., ANDRUSIV U., 2021, Analysis of the Dynamics of Structural Processes in the Context of Ensuring Sustainable Development, *European Journal of Sustainable Development*, 10(1): 153-167, DOI: 10.14207/ejsd.2021.v10n1p153.
16. ŠIPILOVA, V., OSTROVSKA, I., JERMOLAJEVA, E. et al., 2017, Evaluation of Sustainable Development in Rural Territories in Latgale Region (Latvia) by Using the Conception of Smart Specialization, *Journal of Teacher Education for Sustainability*, 19(1): 82-105, DOI: 10.1515/jtes-2017-0006.
17. SKOWROŃSKI A., 2006, Zrównoważony rozwój perspektywą dalszego postępu cywilizacyjnego, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 1(2): 47-57.
18. TRANSPARENCY INTERNATIONAL, 2020, *City Transparency Ranking Methodology*, https://transparentcities.in.ua/storage/media/bz/template_files/default/mKlpLOzuaVK1pDYyBelZYdLedYWS0thZD8N4kSWg.pdf (01.10.2022).
19. TRANSPARENCY INTERNATIONAL, 2020a, *Results of transparency and accountability ratings of Ukrainian cities for 2020*, https://ti-ukraine.org/research/rezultaty-rejtyngiv-prozorosti-ta-pidzvitnosti-za-2020-rik-vid-ti-ukrayina/ (03.10.2022).
20. TRANSPARENCY INTERNATIONAL, 2021, *City Transparency Ranking Methodology*, https://drive.google.com/file/d/14XggXTnshd3AvjKtIOReiajMvhhrrOCM/view (01.10.2022).
21. ZABLODSKA I., SIERIEBRIAK K., KOLOMYTSEVA O. et al., 2019, Interregional partnership as a background for the sustainable development: European facet, *European Journal of Sustainable Development.* 8(2): 365-378.

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Institutional Development of Organic Farming in the EU

Instytucjonalny rozwój rolnictwa organicznego w UE

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Abstract

The concept of sustainable development has been attracting the attention of the scientific and professional community for decades. Various researches and papers focused on the concept of sustainability, exploring it through the prism of the economic, ecological and social subsystem. In this paper, the authors focus on agriculture and its sustainability. Starting from the assumption that organic farming is a sustainable system production, the authors turn to institutional support, trying to find a link between EU agricultural policy (CAP) and the growth of areas in organic agriculture. The research showed that this kind of support system failed to play the role that was intended for it and did not lead to mass acceptance of organic agriculture everywhere. Authors on the example of Denmark, Germany and Italy show the extent to which state support has influenced the expansion of areas under this system. Also, the comparison with the US agricultural policy leads to the conclusion that support policies for organic production constructed on a one-dimensional focus of payments per unit area will not lead to the expected results in terms of further progress and development of the organic sector.

Key words: organic farming, CAP, sustainability, development, subsidies

Słowa kluczowe: rolnictwo organiczne, CAP, zrównoważoność, rozwój, subsydia

Introduction

Sustainable development is a concept that has occupied the attention of both the scientific and wider social community for a long time. One of the first definitions of sustainable development was given by Repetto, who said that in the core of the sustainability idea lies an assurance that decisions made today should not jeopardize perspectives for preservation or improvement of living standards in the future (Repetto, 1985). A definition most often used in the literature is from 1987, provided by The Brundtland Commission, by which sustainable development is a set of activities that allow meeting the needs of today without compromising the possibilities of future generations to meet their own needs (UN, 1987). However, it can be said that to date, the concept of sustainable development has not yet been uniformly defined and accepted despite a decades-long discussion in the relevant literature (Lele, 1991, Bell and Morse, 2003, Kates et al, 2005, UNEP, 2013).

Despite the challenges that exist in defining this concept, trends in modern society unequivocally emphasize the need for action when it comes to sustainable development. One such call to action is Sustainable Development Goals (SDG), also known as the Global Goals, which were adopted by the United Nations in 2015 as a universal call to action to end poverty, protect the planet, and ensure that by 2030 all people enjoy peace and prosperity.

The 17 SDGs defined through this action are integrated and correlated. They recognize that action in one area will affect outcomes in others, and that development must balance social, economic and environmental sustainability, because when we talk about sustainable development, it is clear that we need to take economic, technological, social, political, physiological and environmental aspects into consideration (Tomaš Simin et al., 2019). These systems are connected in different and often very significant ways in a complex system (Bossel, 1999, Munitlak-Ivanović 2005, Raskin et al., 2002).

The negative effects of modern agricultural production are often highlighted in the literature (Rodriguez et al., 2004, Lazić and Lazić, 2008, Kovačević et al., 2011, Praneetvatakul et al, 2013, Krajewski, 2016), as a consequence of increasing dependence on the industry (in terms of fertilizers and pesticides), introduction of monoculture, specialization (Peyraud et al., 2014), water pollution with nitrate and pesticides and soil erosion and degradation, reduction of biodiversity (Hall and Crowther, 1998), adverse effects on human health (Lewalter and Leng, 1999; Sarkar et al, 2012) etc. A possible solution of these issues is development of alternative means of agricultural production in order to mitigate their impacts. These alternative means of agricultural production are often categorized as sustainable agriculture. Hinrichs and Welsh (2003) stated that, *Sustainable agriculture offers an encompassing banner under which groups and individuals have gathered to address the environmental, social, and economic equity problems they associate with conventional, industrial agriculture*. Given the positive aspects of organic production compared to conventional production (Stolze et al., 2000, Kaspercyzk and Knickel 2006, Kichler, 2007, Küstermann et al, 2008, Hinrichs and Welsh, 2003, Biao and Xiaorong, 2003, Galiardi and Pettigrove, 2013, Bell et al, 2014) organic farming is often considered as an alternative way of agricultural production that can meet the goals of sustainability. Some authors suggested that areas under organic farming can be used as an indicator of sustainable agriculutural development (Tomaš Simin et al., 2019). Šeremešić et al. (2021) state that *by considering organic agriculture as a mechanism for achieving SDG, different institutions can be mobilized and closely involved in the development of capacity for its implementation. Creating a favorable environment for small farms, converting conventional land to organic, and aiming at the development of this sustainable branch of agriculture would consequently create more favorable socio-economic conditions for rural areas and the employment of the rural population.*
If the initial assumption is accepted that organic farming is sustainable and contributes to sustainable development and achievement of SDG goals, it is interesting to see and show how this production system is institutionally supported and whether this support has led to the expansion of areas in organic production. In this paper, this review is done with an emphasis on the CAP and the European Union.

Organic farming through policies

Organic farming is a specific system of agricultural production which, thanks to its characteristics, requires a different approach when it comes to formulating agricultural policy. One of the basic and highly emphasized advantages of organic production is the fact that this system is legally regulated, i.e. that it is subject to a certification process that ensures and guarantees that the basic principles of organic agriculture have been applied and respected in the production process. Padel and Lampkin (2007) state that, although organic production has existed as a concept for almost seventy years, it received significant attention from European policy makers only in the mid-1980s. Notable growth of this sector since the eighties, the mentioned authors attribute to this significant interest of economic policy makers for this production. There are different views in the literature on the participation of the state in the promotion and development of organic agriculture, among which the prevailing opinion is that such a system of production requires state aid (Bogdanov et al., 2005; Dimitri and Oberholzer, 2005; Dabbert et al., 2003; Lampkin and Padel, 1994; Stolze et al., 2016; Niggli et al., 2008).
Jansen (2000) states that four basic types of policies related to organic production can be distinguished:

- Policies related to environmental management (regulations related to specific production practices);
- Incentives that stimulate conversion;
- Eco-tax systems;
- Trade-related policies.

Dabert et al. (2001) said that there were two main reasons why EU politicians decided to support organic production (in addition to the relatively short-lived idea that lower yields in organic production would help overcome to then problem of agricultural overproduction):

1. The fact that organic production as a system is recognized as a public good that achieves social, natural and other benefits to the community;
2. The recognition of organic production as a young sector (infant industry).

The European Union and its legislation in the segment of organic production is often taken as a reference region because the EU is at the forefront at the world level when it comes to organic production policy. Certain measures and policies related to organic agriculture have been current in the EU for more than 25 years. EU legislation has been in place for ten years when similar legislation appeared in the United States in 2002. Denmark was the first country in the European Union to establish financial support for producers during the conversion period in 1987. Sweden was the first country to continue with financial support even after the conversion period, recognizing the environmental benefits of organic production. In 1989, Germany was the first country to use the CAP to introduce broader measures to support the conversion process[1].

[1] During that period, the EU had problems with overproduction and surplus of agricultural products. The main goals of the policies of that time were to reduce surpluses by extensifying production, ie by determining allowed quotas and production levels (quantitative method) or by focusing on less intensive production systems (qualitative method), among which organic

CAP and organic farming – outline

When designing various programs and measures in the field of CAP, the creators of these policies strive to achieve some of the following goals (Dabbert et al., 2003):

- To minimize the negative impacts of agricultural production on the environment,
- To provide high quality food while ensuring its sufficient quantity,
- To preserve the income of individual farms without distorting the competitiveness of European Union agriculture,
- To promote rural development,
- In the long run, reduce expenditures intended for the agricultural sector.

According to Offermann and Nieberg (2000), the 1992 CAP reform (so-called McSharie's reform) was one of the biggest policy changes that has affected the economic conditions of the European Union's agriculture in the last twenty years. The main feature of the reform was the reduction of price support coupled with complementary payments and the establishment of programs related to both agriculture and environmental protection (agri-environmental programs). Padel and Lampkin (2007) point out that this reform has led to the introduction of a broader environmental support program at EU level (EC reg. 2078/92). Under this program, all member states were obliged to offer grant approval schemes or financial assistance to producers during the conversion period or to those already in certified production.

In 2007, new regulations related to organic production were adopted by the European Commission. New regulations (Reg. 834/2007/EC) and more detailed rules for its implementation (Reg. 889/2008/EC) have set precise requirements for the production and labeling of organic products. In accordance with these new regulations, regulations for the import of organic products from non-EU countries (so-called third countries) have been adopted (1235/2008/EC). One of the main objections to this CAP reform was the inability of organic producers to use the incentives under the first pillar.

The CAP reform for the period 2014-2020 from 2013, among other things, aimed to direct agricultural production in the EU towards production that is more oriented towards environmental protection and positively oriented towards climate change. This step towards *greener* agriculture is presented in the slogan *public money for public goods*. To ensure that the set goals are met – that is, to obtain more public goods from agricultural production[2], the EU used the measures and instruments available under the first and second pillars of the CAP. Organic agriculture was recognized for the first time within both pillars in terms of its contribution to the creation and protection of public goods (Stolze et al., 2016). Compared to previous reforms, organic agriculture is more visible in CAP programs, as a measure that contributes to the creation of public goods, under both the First and Second Pillars. Under Pillar 1, organic farms automatically receive funds for the Green Component. Under Pillar 2, organic agriculture was more represented under the new Rural Development Regulation (EC Reg. 1305/2013), with an explicit mention of payments for organic agriculture (Article 29), investments (Article 17) and quality schemes (Article 16).

On May 30, 2018, the European Commission adopted the new EU Regulation 2018/848 on organic production and labeling of organic products. According to EU Farm to Fork and Biodiversity Strategies which is a part of European Green Deal, Member States should target 25% of organic land by 2030. Berckmans et al. (2021) suggested that in order to achieve this goal EU has to:

- Triple its organic land area between 2019 and 2030;
- Increase its overall CAP expenditure 3-5-fold by 2030;
- Dedicate 9-15% of the CAP budget to organic (instead of 3% as in 2018).

Although the CAP and measures within this policy in support of organic agriculture are an extremely important segment in the EU, it should be noted that a broader approach is needed to encourage the development of this sector. Payments per unit area, together with national and regional action plans, are certainly the measures that should contribute the most to the development of the organic sector. However, such support from public funds can only be effective if it is complemented by a well-functioning competitive industry, consumers and public opinion that has a positive attitude towards organic production, growing demand and universal confidence in the legislative system. Whether the organic sector will develop depends not only on payments per hectare but on a combination of different public policies, including support for the conversion process, marketing support and training and education.

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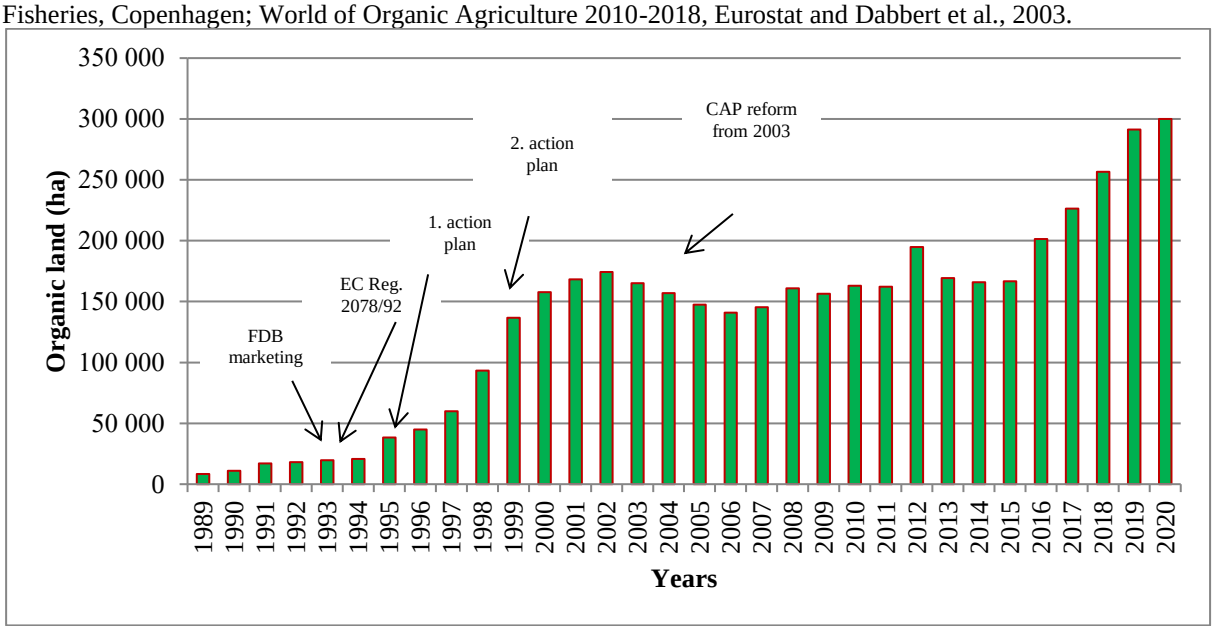
production was recognized. In this way, Germany was the first to use measures that were not directly aimed at organic agriculture to encourage and spread it (see more details in Padel and Lampkin, 2007).

[2] Public goods primarily mean the protection and preservation of a healthy environment (as a public good) and biodiversity (also as a public good).

Some experiences in institutional organic farming development

Denmark[3] – support for organic agricultural production in Denmark began in the mid-1980s. In 1987, the Act on Organic Farm Production was adopted. The aim of this law and the measures within it were to provide financial support to producers during the conversion period and financial support for projects related to the development of infrastructure in organic production. Also, the law provided official labeling of organic products, and a legal system that provided for the certification and control of organic farming. In the first five years since the introduction of legislation and incentives for the conversion process, Dubgaard and Holst (1994) state that the number of farms in the organic system has doubled and that land area has increased by 150% compared to 1988 when this sector existed in Denmark but was less represented and without state support. After five years, there was a standstill and then a drop in the number of producers and farms in the organic production system.
Dabert et al., (2003) in their analysis of Denmark also point out the fact that Denmark was among the first countries to introduce national standards in organic production. The introduction of standards has led to a slight increase in areas in the organic production system, which stagnated or declined slightly until 1994. In 1993, the implementation of Regulation 2078/92 began, ie the Program and measures aimed at encouraging agricultural practices that support environmental protection. The application of these measures did not significantly affect the growth of surfaces in the organic system.
Instead, organic area growth was initiated by the entry of the FDB retail chain (one of the best known in Denmark) into the organic system. The company conducted a significant marketing campaign that led to an increase in demand and almost a shortage of these products. However, the noticeable growth of organic surfaces has been occurring since 1995. That year, large dairies entered the organic sector and began paying additional incentives to buy organic milk - in order to meet growing demand. In the same year (1995) the first national action plan was presented, designed by the National Council for Organic Agriculture. According to this plan, the entire sector needed to be supported, which included financial support for consulting, training, research and especially marketing. Therefore, only one third of the incentives were paid directly to farmers.
In 1999, the second action plan was presented, which was focused on encouraging the export of organic products, primarily as a reaction to the surplus of organic milk to the Danish market. The 2003 CAP reform did not significantly affect the change in the area in the organic system, which recorded continues growth in 2016 (Graph 1).

Graph 1. Organic land in Denmark 1989-2020, source: Adapted from the Ministry of Food, Agriculture and Fisheries, Copenhagen; World of Organic Agriculture 2010-2018, Eurostat and Dabbert et al., 2003.

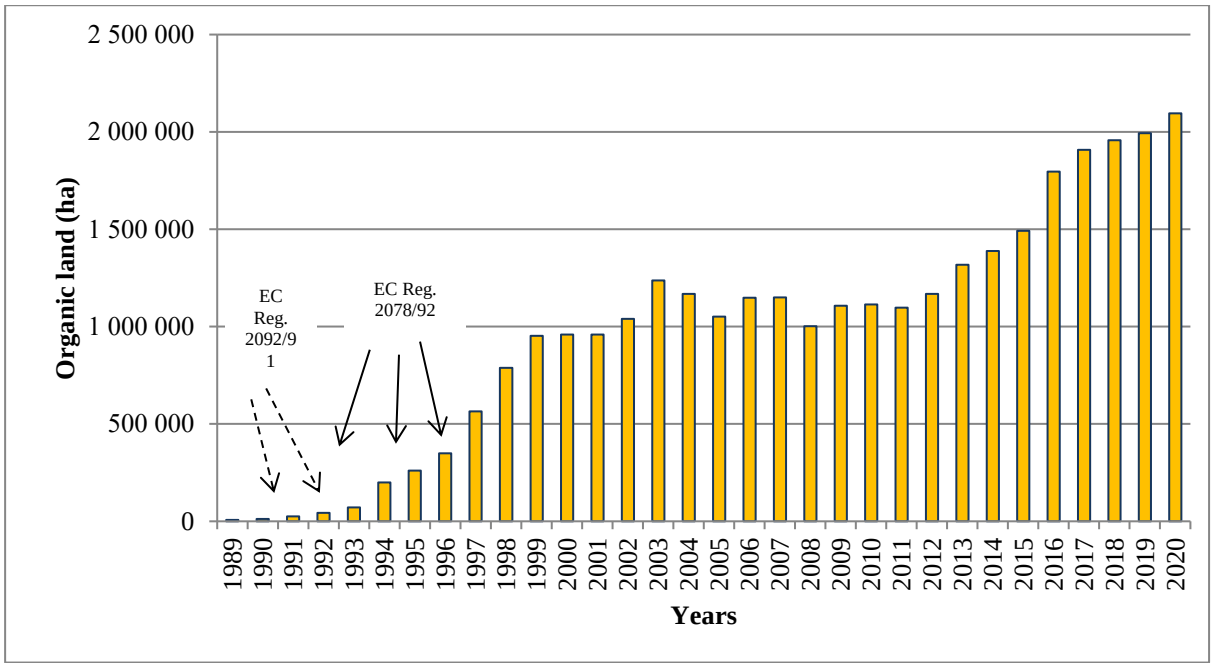


Italy - one of the interesting aspects of the development of organic farming in Italy is certainly the fact that the driver of development in previous years was exports, which absorbed more than 50% of production in the country. The rapid development of organic production in Italy began in the early 1990s. The implementation of European Union regulations related to organic production (EC Reg. 2092/91) and agri-environmental programs (EC Reg. 2078/92) has led to an increase in the area in the organic system in Italy (*Graph 2*). Santucci et al. (1999) state in their research that the claim that European regulations that financially encourage organic production have

[3] See Dubgaard and Holst 1994; Lampkin and Padel, 1994a; Dabbert et al., 2003 for more details.

contributed to the significant growth of organic farming in Italy is supported by the fact that in Italy a year before the introduction of the regulations (1993) there were only 4,200 farms with approximately 71,000 hectares in the organic system and only five years later there were more than 750,000 hectares in the organic system. Progress is even more significant when compared to 1989, when only 800 farms with just over 9,000 hectares were recorded in Italy.

Graph 2. Organic land in Italy 1989-2020, source: Adapted from Santucci and Antoenlli, 2004; Santucci and Pignataro, 2002; Santucci et al., 1999; SINAB 2000-2016; World of Organic 2009-2018, Eurostat.



It is important to note that the domestic market of organic products in Italy developed only at the beginning of the twenty-first century, and that the driver of the development of this sector was certainly the demand for these products in other countries. Experts estimate that close to 50% of organic products are exported - primarily citrus fruits and vegetables (Dabbert et al., 2003). This combination of CAP's encouragement of organic production and significant exports of these products has proven to be positive for Italy in terms of the successful development of the organic sector.

Germany[4] – the process of providing state aid to organic farming in Germany began with the implementation of the European Commission's extensification program (EEC 4115/88) from 1988. This program envisioned two different forms of extensification (Pals et al., 1994):

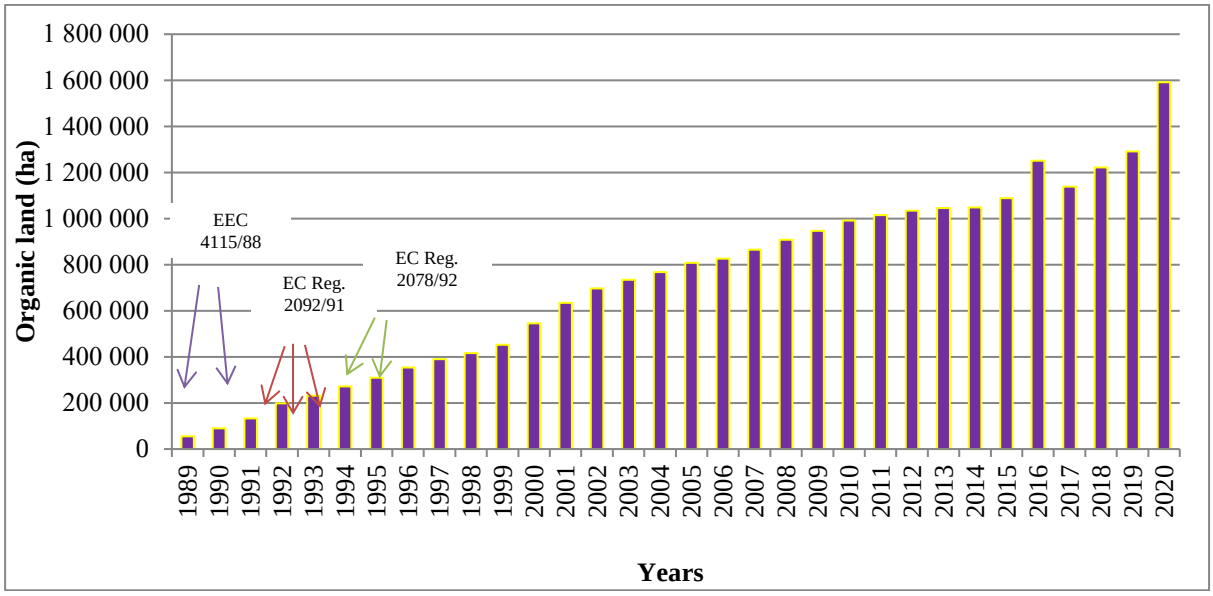
- Quantitative approach that involved an absolute reduction of 20% or land used for certain crops or the number of animals;
- Encouraging production methods that assume sustainable production in which yields are lower by approximately 20%.

Defined in this way, second form of support was important for organic production. Subsidies approved under this program are provided for a period of five years and are paid annually. Their goal was to compensate for the losses caused by lower yields during the conversion, in a period in which producers could not achieve premium prices on the market. Farms that were already certified as organic could not receive subsidies through this program. In the period of the next five years after the implementation of the extensification program, the number of organic farms in Germany increased four times.

In their research, Lampkin and Padel (1994) state that this example of Germany (in the application of this program of measures to help organic production) was followed only by Denmark, which used the extensification program to finance its existing support models. In those years, the low liquidity level of farmers in East Germany may explain the sharp jump in the acceptance of the organic production system, where farmers recognized the possibility of saving in variable costs while receiving incentives from the extensification program. Since 1994, the introduction and development of organic production has been supported through Rural Development Programs (RDPs).

[4] See Dubgaard and Holst 1994; Pals et al., 1994; Lampkin and Padel, 1994a for more details.

Graph 3. Organic land in Germany 1989-2020, source: Adapted from BMEL, World of Organic 2009-2018, Eurostat and Mutlu, 2007.



European Union and the United States – it is interesting to point out that institutional support can contribute to the growth of the organic sector, but that the interaction with the market is of great importance for the effectiveness of the applied incentive measures. In this regard, it is interesting to present the differences in the development of the organic sector between the United States, where development was primarily encouraged by the market and the European Union, where the development of this sector was more focused and encouraged by various policy measures.

Dimitri and Oberholzer (2005) were among the first who attempt to provide such analysis. In the results of their research, Dimitri and Oberholzer state the differences that exist in the organic sector of these two communities of countries: the size of the organic products market, area and number of producers which were higher in the EU than in the USA. Policies to encourage organic production in the United States have largely focused on demand and market mechanisms, where certain grants could be found aimed at on-farm research, producer and consumer education, and marketing. In the EU, policies aimed at the development of organic production are a subset of policies within the measures of sustainable development and agriculture. Each member state independently decides which set of measures (of the offered) will be used. Some countries (such as the Netherlands) have chosen an approach similar to that in the United States, ie policies that allowed the free functioning of the market, while other countries have chosen to actively encourage and promote organic production. The reason for this proactive approach of the EU is the understanding of the European government that organic production brings social benefits that individual producers are not able to see and understand.

As a conclusion of their study, in terms of which policy (US or EU) is better for the development of organic production, these authors note that, regardless of current policy, the organic production sector is dynamic in both regions. What both the US and the EU have in common is that governments define organic standards and enforce legislation and legal frameworks that guarantee consumers that the product purchased is produced according to organic standards. This is roughly where their common traits end. The EU has a wide range of measures under the CAP aimed at increasing land area in the organic production system, guided by the idea of the benefits that organic production has for the community. In the USA, the financing of organic farming is limited, and the measures that exist are primarily the result of lobbying by the organic industry, unlike the EU, where governments actively support this production.

Different "views" on organic production are the causes of these different forms of aid. In the EU, as already mentioned, organic production is seen as a production system which, in addition to the established benefits for individual farms, has wider benefits for the entire community and can contribute to the sustainable development. On the other hand, looking at organic food as a differentiated product produced in an organic production system where government should only provide institutional support to the market and enable consumers to recognize the organic product (through legal regulation of this production) and leave everything else to free market law is a vision of the United States. The final conclusion of this study states that the EU has an advantage in terms of the supply of organic products and that throughout history it has encountered surpluses of these products – as a consequence of its policy of stimulating production. On the other hand, the US market is showing a faster growth

rate, but the demand in this market is unsatisfied and there is a shortage of organic products. It is clear that for the successful functioning of organic farming it is necessary to combine and supplement these forms of support, always keeping in mind the social circumstances in which this policy is implemented.

Conclusion

The initial premise of the paper was that organic farming can be viewed as a sustainable system of agricultural production that can mitigate the negative effects of modern agriculture and contribute to overall sustainable development. Based on that, it is interesting to investigate whether and in what way macroeconomic policies in agriculture affect the spread of organic farming. The research focused on the CAP and the development of organic farming in EU countries. It showed that the introduction of certain incentive measures for organic farming has resulted in an increase in the area and number of producers who have accepted the organic production system in several countries. It can be said that development of organic sector depends not only on payments per hectare (direct incentives) but on combinations of different public policies as well as conversion period, marketing support and training and education. Support policies for organic production constructed on a one-dimensional focus of payments per unit area will not lead to the expected results in terms of further progress and development of the organic sector.

Agriculture itself is an extremely important factor in the sustainable socio-economic growth and development of a country. As a strategic sector, agriculture must be a carrier of development but now a carrier of sustainable development of all or most countries. It can do this through agricultural practices that are in line with the principles of sustainable development, such as organic farming. Organic production (along with other sustainable systems) is participating in a new revolution that will raise the population to a new level of development and help it further improve its well-being, this time keeping in mind everything that a sustainable development entails.

References

1. BELL M.J., CLOY J.M., REES R.M., 2014, The true extent of agriculture's contribution to national greenhouse gas emission, *Environmental Science & Policy*, 39: 1-12, DOI: 10.1016/j.envsci.2014.02.001.
2. BELL S., MORSE S., 2003, *Measuring sustainability-learning by doing*. Earthscan Publication Limited, London.
3. BERCKMANS E., CUOCO E., GALL E., 2021, *Organic in Europe – prospects and developments for organic in national CAP Strategic Plans*, IFOAM, https://www.organicseurope.bio/content/uploads/2021/06/ifoameu_advocacy_CAP_StrategicPlansAnd25Target_202106.pdf?dd .
4. BIAO X., XIAORONG W., 2003, Organic agriculture in China, *Journal of Agriculture and Environmental Ethics*, 16: 297-311.
5. BOGDANOV N., SREDOJEVIĆ Z., RODIĆ V., 2005, Ekonomski aspekti organske poljoprivrede u Srbiji, *Organska poljoprivredna proizvodnja*, eds. Kovačević D., Oljača S, Poljoprivredni fakultet, Beograd-Zemun: 261-301.
6. BOSSEL H., 1999, *Indicators for Sustainable Development: Theory, Method, Applications*, A Report to the Balaton Group, International Institute for Sustainable Development, Winnipeg, Canada.
7. DABBERT S., HÄRING A.M., ZANOLI R., 2003, *Organic farming – policies and prospects*, Zed Books, London.
8. DABBERT S., ZANOLI R., LAMPKIN N., 2001, Elements of a European Action Plan for Organic Farming in Europe, Conference '*Organic Food and Farming – Towards Partnership and Action in Europe'*, May, Ministry of Food, Agriculture and Fisherires, Denamark, Copenhagen.
9. DIMITRI C., OBERHOLTZER L., 2005, *Market-led versus government-facilitated growth: development of the US and EU organic agricultural sectors*, United States Department of Agriculture, Washington DC.
10. DUBGAARD A., HOLST H., 1994, Policy Issues and Impacts of Government Assistance for Conversion to Organic Farming: The Danish Experience, *Organska poljoprivreda*, eds. Lapmkin N., Padel S., The Economics of Organic Farming – an International Perspective, CABI: 383-392.
11. EC, 2008, *Commission Regulation (EC) No 889/2008 of 5 September 2008 laying down detailed rules for the implementation of Council Regulation (EC) No 834/2007 on organic production and labelling of organic products with regard to organic production, labelling and control.*
12. EC, 2008, *Commission Regulation (EC) No 1235/2008 of 8 December 2008 laying down detailed rules for implementation of Council Regulation (EC) No 834/2007 as regards the arrangements for imports of organic products from third countries.*
13. EC, 2007, *Council Regulation (EC) No 834/2007 of 28 June 2007 on organic production and labelling of organic products and repealing Regulation (EEC) No 2092/91.*
14. EEC, 1988, *Commission Regulation (EEC) No 4115/88 of 21 December 1988 laying down detailed rules for applying the aid scheme to promote the extensification of production.*
15. EEC, 1992, *Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside.*
16. EEC 1992, *Council Regulation (EEC) No 2078/92 of 30 June 1992 on agricultural production methods compatible with the requirements of the protection of the environment and the maintenance of the countryside.*
17. EEC, 1991,*Council Regulation (EEC) No 2092/91 of 24 June 1991 on organic production of agricultural products and indications referring thereto on agricultural products and foodstuffs.*

18. EU, 2018, *Regulation (EU) 2018/848 of the European Parliament and of the Council of 30 May 2018 on organic production and labelling of organic products and repealing Council Regulation (EC) No 834/2007*.
19. EU, 2013, *Regulation (EU) No 1305/2013 of the European Parliament and of the Council of 17 December 2013 on support for rural development by the European Agricultural Fund for Rural Development (EAFRD) and repealing Council Regulation (EC) No 1698/2005*.
20. GALIARDI B., PETTIGROVE V., 2013, Removal of intensive agriculture from landscape improves aquatic ecosystem health, *Agriculture, Ecosystem and Environment* 176: 1-8, DOI: 10.1016/j.agee.2013.05.020.
21. HALL J., CROWTHER S., 1998, Biotechnology: the ultimate cleaner production technology for agriculture? *Journal of Cleaner Production*, 6: 313-322.
22. HINRICHS C., WELSH R., 2003, The effects of the industrialization of US livestock agriculture on promoting sustainable production practice, *Agriculture and Human Values* 20: 125-141.
23. JANSEN K., 2000, Labour, livelihoods and the quality of life in organic agriculture in Europe, *Biological agriculture & horticulture*, 17(3): 247-278.
24. KASPERCYZK N., KNICKEL K., 2006, Environmental impacts of organic farming, *Organic Agriculture A Global Perspective*, eds. Kristiansen, P., Taji, A., Reganold, J., CABI, United Kingdom: 259-295.
25. KATES R., PARRIS T., LEISEROWITZ A., 2005, What is Sustainable Development? Goals, Indicators, Values, and Practice, *Environment: Science and Policy for Sustainable Development* 47 (3): 8-21.
26. KILCHER L., 2007, How organic agriculture contributes to sustainable development, *JARTS*, Supplement 89, University of Kassel at Witzenhausen, Germany, pp. 31-49.
27. KOVAČEVIĆ D., LAZIĆ B., MILIĆ V., 2011, Uticaj poljoprivrede na životnu sredinu, *International Scientific Meeting of Agronomists*, Jahorina.
28. KRAJEWSKI P., 2016, Agricultural Biodiversity for Sustainable Development, *Problemy Ekorozwoju/ Problems of Sustainable Development* 12(1): 135-141.
29. KÜSTERMANN B., KAINZ M., HÜLSBERGEN K.J., 2008, Modeling carbon cycles and estimation of greenhouse gas emission from organic and conventional farming systems, *Renewable Agriculture and Food Systems*, 23(I): 38-52.
30. LAMPKIN N., PADEL S., 1994, Organic Farming and Agricultural Policy in Western Europe, *The Economics of Organic Farming – an International Perspective*, eds. Lapmkin N., Padel S., CABI, p. 437-456.
31. LAMPKIN N., FOSTER C., PADEL S. MIDMORE P., 1999, The policy and regulatory environment for organic farming in Europe, *Organic Farming in Europe: Economics and Policy*, Vol.1, University of Hohenheim, Stuttgart.
32. LAZIĆ B., LAZIĆ S., 2008, Organska poljoprivreda, *Organska poljoprivreda*, eds. Lazić B. et al., Institute of Field and Vegetable Crops Novi Sad: 7-38.
33. LELE S., 1991, Sustainable Development: A Critical Review, *World Development*, 19 (6): 607-621.
34. LEWALTER J., LENG G., 1999, Consideration of individual susceptibility in adverse pesticide effects, *Toxicology Letters*, 107: 131-144.
35. MUNITLAK-IVANOVIĆ O., 2005, *Ekološki aspekti održivog razvoja-međunarodna i regionalna komparacija*, Doctoral Dissertation, Faculty of Economics, Subotica.
36. MUTLU N., 2007, *Consumer attitude and behaviour towards organic food: Cross-cultural study of Turkey and Germany, Master Thesis*, University of Hohenheim.
37. NIEBERG H., OFFERMANN F., ZANDER K., 2007, *Organic farms in a changing policy environment: impacts of support payments,* EU-enlargement and Luxembourg reform, Universität Hohenheim, Institut für Landwirtschaftliche Betriebslehre.
38. NIGGLI U., SLABE A., SCHMID O., HALBERG N., SCHLÜTER M., 2008, *Vision for an Organic Food and Farming Research Agenda to 2025 – Organic Knowledge for the Future*, IFOAM EU Group, ISOFAR, Belgium, Germany.
39. OFFERMANN F., NIEBERG H., 2000, *Economic Performance of Organic Farms in Europe*, Germany, University of Hohenheim.
40. PADEL S., LAMKIN N., 2007, The development of governmental support for organic farming in Europe, *Organic Farming – an International History*, ed. Lockeretz W, CABI:. 93-122.
41. PADEL S., LAMPKIN N., 1994, Farm-level Performance of Organic Farming Systems: An Overview, *The Economics of Organic Farming*, eds. Lampkin N., S. Padel, CAB International, Wallingford: 201-221.
42. PALS L.S., BRAUN J., DABBERT S., 1994, Financial Assistance for Conversion to Organic Farming in Germany under the European Communitys Extensification Programme, *The Economics of Organic Farming – an International Perspective*, eds. Lapmkin N., Padel S., CABI: 411-436.
43. PEYRAUD J.L., TABOADA M., DELABY L., 2014, Integrated crop and livestock systems in Western Europe and South America: A review, *Europ. J. Agronomy*, 57: 31-42, DOI: 10.1016/j.eja.2014.02.005.
44. PRANEETVATAKUL S., SCHREINEMACHERS P., PANANURAK P., TIPRAQSA P., 2013, Pesticides, external costs and policy options for Thai agriculture, *Environmental Science & Policy*, 27: 103-113, DOI: 10.1016/j.envsci.2012.10.019.
45. RASKIN P., BANURI T., GALLOPIN G., GUTMAN P., HAMMOND A., KUTES R., SWART R., 2002, *Great Transition*, SEI, Stockholm.
46. REPPETO R., 1985, *The Global Possible-Resources, Development and New Century*, World Resources Institute Book, Yale University Press, New Haven.
47. RODRIGUEZ E., SULTAN R., HILLIKER A., 2004, Negative Effects of Agriculture on Our Environment, *Ef Agric Traprock*, 3: 28-32.
48. SANTUCCI F. M. PIGNATARO F., 2002, *Organic farming in Italy*, Paper for the OECD Workshop on organic agriculture, September 23-26, Washington D.C.
49. SANTUCCI F. M., ANTONELLI A., 2004, The role of public, non governmental and private actors for the development of organic farming: the Italian successful example, *New Medit*, 3(2): 42-49.

50. SANTUCCI F. M., MARINO D., SCHIFANI G., 1999, *The marketing of organic food in Italy*, Prospettive e proposte mediterranee-Rivista di Economia, Agricoltura e Ambiente, Italy.
51. SARKAR A., ARONSON K.J., PATIL S., HUGAR L.B., VANLOON G.W., 2012, Emerging health risks associated with modern agricultural practices: A comprehensive study in India, *Environmental Research*, 115: 37-50, DOI: 10.1016/j.envres.2012.03.005.
52. ŠEREMEŠIĆ S., DOLIJANOVIĆ Ž., TOMAŠ SIMIN M., VOJNOV B., GLAVAŠ TRBIĆ D., 2021, The Future We Want: Sustainable Development Goals Accomplishment with Organic Agriculture, *Problemy Ekorozwoju Problems of Sustainable Development*, 16(2): 171-180, DOI: 10.35784/pe.2021.2.18.
53. SINAB, *Sistema d'Informazione Nazionale Sull'Agricoltura Biologica – SINAB*, Italy, https://www.sinab.it/ (28.03.2022).
54. STOLZE M., PIORR A., HARING A., DABBERT S., 2000. *Environmental impacts of organic farming in Europe*, Organic Farming in Europe: Economics and Policy, Department of Farm Economics, Germany, University of Hohenheim.
55. STOLZE M., SANDERS J., KASPERCZYK N., MADSEN G., MEREDITH S., 2016, *CAP 2014-2020: Organic farming and the prospects for stimulating public goods*, IFOAM EU, Brussels.
56. TOMAŠ SIMIN M., RODIĆ V., GLAVAŠ-TRBIĆ D., 2019, Organic agriculture as an indicator of sustainable agricultural development: Serbia in focus, *Economics of Agriculture* 66(1): 265-281, DOI: 10.5937/ekoPolj1901265T.
57. UNEP (United Nation Environmental Program), 2013, *Embedding the Environment in Sustainable Development Goals*, UNEP Post-2015 Discussion Paper 1, available at http://www.unep.org/pdf/embedding-environments-in-SDGs-v2.pdf.
58. WCED (World Commission on Environment and Development), 1987, *Our Common Future*, Oxford University Press, New York.

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Civilizational Imperative of Social Economy

Imperatyw cywilizacyjny ekonomii społecznej

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Abstract

In recent decades, the socialization of economic development has become one of the key trends in globalization and, at the same time, a multilevel, structured and institutionalized process. Theoretical approaches to the essential identification of the social economy are generalized and a multi-criteria format of evolution of its models is proposed, based on social justice, responsibility and solidarity, social mentality and culture, social unity and optimism, social security, climate and comfort. The current configuration of the sustainable development paradigm with its subjective determination is outlined. The results of cluster modeling according to global indices of human development, social process, economic freedom, well-being of the elderly, happy planet, happiness and gender gap are presented. Social attention is paid to the empirical comparison of countries in terms of social optimism using global indices of happiness and a happy planet. The results of the empirical analysis are summarized in the disposition of the Anglo-Saxon, Scandinavian, continental, Mediterranean and transitive models of the social economy, which need qualitative renewal in the process of their global scaling.

Key words: global socialization, social economy, social justice, social responsibility, social solidarity, social mentality, social culture, social unity, social climate and comfort, social optimism

Jel classification: B55, F63

Słowa kluczowe: globalna socjalizacja, ekonomia społeczna, sprawiedliwość społeczna, odpowiedzialność społeczna, solidarność społeczna, mentalność społeczna, kultura społeczna, jedność społeczna, klimat i komfort społeczny, optymizm społeczny

Introduction

Under the influence of XXI century superfast scientific and technological progress with phenomenal empirical and practical implementation results of paradigms, models and technologies being futuristic until recently, human civilization has entered an era of digital changes and geo-anthropological cataclysms. On the one hand, unprecedented opportunities for economic and social progress primarily conditioned by the comprehensive technological revolution 4.0. On the other hand, the labor market, its professional age and organizational structure are qualitatively changing, traditional conditions, forms and regulations of employment, vocational training and recreation are discredited. Moreover, due to the latest unexpected challenges and threats, the longstanding *frozen* global security, economic and migration problems have become acute, and unpredictable regressive niches have emerged. As the COVID-19 pandemic shows e.g., even their adequate understanding and, in particular, prejudice or neutralization takes place in conditions of rigid intellectual, temporal, resource, political time, which is al-

ready becoming a new reality of human life in general. For the first time, all countries of the world have faced the dilemma of *human health – economic development* with internal contradictions and competition between the components of socialization for limited budget finances. The large-scale war that began in Ukraine on February 24, 2022 has raised many global social challenges to a new level, such as the migration and food crisis, energy and security problems in a new configuration. Against the background of established global demographic trends, increasing domestic and international disparities in the distribution of income and wealth, innovation and information and digital gaps, terrorist and military-political escalation, discredit and require qualitative renewal traditional concepts and models of social economy (Anglo-Saxon, Saxon, continental, Mediterranean, transitive) in terms of their global convergent-divergent scaling.

Analysis of research and problem statement

From ancient times the philosophers of antiquity Socrates and Plato began to form a philosophical concept, which in its modern interpretation reflects the pursuit of social justice, human rights and freedoms, the welfare state, and the harmonious coexistence of man and nature. Later, this philosophy developed thanks to the views of such scientists as J. J. Rousseau, G. Spencer, J. Baudrillard and others.

The fundamental foundations of the modern theory of the social European state were laid in the first half of the nineteenth century, when the social functions of economic management began to strengthen in Germany, France, and Austria. A. Jasay stressed that in a free market social market economy to some extent borrows from capitalism the desire to make a profit in the development of private property, but at the same time spends part of it on social goals – solidarity, social justice and equality, ensuring efficient production of social product (Jasay, 2010). At the same time, according to the scientist, the practical implementation of these principles has negative consequences, because in tough competitive conditions the protection of weak and uninitiated industrialists leads to the gradual destruction of rational economic structure, rising production costs, discouraging job creation and increasing wages (Jasay, 2010). Thus, the foundations of increasing the welfare of the population are discredited, as a high-cost socially unpromising economy is formed.

U. Baimuratov defines the social economy as one that meets the reasonable material and spiritual needs of the vast majority of the population, as well as the stage of development of the economic system with the formation of the middle class – the basis of social economy (Baimuratov, 2014, p. 27-28). At the same time, it is important to emphasize the middle class as an intermediary between the poor and the rich, because it is the carrier and guarantor of socialization of a market economy based on free competition, legal norms, political and economic stability. At the same time, according to the author's position, further confirmed practice, the social economy through the potential of the middle class is able to meet the needs of the *absolute majority of the population*.

Active research of the social economy by Ukrainian scientists is characterized by certain contradictory interpretations. Thus, T. Zaslavska believes that the social economy is an economic system that meets the interests of the main mass strata of society, which is the main subject of economic life (Zaslavska, 1997, p. 52-53). The vulnerability of this view, in our opinion, is due to the fact that the masses are not always the most educated and proactive in terms of ensuring positive socio-economic dynamics, and *the social economy should still focus on the middle class as a driver of economic growth with state support the most vulnerable segments of the population* (Simakhova, 2017, p. 85). Instead, Grishkin VO interprets the social economy as genuinely aimed at meeting a variety of human needs, based on such fundamental categories as labor and property, power and freedom, contribution and reward, income and assistance (Grishkin, 2005, p. 59), i.e. offers a fairly structured political economy market and social construct.

The academic, expert and regulatory environment of the European Union actively uses the category of *social economy* in its understanding as a system based on the principles of solidarity and collective participation, producing high quality jobs and better quality of life, offering new forms of entrepreneurship, work and responsible consumption. plays an important role at the regional and local levels in the development of social cohesion, responsibility and economic democracy (EU, 2017). These essential characteristics of the social economy testify to its focus on ensuring common European values – democracy, solidarity, stability, pluralism of markets and localities. Moreover, the socialization of the economy is one of the key priorities of the non-alternative European strategy in the concept of sustainable development. Moreover, most of the 17 sustainable development goals of the UN until 2030 affect the socialization of the economy by overcoming poverty, food security, ensuring the well-being and employment of people of any age, reducing social inequality, improving people's health, and rational use of natural resources , preservation of the environment for future generations, etc. (UN, 2015).

The main reasons for the recent formation of generally accepted terminology for the social economy are, firstly, the wide interdisciplinarity of most definitions and concepts in the research of philosophers, globalists, economists, demographers, sociologists, psychologists, political scientists, and secondly, long and constant renewed disputes between representatives of various scientific schools in the dilemma of *social – market*. Indeed, there is a certain dissonance in the combination of social justice and equality and market competition. Emerging contradictions are eliminated by subordinating business goals to social development goals with appropriate regulatory

intervention of the state, which expresses the interests, needs and positions of various social groups and segments of the population and can protect them by guaranteeing certain social standards. At the same time, other market players are encouraged to engage in socially responsible behavior at their own levels.

In this context, it is important to understand that the evolving market paradigm and practice have been successful and viable in large part due to timely and, in general, adequate responses to social problems and challenges. Perhaps the most striking example is the currently dominant joint-stock mechanism of private business, which, along with the obvious advantages of its market organization, helps to eliminate age-old conflicts between owners and employees in terms of their participation in share capital formation and dividend distribution. Through stock, mainly exchange instruments, there is an internal and international scaling of the *co-owner effect*, i.e., in fact, the global socialization of the market.

In our opinion, overcoming the current categorical consensus is overcome on the one hand, without alternatives in the foreseeable future of market relations, by their nature can not only ensure entrepreneurial productivity and economic progress, but also quickly adapt to environmental change and social challenges, on the other – the need for effective state and interstate regulation of the market economy.

Undoubtedly, the market social economy in all its forms of organization should be aimed at ensuring a decent standard of living by providing equal opportunities to realize on a competitive basis the potential of citizens in all spheres of life through state-regulated distribution, redistribution and consumption of public resources and goods.

This is complicated by the conditions of super-dynamic qualitative changes in the social and labor sphere, due primarily to the comprehensive digital transformation, which are the subject of special studies in: finance – blockchain, cryptocurrency, industry –industry 4.0, 3-D printing, marketing – e-commerce, management – E-government, communications – the Internet, professional and social networks (Jurgen, 2019; Kolot, Herasimenko, 2020; Srnicek, 2017; Schwab, 2017). Representatives of the academic environment are responding adequately to these new challenges (Bowen, 2013; Skinner, 2020).

Research interest is increasingly focused on the formation of the economy of artificial intelligence (Lee, 2020). It is obvious that even in comparison with the 4.0 industries, the economics of artificial intelligence will devalue or acquire new meaning directly related to human social principles, criteria and parameters.

At the same time, the need to explain numerous phenomena and paradoxes of new market practice by theoretical economists has motivated non-trivial approaches and concepts, the historical and fundamental basis of which clearly deviates from classical and neoclassical, liberal and neoliberal foundations (Sedlacek, 2017; Stephen, 2019).

A new area of research, in particular, has become the economy of a complex person, which considers man in all the unity of social, historical, cultural, political, environmental, economic and others. factors. New demographic trends in the automation of production processes determine the importance of research in the form of leisure and longevity economics (Kluge et al., 2014), which is seen as a future driver of innovation and economic growth with new human resources for the elderly, developing methodology and tools of economics happiness that as a scientific school was formed in the early XXI century. and presupposes virtuous action through reasonable actions (Aristotle, 2004).

Studies of pandemic (COVID-19) and post-pandemic development of the sphere of labor and social relations, initiated, in particular, by Ukrainian scientists, are extremely relevant and fundamentalized (Kolot, Herasimenko, 2020), and also in the perspective of post-war social development.

The purpose of the article is to outline the civilizational format of the evolution of motivations, principles, criteria and models of the social economy.

Research results

In the process of long in-depth interdisciplinary studies of the nature of the social economy, their generalization and identification by economists outlined a universal, in fact, civilizational format of its key characteristics (Fig. 1).

The question of equality and justice has troubled mankind since distant historical retrospect, placing them at the center of the social order (for example, the *ideal democratic state* in ancient philosophy). In a market environment, social equality is objectively impossible, and social justice is manifested or not manifested (social injustice) in the distribution of resources, income, social benefits among members of society, models of economic and social life, human behavior. In the multilevel structure of mature market economies, it becomes an important social institution with certain norms, rules, standards of behavior of individuals, teams, businesses, governments.

Corporate social responsibility is due, on the one hand, to internal factors (increasing demands from employees to the employer company for decent work and leisure, fair pay, social packages, etc.), and, on the other – external (interest of external investors, partners, employees, customers, consumers, etc. in the activities of the company, organization, corporation, the importance of social orientation of business and the connection with the social goals of the state). The growing importance of social corporate image and brand occurs in conditions of open

information about the company in external sources, including the Internet, which makes globally transparent indicators of not only economic but also social activity. In national and global economies, it is through the social dialogue between the state and big business that the preconditions for their strategic social partnership are created, primarily in the implementation of socially significant infrastructure programs and projects.

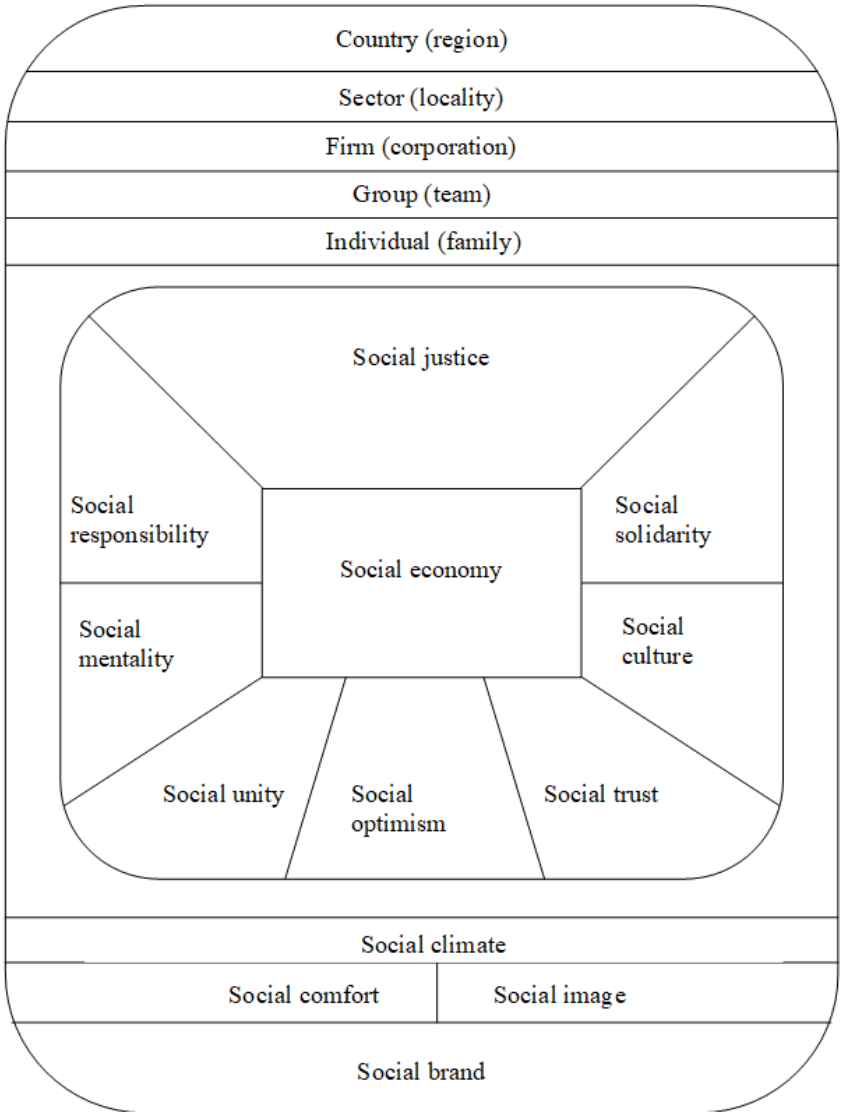

Figure 1. Civilizational format of the social economy

Adoption of the principles of social justice and social responsibility contribute to the achievement of social solidarity based on the coherence of the interests of individuals, social groups, teams in solving common socio-economic problems or problems in the process of multilevel social dialogue.

The scale, levels and features of the socialization of the economy are largely determined by the social culture, which is formed primarily by mental values and traditions. In this case, the mentality as a composition of thoughts, a set of mental and unconscious mental skills and spiritual guidelines may be inherent in an individual or their social group – by profession, gender, lifestyle, ethnicity, family, generation (Strazhny, 2018, pp. 5-6). It is the mentality that embodies the motivations of man, is the basis of the economy of a complex man.

Within our study, it is sufficient to identify individual, collective, national, regional and global mentalities. It is also well known that it is almost impossible to teach an adult the basic social principles, because they are absorbed by him through mental culture and are formed in the family and school, in the process of education and training. Based on the focus on freedom, social consciousness, responsibility and equality, it absorbs the moral and ethical values and communication practices of society, reflects the level of social maturity and development of people. In the civilizational context, researchers emphasize the uniqueness of societies, using the methodological construct of the social matrix as the basic structure of social relations, the system-forming elements of which are historically formed way of life, social institutions, worldview, dominant spiritual values, national character, archetypes and stereotypes. codes (Shulga, 2018, p. 15).

With the development of information and communication technologies, a virtual sociality is formed, characterized by the collapse of the density of interpersonal communications, the transition to the ZOOM-mode of communication, the deepening of human loneliness. (Heyets, 2021, p. 4; Dluhopolskyi O., Simakhova A., Zatonatska T., Kozlovskyi S., Oleksiv I., Baltgailis J., 2021; Menshikov et al., 2017). It is becoming acute in the pandemic world.

Social unity (consensus) is extremely important for social stability, especially in critical or crisis periods of development, based, as a rule, on institutional associations of individuals, groups, collectives (social cohesion) for direct or indirect participation in solving social problems. For her, in turn, the atmosphere of social trust is important. Moreover, it is in the active involvement of the institution of trust that researchers connect new sources and ways of solving modern socio-economic problems (Kolot, Gerasimenko, 2021, p. 388), which is especially relevant in the new relationship of digital network economy.

Social optimism is a civilizational phenomenon of the development of a market social economy, which demonstrates promising positivism in individual, group and collective behavior. It can be objective (reflects specific indicators of a high level of well-being and quality of life) and subjective (a person's self-awareness of his place in society and his sense of happiness). Sociologists study it at the level of social optimism of the masses, when through a survey it is possible to determine how in a positive or negative light citizens predict their future in the real conditions of social reality. Socio-psychological research is conducted mainly on the basis of studies of the average individual with confirmation or refutation of the reliability of such predictions, i.e. social optimism appears as optimism of the individual with the perception of man as a competent and effective person (Rafikov, 2015, p. 80).

Security, social climate and comfort are certain environmental conditions of life of an individual, family, group, team, company, locality, region, society. The war currently underway in Europe is destroying these conditions and social ties at all levels of social development, increasing social alienation and social asymmetry.

The level and quality of socialization of the economy according to the system of proposed criteria form the social image of individual actors and their social brand – positioning in relevant global or regional social coordinates determined by safety and welfare, education, health, life expectancy, decent work and leisure, increasing social capital.

In today's highly conflicted, politically, economically and, as we can see, epidemiologically unstable world, methodological modernization requires, in our opinion, a paradigm of sustainable development that has not been updated for decades, which requires in-depth interdisciplinary research. In the most general terms, it is necessary, firstly, its subjective identification, and, secondly, the fundamentalization of the security component, which is actualized by Russian aggression (Fig. 2).

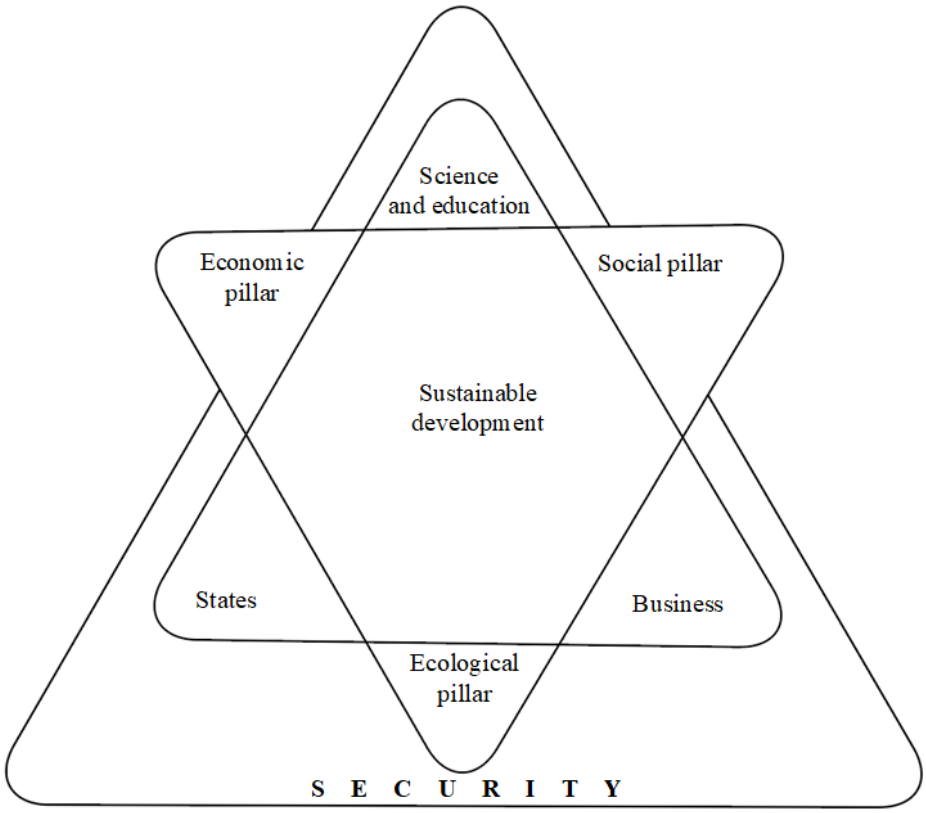

Figure 2. Modern configuration of the sustainable development paradigm (UN, 1987)

It is in the triangle *Science / Education – Business / State* that the motivation, ideas, technologies, resources and regulatory opportunities necessary for sustainable development are generated. At the same time, the institutions of civil society play a growing role in modern society. This approach outlines the contours of targeted social responsibility, helping to balance the interests of economic and social development of society, which is extremely important in the political and economic format of the welfare state of the first half of the XXI century (Kolot, Herasimenko, 2021, p. 340-382).

To empirically compare countries in terms of social optimism, we propose to use 2 unique global indices – the Happy Planet Index and the Happiness Index (Table 1).

Table 1. Ranking of countries in the world by subjective and objective social optimism, source:NEF (2016); WHR (2020)

Global index	The first 20 countries	The last 20 countries
Happy Planet Index	Costa Rica (44.7), Mexico (40.7), Colombia (40.7), Vanuatu (40.6), Vietnam (40.3), Panama (39.5), Nicaragua (38, 7), Bangladesh (38.4), Thailand (37.3), Ecuador (37.0), Jamaica (36.9), Norway (36.8), Albania (36.8), Uruguay (36.1), Spain (36.0), Indonesia (35.7), El Salvador (35.6), Netherlands (35.3), Argentina (35.2), Philippines (35.0)	Latvia (17.1), Niger (16.8), Hong Kong (16.8), Cameroon (16.7), Lesotho (16.7), Botswana (16.6), Djibouti (16.4), South Africa (15.9), Guinea (15.9), Trinidad and Tobago (15.7), Burundi (15.6), Swaziland (15.5), Sierra Leone (15.3), Turkmenistan (14, 6), Ivory Coast (14.4), Mongolia (14.3), Benin (13.4), Togo (13.2), Luxembourg (13.2), Chad (12.8)
Happiness index	Finland (7.809), Denmark (7.646) Switzerland (7.560), Iceland (7.504), Norway (7.488), Netherlands (7.488), Netherlands (7.449), Sweden (7.353), New Zealand (7.353), Austria (7.30), Austria (7.223), Luxembourg (7.238), Canada (7.232), Australia (7.223), United Kingdom (7.165), Israel (7.129), Costa Rica (7.121), Ireland (7.094), Germany (7.094), Germany (7.076), USA (6.940), Czech Republic (6.911), Belgium (6.864)	Comoro Islands (4.289), Togo (4.187), Ethiopia (4.186), Madagascar (4.166), Egypt (4.151), Sierra Leone (3.926), Burundi (3.775), Zambia (3,759), Haiti (3,721), Lesotho (3.653), India (3.573), Malawi (3.538), Yemen (3.527), Botswana (3.479), Tanzania (3.476), Central African Republic (3.476), Rwanda (3.312), Zimbabwe (3.299), South Sudan (2.817), Afghanistan (2.567)

The Happy Planet Index (HPI) is calculated on the basis of 4 components (well-being, life expectancy, income inequality, ecology) and is subjective, as people self-assess their level of life satisfaction. This global index is led by developing countries Costa Rica (44.7), Mexico (40.7), Colombia (40.7), Vanuatu (40.6), Vietnam (40.3), Panama 39.5), Nicaragua (38.7), Bangladesh (38.4), Thailand (37.3), Ecuador (37.0).

At first glance, it seems paradoxical, but it is quite obvious that a high standard of living by international standards is not a guarantee of happiness and social optimism, given the arguments of in-depth socio-psychological and psychological research (Stephen, 2019, pp. 269-294). At the same time, the universal constants of happiness are life itself, better health (with a steady income), freedom to dispose of one's life at one's own discretion, education, social support, and the environment (Stephen, 2019, p. 271, 277).

The Happiness Index is an indicator of objective social optimism when it takes into account: GDP per capita, social support, life expectancy, level of freedom to choose life, generosity, perception of corruption, level of trust. For three years in a row, Finland tops the list, and the top ten also includes Denmark, Switzerland, Iceland, Norway, the Netherlands, Sweden, New Zealand, Austria and Luxembourg. The most unfortunate countries are Afghanistan, South Sudan, Zimbabwe, Rwanda, the Central African Republic, Tanzania, Botswana, Yemen, Malawi and India.

The high level of subjective and objective social optimism coincided with only 3 countries - Norway, the Netherlands and Costa Rica, and the lowest is in African countries such as Sierra Leone, Burundi, Lesotho, Botswana.

Geographically, mostly Latin American and Asia-Pacific countries consider themselves happy, while developed countries in Europe and America are objectively socially optimistic.

In the broader context of socialization of the economy, cluster modeling was conducted according to 7 global indices: human development, social progress, economic freedom, well-being of the elderly, happy planet, happiness and gender gap (Fig. 3).

The solution of cluster analysis is a breakdown that satisfies the criterion of optimality. It can be an intergroup sum of squares of deviations:

$$W = \sum_j (X_j - \bar{X})^2$$

where X_j – vector of measuring of the j-th country, $\overline{X}$ - middle vector; j- 1, …., number of countries.

As a result, 4 clusters were obtained, which can be classified as countries of high (2 cluster), satisfactory (3 cluster), medium (1 cluster) and low (4 cluster) level of social optimism (Tables 2–6).

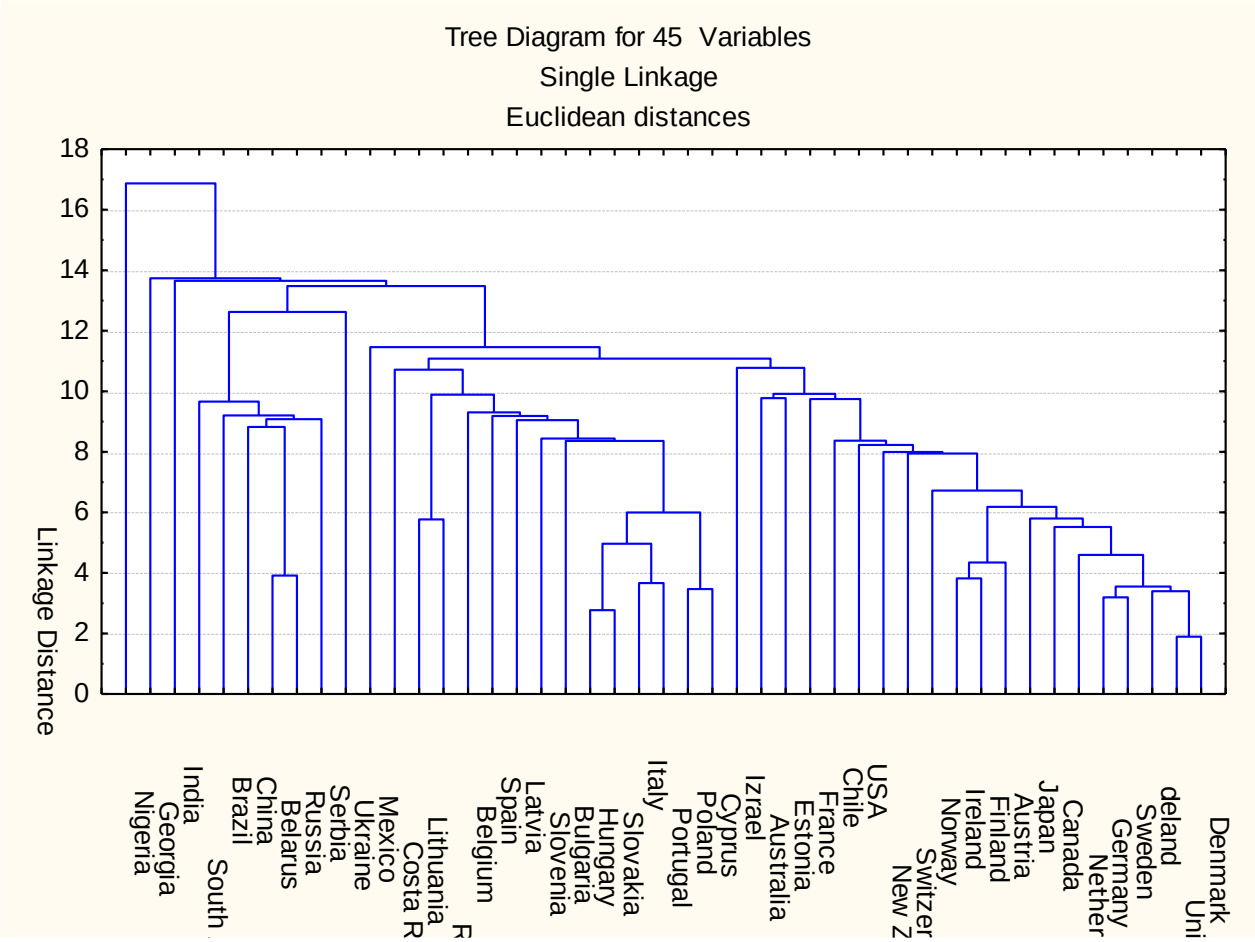

Figure 3. Dendogram of grouping of 45 countries of the world according to global social indicators

Table 2. Results of cluster modeling

For cluster 1 countries				For cluster 2 countries			
Index	Mean	Standard	Variance	Index	Mean	Standard	Variance
C_1	0.83860	0.045036	0.00203	C_1	0.92218	0.013083	0.00017
C_2	78.55267	5.046578	25.46795	C_2	88.39455	1.005916	1.01187
C_3	67.53333	5.360659	28.73667	C_3	76.15455	3.874368	15.01073
C_4	54.16000	5.593593	31.28829	C_4	82.86364	4.285154	18.36255
C_5	28.40667	7.459746	55.64781	C_5	31.21818	3.666556	13.44364
C_6	6.07240	0.574194	0.32970	C_6	7.24036	0.486336	0.23652
C_7	0.73193	0.037980	0.00144	C_7	0.78300	0.058071	0.00337
For cluster 3 countries				For cluster 4 countries			
Index	Mean	Standard	Variance	Index	Mean	Standard	Variance
C_1	0.89740	0.026908	0.00072	C_1	0.71422	0.091554	0.00838
C_2	84.94200	4.260943	18.15564	C_2	63.35111	8.276268	68.49661
C_3	73.55000	5.395935	29.11611	C_3	56.11111	4.223578	17.83861
C_4	70.53000	4.714529	22.22678	C_4	39.52222	6.865817	47.13945
C_5	26.62000	5.187763	26.91289	C_5	24.78889	5.738128	32.92611
C_6	6.92570	0.521877	0.27236	C_6	5.11511	0.815806	0.66554
C_7	0.75920	0.038944	0.00152	C_7	0.70656	0.044453	0.00198

As we can see, in the format of this stratification, the countries of the Scandinavian model of social economy have the highest level of social optimism; countries of liberal and continental models of social economy – satisfactory; countries of the Mediterranean model – medium, and transitive – low level of social optimism.

Table 3. Countries with medium level social optimism (cluster 1) and Distances from Respective Cluster Center

Countries	Distance
Cyprus	1.947639
Spain	5.107687
Slovenia	4.753703
Poland	1.382455
Portugal	3.101616
Slovakia	1.059453
Hungary	1.397898
Bulgaria	4.245986
Republic of Korea	4.894214
Georgia	5.216269
Lithuania	5.927411
Latvia	5.211071
Costa Rica	6.601370
Mexico	5.905731
Italy	2.433955

Table 4. Countries with high level social optimism (cluster 2) and Distances from Respective Cluster Center

Countries	Distance
Denmark	1.798488
Switzerland	3.600892
Norway	3.324892
Sweden	1.437733
Netherlands	1.554557
Germany	1.390999
United Kingdom	1.413600
Iceland	0.784232
Canada	2.965239
New Zealand	3.855553
Japan	2.953653

Table 5. Countries with satisfactory level social optimism (cluster 3) and Distances from Respective Cluster Center

Countries	Distance
Austria	2.219352
Finland	2.780062
Ireland	2.155600
Belgium	3.664278
France	4.138527
Estonia	4.547342
Australia	3.830891
USA	4.043821
Israel	4.006882
Chile	2.948514

Table 6. Countries with low levels of social optimism (cluster 4) and Distances from Respective Cluster Center

Countries	Distance
Ukraine	3.441819
Serbia	3.740129
Russia	2.511067
Belarus	2.089844
China	3.551455
South Africa	4.719513
Nigeria	8.404438
India	4.238446
Brazil	5.563411

Conclusions

Categorically, the conceptual apparatus of the studied problem requires development and logical ordering in the concept of global socialization of the economy as a complex multilevel process of unification of social standards, norms, rules, worldviews and behavioral guidelines.

However, several important circumstances should be taken into account. First, the dualistic nature of global socialization, on the one hand, as an objective trend of evolution of the market economic system, in which new

content and forms acquire motivations and practices of social responsibility, and on the other – the ability of market participants and citizens to adapt to the latest information and digital space of life, when the problems of not only part-time or non-standard work activity, but also free time and active longevity are actualized. Second, there is growing direct or indirect interference in the social sphere and public relations of global actors (TNCs, international organizations, celebrities, expert communities, the creative class, social networks), and in the social culture and politics of influential mass-media. Third, not only the regulatory but also the direct influence of states on social relations and processes in an era of political and economic crisis and, especially, global turbulence is significantly increasing in contrast to the long period of neoliberalization, when their functions have significantly weakened.

In the context of the priorities of inevitable technologicalization and the tasks of sustainable development, the proposed civilization format of socialization of the economy is actualized and becomes practically unalterable under conditions of responsible global thinking in the motivations and actions of world elites and social consolidation.

References

1. ARISTOTLE, 2004, *Nicomachean Ethics*, Penguin, London.
2. BAIMURATOV U., 2014, *Harmony of Economy and Society: The Paradigm of "D+3D", Laws, and Problems*, XLIBRIS, Bloomington.
3. BOWEN W. G., 2013, *Higher Education in the Digital Age*, Princeton University Press, Princeton.
4. DLUHOPOLSKYI O., SIMAKHOVA A., ZATONATSKA T., KOZLOVSKYI S., OLEKSIV I., BALTGAILIS J., 2021, Potential of Virtual Reality in the Current Digital Society: Economic Perspectives, *11th International Conference on Advanced Computer Information Technologies, ACIT 2021-Proceedings:* 360-363. DOI**:** 10.1109/ACIT52158.2021.9548495.
5. EU, 2017, *Social economy*, http://www.socialeconomy.eu.org/ (08.04.2018).
6. GRISHKIN V.O., 2005, *Socialization of the Ukrainian economy: theory, methodology, perspectives*, Porogi, Dnipropetrovsk (in Ukr.).
7. HEYETS V.M., 2021, Socialization in social transformations of long-term character, *Economy of Ukraine*, 9:3-17 (in Ukr.).
8. JÜRGEN A., 2019, *Management 3.0 Agile management. Leadership and team management*, Publishing House Morning: Fabula, Kharkiv (in Ukr.).
9. KLUGE F., ZAGHENI E., LOICHINGER E., VOGT T., 2014, The advantages of Demographic change after the wave: fewer and older, but healthier, greener, and more productive? *PLoS ONE*, 9(9).
10. KOLOT A., HERASIMENKO O., 2020, *The sphere of work in the conditions of global socio-economic reality 2020: challenges for Ukraine*, Friedrich Ebert Foundation, Kiyv (in Ukr.).
11. KOLOT A., HERASYMENKO O., 2020, Digital transformation and new business models as determinants of formation of the economy of nontypical employment, *Social and labour relations: theory and practice*, 10(1):33-54. DOI:10.21511/slrtp.10(1).2020.06
12. KOLOT A.M., 2017, *Decent work: imperatives, Ukrainian realities, support mechanisms*, KNEU, Kyiv (in Ukr.).
13. KOLOT A.M., HERASIMENKO O.O., 2019, Social and labor development in the XXI century: to the nature of global changes, new opportunities, limitations and challenges, *Demography and social policy*, 1 (35):116-117 (in Ukr.).
14. KOLOT A.M., GRISHNOVA O.A., 2012, *Social rationality: theory and practice of development*, KNEU, Kyiv (in Ukr.).
15. KOLOT A.M., HERASIMENKO O.O., 2021, *XXII work philosophy of change, challenges, vectors of development*, KNEU named after Vadym Hetman, Kyiv.
16. LEE K.-F., 2020, *Superpowers of artificial intelligence: China, Silicon Valley and the new world order*, Force Ukraine, Kyiv (in Ukr.).
17. MENSHIKOV V., LAVRINENKO O., SINICA L., SIMAKHOVA A., 2017, Network capital phenomenon and its posibilities under the influence of development of information and communication technologies, *Journal of Security and Sustainability Issues*, 6(4): 585-604, DOI:10.9770/jssi.2017.6.4.(5).
18. NEF, 2016, *The Happy Planet Index 2016*, http://www.happyplanetindex.org (08.04.2018).
19. RAFIKOV O.R., 2015, Social optimism among pre-adolescent sociologists and social psychologists, *Pedagogical process: theory and practice*, 1:57-62 (in Ukr.).
20. SCHWAB K., 2017, *The Fourth Industrial Revolution*, Crown Publishing Group, New York.
21. SEDLACEK T., 2017, *The economy of good and evil. In the footsteps of human search: from Gilgamesh to the financial crisis*, Old Lion Publishing House, Lviv (in Ukr.).
22. SHULGA M., 2018, *Social matrix disruption: monography*, Institute of Sociology, NAS of Ukraine, Kyiv.
23. SIMAKHOVA A.O., 2017, Evolution of approaches to the interpretation of the social economy in a global sense, *Bulletin of Dnipropetrovsk University. Series: World Economy and International Economic Relations*, 25(9): 80-89 (in Ukr.).
24. SKINNER C., 2020, *Digital man*, Publishing House Morning: Fabula, Kharkiv. (in Ukr.).
25. SRNICEK N., 2017, *Platform Capitalism*, Polity Press, Cambridge.
26. STEPHEN P., 2019, *Enlightenment today: Arguments in favor of reason, science and progress*, Kyiv (in Ukr.).
27. STRAZHNY A., 2018, *Ukrainian mentality: illusions - myths – reality*, Spirit and Letter, Kyiv (in Ukr.).
28. UN, 2015, *Transforming our world: the 2030 Agenda for Sustainable Development*, Resolution adopted by the General Assembly on 25 September 2015.

29. WCED, 1987, *Our Common Future*, Oxford University Press, New York.
30. WORLD HAPPINESS REPORT, 2020, https://happiness-report.s3.amazonaws.com/2020/WHR20.pdf (20.08.2021).
31. JASAY A., 2010, Social market economy: socialism in a different form? *Political Economy, Concisely: Essays on Policy that does not work & markets that do (Collected Papers of Anthony de Jasay)*, Liberty Fund Inc, Indianapolis.

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Asymmetry as a Factor Weakening Resilience and Integration in the Sustainable Development of the Polish-Czech Borderland in the Context of the Dispute About the Turów Mine

Asymetria jako czynnik osłabiający odporność i integrację w zrównoważonym rozwoju polsko-czeskiego pogranicza w kontekście sporu o Kopalnię Turów

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Abstract

By analysing asymmetry in socioeconomic and environmental development in the Polish-Czech borderland, we contribute to the discussion on its impacts as a factor weakening resilience and integration for the purposes of sustainable development in the region. In the article, we use the results of the studies under the Project *The crisis at the Turów Mine and its impact on Czech-Polish cross-border cooperation: An evaluation, conclusions and recommendations*, funded by the Polish National Agency for Academic Exchange in 2022. The main aim of our research is to draw conclusions for territorial self-governments as to how they should strengthen sustainable development based on integration with foreign partners, thus enhancing resilience. We draw conclusions based on qualitative research, statistical analyses and literature studies. One of the key conclusions which can be drawn from the present study is that the asymmetry visible in many socioeconomic areas weakens the resilience of institutional structures to crises, resulting in barely discernible cooperation between these regions.

Key words: Turów mine, quality of life, sustainable development, sustainability

JEL Classification: R11, O52, P28, P27

Słowa kluczowe: kopalnia Turów, jakość życia, zrównoważony rozwój, zrównoważoność

Introduction

The issues related to asymmetrical development of border regions have been widely addressed in literature and provide a background to the considerations presented here. There are two novel aspects here: resilience and cross-border integration in the case of the Polish-Czech borderland. The article was prepared using questionnaires carried out under the Project *The crisis at the Turów Mine and its impact on Czech-Polish cross-border cooperation: An evaluation, conclusions and recommendations*, funded by the Polish National Agency for Academic Exchange in

2022[1]. We assume that the main goal of these regions is to work towards sustainable development. This is a particularly difficult border region, since an open pit mine operating in this area has changed the image and landscape of region.

Firstly, we focus on analysing the Turów dispute. The operation of such a mine in Poland so close to the German and Czech territories has been criticised by environmental activists and the people living nearby. The mine causes air and noise pollution, soil subsidence and water shortages. Together with the nearby power plant (and the entire Polish national energy policy) it is not consistent with the EU environmental goals. The mine's lifespan was extended without environmental impact research or consultation on an international level. The dispute involved two principal positions: i) environmental protection and peaceful neighbourly relations and ii) the energy security of the local Polish populations and Poland as a whole. Over three years, the dispute became a clash of many local, regional, state, macroregional and global interests.

Secondly, we ground a broader background of the dispute in the cross-border socioeconomic asymmetry at local and regional levels. This is a significant factor weakening resilience and cross-border cooperation and integration in the region. In some cases, cross-border asymmetry functioned as a catalyst for the conflict.

The issues listed here are developed in this article: An analysis of the Turów crisis; Conceptual background and hypothesis development; Data collection and the research sample; Basic characteristics of the area; Empirical analyses and their results; Conclusion.

The article was prepared as a result of the work done by an interdisciplinary team consisting of Polish and Czech scientists.

1. An analysis of the Turów crisis

The Turów Mine has been operating since 1904 and the Turów power plant since 1962 (IZIDORCZYK, 2022). The problems began due to the continuous expansion of the mine, despite efforts taken to mitigate pollution (PGE 2022). The pit causes air and noise pollution, soil subsidence and groundwater drainage. According to the Czechs, 30,000 inhabitants in the borderland suffered from a lack of drinking water (DATEL & HRABÁNKOVÁ, 2020).

Czech-Polish negotiations were held in the 2010s but no resolution was reached. A proposal to expand the mine and operate it until 2026 and potentially until 2044 was submitted in 2019 by PGE (Polska Grupa Energetyczna = Polish Energy Group). Polish authorities supported this plan without carrying out research or cross-border consultation, violating EU law and other regulations. PGE promotes the slow transformation of the Municipality of Bogatynia with the help of the EU's Just Transition Fund, ensuring Poland's energy security and local jobs. About 2,500 people work in the Turów mine, approximately 1,200 more are employed in the power plant and another 15,000 in cooperating subsidiaries (ŻUK & ŻUK, 2022).

Czech-Polish relations in the region worsened and very little common ground could be found. Several Czech municipalities, together with the Liberec Region and Greenpeace, petitioned the European Parliament (MĚSTO FRÝDLANT, 2019). The petition was found to be justified and this European Parliament support was influential in later court proceedings.

The Czech Republic successfully sued Poland over the mine in the ECJ (European Court of Justice). The ECJ fined Poland EUR 500,000 for each day mining continued. An agreement between Prime Ministers Petr Fiala and Mateusz Morawiecki was signed on 4 February 2022 (MINISTERSTVO ŽIVOTNÍHO PROSTŘEDÍ ČR, 2022). Poland paid the Czech Republic EUR 45 million in compensation and the Czech government withdrew its charges from the ECJ.

2. Conceptual background and hypothesis development

Interest in the issues related to border regions can be seen in numerous publications, often interdisciplinary in character (Cappellano et al., 2022; Cappellano & Kurowska-Pysz, 2020; Jakubowski, 2020; Knippschild & Vock, 2017; Nienaber & Wille, 2020; Ulrich, 2020; Wong Villanueva et al., 2020), and involve searching for possible sustainable development paths for these regions (Ilic et al., 2022; Ospanova et al., 2022; Thomas et al., 2012), which can differ fundamentally from central regions. We need to remember that the development of border regions depends to a large extent on national factors, both endogenous and exogenous, conditioned by the international environment. The difference in the development of border regions results, on the one hand, from a lower level of socioeconomic development and, on the other hand, from a different level of integration in the cross-border region and differentiated levels of asymmetry on both sides of the border. For the purposes of the Project, two different interpretations of cooperation and integration were adopted. As far as the research problems addressed in the Project are concerned, the term *cooperation* refers to institutions and their role in the mitigation of the dispute, while

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integration applies to labour flows and cross-border contacts. The sustainable development of the region is addressed in the article in three aspects: environmental, economic and social.

Border regions are classified as peripheral regions (problematic, less economically developed, often facing significant environmental problems caused by their failure to take care of the environment, the location of harmful industry, the post-military character of these regions, etc.).

Given the absence of large economic centres, border regions are often weaker economically than central regions of the country (Proniewski, 2014). Developmental shortcomings also result from poor infrastructure. In regions with open state borders, economic cooperation is a natural phenomenon, helping reduce deficits in socioeconomic development. These can take different forms of cooperation and integration. The problems of cross-border cooperation are particularly noticeable environmentally. The exploitation of natural resources often requires the cooperation of institutions, financial resources and a combination of different budgets. Clearly, in this area there is an absence of coordinated responses to the adverse impacts of economic activity and the crisis situations that followed. The idea of a *common good* is not always easy to communicate, particularly in border regions.

In the concept of sustainable development, the transformation of socioeconomic and political processes from *homo oeconomicus* to *homo cooperativus*, the evaluation of contemporary concepts of urban development (*smart city*, *eco city* and *compact city*), the conceptual framework is very important for the inclusive urban development model synergically taking into account their key values (Pięta-Kanurska, 2019; Przywojska & Podgórniak-Krzykacz, 2020). In this case, two aspects are very important: The cause of the crisis and the solution to it; the resilience of a given economy enabling it to restore equilibrium. Economists propose that sustainable development goals should be perceived and taken into account as strategic conditions or restrictions in the building of companies' development strategies (Gorynia & Trąpczyński, 2022).

Cross-border cooperation generates a need to overcome disparities in economic development, legal conditions, other support instruments under the national policy, cultural and other differences. Institutions which strengthen the integration processes and mitigate the emerging conflicts play a very important role. Economic activity which causes damage to the environment is an area of potential dispute and discussed to the greatest extent. Residents cooperate to gain individual benefits, but not to strengthen the role of institutions working to support cross-border activities. In the case of integration, institutional cooperation is most often referred to. Unfortunately, in many of such regions a significant barrier to cooperation (Sohn, 2014) is the economic asymmetry. This translates to the absence of areas of cooperation between border regions. Cooperation is understood to mean mutual relations of institutional actors, while integration takes place at the level of the relations of the residents of a region. A primary feature of these regions is their peripherality constituting a barrier to their development. Development is also hampered by non-economic factors: environmental, social and even historical. In addition to the traditional tools of cooperation and integration, authors often point out the need to direct research so that it indicates opportunities for digital solutions to given problems (Łaźniewska et al., 2021; Merisalo & Makkonen, 2022).

Asymmetry is expressed as a gap in the socioeconomic development and long term it is related to the development of these regions. One measure of asymmetry can be economic competiveness, demonstrating the socioeconomic gap between regions (Gorzelak, 2003; Łaźniewska & Gorynia, 2012). In terms of the contemporary development challenges, a measure of competitiveness is compliance with specific environmental standards associated with the concept of sustainable development (Łaźniewska et al., 2021).

Asymmetry in the socioeconomic development of border regions is an opportunity for mutual compensation of regional shortages at cultural, tourism and economic levels as well the labour market, services, etc. The existing development disparities can be a difficult barrier to overcome, limiting cross-border ties, particularly in institutional cooperation (Masik & Sagan, 2016; Opioła & Böhm, 2022), which creates the basis for integration. Important factors limiting the reduction of asymmetry include relations between neighbouring states, position in the international environment, institutional environment and associated conditions (related to the presence of an institutional and organisational gap), socio-demographic conditions (related to multiculturality and unfavourable demographic processes), as well as economic conditions resulting from existing differences in economic systems and levels of development of borderlands (Komornicki et al., 2019).

> H1: Asymmetry in the development of cross-border regions can be a significant barrier to deepening the cooperation process

Resilience to internal and external disturbances is related to the specificity of a given place. Central European cities and regions point out that, due to the existing path dependence, rooted, among others, in their post-industrial and post-Socialist legacy, building socioeconomic, environmental or institutional resilience requires a customised approach based on adaptation, modification of new ideas, concepts and solutions resulting from the impact of globalisation, digitisation, the green economy or the cohesion policy of the European Union (Drobniak & Plac, 2021). The popularity of resilience research is related to numerous crisis situations affecting the economies of the regions (such as the financial crisis, climate change, the Covid-19 pandemic etc.), the continuous evolution of the regional development drivers and the efforts to find formulas for adaptation and survival (Bristow & Healy, 2015). The concept of resilience has a long tradition in biological and engineering sciences; in the last decade it also

gained popularity in urban and regional sciences (Borsekova et al., 2018, 2021; Drobniak, 2018; Smętkowski, 2015). Definitions of the phenomenon of resilience can apply to man, society, ecosystem or city.
The scale and duration of disturbances are important elements of resilience research. In literature, the resilience triangle is referred to (Falasca et al., 2008). In the case of border regions, the crisis generating factors can have a global character, such as a pandemic, or be local – the Turów Mine. In terms of duration, we can speak of a sudden shock or a cumulative, slowly smouldering pressure, e.g. climate change (Drobniak & Plac, 2021). The sustainable development associated with the idea of green infrastructure strengthens the resilience of a given region and, conversely, the absence of transition tools for the local economic activities, translating into a deterioration of the environment, even on the scale of the entire region, weakens resilience (Korhonen et al., 2021; Rizzi et al., 2018; Szabó et al., 2018). Different types of institutions play important roles in building the resilience of a region. Innovative entrepreneurs create new activities, while institutional entrepreneurs introduce new rules and practices (Görmar et al., 2022; Grillitsch & Nilsson, 2022).

H2: Asymmetry in the socioeconomic development in a border region as a factor weakening resilience

3. Data collection, research sample and the characteristics of the sample

The Authors used triangulation of data sources in order to verify the research hypotheses (Saunders, M., Lewis, P. and Thornhill, 2012) and research methods. A combination of different methods and sources makes it possible to look at a wider picture of the phenomenon examined rather than single cases (Fusch et al., 2018). A quantitative analysis was complemented by qualitative individual and direct in-depth interviews. Since representativeness is not a priority for qualitative studies, their purpose is rather to provide a wider understanding of a given problem on the basis of a smaller number of cases (Glinka & Czakon, 2021). Interviews were held with representatives of local governments, the power plant and representatives of the Neisse-Nisa-Nysa Euroregion. Analysis covered the following actors:

- entities functioning in the Polish-Czech borderland (in the Neisse-Nisa-Nysa Euroregion) and involved in cross-border cooperation: 30 IDIs (15 IDIs with respondents from the Polish part of the Neisse-Nisa-Nysa Euroregion and 15 IDIs with respondents from the Czech part of the Neisse-Nisa-Nysa Euroregion);
- entities functioning in the Polish-Czech borderland (in the Neisse-Nisa-Nysa Euroregion) and involved in cross-border cooperation, as well as residents of the Neisse-Nisa-Nysa Euroregion. The spatial extent of the study: the Polish and Czech parts of the Neisse-Nisa-Nysa Euroregion. Methods: the CAWI and PAPI interviews. 70 respondents – Interreg beneficiaries (35 respondents from the Polish part and 35 respondents from the Czech part of the Neisse-Nisa-Nysa Euroregion), as well as 330 respondents – inhabitants of the Euroregion (180 respondents from the Polish part Euroregion and 150 respondents from the Czech part of the Neisse-Nisa-Nysa Euroregion). The sampling was purposive in the case of the representatives of the entities and random in the case of the residents. We can draw conclusions about the regions from which the sample was drawn and which are directly involved in the dispute. We can only assume that the results in other communes would be similar. Due to the lack of a sampling frame, deliberate selection of units for the sample was justified (the sample included both people living on the Polish and Czech sides of the Nysa Euroregion and in particular people who were familiar with the problem of the Turów Mine). The selection was based on a quota and all efforts were made to ensure that the research sample was the best possible representation of the entire population affected by the Turów problem. The size of the group assumes that the Polish side of the Nysa Euroregion is inhabited by about 600,000 people and the Czech side by about 500,000. To fulfil the condition of the group size for the study, a group of at least 318 people should be surveyed to achieve results with a confidence level of 95% (fraction size 0.5) and the assumed maximum error of 5% estimate of the true results in the population. Such a group was tested.

To ensure comparability between different countries, the questionnaire was designed in closed form using a five-point Likert scale. In drafting the questions, we followed well-known questionnaires (e.g. those of the World Value Survey, European Social Survey (Norwegian Centre for Research Data, Norway – Data Archive & distributor of ESS data for ESS ERIC, 2018). We also checked if there were no questions which had already been proved in other cross-country analyses. The questionnaire was prepared in Polish and Czech and its translation into Czech was prepared by native speakers. Care was taken to ensure exact translation of keywords and the context, too.

3.1. The first group of respondents were the inhabitants of the region studied.

The main aim of the study was to show whether there is a cause-and-effect relationship between the dispute over the Turów mine and the cross-border relations in the Polish-Czech border area after the conflict emerged? The distribution of basic data on the Polish and Czech sides was as follows:

a) The respondents on the Czech side were residents of the following towns:

- Hrádek n. Nisou – 74,8%,
- Chrastava – 10,4%,

- Heřmanice – 5,2%,
- Kunratice – 4,4%,
- Višňová – 5,2%,
- 100% of the respondents on the Polish side were from Bogatynia.

b) Summary of surveyed residents by gender

Table 1 presents the gender structure of the respondents for the Polish and Czech sides.

Table 1. List of respondents on the Polish and Czech sides by gender

gender	**PL**		**CZ**	
women	109	59,60%	67	51,15%
men	74	40,40%	64	48,85%

Table 2. List of Polish and Czech respondents by age

age	**PL**		**CZ**	
18-24	5	2,60%	40	29,85%
25-34	16	8,40%	18	13,43%
35-44	37	19,50%	17	12,69%
45-54	64	33,70%	26	19,40%
55-64	44	23,20%	1	11,94%
over 64	24	12,60%	17	12,69%

Table 2 shows the age structure of respondents. The age range in Poland differs from that in Czech in that about 30% of the respondents on the Czech side are people in the lowest age group, and on the Polish side people in the 45-64 age range, which could have influenced the results of the survey. It may also be related to the fact that the research region on the Czech side is closely related to the university in Liberec and therefore has a large number of students. On the Czech side, 26.47% of students took part in the study, and only 1% on the Polish side.

c) List of residents by education

The distribution of respondents in relation to education is similar. The existing differences do not affect the interpretation of the test results.

Table 3. List of respondents on the Polish and Czech side by education

Education	**PL**		**CZ**	
Primary	9	4,70%	3	2,26%
Technical	47	24,40%	25	18,80%
College	93	48,20%	84	63,16%
Higher	44	22,80%	21	15,79%

d) Social status on the labor market

Table 4. List of Polish and Czech respondents by social status on the labor market

Social status	**PL**		**CZ**	
pupil/student	2	1,00%	36	26,47%
Casual labor without contract	1	0,50%	2	1,47%
Contracted employee	121	62,70%	56	41,18%
Self-employeed	13	6,70%	8	5,88%
Farmer	1	0,50%	5	3,68%
Retired/pensioner	43	22,30%	18	13,24%
Unemployed	3	1,60%	0	0%
freelancer	9	4,70%	11	8,09%

The most frequently indicated social status on the labor market on both sides of the border was the status - Contract employee - 41.2% (CZ) and 62.7% (PL).
f) Professional relationship of the respondent or his immediate family member
with the Turów mine / power plant.

Table 5. Information on the professional ties of the respondents or their immediate family with the Turów mine / power plant on the Polish and Czech sides of the border

Linking the respondent with the Turów mine	**PL**		**CZ**	
No	65	34,80%	133	98,52%
Yes	122	65,20%	2	1,48%

Among the respondents, 65.2% of those surveyed on the Polish side confirmed that they or their families are professionally connected with the Turów Mine. In the case of the Czech side, it was only 1.5% of the respondents.

3.2. Interreg program beneficiaries record for H2 verification

Table 5. List of respondents on the Polish side by type of entity represented

Institution	**PL**		**CZ**	
local government unit	17	48,60%	13	35,10%
subordinate unit of the local government	10	28,60%	7	18,90%
State institution	0	0%	1	3%
non-governmental organization	8	22,90%	14	37,80%
school or university	0	0%	2	5%

The most numerous group of respondents on the Czech sides were people representing local government units - 35.1%, while the least numerous were those who worked in state institutions - 3%. On the Polish side, the representatives of LGUs also constituted the most numerous group of respondents - 48.60%. None of the people taking part in the study represented a state institution, school or university.
a) Table 6 presents the list of respondents in terms of the key area of activity.

Table 6. List of respondents on the Polish and Czech sides by key area of activity

Activity	**PL**		**CZ**	
matters subordinate to local government units	9	25,70%	10	27,03%
Education	2	5,70%	8	21,62%
culture and entertainment	9	25,70%	0	0,00%
sport and tourism	2	5,70%	5	13,51%
social affairs	2	5,70%	2	5,40%
regional and local development	10	28,60%	11	29,73%
security and crisis management	1	2,90%	1	2,71%

The key area of activity indicated by the highest percentage of respondents on the Czech side was regional and local development - 29.7%. On the Polish side, the greatest number of respondents gave the same answer - 28.6%.

b) Table 7 shows the period of involvement in the cross-border cooperation of Interreg beneficiaries

Table 7. List of respondents on the Polish and Czech sides by the period of involvement in cross-border cooperation

Engagement period	**PL**		**CZ**	
Up too 5 years	2	5,70%	4	10,80%
between 5 lat, a nd10 years	14	40%	8	21,6%
10 years and above	19	54,30%	25	67,60%

The majority of beneficiaries on the Czech side declared an involvement in cross-border cooperation for a period of 10 years and above - 67.6%. The same situation occurred on the Polish side.

c) Table 8 presents the total number of partners with which the entity cooperated.

Table 8. List of respondents on the Polish and Czech sides by total number of partners of cross-border projects with which the entity cooperated

Number of partners	PL		CZ	
1	0	0%	7	18,9%
2 to 5 partners	20	57,10%	23	62,20%
more than 5 partners	15	42,90%	7	18,90%

The most common answer given by beneficiaries on the Czech side was having 2 to 5 partners for the cross-border projects with which they cooperated - 62.20%. The same number of partners was indicated by the beneficiaries on the Polish side - 57.10%.

4. Basic characteristics of the area

The Turów lignite surface mine is in the Zittau Basin, in Southwestern Poland (Lower Silesian Voivodeship) near the Germany (Saxony) and the Czech (the Liberec Region) borders. The region is defined by the towns Zittau, Hrádek nad Nisou and Bogatynia as well as the Neisse River and is a part of the Neisse – Nisa – Nysa Euroregion. Our article analyses the Czech and Polish parts of the region, epitomized by peripheries or semi peripheries with complicated modern histories. The most problematic regions in terms of development are territorial protrusions such as the Bogatynia protrusion in Poland or the Czech Frýdlant protrusion. The territory between Zittau and Liberec is a semi periphery with good transport connections (VON KORFF & MAIER et al., 2020).
Bogatynia is remote from important regional and subregional capitals, apart from Liberec, just 16 km away. Public transport is limited and there is no passenger railway, unlike over the border. Public transport links to Zittau, Hrádek nad Nisou or Frýdlant are insufficient. There is a strong border effect on the Czech-Polish border in the area studied, possibly caused by the poor transport links or the peripherality of Bogatynia and neighboring Frýdlant protrusion (DRÁPELA & BAŠTA, 2018). Bogatynia is, however, one of the wealthiest municipalities in Poland. The Turów mine, together with the power plant, provides 7 % of Poland's energy (IZIDORCZYK, 2022). Bogatynia is wealthy but isolated and damaged by mining and industry. There are no effective economic transition programs for Bogatynia and the municipality remains dependent on mining and heavy industry.
Our text deals with the town and municipality of Bogatynia (21 891 inhabitants, 136,2 km^2) on the Polish side, where the Turów mine (26 km2) is located, and the Czech municipalities affected by the operation of the mine, according to the Liberec Regional Government: Hrádek nad Nisou including the famous border settlements Uhelná and Václavice, Frýdlant, Chrastava, Bílý Kostel nad Nisou, Bulovka, Černousy, Dětřichov, Habartice, Heřmanice, Chotyně, Kunratice, Mníšek, Oldřichov v Hájích, Pertoltice and Višňová (in total 30 439 inhabitants, 297,13 km2). The population density is significantly higher on the Polish side of the border thanks to increased urbanization in Bogatynia.
The area impacted by the Turów Mine was determined as a result of a study carried out under the Project. It is relatively small and only affects the municipalities around Bogatynia, including Czech municipalities as indicated in Fig. 1. The problem of asymmetry involves, among others, differences in the administrative division of the border regions, their population density, the level of socioeconomic development, leanings related to cross-border flows, hydrological problems and the proximity of large competitive development centres, including Liberec, as shown in Fig. 2. This asymmetry in the area studied also reflects the different economic character of the municipalities.

5. Empirical analyses and their results

With respect to H1, the following conclusions were drawn:

1. The questionnaires indicate diverse preferences and needs with regard to cross-border contacts and the benefits of a cross-border location. They also indicate that the residents' interest in seeking benefits is relatively low, which is caused by factors related to the absence of infrastructure, in the form of roads, the knowledge of a foreign language and the absence of sufficient knowledge and information about existing opportunities. Generally, the level of cross-border contacts is low and there is asymmetry in the reasons for crossing the border: for Czechs it is shopping, while for Poles it is work, culture and sports/tourism. Czechs generally like shopping in Poland because of better prices. Polish preferences show that there are interesting job opportunities over the border – there is even a bus connection between Bogatynia and Liberec operating 3 times a day

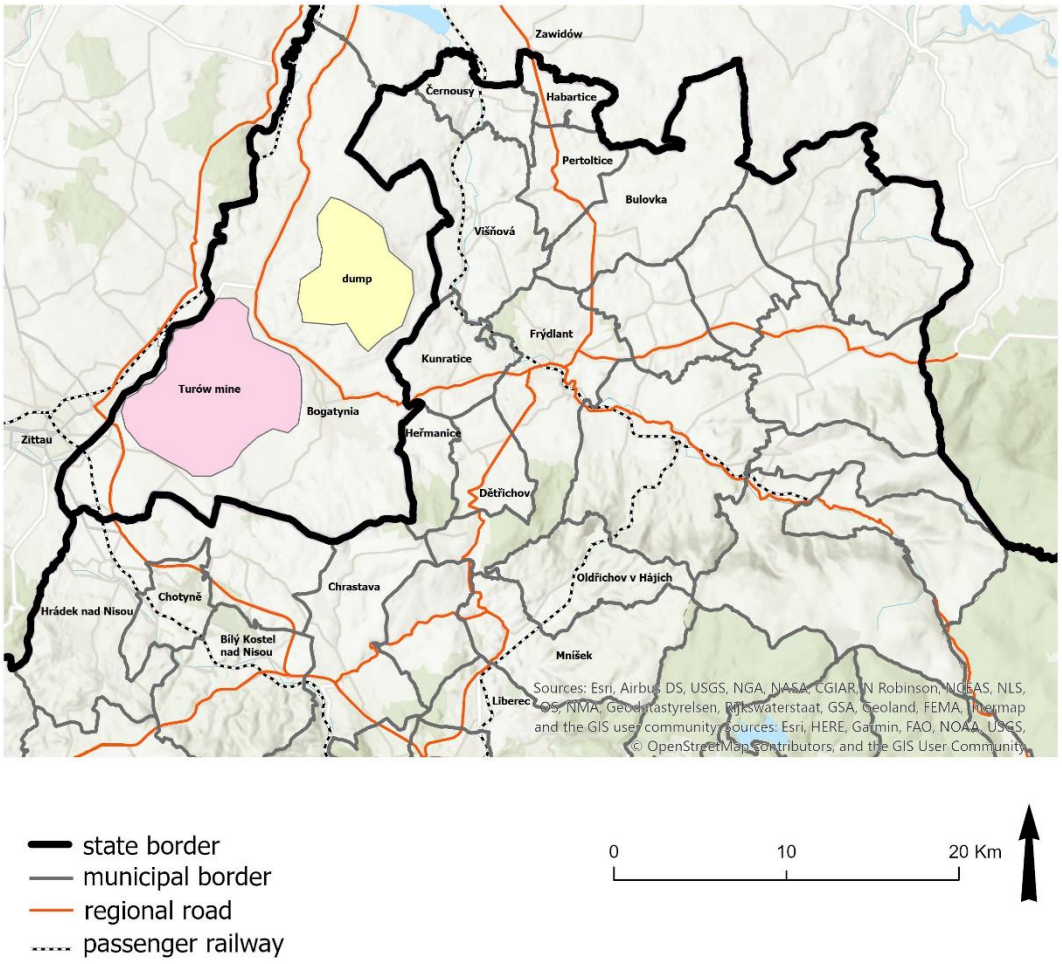

Figure 1. The area impacted by the Turów Mine as determined by the study, source: Own elaboration

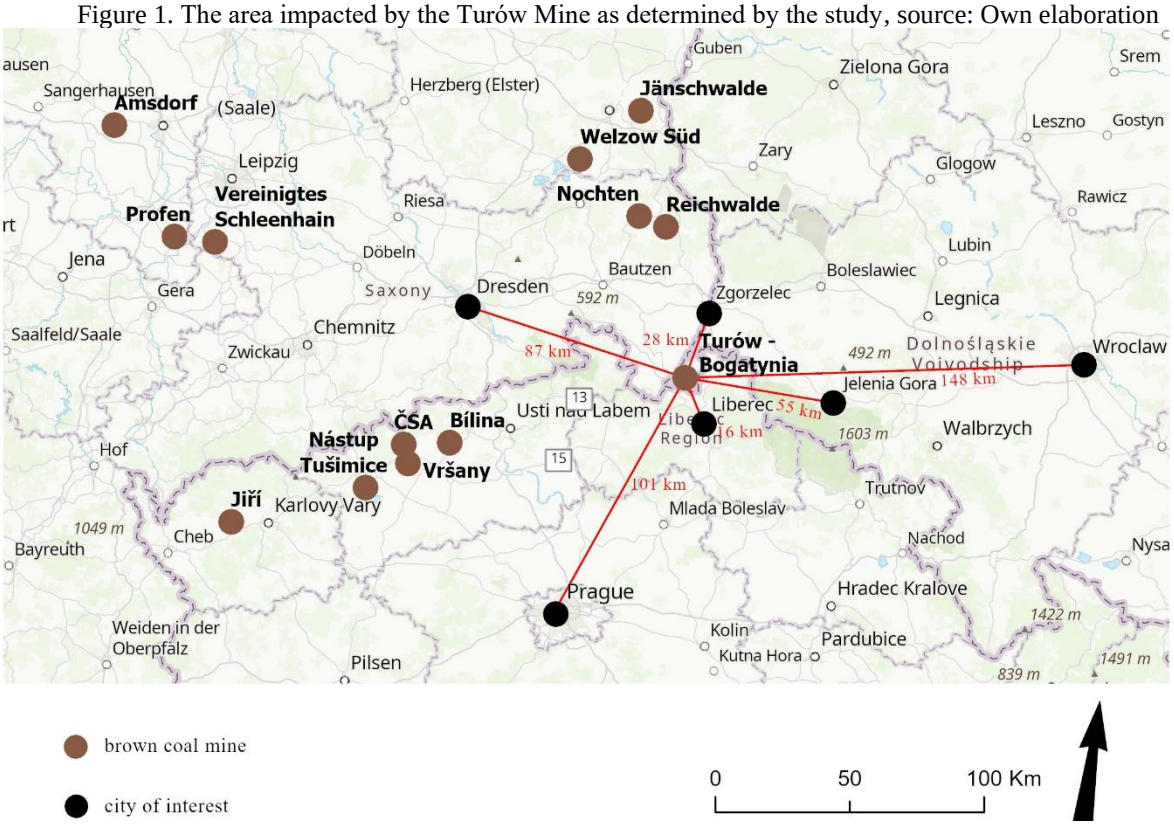

Figure 2 The links between Bogatynia and the neighbouring regions and the lignite centres in the vicinity, source: Own elaboration

Table 9. Purpose and frequency of Polish-Czech border crossings by respondents from the Polish and Czech sides

Purpose	Very often				Often				Rarely				Very rarely				I don't cross the Polish-Czech border for these purposes			
	PL		**CZ**		**PL**		**CZ**		**PL**		**CZ**		**PL**		**CZ**		**PL**		**CZ**	
Family / friends	7	3,80%	0	0%	20	10,87%	9	7,63%	21	11,41%	9	7,63%	14	7,62%	7	5,93%	122	66,30%	93	78,81%
Work	13	7,07%	0	0%	2	1,09%	4	3,51%	2	1,09%	11	9,65%	3	1,63%	4	3,51%	164	89,13%	95	83,33%
business	2	1,10%	1	0,88%	2	1,10%	6	5,32%	4	2,20%	1	0,88%	11	6,04%	8	7,08%	163	89,56%	97	85,84%
shop-ping	2	1,10%	4	3,28%	12	6,52%	30	24,59%	30	16,30%	35	28,69%	41	26,63%	33	27,05%	91	49,45%	20	16,39%
Educa-tion	0	0%	0	0%	4	2,18%	2	1,73%	5	2,73%	6	5,17%	3	1,64%	15	12,93%	171	93,45%	93	80,17%
Health services	0	0%	0	0%	2	1,10%	0	0%	7	3,82%	1	0,89%	15	8,20%	7	6,25%	159	86,88%	104	92,86%
Culture / enterta-inment	6	3,25%	1	0,90%	16	8,70%	2	1,80%	22	11,95%	10	9,01%	46	25%	30	27,03%	94	51,10%	68	61,26%
Sport/to-urism	16	8,64%	0	0%	28	15,14%	8	7,02%	38	20,54%	25	21,93%	48	25,95%	36	31,58%	55	29,73%	45	39,47%
Travel	20	10,58%	10	8,62%	27	14,29%	10	8,62%	50	26,45%	23	19,83%	43	22,75%	31	26,72%	49	25,93%	42	36,21%

when shifts start and end. Perhaps, there is a lack of job opportunities in Bogatynia except for the Turów Mine or Power Plant. The interest in tourism in Czech results from the damage to the Polish landscape by industry. On the Czech side there are natural reserves such as the Jizera Mountains. Polish businesses concentrated along Motorway A4 (hotels, catering sites, fuel discount stations, currency exchanges and carwashes) also benefit from the cross-border location.

Most residents on the Czech side crossed the border infrequently (see Table 9) with 80.1% of respondents declaring that they do not cross the border for education, 85.8% for business and 92.8% for the Polish health service. 61.2% of respondents do not cross the border to take advantage of the cultural and entertainment offer and a further 36% cross the border for this reason rarely or very rarely. The interest in sports and tourism offers is also low: 39.4 % do not cross the Polish border for this purpose, and more than half rarely or very rarely (21.9% and 31.5% respectively).

The most common reason for crossing the border is shopping - 27.9% used this option very often or often, followed by travel (transit) - 63.7% of Czechs (very often - 8.6%, often - 8.6%, rarely - 19.8%, very rarely - 26.7%). The third reason is sport / tourism - 60.5%, and culture and entertainment (38.7%, most of whom only very rarely - 31.6%).

2. The questionnaires also show that asymmetry is manifested by diverse regional specialisations. On the Polish side, there is the energy industry, whereas on the Czech side there is an automotive cluster. For Polish respondents, aspects related to employment and a stable municipal financial situation are very important. This shows that the Turów energy complex is a very important employer in the region.
3. The surveys also reveal asymmetry in the scope of nature and landscape which affect the settlement system. The system was formed over many years. It is asymmetric and this has an adverse effect on the character of integration of these regions. Residents appreciate natural and architectural values but the absence of sufficiently developed technical infrastructure and lack of access of Polish municipalities to railway connections has had an adverse impact. These deficiencies occur not only on the Polish side. The lack of investment on the Czech side is painful, too. The environmental and economic landscape developed in this way does not lay the foundations for cross-border cooperation.
4. The surveys which were carried out also confirm the hypothesis that cross-border asymmetry perceived by residents is also manifested in the negative development factors; low prospects for university education on the Polish side, a lack of well-paid job opportunities, little in the way of attractive culture and recreation, infrastructural deficiencies, no communication of actions for sustainable development, etc.

In conclusion, it can be said the crisis at the Turów Mine generated publicity for the region but did not affect the cross-border integration processes. Cross-border asymmetry, which is aggravated by the absence of infrastructure and cross-border transport, is a factor which weakens integration.

With respect to H2, institutions (the beneficiaries of the Interreg funding, local governments and nongovernmental organisations, the Neisse-Nisa-Nysa Euroregion, EGTC etc.) were investigated. Particular attention was paid to the impact of the crisis on the use of the Interreg Programme. The research question which we posed was whether the dispute Mine had disturbed the internal homeostasis and affected the cooperation between institutions in the Polish-Czech borderland.

An evaluation of the competitiveness of the Municipality of Bogatynia in the context of the contemporary directions of sustainable development indicates that the local competiveness is gradually being eroded. Strategic actions for diversification and energy transition of the region require long-term investment and support. Regional and local actors, directly participating in the process of anticipating and responding to crises, play an important role in this process. Primarily actions of a collective character play a key role. It was particularly this aspect that was investigated among the beneficiaries of the Interreg Programme. The decisive factors in a crisis include the mobilisation of social resources and strong actions in communication and a common narrative of many important local and regional actors. In this approach, the institutional potential is regarded as a critical factor for the organisation of relations and the initiation of interactions among actors (Harris et al., 2020) and in the case of Bogatynia it plays an vital role.

In accordance with the concept adopted for the study, the research presented here had mainly a qualitative character and it was in this context that the problem of resilience was examined. It was assumed that in Bogatynia and the neighbouring municipalities, including those on the Czech side, new elements of local activity and intentions of actors appeared and that they could have a positive effect on the outcome of the transition of the region to a more sustainable direction, primarily in environmental terms (Bristow & Healy, 2015). Research reveals such remedial tendencies related to a high level of Bogatynia local government and PGE Management Board activity, which will communicate the Czech side more about their actions for sustainable development. Two completely different contexts should also be emphasized: one pre-energy crisis and the other post the outbreak of the war in. Research shows that institutions like the Euroregion, implement Interreg projects, which are not always carried out symmetrically on the Polish and Czech sides.

The positive verification of the second research hypothesis adopted here can be evidenced by the following conclusions from the research:

1. Cross-border asymmetry is visible in the context of local needs and is also visible in the context of the declared needs and directions of action for the regional development of the regions studied. The interest in the implementation of Polish-Czech micro-projects is higher on the Czech than on the Polish side. Nearly 41 % of Czech respondents expressed an interest in the implementation of micro-projects, on the Polish side - 25.7 percent. Almost every third respondent in the Czech Republic (29.7%) did not express their interest on behalf of their entity, while in Poland - 20%. More respondents on the Polish side chose the answer *I don't know* (54.3%) than on the Czech side (29.7%). The Czechs showed interest in micro-projects related to environmental protection, land revitalization and reclamation, sustainable use of transport resources, education and school cooperation. Beneficiaries on the Polish side were most interested in the implementation in ecology, tourism, crisis management and institutional cooperation projects.

Table 10. List of beneficiaries' responses on the Polish and Czech side regarding new areas of cross-border cooperation that should be developed

New areas for development in projects	**PL**		**CZ**	
Environmental Protection	3	100,00%	11	91,70%
Energy transformation	3	100,00%	8	66,70%
Improving the landscape	3	100,00%	9	75,00%
Rebuilding mutual trust in social relations	2	66,70%	4	33,30%
Crisis management	1	33,30%	3	25,00%
Cross-border communication (transport)	0	0,00%	2	16,70%

2. Most beneficiaries on both sides of the border believed the dispute over the Turów Mine had not translated into the development of new areas in the Polish-Czech cross-border cooperation. Nevertheless, the percentage of persons who gave such an answer was much lower on the Czech than the Polish side (43.2% and 62.9%, respectively).
3. The overwhelming majority of beneficiaries on the Czech side believed crisis resilient cross-border cooperation to be characterised by good interpersonal relations in the teams carrying out cross-border projects (75.7%, por. Tab. 11). In turn, the Polish beneficiaries focused on the interpersonal relations in the teams carrying out cross-border projects, a high level of mutual trust, making sure that the cooperation is based on equal benefits and a mutual understanding of the partners' needs and problems (48.6%, 42.9%, 40% and 40% respectively).

Table 11. List of beneficiaries' responses on the Polish and Czech sides regarding the characteristics of cross-border cooperation resistant to crises such as the dispute over the Turów Mine

	PL		CZ	
Good interpersonal relations in teams implementing cross-border projects	17	48,60%	28	75,70%
A high level of mutual trust	15	42,90%	8	21,60%
Basing cooperation on equal benefits for both parties	14	40%	15	40,50%
Durability of alliances between partners of cross-border cooperation	7	20%	2	5,40%
A common interest in the willingness to raise funds from the INTERREG program	6	17,10%	4	10,80%
A professional approach to cross-border cooperation (knowledge and know how)	10	28,60%	7	18,90%
Experience in cross-border cooperation	4	11,40%	3	8,10%
Using own funds to maintain cooperation also outside of projects co-financed from the INTERREG program	5	14,30%	0	2,70%
Mutual understanding for the needs and problems of partners	14	40%	21	56,80%
Assigning tasks related to cross-border cooperation to specific employees	0	0%	1	2,70%
Including cross-border cooperation in the organization's operational strategy	4	11,40%	0	0,00%
Common values shared by partners	4	11,40%	12	32,40%

Table 12. Cross-border asymmetry in the context of the verification of the hypotheses, source: Own elaboration

Manifestations of asymmetry in the context of the verification of hypothesis H1	**Manifestations of asymmetry in the context of the verification of hypothesis H2**
Imbalance between the inhabitants of border communes in terms of meeting their educational, business and tourist needs	Different specialization on both sides of the border
The country's stronger leanings towards internal national matters than cross-border ties	Functional proximity in ineffective sectors of the economy
High public approval of the integration processes and low approval of cooperation	Continuous transformation of institutional structures related to the border region
Low infrastructure availability (railways, roads, bicycle paths, waterworks)	Low public approval of cross-border institutions
Sustainable development which does not take into account the cross-border scale	Institutional gap
Sustainable development not taking into account the cross-border scale (no links integrating various areas of economic activity)	A different administrative and competence division, hampering cross-border cooperation
Difference in economic development	Low populations of Czech municipalities as partners for cooperation with Polish municipalities
Underdeveloped municipal infrastructure	Asymmetric support from the nation states
The absence of a strong representation of economic operators at local level	The absence of international agreements and memorandums of understanding on cooperation
Weaknesses of the public; poor knowledge of foreign languages and negative stereotypes	The need for the energy transition on the Polish side
Residents' low involvement in cross-border projects	A complicated procedure for mobilising resources for cross-border cooperation and the ways of accounting for assistance resources
Differences in residents' quality of life	
Differences in spatial development	Low activity of offices in navigating cooperation
	Poorly developed cross-border communication in mitigating environmental problems
	Poor coordination between institutions in the scope of cooperation
	The absence of marketing measures and CSR in the scope of the environmentally harmful operations of large enterprises
	No actions to prevent the emergence of crisis situations

Conclusion

The research confirmed the validity of the hypotheses posed. The conclusions confirm that the elimination of development asymmetries or their recognition as valuable for development in certain areas of the economy is a very important factor in the processes of cross-border integration and cooperation. Table 12 shows the manifestations of asymmetry which the Authors consider to be the most important in the context of the verification of the research hypotheses.

It is difficult at this point to enumerate the eventualities which may arise in the future. Although not all potential problems are equally, dangerous, they should all be borne in mind and addressed, (Gorynia & Trąpczyński, 2022). Such problems include economic policy. In turn, disparities of a cross-border character, especially in the social, climatic and demographic areas can be treated as longer-term problems.

It is possible and necessary to ask to what extent the proximity of the power plant ensures a safe and just development space? It is difficult to answer, as the unstable geopolitical situation contributes to the emergence of factors which can affect the approach of the evaluation. At present, humankind not only exceeds critical biophysical limits but also fails to achieve the minimal social thresholds guaranteeing a "safe and just" development space (O'Neill et al., 2018).

It follows that greater sustainability can be achieved as a result of the transition of the border regions in many areas: economic, technological, information and institutional. Asymmetry should be gradually alleviated by immersing the regions into the digital economy, thus contributing to their resilience (Łaźniewska, 2022). Each innovation must be accompanied by an exact assessment of its impacts; still, they can be important tools for remaining in a safe and just space for mankind.

The need for communication and marketing actions of a cross-border character can also be associated with the need for innovation as a means of conflict resolution. There must be cross-border interaction between regional and local actors who have diverse knowledge and resources and in this context, asymmetry is a positive factor.

The border regions are a very interesting testing ground for different types of international relations. The resilience of the regions to different types of internal disturbances is strongly related to the involvement of different actors in cross-border relations and in the building of the image of their own actions in a wider area with a cross-border dimension. It is very important for local actors to communicate their remedial measures so, as to win residents' support and ease local tensions.

References

1. BORSEKOVA K., KORÓNY S., NIJKAMP P., 2021, In Search of Concerted Strategies for Competitive and Resilient Regions, *Networks and Spatial Economics*, 22: 607-634, DOI: 10.1007/s11067-021-09522-z.
2. BORSEKOVA K., NIJKAMP P., GUEVARA P., 2018, Urban resilience patterns after an external shock: an exploratory study, *Disaster Risk Reduct*, 31: 381-392, DOI: 10.1016/j.ijdrr.2018.05.012.
3. BRISTOW G. I, HEALY A., 2015, Crisis response, choice and resilience: Insights from complexity thinking, *Cambridge Journal of Regions, Economy and Society*, 8(2): 241-256, DOI: 10.1093/cjres/rsv002.
4. CAPPELLANO F., KUROWSKA-PYSZ J., 2020, The Mission-Oriented Approach for (Cross-Border) Regional Development, *Sustainability*, 12(12), DOI: 10.3390/su12125181.
5. CAPPELLANO F., MAKKONEN T., KAISTO V., SOHN C., 2022, Bringing borders back into cross-border regional innovation systems: Functions and dynamics, *Environment and Planning A, January*, DOI: 10.1177/0308518X221073987.
6. DOŁZBŁASZ S., 2015, Symmetry or asymmetry? Cross-border openness of service providers in Polish-Czech and Polish-German border towns, *Moravian Geographical Reports*, 23: 12-2.
7. DROBNIAK A., 2018, Economic Resilience and Hybridization of Metropolitan Centers of the European Union, *Prace Naukowe Uniwersytetu Ekonomicznego We Wrocławiu*, 517: 30-41, DOI: 10.15611/pn.2018.517.03.
8. DROBNIAK A., PLAC K., 2021, *Rezyliencja miast i regionów Europy Środkowej w kontekście hybrydyzacji rozwoju*, Wydawnictwo Uniwersytetu Ekonomicznego w Katowicach, Katowice.
9. FALASCA M., ZOBEL C. W., COOK D., 2008, A decision support framework to assess supply chain resilience, *Proceedings of ISCRAM 2008, 5th International Conference on Information Systems for Crisis Response and Management*, January: 596-605.
10. FUSCH P., FUSCH G. E., NESS L. R., 2018, Denzin's Paradigm Shift: Revisiting Triangulation in Qualitative Research, *Journal of Social Change*, 10(1): 19-32, DOI: 10.5590/josc.2018.10.1.02.
11. GLINKA B., CZAKON W., 2021, *Podstawy Badań Jakościowych*, Polskie Wydawnictwo Ekonomiczne.
12. GÖRMAR F., GRILLITSCH M., HRUŠKA V., MIHÁLY M., PÍŠA J., STIHL L., 2022, Power relations and local agency: a comparative study of European mining towns, *Urban Research & Practice*: 1-24, DOI: 10.1080/17535069.2022.2051066.
13. GORYNIA M., TRĄPCZYŃSKI P., 2022, Pocovidowe przesilenie w cieniu wojny-konsekwencje dla globalizacji, *Obserwator Finansowy.Pl*.
14. GORZELAK G., 2003, Bieda i zamożność regionów Założenia, hipotezy, przykłady, *Studia Regionalne i Lokalne*, 1(11): 37-59.
15. GRILLITSCH M., NILSSON M., 2022, The role of initial and gradual trust in growing and unlocking regional industrial specialisations, *Industry and Innovation:* 1-22, DOI: 10.1080/13662716.2022.2036599.

16. GROSSE T. G., 2007, Wybrane koncepcje teoretyczne i doświadczenia praktyczne dotyczące rozwoju regionów peryferyjnych, *Studia Regionalne i Lokalne*, 1(1): 27-49.
17. HAMMER N., 2010, Cross-border cooperation under asymmetry: The case of an interregional trade union council, *European Journal of Industrial Relations*, 16(4): 351-367, DOI: 10.1177/0959680110384535.
18. HARRIS J. L., SUNLEY P., EVENHUIS E., MARTIN R., PIKE A., HARRIS R., 2020, The Covid-19 crisis and manufacturing: How should national and local industrial strategies respond?, *Local Economy*, 35(4): 403-415, DOI: 10.1177/0269094220953528.
19. ILIC S., PETROVIC T., DJUKIC G., 2022, Eco-innovation and Sustainable Development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(2): 197-203, DOI: 10.35784/pe.2022.2.21.
20. JAKUBOWSKI A., 2020, Asymmetry of the economic development of cross-border areas in the European Union: assessment and typology, *Europa XXI*, 39(December): 45-62, DOI: 10.7163/eu21.2020.39.6.
21. KNIPPSCHILD R., VOCK A., 2017, The conformance and performance principles in territorial cooperation: a critical reflection on the evaluation of INTERREG projects, *Regional Studies*, 51(11): 1735-1745, DOI: 10.1080/00343404.2016.1255323.
22. KOMORNICKI T., WIŚNIEWSKI R., MISZCZUK A., 2019, Delimitacja przygranicznych obszarów problemowych, *Przegląd Geograficzny*, 91(4): 467-486, DOI: 10.7163/przg.2019.4.2.
23. KORHONEN J. E., KOSKIVAARA A., MAKKONEN T., YAKUSHEVA N., MALKAMÄKI A., 2021, Resilient cross-border regional innovation systems for sustainability? A systematic review of drivers and constraints, *Innovation: The European Journal of Social Science Research*, 34(2): 202-221, DOI: 10.1080/13511610.2020.1867518.
24. ŁAŹNIEWSKA E., 2022, *Gospodarka cyfrowa - rozwój regionalny - odporność*, Wydawnictwo Uniwersytetu Ekonomicznego w Poznaniu, Poznań, DOI: 10.18559/978-83-8211-099-9.
25. ŁAŹNIEWSKA E., GORYNIA, M., 2012, *Konkurencyjność regionalna. Koncepcje-strategie-przykady*, PWN, Warsaw.
26. ŁAŹNIEWSKA E., JANICKA I., GÓRECKI T., 2021, 'Green smart city' as a new paradigm of local development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 16(2): 125-136, DOI: 10.35784/pe.2021.2.13.
27. MASIK G., SAGAN I., 2016, Strategie i instrumenty wspierające odporność gospodarczą. Przykład wybranych regionów europejskich, *Studia Regionalne i Lokalne*, 4: 5-29, DOI: 10.7366/1509499546601.
28. MERISALO M., MAKKONEN T., 2022, Bourdieusian e-capital perspective enhancing digital capital discussion in the realm of third level digital divide, *Information Technology & People*, 35(8): 231-252, DOI: 0.1108/itp-08-2021-0594.
29. NIENABER B., WILLE C., 2020, Cross-border cooperation in Europe: a relational perspective, *European Planning Studies*, 28(1): 1-7, 10.1080/09654313.2019.1623971.
30. O'NEILL D. W., FANNING A. L., LAMB W. F., STEINBERGER J. K., 2018, A good life for all within planetary boundaries, *Nature Sustainability*, 1(2): 88-95, DOI: 10.1038/s41893-018-0021-4.
31. OLENSKI J., 2015, Types of transborder economies and its impact on national economies in the light of official statistics, *Сталий Розвиток Економіки*, 2: 334-345.
32. OPIOŁA W., BÖHM H., 2022, Euroregions as political actors: managing border policies in the time of Covid-19 in Polish borderlands, *Territory, Politics, Governance:* 1-21, DOI: 10.1080/21622671.2021.2017339.
33. OSPANOVA, A., POPOVYCHENKO, I., CHUPRINA, E., 2022, Green economy – Vector of sustainable development, *Problemy Ekorozwoju / Problems of Sustainable Development*, 17(1): 171-181, DOI: 10.35784/pe.2022.1.16.
34. PIĘTA-KANURSKA M., 2019, Smart city a rozwój inkluzywny, *Biuletyn KPZK PAN, 273*, 60.
35. PRONIEWSKI M., 2014, Polityka rozwoju regionów peryferyjnych, *Optimum. Studia Ekonomiczne*, 6(72): 79-90, DOI: 10.15290/ose.2014.06.72.06.
36. PRZYWOJSKA J., PODGÓRNIAK-KRZYKACZ A., 2020, A comprehensive approach: Inclusive, smart and green urban development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 15(1): 149-160, DOI: 10.35784/pe.2020.1.16.
37. RIZZI P., GRAZIANO P., DALLARA A., 2018, A capacity approach to territorial resilience: the case of European regions, *The Annals of Regional Science*, 60(2): 285–320, DOI: 10.1007/s00168-017-0854-1.
38. SAUNDERS M., LEWIS P., THORNHILL A., 2012, *Research methods for business students*, Pearson Education.
39. SMĘTKOWSKI M., 2015, Zróżnicowanie i dynamika rozwoju regionów Europy Środkowo-Wschodniej w okresie prosperity i kryzysu, *Prace Komisji Geografii Przemysłu Polskiego Towarzystwa Geograficznego*, 29(2): 37-52.
40. SOHN C., 2014, Modelling Cross-Border Integration: The Role of Borders as a Resource, *Geopolitics*, 19(3): 587-608, DOI: 10.1080/14650045.2014.913029.
41. STUDZIENIECKI T., JAKUBOWSKI A., MEYER B., 2021, Key conditions for Euroregions development at external EU borders: A case study of the Polish–Belarusian borderland, *Regional Science Policy and Practice*, DOI: 10.1111/rsp3.12414.
42. SZABÓ M., CSETE M. S., PÁLVÖLGYI T., 2018, Resilient Regions From Sustainable Development Perspective, *European Journal of Sustainable Development*, *7*(1), DOI: 10.14207/ejsd.2018.v7n1p395.
43. THOMAS I., COTTEELS C., JONES J., PEETERS D., 2012, Revisiting the extension of the Brussels urban agglomeration: new methods, new data… new results?, *Belgeo:* 1–2, DOI: 10.4000/belgeo.6074.
44. ULRICH P., 2020, *Cross-Border Impact Assessment 2020. Dossier 1: The impact of the corona crisis on cross-border regions (TEIN study)*, The Institute for Transnational and Euregional cross border cooperation and Mobility, Maastricht.
45. WONG VILLANUEVA J. L., KIDOKORO T., SETA F., 2020, Cross-Border Integration, Cooperation and Governance: A Systems Approach for Evaluating 'Good' Governance in Cross-Border Regions, *Journal of Borderlands Studies:* 1-24, DOI: 10.1080/08865655.2020.1855227.

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Biblical and Quranic Argumentation for Sustainable Behaviors Toward Nature

Biblijne i koraniczne argumenty na rzecz zrównoważonych zachowań wobec natury

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Abstract

We observe an ever-increasing role of religions in fighting the environmental crisis. Religious argumentation has enormous potential to shape the attitudes of the followers of religions. Applying this argumentation can significantly change attitudes towards the environment in the majority of the human population. Christianity and Islam together have over 4 billion followers. Here, we present seven common Biblical and Quranic issues that are key to human attitudes to nature. The conducted analysis leads to a surprising conclusion. The Bible and Quran similarly encourage their followers to build harmonious relations with the natural world.

Key words: religion and ecology, Christianity, Islam, Bible, Quran, environmental crisis, biblical argumentation, quranic argumentation

Słowa kluczowe: religia i ekologia, chrześcijaństwo, islam, Biblia, Koran, kryzys ekologiczny, argumentacja biblijna, argumentacja koraniczna

1. Introduction

For several decades, we have witnessed the active involvement of religions in the debate on the environmental crisis. The catalyst for this involvement was an article by Lynn White entitled *Historical Roots of our Ecologic Crisis* (1967). Lynn White expressed the opinion that the Judeo-Christian tradition bears the huge burden of guilt for the ecological crisis. The international debate over the guilt of Christianity for the ecological crisis has extended to the discussion of the positive influence of Christianity on the attitude towards nature over time. With time, the debate took over the role of all religious traditions, both in terms of causing and counteracting the ecological crisis. Over time, the dynamic and tumultuous beginning of this debate has taken on an in-depth form of interdisciplinary and interreligious research. The initiative of Mary Tucker on John Grim, who initiated the Forum on Religion and Ecology (FORE) in the second half of the 1990s, played an important role in this respect (Grim and Tucker, 2014, 85-95). Thanks to their initiative, it was possible to create a large group of academics representing all the main religious traditions. As part of FORE, many research projects have been carried out and university education programs in the field of religion and ecology have been developed at the undergraduate, graduate, and doctoral levels (Monserud, 2002; Foltz, 2006).

The ecological involvement of the world's religions takes place on several levels: academic, pastoral, spiritual, and practical. All these levels are closely related to each other. Research is the starting point for all other activities. Based on scientific research, pastoral programs are developed, the aim of which is the spiritual formation of the believers. Such formation leads to a change in the ecological awareness of the believers and indicates the spiritual dimension of their relationship to creation. As a result of these changes, the believers engage in the protection of

the creation on both spiritual and practical levels. Spiritual commitment manifests itself mainly in individual prayer and community celebrations that take into account the concern for creation. Practical commitment is manifested both in the fact that numerous religious institutions undertake ecological projects and in the creation of religious ecological organizations, in which the faithful undertake activities to protect nature, based on their religious beliefs. In many religious traditions, a new theological reflection is taking place. The new academic approach focuses on the place of man in the world of nature and the role of man in relation to creation. This reflection has already taken a mature form as a scientific discipline known as eco-theology. An important source of eco-theological research is reading the sacred texts from an environmental perspective. Such readings make it possible to see the ecological potential present, among others, in the Bible and the Quran. The ecological approach to the sacred texts of Judaism, Christianity, and Islam allows for completely new interpretations of their holy books. This approach shows the faithful the moral dimension and responsibility of their relationship to nature and supports the formation of a proper relationship with all the creation.

This article aims to show the ecological potential of Biblical and Quranic argumentation in shaping sustainable behavior patterns towards nature. Both the Bible and the Quran can identify several common issues that contribute to shaping the pro-environmental attitudes of Christians and Muslims.[1] These issues include: 1) Creator is the absolute ruler and owner of the world, 2) Creator is concerned for non-human nature, 3) Creation is the space in which God's existence and many of His attributes are revealed, 4) Creation itself praises the Creator, 5) Creator subdued creation to humans, 6) Creator limited humans' power over creation, and 7) Creator will restore the original harmony between humans and creation. The second purpose of this article is to analyze the similarities between the biblical and the quranic arguments for caring for creation.

2. Creator is the absolute ruler and owner of the world

2.1. Biblical perspective

The Christian approach to the place and role of man in the world is based on the biblical message that God is the creator of the world, its sole ruler and owner, and the entire universe is sustained in existence by God (Sadowski, 2020, 44-46). This message is contrary to the humanistic interpretation of the maxim *Man is the measure of all things* (*πάντων χρημάτων μέτρον ἐστὶν ἄνθρωπος*) (Plato, 1986). The biblical message is also contrary to the modern thought that man, thanks to his reasoning abilities, is the supreme ruler of the world. Bill McKibben even states that – in Western thought – humans turn out to be God's equal – or at least, His rivals – able to destroy creation (McKibben, 1989, 78).

The Bible is unequivocal – the Creator of the world, and therefore its absolute owner and ruler, is solely God (Acts 17:24-25). Man is merely one of the creatures. Admittedly, man is a unique creature, but only because God made him so. The proper term for the role of a human being is, therefore, a governor, regent, tenant, or steward. Man has only received from the Creator the permission to use nature. However, the scope of this permission is limited (Ngewa, Reed and Ngaruiya, 2019).

Numerous biblical passages confirm this position. This is most clearly seen in both of the creation stories in Genesis (chapters 1-2). The Bible leaves no doubt that God is the only Lord of the world. This is clearly presented in the Book of Psalms: *The earth is the Lord's and the fullness thereof, the world and those who dwell therein; for he has founded it upon the seas and established it upon the rivers* (Ps. 24:1-2). The sovereignty over all creation is also confirmed by the First Book of Chronicles: *Thine, O Lord, is the greatness, and the power, and the glory, and the victory, and the majesty; for all that is in the heavens and in the earth is thine; thine is the kingdom, O Lord, and thou art exalted as head above all. Both riches and honor come from thee, and thou rules overall. In thy hand are power and might; and in thy hand it is to make great and to give strength to all* (1 Chron. 29:11-12).

The above-mentioned fragments of the Bible confirm the unlimited power of God and the limited power of man over the creation. This, in turn, leads to the conclusion that the transgression of man beyond the competencies assigned to him is inconsistent with the will of God (Moltmann, 1993). Moreover, it is a kind of robbery of the divine property and the usurpation of divine powers. The Bible also confirms the anthropocentric concept of man's relationship to nature. However, this is just moderate anthropocentrism. It is a consequence of the strictly theocentric approach present in the Bible.

2.2. Quranic perspective

While the word *creator* is attributed to God in thirteen verses of Quran, *creation* attributed to Him in 236 places. God is the only true reality and sole source of all creation. He created everything for a divine purpose. There is no shortcoming or defect of any sort in any of His creations. The Quran states that God is the *Rabb al Alamin*. It means the *Creator of the Worlds*, the *Ruler of the Universes*, the *Creator and Sustainer of all the living organisms and Universes*.

[1] All biblical fragments are quoted from the Bible available on the website: https://mycatholic.life/bible/rsvce/ – Revised Standard Version – Catholic Edition. All quranic fragments are quoted from the Quran available on the website: https://mquran.org/component/option,com_quran/Itemid,3/.

God's process of creation is continuous with expansion in scope, range, and variety. Not only does He creates to satisfy a purpose but also for perfection. Because of this, He creates everything in the most beautiful and purposeful form and fashion. Numerous verses of the Quran express this position (39:62; 25:2; 10:5; 54:49). No-fault or incongruity can be seen in the creation of the All-Merciful (67:3; 35:3). There are three great descriptors that describe God. One of them is the universe (10:6; 35:1), the other is the Quran and the third is the Prophet. Each of them introduces God to human beings, shows His existence and attributes, and informs us of Him (Nursi, 2013, 287).

Man is placed on the highest pedestal in the hierarchy of creations. Adam was created to be a viceregent of God on earth. But to be God's viceregent, he first had to be God's servant. In other words, people were created to represent God on the face of the earth. Servanthood must precede viceregency. You cannot represent someone without following His commands. Vicegerency is that humans are responsible for the world and should take care and look after it. Numerous verses of the Quran express this position (2:30; 95:4; 17:70; 2:31). God has appointed human being vicegerents over the earth (to improve it and rule over it according to His commandments) and has exalted some of them over others in degrees (of intelligence, capacity, and then wealth and status): thus, He tries you in what He has granted you (6:165; 35:39). The primary reason why humankind was accorded superiority over the angels is that we were *taught the names*. The duty of humankind on the earth is vicegerency or *khilāfah*, meaning succession. As a term, *khilāfah* or vicegerency denotes improving the earth, based on knowledge of things and the laws of creation (which we wrongly call the *laws of nature*) and ruling on the earth according to the dictates of God, thus establishing justice. Carrying out this duty requires scientific knowledge and religion. Humankind can acquire scientific knowledge by studying nature and are given religion through God's Messengers. The names taught to Adam also signify the potentiality of learning bestowed on humankind. Giving a name means knowing, for one can give a name only to something one knows. Vicegerency denotes humankind's ruling on the earth and improving it by using all that is subjected to it in accordance with the dictates of God. If humans attribute to themselves what God has given them of knowledge, power, the ability of learning, and various other capacities, and then attempt to act independently of God, it is then that disorder and bloodshed begin on the earth (The Miraculous Quran).

The Quran mentions several virtues that cultivate piety – *taqwa* (Arabic: تقوى) or that *taqwa* cultivates in a person. *Taqwa* motivates the person who possesses it *to perform righteous deeds* and avoid forbidden acts. Quranic verses relate *taqwa* to the good life on this earth besides reward in the hereafter (7:96; 10:63-64; 39:10). To live a life of sincerity and piety, it is important to follow a certain discipline by avoiding extremes in all aspects of one's life and to maintain a straight path (Gulen, 2017).

Numerous verses of the Quran express how human beings should behave in the world (67:2; 103:2-3). They are created with a purpose and are not left to themselves (75:36; 75:36). Those who do good deeds in this world will be rewarded (75:36). God appoints the Hereafter unto those who seek not exaltation in the earth nor corruption, and the happy end is for those who have *taqwa* (28:83).

3. Creator is concerned for non-human nature

3.1. Biblical perspective

The Bible confirms that the Creator loves all creation (Wis 11:26). He cares for both humans and non-human nature (Davidson, 2016, 510-511). The first story of creation illustrates this very well. Each of the first five creation days ends with the statement, *God saw that it was good* (Gen. 1:10, 12, 18, 21, 25). Such an approach clearly shows the value of nature assigned by the Creator. It is worth noting that this value is in no way related to man, as the man was created on the sixth day (Davidson, 2016, 506).

God's covenant with Noah also confirms care for the non-human nature. The parties to this covenant, in addition to Noah and his descendants, are all living creatures, fowl, and domestic and wild animals (Gen. 9: 9). Many biblical passages indicate that God's concern for non-human nature does not result from its usefulness to humans. Since the Creator cares for wild animals and plants, even if they are not used by humans (Ps. 104:10-11; Job. 12:10; Job. 38:25-27; Job. 39; Ps. 145:9). Concern for non-human nature also manifests itself in the fact that the Bible imposes numerous restrictions on the use of animals (Lev. 17:3-4; Isa. 66:3; Ex. 23:4-5; Deut. 22:6; 22:10; 25:4; Prov. 12:10; Jon. 4:11).

Scholars representing both the Judaic and Christian traditions agree that the Bible provides many arguments in favor of man's relationship with the natural world and his responsibility for all creation (Moritz, 2009; Schochet, 1984; Bołoz et al., 2016). Moreover, the Christian interpretation of the Bible draws attention to Jesus' attitude towards animals, showing His concern for creation (Bauckham, 1998a; Bauckham, 1998b). Christians' attitude to non-human nature is influenced by the reference to the symbolism of plants and animals in Jesus' teachings: the lost sheep (Lk. 15:4-7), the lamb (Jn. 1:29, 36), the Good Shepherd (Jn. 10:11-18), and the fig tree (Lk. 13:6-9). These highlight the differences between the Judaic and Christian approaches, especially in the context of animal sacrifice and the division into ritually clean and unclean animals (Grant, 1999; Frayne, 2018; Gilhus, 2006, 161-182).

The New Testament presents God's care for animals and plants. A good example of this is the Gospel according to St. Luke, which in several passages presents this concern. *Consider the ravens: they neither sow nor reap, they have neither storehouse nor barn, and yet God feeds them* (Lk. 12:24). The evangelist Luke also points to responsibility for animals, even if it clashes with religious regulations - *Which of you, having an ass [a] or an ox that has fallen into a well, will not immediately pull him out on a sabbath day?* (Lk. 14:5).
One of the most beautiful biblical passages presenting the Creator's concern for non-human nature is the Book of Wisdom, which shows the Creator's wisdom, His love for all creation, and concern for satisfying its needs. *For thou lovest all things that exist, and hast loathing for none of the things which thou hast made, for thou wouldst not have made anything if thou hadst hated it* (Wis 11:24).
The biblical tradition unequivocally encourages Jewish and Christians to imitate God. His concern for nonhuman nature thus encourages people who identify with the Bible to adopt such attitudes.

3.2. Quranic perspective
God has stated in the Quran that He did not create the heavens and the earth and all that is between them as a play and game (21:16, 38:27). As it is expressed in the Quran, all beings glorify and sanctify the Almighty Creator in their own language. The seven heavens and the earth, and whoever is therein, glorify Him. There is nothing that does not glorify Him with His praise (proclaiming that He alone is God, without peer or partner, and all praise belongs to Him exclusively) (17:44). They fulfil the duties entrusted to them with great pleasure and enthusiasm. Moreover, if the universe had not been created, the infinite perfection and beauty of His attributes and names would not have been known. This knowledge would be reserved for God alone. God wanted to witness His own beauty and perfection in His creations (Nursi, 2013, 697). The beauty of creation is a reminder of God. When we respect any part of God's creation, be it nature or another human being, we are seeing value in what God created and admiring the creator.
There are many verses of the Quran stating that many things and events in the universe point to the existence of God. These proofs are called natural verses of God (Nursi, 2013, 569). This means that heaven and earth stand firm and subsist by the laws issuing from the pure realm of His commands that originate from His Attributes of Power and Will. All-Glorified is He in Whose Hand is the absolute dominion of all things (36:83). Among His signs are that the heaven and the earth stand firm (subsisting) by His Command (30:25), the creation of the heavens and the earth, and the diversity of your languages and colors (30:22), His displaying the lightning, to give rise to both fear and hopeful expectation, and sending down water from the sky, and reviving with it the earth after its death (30:24).
Quran is the most exalted expounder and the most eloquent translator of this universe. It is the Criterion that instructs jinn and humanity in the truths of creation – Divine laws regarding the creation and the universe's operation – inscribed by the Pen of Power on the sheets of the universe and pages of time (Nursi, 2013, 167).

4. Creation is the space in which God's existence and many of His attributes are revealed

4.1. Biblical perspective
The biblical tradition presents the problem of recognizing God's presence in nature very carefully. Because Judaism was born in the Middle East, where religions often identified their deities with the forces of nature or celestial bodies (Gądecki, 2010, 34). The Bible separates the Creator from the creature. According to the Bible, granting nature divine attributes is considered idolatry. This sin is an offense against the first commandment of the Decalogue (Ex. 20:3-5). Numerous passages from the Bible clearly show that God is one and that only He can be worshiped (Isa. 44:6; Isa 45:5; Deut. 5:7-9; Deut. 4:15-19). The worship of the divine forces of nature or animals is unequivocally condemned (Wis 13:1-9; Wis 15:14-19). Such behaviors were so contrary to the biblical doctrine that the rabbinical tradition considered the cult of nature to be the first of the three cardinal sins, and it was punished with death (Gądecki, 2010, 38).
Taking into account the dangers associated with pantheism and zoolatry, the Bible indicates that nature, without having a divine character, is nevertheless space for discovering the existence of the Creator and His numerous attributes. *For all men who were ignorant of God were foolish by nature; and they were unable, from the good things that are seen, to know Him who exists, nor did they recognize the craftsman while paying heed to his works* (Wis 13:1; see also Isa. 49:26). Christian biblical tradition also affirms that a person can recognize the Creator by admiring His works. *Ever since the creation of the world, His invisible nature, namely, His eternal power and deity, has been clearly perceived in the things that have been made. So, they are without excuse* (Rom. 1:20).
Although the Judeo-Christian tradition unequivocally rejects pantheism, it recognizes that creation represents the power of the Creator. The prophet Amos illustrates this well. *He who made the Pleiades and Orion, and turns deep darkness into the morning, and darkens the day into night, who calls for the waters of the sea, and pours them out upon the surface of the earth, the Lord is his name* (Am 5:8). Although nature does not have a divine character, it is nevertheless filled with the presence of God and reveals Him (Moo and Moo, 2018, 64-69; Davidson

2016, 508-509). The prophet Habakkuk puts it this way. *God came from Teman, and the Holy One from Mount Paran. His glory covered the heavens, and the earth was full of his praise* (Hab 3:3).
The destruction of nature is therefore unacceptable from the biblical point of view. Depriving nature of its beauty makes it difficult or even impossible to recognize the existence of the Creator and His many attributes.

4.2. Quranic perspective
God is mentioned by various attributes in the Quran, such as Ar-Rahman (The Most Compassionate), Ar-Rahim (The Most Merciful), Al-Khaliq (The Creator), and Al-Nur (The Light), among many other attributes. It is said that God has ninety-nine names in the Quran, although this refers to some of the qualities or attributes of God (Naqvi, 2012, 25). Some verses in the Qur'an end with some of the names of God. This means that the subjects in the verse are ultimately tied to these names and attributes (Bakkal, 2016).
Ali Unal, whose translation has been noted for its use of contemporary English, which makes it more readable than some classical Quran translations, states that the inanimate matter which is converted into living forms is a direct gift of the Creator. As we know, the body in which our soul dwells works without our conscious effort or decision – the brain, heart, lungs, stomach, senses, limbs, etc. Very little of what man has, is his own doing – if he was left to manage only his own body, unaided by the Creator, he could not do it and so could not survive (Unal, 2018).
Said Nursi's endeavor was to prove and demonstrate that Islam is compatible with modern sciences and progress. According to him, the Holy Book was the source of true progress and civilization. He wrote the Risale-i Nur Collection, a body of Quranic commentary exceeding six thousand pages (Markham and Pirim, 2011, 194). In his book *The Flashes Collection*, he wrote that a perfect work self-evidently points to a perfect act. A perfect act necessarily points to a perfect name and a perfect performer of the act. And a perfect name doubtlessly points to a perfect attribute. A perfect attribute indubitably points to a perfect quality. And a perfect quality certainly points in a way worthy of such a one, to the perfection of His essence. God is All-Just, the Pre-Eternal All-Wise Arbiter and Sovereign, who established the universe in accordance with the principles of His wisdom and will. He set the universe in order through the laws of His practices. He illumined all the world through the manifestations of His names and attributes. All this is testified to by the order and regularity of His artefacts, their mutual assistance and cooperation, their embracing one another, and the conscious, skilful art in all things specified by Divine Determining. All the flowers, fruits, plants, trees, animals, and stones and even grains found in all valleys, all mountains, all deserts indicate the existence of God and the manifestations of His names (Nursi, 2009, 383-385).
Many of the verses of the Quran state that the beings and events in the universe point to the existence and attributes of God. For example: And it is He Who has spread the earth wide and set therein firm mountains and rivers, and of the fruit of every kind He has made mated pairs. He covers the day with the night. Surely in that are signs (manifesting the truth) for people who reflect. And on the earth are tracts close by one another (and yet different from one another), and gardens of vines, and cultivated fields, and date-palms growing in clusters from one root but standing alone, (all) watered with the same water; and yet, as sustenance, we have made some preferable to others (in certain respects). Surely in that are signs of truth for a people who use their reason (13:3-4). Or He Who has created the heavens and the earth, and sends down for you water from the sky? – We cause to grow with it gardens full of loveliness and delight: it is not in your power to cause their trees to grow. Is there another deity besides God? No, but they are a people who veer away (from the truth) (27:60).
Some verses in the Quran end with some of the names of God. This means that the subjects in the verse are ultimately tied to these names and attributes (Bakkal, 2016).
In a verse, it is stated that God increases in creation what He wills (35:1). This means that God's process of creation is continuous with expansion in scope, range, and variety. It also means that He not only creates to satisfy a purpose, but also for perfection. Because of this, He creates whatever He creates in the best, and the most beautiful and purposeful form and fashion.

5. Creation itself praises the Creator

5.1. Biblical perspective
In the biblical tradition, nature, on the one hand, praises the Creator by its very existence, and on the other hand, encourages man to join her in praising the Creator. The Bible is abundant in passages indicating that inanimate and animate beings praise their Creator (Coad, 2009; Vischer and Birch, 1997, 5). Psalm 148 confirms that and states that the choir praising the Creator consists of the sun, moon, stars, fire, hail, snow, fog, sea, as well as land animals, trees, birds, and man (Calduch-Benages 2008; see also Ps. 66:1-4).
The idea of praising the Creator through creation is also present in the New Testament. St. John in the Book of Revelation puts it this way. *And I heard every creature in heaven and on earth and under the earth and in the sea, and all therein, saying, «To him who sits upon the throne and to the Lamb be blessing and honor and glory and might for ever and ever!»* (Rev 5:13). Nature not only honors the Creator itself but also encourages man to do likewise. *Look upon the rainbow, and praise Him who made it, exceedingly beautiful in its brightness* (Sir 43:11).

It seems that one of the most beautiful passages of the Bible showing nature praising its Creator is the Canticle of the Three Jews. This canticle lists many elements of inanimate and animate nature and encourages people to worship the Creator (Dan. 3:28-68).
Since the creature worships the Creator, man should not destroy it recklessly because the destruction of nature will deprive God of worship and diminish His glory.

5.2. Quranic perspective
Since it is the One God who creates, sustains, maintains, and administers the whole universe with all in it, all praise is due to Him, and so the whole of creation praises Him exclusively. While conscious, believing beings praise Him consciously – verbally, actively, and by heart – the bodies of all beings also praise Him through the satisfaction of their needs and contentment of their senses and faculties. Quran expresses this truth as follows: *The seven heavens and the earth, and whoever is therein, glorify Him. There is nothing that does not glorify Him with His praise (proclaiming that He alone is God, without peer or partner, and all praise belongs to Him exclusively), but you cannot comprehend their glorification* (17:44) The expression *thing* includes all living and non-living beings. *Whatever is in the heavens and whatever is on the earth glorifies God. To Him belongs the sovereignty (absolute ownership and dominion of everything), and for Him are all praise and gratitude; and He has full power over everything* (64:1), *And We subdued the mountains, as well as birds, to glorify Us along with David. It is We Who do all these things* (21:79). It is stated here that everything animate and inanimate glorifies God. The verse points out that Almighty God gave David's glorifications such strength and such a resonant and pleasing tone that they brought ecstasy to the mountains. Like a huge sound system, each mountain formed a circle around the chief reciter David and repeated His glorifications. This is a reality, for every mountain with caves can *speak*. If you declare before a mountain: *All praise, be to God*, the mountain will echo it back. God endowed David with both Messengership and the Caliphate in an exceptional form. Thus, He made this seed of ability flourish as a miracle with that comprehensive Messengership and magnificent sovereignty, causing the great mountains to follow him like soldiers, students, or disciples. Under his direction and in his tongue, they glorified the All-Majestic Creator and repeated whatever he said. Moreover, each mountain has a collective personality and corporate identity, and offers glorifications and worship particular to it. Just as each one through echoes glorifies in the tongue of humankind, it also glorifies the All-Majestic Creator in its own particular tongue (Nursi, 2013, 318-319).
Also, there is another verse like, *Whatever in the heavens and the earth glorifies God; and He is the All-Glorious with irresistible might, the All-Wise* (57:1). Conscious beings glorify God and express with their tongues that He is free from all kinds of deficiencies and things that do not suit His lofty glory. The glorification of unconscious and inanimate beings should be understood as His creativity and power over everything. The existence of these things shows the majesty of Allah. This state of theirs is their glorification. That is, all things, with their existence, their lives, maintenance, and functions, show that God is above having any defects or any partners in His Divinity, Lordship, and Sovereignty.
Some scholars have also said that inanimate beings, like living beings, remember God, and there is a vitality in everything that is thought to be inanimate, which people cannot discern. All things are made up of atoms. Electrons around the nucleus of the atom are spinning at a speed that would astonish the mind. Everything is in submission to His command.
In addition, all beings prostrate to God. *Do you not see that what is in the heavens and the earth, the sun, the moon, the stars, the mountains, the trees, the animals, and most of the people, are prostrating to Allah?* (22:18) verse clearly expresses this. The duty of man is to understand the praise of creation, to see it with the eyes of the mind and heart, to witness it, and to express it with his tongue. The reason why many human beings are specifically mentioned, even though they are included in all those who are on the earth, is that all human beings prostrate to God in the sense that they cannot escape God's laws of *nature* or creation and the operation of the universe in many respects, such as their coming into and leaving the world, the operation of their bodies, the appointment of their families and races, and their physique, etc. However, many human beings prostrate before God of their free volition, they believe in Him and worship and live according to His commandments.
The All-Merciful; He has taught the Quran; He has created human; He has taught him speech; The sun and the moon are by an exact calculation; And the stars and the trees both prostrate (before God in perfect submission to His laws) (55:1-6) verse also indicates this, it is the duty of man to declare this by saying *Glory be to God.*

6. Creator subdued creation to humans

6.1. Biblical perspective
The Bible, describing the world and man's position among other creatures, leaves no doubt that man is unique and privileged. When defining the position of man in the natural world and his relationship to the environment, it should be stated that they are certainly anthropocentric. This does not mean, however, that it is justified to blame the Bible for encouraging the devastation of nature (White, 1967).

The Book of Genesis is the most evident of all the books in the Bible about man's relationship to nature. The first two chapters of this book present two stories of the creation of the world. The ecological message of these stories varies significantly. However, these are stories that complement each other.

The first story of creation (Gen. 1:1-2:4) is treated as an apotheosis of man's domination over the world. This description is often cited as an allegation of man's alleged right to his unlimited power over the world. Man himself is referred to as *the crown of creation* (Ps. 8:5-9). The following arguments prove the uniqueness of man concerning other creatures. A man was created at the end of the sixth day as the last of creatures (Gen. 1:26). So, it can be presumed that man is the most perfect creature. Moreover, it is only man who was created as *imago Dei* (Gen. 1:26; Najda 2004, 144-145). In this story, the Creator even states *let them **have dominion** over the fish of the sea, and over the birds of the air, and over the cattle, and over all the earth, and over every creeping thing that creeps upon the earth* (Gen. 1:26). Man's power over the world is also evidenced by the following excerpt: *Be fruitful and multiply, and fill the earth and **subdue** it; and **have dominion** over the fish of the sea and over the birds of the air and over every living thing that moves upon the earth* (Gen. 1:28).

In order to recognize the real message of these passages, we need to refer to experts who have studied these passages in the original languages. The results of these studies are extremely interesting. The Hebrew verb ***rāda*** (have dominion) used in these passages appears in the Bible in the context of the domination of the head of the family over domestic servants or in the context of kingship (Lev. 25:42-43; 1 Kgs. 5:4; Ps. 72(71):8; Numbers 24:18-19). On the other hand, the Hebrew verb ***kābaš*** (subdue) means to rule, to show someone your power and authority. This verb is even stronger than ***rāda***. The term is often used in a military context and in connection to a king who demonstrates his authority over his subjects (Num. 32:20-22; Jer. 34:11).

Experts who interpret the model of human power over the world contained in the first story of creation argue that this power is a gentle concern, not a despotic tyranny (Davis, 2008, 42-65; Steffen, 1992). Even if the man is considered to be the crown of creation, in ruling the world man follows the pattern of God, the ruler, and owner of the world. The task of man is therefore to care for creation, which is to lead to a harmonious balance (Pardee, 2013, 126-127).

The second story of creation is much shorter and more synthetic (Gen. 2:4-7). This story also confirms the uniqueness of man, but it does it differently. While all beings were created from the soil, the man was created from the dust of the soil, i.e., a more noble material (Gen. 2:19; Gen. 2:7; Hiebert, 2000, 139). Man's superiority is also evidenced by the fact that God allowed man to name animals (Gen. 2:19-20). However, a proper understanding of the role that God has assigned to man requires a linguistic analysis of this passage. Key in this regard is the passage *The Lord God took the man and put him in the garden of Eden to **till** it and **keep** it* (Gen. 2:15).

The Hebrew verb ***ābad*** (till) means to serve. In the Bible, the verb *ābad* is a term that expresses the service of a slave to his master (Gen. 12:6) or the service of one nation to another (Ex. 5:9). On the other hand, the Hebrew verb ***šamar*** (keep) means to guard, protect, care for, and preserve (Koehler, Baumartner, and Stamm, 2008, 546-549; Greenspoon 2008, 165). The analysis of the terms allows concluding that this fragment presents man not as the master of the garden, but as the servant of the garden (Hiebert, 2000, 136-145).

It can, therefore, be concluded that the Bible confirms the unique position of man. However, man has not been given the power to be a tyrant or a satrap who can freely use the resources of nature (Attfield, 1991, 31). Rather, man is its manager or steward, whose task is to care for the world entrusted to him by the Creator. Destroying nature is, therefore, contrary to biblical teaching.

6.2. Quranic perspective

The blessing of provision and the universe and all it contains being subject to the service of man. God put man at the center of worldly authority, having made the world swift to serve him beneficially and continuously throughout his life. This is expressed in Quran as It is He Who (prepared the earth for your life before He gave your life, and) created all that is in the world for you (to create you – the human species – and make the earth suitable for your life) (2:29). He also affirmed that whatever is in existence works to serve man. God says: He has also made of service to you whatever is in the heavens and whatever is on the earth; all is from Him (a gift of His Grace). Surely in this, there are (clear) signs for a people who reflect (45:13). He also says: Do you not see that God has made all that is in the heavens and all that is on the earth of service to you, and lavished on you His favors, outward and inward? (31:20). About subdue the creation to humans are other verses like He has made the night and the day and the sun and the moon to be of service to you, and the stars are made subservient by His command. Surely in that are signs for people who reason and understand. And whatsoever He has created for you on earth of varying colors (and diverse forms and qualities): surely in that is a sign for people who reflect and are mindful. And He it is Who has made the sea to be of service (to you) so that you eat from it fresh meat and draw out from it ornaments that you wear. And you see the ships plowing their course through it so that you may go forth in quest of His bounty and give thanks (to Him Who has created all this). And He has cast firm mountains on the earth lest it should shake with you (with its movement), and rivers, and roads, so that you may find your way (16:12-15). God is He Who has created the heavens and the earth and sends down water from the sky with which He brings forth fruits for your provision. And He has made the ships serviceable for you, so that they run upon the sea by His command;

and He has made the rivers serviceable for you; And He has made the sun and the moon constant in their courses, (and so) serviceable for you; and He has made the night and the day of service to you. He has granted you from all that you ask Him. Were you to attempt to count God's blessings, you could not compute them? But for sure, humankind is much prone to wrongdoing (sins and errors of judgment) and to ingratitude (14:32-34).

At the blessings outlined in Quran, the first passage started with the creation of the universe and everything that is in it for the sake of mankind. It can be understood that the Creator subdued creation for all people. The purpose of creating animals was then explained; that they were created for the benefit of man: for consumption, clothing, warmth, riding, carrying loads, and as beauty to behold. Then the discussion turned to the descent of rain, that man may drink thereof, and then its benefit to the growth of trees upon which animals graze and from which various fruits are borne. All of that is for the sake of mankind. Then came the creation of seas and rivers, which ships course through to transport God's blessings of goods and provision to mankind, and in which are fish with tender meat and pearls to adorn. The passage ended by speaking about a great honor that God conferred upon man, that He gives him all that he asks Him of (Al-Muslih, 2019).

7. Creator limited humans' power over creation

7.1. Biblical perspective

While the Bible affirms man's uniqueness and authority over nature, that authority is limited in various ways. Pope John Paul II describes it as follows. *The dominion granted to man by the Creator is not an absolute power, nor can one speak of a freedom to «use and misuse», or to dispose of things as one pleases. The limitation imposed from the beginning by the Creator himself and expressed symbolically by the prohibition not to «eat of the fruit of the tree»* (Gen. 2:16-17) shows clearly enough that, when it comes to the natural world, we are subject not only to biological laws but also to moral ones, which cannot be violated with impunity (John Paul II, 1987, no 34; Bołoz, 2008). The Bible, therefore, shows that man can exercise his power over nature only when he meets high moral standards.

> *O God of my fathers and Lord of mercy, who hast made all things by thy word, and by thy wisdom hast formed man, to have dominion over the creatures thou hast made, and rule the world in holiness and righteousness, and pronounce judgment in uprightness of soul* (Wis 9:1-3).

The Book of Wisdom teaches that man's power over creation is dependent upon the holiness, righteousness, and uprightness of his soul. Only a noble and good man can rule over creatures. Only then man will be able to fulfil the obligations entrusted to him by the Creator towards the world. Only a morally mature man can impose limitations on himself and thus he will not abuse or destroy nature.

To emphasize that man's power over the world is limited, the Bible points out numerous restrictions. These restrictions confirm that God is the only lord and owner of the world, and man is only its regent and tenant. The most important of these restrictions are those related to the Sabbath (Ex. 16:23-30; Ex. 20:8-10; Lev. 23:1-3; Deut. 5:12-15), the sabbath year (Ex. 23:10-13); Lev. 25:1-7; Deut. 15:1-18), a jubilee year (Lev. 26:13-22), and the division of animals into clean and unclean (Lev. 11; Deut. 14:3-20). The limitations quoted here confirm that God did not give man unlimited power over the world.

The biblical teaching on the limitation of the human right to use nature indicates that the way and scope of using natural resources should be restricted. Man is not allowed to use carelessly natural resources to fulfil his whims, for it can lead to disturbing the balance of nature.

7.2. Quranic perspective

In many verses of the Quran, some limits have been drawn within the scope of human intervention in the natural structure in different types of beings such as animals, plants, nature, and the universe. One of the main goals of Islam is to reform societies and put an end to all kinds of corruption (Özdemir, 2017). Many verses forbid making mischief on earth (7:56,74). As revealed in the Quran, one of the ways Satan leads people astray from the right path is by leading them to superstitious beliefs and inspiring them to change and corrupt God's creation. Those who abandon God's command and act in accordance with Satan's will are clearly disappointed (4:119).

Humans should behave within certain limits in nature. Human beings who have severed their ties from the divine realm; he started to think that he could dominate the environment and nature and that he was the only authority to dominate. Thinking like this, he started to use nature rudely and consume it seriously. As a result of this consumption style, it led to many bad consequences that he could not think of. Man has exceeded his limits and bad results have appeared. To give an opportunity to return to the right path and to the right attitude, the Quran informs us that God causes people to experience some bad consequences: Corruption and disorder have appeared on land and in the sea because of what the hands of people have (done and) earned (of evil deeds). Thus, He causes them to taste the consequence of some of what they have done, so that they may (take heed, repent, and reform, and so) return (to the right way) (30:41). While interpreting this verse, Kadi Beydavi associates the emergence of mischief with the processing of environmental disasters. According to him, these disasters are the barrenness and infertility

of the land, mass deaths, forest fires, the deterioration of the seas, the disappearance of fertility, the increase of all kinds of harm and damage, the emergence of perversions and all kinds of cruelty (Eren, 2010, 499).
Man has never been given the absolute power of disposition in the universe. One must know his limits. We realize that man has exceeded this limit in a very serious way, especially in the modern period. Man has reached the delusion that he has unlimited authority over the whole world by exceeding his own limit and has started to engage in many activities with this delusion. With his actions, irreversible damage appeared on the earth. Climates have changed. Ecosystems are disrupted. Living species began to disappear.
As we examine environmental problems, we see that the real problem is not caused by the environment, but by people. Environmental pollution has unseen real dimensions stemming from a human moral stance. We can call this the contamination of modern culture, the contamination of the human spirit. In fact, environmental pollution looks like an iceberg. There's the part of the iceberg that's above the water, and there's the part that's underwater that's invisible. The visible part of the water is environmental problems, water pollution, nature pollution, air pollution, and soil pollution. The part that remains underwater is the contamination of culture and the deterioration of human thought. The problems we face today are due to the contamination of our worldview. The biggest factors in this pollution are greed and insatiability (Gürdogan 2006). As a matter of fact, it is stated in the Quran that excessive consumption and wastefulness are not welcomed by God: O children of Adam! Dress cleanly and beautifully for every act of worship; and (without making unlawful the things God has made lawful to you) eat and drink, but do not be wasteful (by over-eating or consuming in unnecessary ways): indeed, He does not love the wasteful (7:31). The All-Compassionate Creator desires thanks in return for the bounties He bestows on mankind. Wastefulness is contrary to thanks and slights the bounty and causes loss. Frugality, however, shows respect for the bounty and is profitable. Frugality is both a sort of thanks and shows respect towards the divine mercy manifested in the bounties, and most definitely is the cause of plenty. As for wastefulness, since it is opposed to these instances of wisdom, it has grave consequences (Nursi, 2019, 219).
By mentioning balance in three successive verses (55:7-9), the Quran shows the importance attached to it. It clearly states that there is a very sensitive balance in the creation and the relationships among its parts. The wonderful accord observed in the universe and its maintenance is thanks to this most sensitively computed balance. It is also indispensable to human life, both individually and socially. With respect to human education and perfection, this balance requires that everything is given its due importance in life and that the basic faculties or impulses of anger, desire or appetite, and reason be trained, disciplined, and employed to develop them into the virtues of courage, moderation and chastity, and wisdom (Unal, 2021, 1689).

8. Creator will restore the original harmony between humans and creation

8.1. Biblical perspective

The Bible teaches that the world that God created was originally in perfect harmony. The basis of this harmony was the strong bond between God and man. This harmony, however, also extended to nature. The situation changed radically with the committing of original sin by Adam and Eve. Initially, humans did not hunt animals, and animals did not attack humans. Both man and animals ate only plants as food (Gen. 1:29-30; Gen. 2:16-17; Gen. 3:2-3). On the other hand, breaking the friendship with God resulted in the disturbance of the harmonious coexistence of man with nature (Gen. 3:17). As a result, the man began to eat animals (Gen. 9:3-4).
Therefore, it seems that man's relationship to nature depends on his moral condition. People who obey God attain an orderly vision of harmony with the natural world. Those who confront God's plans trigger environmental disorder and ultimate retaliation (Kay, 1989, 220).
The Bible foretells the restoration of the original harmony of all creation. The prophets foretell the coming of the messianic times, in which man will live again in harmony with nature. Especially the prophet Isaiah stresses the restoration of the original harmony (Isa. 11:5-9).
The thesis that sin causes disturbance of the harmonious coexistence of man and the world of animals and plants is confirmed by the description of Jesus in the desert (Mk. 1:13). The Bible also teaches about the *restoration of all things* (Acts 3:21). The New Testament explicitly says that Christians *wait for new heavens and a new earth* (2 Pet. 3:13; see also Rev 21: 3). Thus, both Judaism and Christianity expect that man's original harmony with nature will be restored. All this shows the value and importance of nature and encourages care for it.

8.2. Quranic perspective

The change that other creatures than humans – plants, and animals – can bring about in nature is limited, and this change is brought back to its original state in accordance with the laws that God has set in the universe. Human beings can bring about unlimited changes in the universe, and these changes are often irreversible. For example, because of excessive consumption of fossil fuels, acid rain, global warming, and climate change occur and the harmony and balance in nature is disturbed. In the Quran, the corruption caused by human beings is expressed in many verses with the term فساد *fasad* (2:11,12,27,30,60,205; 5:32-33; 7:56,127; 8:73; 10:40,81; 11:85,116; 12:73;

13:25; 17:4; 18:94; 21:22; 23:71; 26:152,183; 29:30,36; 38:28; 47:22; 89:12). In one of these verses, God says: *Do not cause disorder and corruption on the earth seeing that it has been so well ordered* (7:56).
Quran gives a lot of examples from the old nations that made these corruptions, and the disasters that happened to them because of their disobedience to God's orders are explained (5:64; 7:74,85,86,103; 10:91; 16:88; 30:41). The purpose of these narratives is to remind people to live in harmony with God's orders and laws in nature. Man is held responsible by God not only for not doing evil but also for preventing it. There are many verses in the Qur'an regarding the task of preventing evil and directing them to the right behavior (3:104; 7:199; 9:71). God praised the societies that fulfil this duty in Quran (3:110; 7:165).
In this regard, Prophet Muhammad said, *Whosoever of you sees an evil, let him change it with his hand; and if he is not able to do so, then [let him change it] with his language; and if he is not able to do so, then with his heart — and that is the weakest of faith* (Sunnah.com 2022). He also said that when people see evil things done and they do nothing to change it, then they run the risk of being included by God among those who are punished for doing the evil (Oxford Islamic Studies Online 2022).
According to Islamic belief, life in our world is limited. After the total social deterioration that occurred because of not following God's orders, the apocalypse will break, this world will disappear, and eternal life will begin for people in new living spaces called Heaven and Hell. At the end of the social deterioration before the apocalypse, there will be harmony with nature and social recovery for a short time – some say 40 years. According to this belief, this improvement and harmony will happen with the cooperation of Jesus and the Mahdi, whom Muslims believe in. In this regard, there are many sayings of Prophet Muhammad (The Muslim Vibe 2022).
Nursi states that, with the Mahdi, God will dispel evil in the world. In terms of the continuity of divine laws, with his perfect mercy, God sends enlighteners who will invite societies to the right path in times of corruption, or blessed persons like the Mahdi. Through them, corruption will be eliminated. He will remove it, reform society, and protect his divine religion. He will appoint a luminous person who will rule and guide people to the right path in the time of great mischief before the Day of Judgment, and thus He will fulfil His promise (Nursi, 2014, 385-386).
As a result, according to the Islamic belief, before the Doomsday comes, the harmony of man with God and therefore with nature will be realized by the joint efforts of the Christians and Muslims.

9. Conclusion

The conducted analysis of the holy books of Judaism, Christianity, and Islam leads to the surprising conclusion that the teaching of the Bible and the Quran in the context of human relations with the environment is surprisingly convergent. This study identifies seven key issues that constitute the basis of the ecological approach to nature by Jews, Christians, and Muslims and shapes the pattern of sustainable behaviors towards nature.
Issue 1: *The Creator is the absolute ruler and owner of the world*. The Bible and Quran proclaim in this regard very similar opinions. According to the Bible, God is the creator of the world, its sole ruler and owner, and the entire universe is sustained in existence by God. According to the Quran, God is the only true reality and sole source of all creation.
Issue 2: *The Creator is concerned for non-human nature.* The Bible (both the Old and New Testament) presents God's corner for non-human nature not because of their usefulness to humans but because of the intrinsic value of non-human nature. On the other hand, Quran says that also non-human nature glorifies God, and He wants nature to witness His beauty and perfection.
Issue 3: *The creation is the space in which God's existence and many of his attributes are revealed*. The Bible indicates that nature, without having a divine character, is nevertheless space for discovering the existence of the Creator and his numerous attributes. The Quran teaches that the whole universe (all creatures and events) reveals the existence and numerous attributes of God.
Issue 4: *Creation itself praises the Creator*. The Bible points out that nature, on the one hand, praises the Creator by its very existence, and on the other hand, encourages man to join it in praising the Creator. The quranic approach to this issue is very similar. According to the Quran, the whole of creation praises God exclusively. While conscious, believing beings praise Him consciously – verbally, actively, and by heart – the bodies of all beings also praise Him through the satisfaction of their needs and contentment of their senses and faculties.
Issue 5: *Creator subdued creation to humans*. The Bible, describing the world and man's position among other creatures, leaves no doubt that man is unique and privileged. According to the Bible, man - as the crown of creation – has the right to govern and use nature. Although man is not the owner of the Earth but just a regent, tenant, or steward, to whom the Creator entrusted it. The analysis of some biblical passages justifies the statement that man is not the master of the Garden of Eden, but just its servant and gardener. The Quran teaches in a similar way. God is the lord and owner of the universe; man is just a viceregent or *khilāfah.* According to both biblical and quranic perspectives, man can use creation to fulfil his needs, but at the same time, man should care for the creation, and his power over it is not unlimited.

Issue 6: *The Creator limited humans' power over creation*. The Bible teaches that man has the right to rule over the Earth only if he meets high moral standards. If so, he uses creation and cares for it properly. Because only a righteous man can limit himself in using nature and thus fulfil the duty of caring for the Earth entrusted to him by the Creator. Moreover, the Bible imposes many restrictions on man to prevent creation from being abused and overused. Similarly, the Quran imposes numerous restrictions on man's use of nature. The Quran encourages the followers of Islam to behave in moderation, within the proper limits. A man should respect the balance of nature and not disturb it. This is the reason for these limitations.

Issue 7: *Creator will restore the original harmony between humans and creation*. Bible, like the Quran, teaches that there will eventually be perfect harmony in the world between God, man, and nature. The Bible foretells the restoration of the original harmony of all creation, which took place before the original sin. In the coming of the messianic times, *new heavens and a new earth* will be restored, and man will live again in perfect harmony with God and nature. According to the Islamic belief, before the Doomsday comes, the harmony of man with God and therefore, also with nature will be realized by the joint efforts of the Christians and Muslims.

In conclusion, it is surprising that there are no significant differences in the approach to creation from the biblical and quranic perspectives. The holy books are the basis for shaping the worldviews of their adherents. Because worldview is a crucial factor influencing human's relationship with the world, it creates the base for joint ecological initiatives by Jews, Christians, and Muslims. Hopefully, environmental interpretation of the Bible and Quran will cause numerous joint activities of Jews, Christians, and Muslims to build a sustainable world for future generations.

It is worth emphasizing here that the religious factor is only one of many factors influencing human decisions and behavior. Economic, legal, political, social, aesthetic, and traditional factors also play an essential role in a complex decision-making process and sustainable development. The final decision is, therefore, the result of a complex game of factors. This decision often depends on the person's current wishes, abilities, and preferences and may change with time and life circumstances. Thus, the significance of religious argumentation, while vital for shaping a pattern of sustainable behavior towards nature, is only one of many factors. The significance of the religious factor depends on religious maturity, the depth of religious life, and identification with religious teaching. However, many actors still underestimate the importance of the religious factor in shaping a sustainable approach to the environment. According to the study's authors, the potential of religious argumentation may play a much more significant role in this regard.

References

1. Afsv.org. 2022, *Core Values of the Hizmet Movement*, https://afsv.org/hizmetcorevalues/.
2. Al-Muslih, Abdullah Ibn Abd Al-Aziz, 2019, *The Blessings, Gifts, And Favors of Allah Upon His Creation*, https://knowingallah.com/en/articles/part-1-the-blessings-gifts-and-favors-of-allaah-upon-his-creation/.
3. ATTFIELD R., 1991, *The Ethics of Environmental Concern,* University of Georgia Press, Athens-London.
4. BAKKAL A., 2016, A Different Miraculous Aspect of the Quran: The Indication of the Summaries of the Names of Beauty at the End of Each Verse, *Katre-Kur'ân'ın İ'câzı Sayısı,* 2: 125-147.
5. BAUCKHAM R., 1998a, Jesus and the Wild Animals I: What Did He Teach?, *Animals on the Agenda: Questions about Animals for Theology and Ethics*, eds. Linzey A., and Yamamoto D., University of Illinois Press, Urbana: 33-48.
6. BAUCKHAM R., 1998b, Jesus and Animals II: What Did He Practice?, *Animals on the Agenda: Questions about Animals for Theology and Ethics*, eds. Linzey A., and Yamamoto D., University of Illinois Press, Urbana: 49-60.
7. BOŁOZ W., JAROMI S., KARACZUN Z., ŁEPKO Z., PAPUZIŃSKI A., SADOWSKI R.F., 2016, Ecophilosophical Message of Encyclical Laudato Si', *Studia Ecologiae et Bioethicae,* 14(4): 109-12, DOI: 10.21697/seb.2016.14.4.06.
8. BOŁOZ W., 2008, Integral Environmental Protection in John Paul's II Teaching, *Studia Ecologiae et Bioethicae,* 6(1): 117-127, DOI: doi.org/10.21697/seb.2008.6.1.08.
9. CALDUCH-BENAGES, Nuria. 2008, The hymn to the creation (Sir 42: 15–43: 33): a polemic text?, *The Wisdom of Ben Sira. Studies in Tradition, Redaction and Theology,* ed. Passaro A. and Bellia G.: 119-138, Walter de Gruyter, New York.
10. COAD D., 2009, Creation's Praise of God: A Proposal for a Theology of the Non-Human Creation, *Theology,* 112(867): 181-189, DOI: 10.1177/0040571X0911200304.
11. DALL'OGLIO C., 2020, Ecological Initiatives of the Global Catholic Climate Movement, *Studia Ecologiae et Bioethicae,* 18(1): 61-72, DOI: 10.21697/seb.2020.1.07.
12. DAVIDSON J.A., 2016, The Creator and Creation: God's Affection for This World, *Meeting with God on the Mountains: Essays in Honor of Richard M. Davidson,* ed. Moskala J., Andrews University, Berrien Springs: 505-515.
13. DAVIS E.F., 2008, *Scripture, Culture, and Agriculture: An Agrarian Reading of the Bible,* Cambridge University Press, Cambridge – New York.
14. Ekolojionline.com. 2022. *Ekoloji Hakkinda,* https://www.ekolojionline.com/aboutus/.
15. EREN Ş, 2010, *Muhtasar Beydavi Tefsiri Cilt 3,* Selsebil Yayinlari, Istanbul.
16. FOLTZ R.C., 2006, Nature in Asian Traditions: the State of the Field, *Worldviews: Environment Culture Religion,* 10(1): 1-4.
17. FRAYNE C.T., 2018, Animals in Christian and Muslim Thought, *The Routledge Handbook of Religion and Animal Ethics,* eds. Linzey A. and Linzey C., Routledge, London: 201-215.
18. GĄDECKI S., 2010, «Stajemy się tym, co czcimy» idolatria źródłem wszelkiego zła, *Warszawskie Studia Teologiczne,* 23(1): 31-46.

19. GILHUS I.S., 2006, *Animals, Gods, and Humans: Changing Attitudes to Animals in Greek, Roman, and Early Christian Ideas*, Routledge, London.
20. GRANT R.M., 1999, *Early Christians and Animals,* Routledge, London – New York.
21. GREENSPOON L.J., 2008, From Dominion to Stewardship?, *Journal of Religion & Society*, 3: 159-183.
22. GRIM J., TUCKER M.E., 2014, *Ecology and Religion,* Island Press, London.
23. GULEN F., 2017, Taqwa, *The Fountain*, 118 (Jul-Aug), https://fountainmagazine.com/2017/issue-118-july-august-2017/.
24. GÜRDOGAN N., 1988, Çevre Kirlenmesinin Ekonomik Boyutlari, *Bilim ve Teknik*, 21(252): 22-23.
25. HIEBERT T., 2000, The human vocation: Origins and transformations in Christian traditions, *Christianity and Ecology: Seeking the Well-Being of Earth and Humans,* eds. Hessel D.T. and Ruether R.R., Harvard University Press, Cambridge: 135-54.
26. *Holy Bible*. Revised Standard Version – Catholic Edition, https://mycatholic.life/bible/rsvce/.
27. JOHN PAUL II, 1987, *Encyclical letter* «*Sollicitudo rei socialis*», https://www.vatican.va/content/john-paul-ii/en/encyclicals/documents/hf_jp-ii_enc_30121987_sollicitudo-rei-socialis.html.
28. KAY J., 1989, Human Dominion over Nature in the Hebrew Bible, *Annals of the Association of American Geographers,* 79(2): 214-232.
29. KOEHLER L., BAUMARTNER W., STAMM J.J., 2008, *Wielki słownik hebrajsko-polski i aramejsko-polski Starego Testamentu*, vol. 2, Oficyna Wydawnicza Vocatio, Warszawa.
30. MARKHAM I.S., and PIRIM S.B., 2011, *An Introduction to Said Nursi: Life, Thought and Writings,* Routledge, London.
31. McKIBBEN B., 1989, *The End of Nature,* Random House, New York.
32. MOLTMANN J., 1993, *God in Creation: A New Theology of Creation and the Spirit of God*, Fortress Press, Minneapolis.
33. MONSERUD B., 2002, Religion and Ecology: Visions or an Emerging Academic Field Consultation Report, *Worldviews: Environment Culture Religion*, 6(1): 81-93.
34. MOO D.J., and MOO J.A., 2018, *Creation Care: A Biblical Theology of the Natural World,* Zondervan, Grand Rapids.
35. MORITZ J.M., 2009, Animals and the Image of God in the Bible and Beyond, *Dialog,* 48(2): 134-146, DOI: 10.1111/j.1540-6385.2009.00449.x.
36. NAJDA A.J., 2004, The Beginnings of Ecology in the Bible, *Studia Ecologiae et Bioethicae,* 2(1): 143-50, DOI: 10.21697/seb.2004.2.1.07.
37. NAQVI E., 2012, *The Quran: With or Against the Bible? A Topic-By-Topic Review for the Investigative Mind,* iUniverse Inc., Bloomington.
38. NURSI B.S., 2009, *The Flashes Collection,* Sözler Neşriyat A.Ş., Istanbul.
39. NURSI B.S., 2011, *Lem'alar,* Sahdamar Yayinlari, Istanbul.
40. NURSI B.S., 2013, *Sözler,* Ufuk Yayinlari, Izmir.
41. NURSI B.S., 2014, *Mektubat,* Ufuk Yayinlari, Istanbul.
42. Oxford Islamic Studies Online, 2022, *Commanding the Good and Forbidding the Evil*, http://www.oxfordislamicstudies.com/print/doc/ps-islam-0053.
43. ÖZDEMIR A., 2017, Kuran'da Fitri Yapinin Sinirlarini Belirleyen Ilkeler, *Kastamonu Üniversitesi Ilahiyat Fakültesi Dergisi*, 1(1): 49-68.
44. PARDEE C., 2013, Making Earth Heaven: Ecological Implications of Genesis 1-3, *Leaven,* 21(3): 125-128.
45. PLATO, *Theaetetus,* Macmillan, New York.
46. REED R.L., and NGARUIYA D.K., 2019, *God and creation,* Langham Global Library, Carlisle.
47. SADOWSKI, R.F., 2020, Resources Within Spiritual and Mystical Christian Traditions for the Care of Earth – Our Common Home, *Studia Ecologiae et Bioethicae*, 18(1): 43-53, DOI: 10.21697/seb.2020.1.05.
48. SCHOCHET E.J., 1984, *Animal life in Jewish tradition: attitudes and relationships,* Ktav, New York.
49. STEFFEN L.H., 1992, In Defense of Dominion, *Environmental Ethics,* 14(1): 63-80.
50. Sunnah.com, 2022, *Forty Hadith of an-Nawawi*, https://sunnah.com/nawawi40:34.
51. *The Miraculous Quran,* An eternal translation of the great book of the Universe, https://mquran.org/component/option,com_quran/Itemid,3/.
52. The Muslim Vibe, 2022, *8 Hadiths Regarding the Mahdi*, https://themuslimvibe.com/faith-islam/8-hadiths-regarding-the-mahdi.
53. UNAL A., 2018, Man, and Religion, *The Circle*, http://thecrcl.ca/ali-unal-man-religion/.
54. UNAL A., 2021, *Kur'an-ı Kerim* ve *Aciklamali Meali,* Süreyya Yayinlari, New Jersey.
55. VISCHER L., and BIRCH Ch., 1997, *Living with the Animals*, WWC, Geneva.
56. WHITE L. Jr, 1967, The historical roots of our ecologic crisis, *Science,* 155: 1203-1207.

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Liberty, Utilitarian Morality and Sustainable Development

Wolność, moralność utylitarna i zrównoważony rozwój

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Abstract

State's progress is dependent upon its political and socio-economic development which is tantamount to an increasingly adverse impact on climate. These adverse impacts on climate not only endangers our life but also our future generations, resulting in political and socio-economic instability. These irrational and rampant developments of any state require a systematic strategic principle. Following such a principle, a state can be progressive in a real sense by gaining political and socio-economic development while simultaneously maintaining sustainability. In this paper, through examining J. S. Mill's doctrine of liberty and utilitarian morality, a valiant attempt has been made to resolve the problem of the free individual within the social whole by including sustainable development as a part of the progressive accomplishment of well-being.

Key words: liberty, development, state, opinion, individuality, utility, sustainable development

Słowa kluczowe: wolność, rozwój, państwo, opinia, indywidualność, zrównoważony rozwój

Introduction

The notion of development employs the growth of any state as political, and socio-economic, but without adding sustainable development does not complete the development of a state. We have been facing various ecological problems such as natural disasters, climate change, air pollution, futile land, earthquake etc. which drive us in an adverse way towards development irrespective of that state and attains development in political, and socio-economic sense, which is why development without sustainability and sustainability without development jeopardize the growth of the economy in any state as in the contemporary world, development is considered through the economic growth (Prakash, 2020, p. 205). Firstly, for the betterment of a state's long-lasting prosperity, the Brundtland Commission released its report to remodel our ways of living after industrialization and raised a global agenda for strategic change by including environmental integrity with socio-economic development (Strange and Bayley, 2008, p. 24; Baker, 2006, p. 19, Singh, 2018, p. 185). Though the term sustainable development was firstly mentioned in the *Nature Conservation of Nature* published in 1980 as ecological perspective in the field of forestry (Klarin, 2018, p. 70). The exploitation of natural resources ensures the implementation of environment friendly systematic schemes. The modern notion of sustainable development has come into light from the Brundtland Report. To operationalise sustainable development, one should uphold a principle that should integrate decision-making which secures the environmental goals and considerations together and implement it into the decision-making for development. Thus, in the sustainable development framework, all kinds of development underlie, and such integrated decision-making principles should be implemented in a state by policy or law (Dernbach, 2003, p. 248). In this paper, I argue that J. S. Mill came forward with his doctrine of liberty with a utilitarian background so that a society can be flourished fully and his account of the notion attains the development of a society. Here, his account of societal development encapsulates latent development of sustainability too, subsequently, adding a principle that facilitates us to move towards greater social, economic, and political development with environmental sustainability and helps in reducing the negative effects of rampant urbanisation and globalisation.

The doctrine of liberty

I analyse the modern doctrine of societal development that adopts a development of sustainability so that such a coherent conceptual system operates upon this liberal state at a more abstract level. The underpinning characteristic of classical and medieval theory gives an account of an oppressive authority or state. Political history has always represented the struggle between liberty and authority, thus in the earliest known history, the term liberty is being defined as a protection against the tyranny of the authority (Mill, 1951, p. 267). Here, for Mill liberty is paramount in all kind of state, still democracy is the most prominent one, nevertheless, state does carry its oppressive part through the tyranny of the majority. To dilute the problem of oppressive rule, Mill tries to make a fitting adjustment between individual liberty and authority power (Bell, 1994, p. 121-123). Here, Mill adopts negative sense of liberty where within an area one is free to do according to her/his nature, while give up some liberty for preserving others' liberty (Berlin, 1969, p. 126). To be very lucid to expound his doctrine of liberty, Mill formulates a harm principle so that we can draw some limits on a state to exercise its power and within an area an individual enjoys her/his liberty unobstructed by others (Gray, 1983, p. 57). *The sole end for which mankind are warranted, individually or collectively, in interfering with the liberty of action of any of their number, is self-protection. That the only purpose for which power can be rightfully exercised over any number of a civilised community, against his will, is to prevent harm to others* (Mill, 1952, p. 271). By formulating this harm principle, Mill distinguishes between the private and public realm and confines legislation into the realm of the public, where one's action directly harms others (Singh, 2021, p. 508). For defining the harm principle, Mill's vital purpose is to draw a personal realm so that every individual can enjoy his/her liberty for the development of a state and within this realm, no one can interfere.

The idea of individual liberty facilitates an individual to act according to her/his conviction or will as an instrument of getting full development of a state and curbs the state to exercise its coercive power over the individual. Here, it seems to facilitate individual liberty; Mill is in favour of the free development of individuality that is subservient to the development of a state, and such development is averse to the development of sustainability. For example, single use of plastic is very harmful to the environment. Still, if an individual wants to use it, then a state cannot restrict her/him from using it due to disruption of the personal realm because all individuals are sovereign over his/her mind and body. Subsequently, as per Mill's proclamation of adopting democracy the most favourable one to adopt his principle is to fail to discharge environment-friendly schemes, which would be more helpful in the development of a state. Suppose all individuals decide unanimously to adopt or avoid particular law which is governed by the state. In that case, no rule can prevent them to act accordingly whether it is environment friendly or not. However, if one interferes in this realm, then this interference should be ceased by the harm principle. Here, the state should curb other's interference, and this interference might be by humans or non-humans as this relationship between humans and non-humans in connection with the harm principle is a much-debated issue among environmental philosophers (Fragniere, 2014, p. 6). For Mill, the harm principle embodies that one cannot obstruct others personal realm or harm others. If we extend Mill's account of harm principle to abstract entities such as climate and ecosystem then this principle is applicable on the notion of common ecological good. And this connection between harm and the environment has a direct connection even which is subservient to individual liberty. Though, individual liberty is at stake when a state, through the harm principle, puts coercive action against the individuals' will to draw the collective accountability for the development of a whole society. It is noteworthy that environmental problems lead to lots of damage which directly harms individuals as CO_2 emission causes. Furthermore, Mill's arguments of individual liberty bolster the development of a state which supports the sustainable development schemes within as his advocacy of free development of individuality on the backdrop of absolute liberty of thought and discussion aligns with sustainable development so that not only present generations but future generations could also enjoy their liberty in an adequate sense. Thus, in the next section of this paper, I argue how free development of individuality is possible on the backdrop of absolute *liberty of thought and discussion*.

The free development of individuality

Certainly, Mill concedes that an individual is sovereign over his mind and body and parallelly examines the nature of a state's power, which can be applicable to individuals legitimately. For this consideration, he admits that an individual can accelerate one's liberty by applying absolute *liberty of thought and discussion*. Furthermore, Mill elucidates that there is a distinction between '*liberty of thought and discussion'* to *liberty of free speech* as liberty of free speech belongs to the umbrella category and underlies *liberty of thought and discussion*. To define more explicitly, an example of a *black current* and *fruit* elucidate its connection as a black current is a fruit, but it does not mean all the attributes of a black current can be applicable to every fruit. *Liberty of thought and discussion* is an act of speaking and writing which requires context, and difference in context makes a difference of significance. For an instance, if a person raises his/her hand in a different context then his/her same gesture of raising one's right hand at right angles to one's body makes a difference in significance as when s/he on the road or on the soccer

ground. To analyse all different discussion forms, Mill provides an idealist model of the seminar room so that all individuals can get assurance of absolute liberty which can serve the purposes of human life (Mill, 1952, p. 276). Discussions are always needed because one experience is not enough to rectify all mistakes. And a fair discussion cannot be possible without being open to listen to one's own criticism of conduct or opinion. During an ideal seminar room presentation, no one is allowed to interfere when one speaks, nor to dominate others in the discussions. Here, the successfulness of a seminar depends upon the members who assemble to discuss a particular topic, and all are rational and fair, so that concur upon some agreement as a rule to participate even in any complex set of conventions. This seminar model represents an ideal model for any of the institutions of a state so that one can get the best possible approach to getting the truth, and for Mill, every opinion is a fraction of truth as support or help to replace another. The discussion is the right way of getting the right truth. One thing one should practice continuously in the way of outstanding performance is listening to all individuals' opinions, irrespective of favourable or unfavourable opinions (Mill, 1952, p. 276). And this feature of outstanding performance neutralises the fallacy of the infallible being as this fallacy leads to a coercive, authoritative government. As per Mill's account, *Miscellaneous collection of a few wise and many foolish individuals, called the public* (Mill, 1952, p. 276). To deal with the public for getting the best possible approach of truth, Mill recalls that every person is a fallible being embodies one should not concur with an argument sans listening to others where it does not matter to him/her whether others' opinion support his/her argument or oppose. This is the lone way of keeping a being away from falling upon the fallacy of infallibility. History itself divulges the example of the lack of free discussion, steering the whole society far behind real development. As the Greek philosopher, Socrates should have been awarded as a great human being instead of being awarded the death penalty by accusing him of a corruptor of youth by the authority (Mill, 1952, p. 278). This was the dispute between authority and Socrates's notion, and at that time, authority used its coercive power to trample Socrates's notion, but gradually Socrates idea's come into limelight and conceded him as a great thinker. Mill writes, *no one can be a great thinker who does not recognise, that as a thinker it is his first duty to follow his intellect to whatever conclusions it may lead* (Mill, 1952, p. 283) and later, designated him as a virtuous man.

For Mill, even a living truth can be transformed into a dead dogma without fair discussion. One should follow the intellect to deal with an opinion by knowing the underpinnings of the opinion. For example, the sheer parroting of any formula does not represent that person's learning skill until that person does not understand and know the underpinnings of the formula. And certainly, a person follows all the underpinnings carefully and carries out an opinion, that opinion has more weightage because being rational, a person gave that opinion. Here, in a state, undoubtedly, free and equal liberty of discussion should be facilitated as *culture without freedom never made a large and liberal mind* (Mill, 1952, p. 285). Subsequently, suppression to express an opinion entails suppression of liberty and demands for equality (Gauba, p. 134). And Mill provides *liberty of thought of discussion* in an absolute way by asserting that *if all mankind minus one were of one opinion, and only one person was of the contrary opinion, mankind would be no more justified in silencing that one person, that he, of had the power, would be justified in silencing mankind* (Mill, 1952, p. 274). Considering this, Mill gives some sound arguments to prove his assertion that making a person silent is not good for mankind at any point. If an authority is quashing a person's opinion to express then:

- The first possibility of being true to that person's opinion is subservient and if his/her thought is true, authority deprives the truth from whole human race.
- The second possibility is that if an opinion is partially true, then the suppression of that opinion hinders the complete truth from society.
- The third possibility is that opinion is totally false but a true argument without any discussion turns into a dogma.
- The fourth possibility is that quashing an opinion without listening generates the fallacy of infallibility and this fallacy leads to the aristocracy.

In this way, Mill defines how suppression of any opinion heads towards the disadvantageous stage, which is why in any form, quashing an opinion should not be permitted in civilised society and facilitates individuals with an absolute right to liberty of thought and discussion.

Moreover, Mill does not make only critic of suppression of an opinion but also of prevailing sentiment as he asserts that *protection against the tyranny on the magistrate is not enough; there needs protection also against the tyranny of the prevailing opinion and feeling; against the tendency of society to impose, by other means than civil penalties, its own ideas, and practices as rules of conduct on those who dissent from them; to fetter the development, and, if possible, prevent the formation of any individuality not in harmony with its ways, and to compel all charactered to fashion themselves upon the model of its own* (Pyle, 1994, p. 7). Here, Mill gives a fillip to individual liberty by facilitating all individuals with a free and equal discussion which turns down any prevailing sentiments and opinion, and adding this right as an absolute way maintains room for truly rational and effective governance. And this truly rational and effective governance is the need of a state to preserve the environment as well because the present and future development of a state depend upon environmental sustainability. The link between environment and societal development paves the way for enlightened self-interest and this link is the underpinning of sustainable

development (Emas, 2015, p. 1). Taking this into consideration, true development of a state is only possible after following the path of enlightened self-interest and Mill's formulation of the principle of liberty against the background of utility is following the same. For example, drinking water and oxygen are the base of human life and due to industrialization, air and water get polluted. But without fulfilling these basic needs, no state can be developed. Therefore, clean water and air drive are necessary for the development of human beings. These natural resources are limited so policies and rules are required to preserve these for current and future generations. And these natural resources friendly policies and schemes get enough scope in Mill's principle of liberty within which man as a progressive being is the supposition, and long-term stability of the environment is latent.

Individual liberty protects every individual against the tyranny of the magistrate and an authority. However, Mill knows very well that society's tendency to impose is also a major factor in precluding the formation of any individuality (Mill, 1952, p. 293) that drives a person to think and discuss any desired topic. Though Mill distinguishes between opinion and action as theory leads action that could be impacted negatively, that is a key element of well-being. Through the example of a corn dealer, Mill exemplifies the distinction. An opinion cannot be publishable through the press that a corn dealer is a starver of the poor, but the same opinion cannot be expressible in front of the house of the corn dealer where an excited mob is gathered. The prohibition of the such expression of one's opinion is justified due to increasement in molestation (Mill, 1952, p. 293). Despite individual liberty as an element of well-being, Mill's assertion of the restriction of individual liberty by restricting to harm others and infallibility inherent to restrict liberty. Furthermore, as an element of well-being, Mill accentuates the free development of individuality which curbs the majority rule as a leading principle. And he attaches high values to the proper development of individuality as without the maturity of one's faculty (using and interpreting experience in her/his own way), one could not gain the highest and most harmonious development. *The free development of individuality is one of the leading essentials of well-being; that it is not only a co-ordinate element with all that is designated by the terms civilisation, instruction, education, culture, but is itself necessary part and condition of all those things; there would be no danger that liberty should be undervalued, and the adjustment of the boundaries between it and social control would present no extraordinary difficulty* (Mill, 1952, p. 294). Through the development of individuality, Mill wants to develop the whole society by taking the assumption of man as a progressive being.

Further, Mill discards Calvinistic theories due to its application of sameness for all as every human being is valuable, however, it does not mean that all human beings are the same number of patterns. Every person has her/his own distinguishing features which make her/his unique being. *If a person possesses any tolerable amount of common sense and experience, his own mode of laying out his existence is the best, not because it is the best in itself, because it is his own mode. Human beings are not like sheep; and even sheep are not indistinguishably alike* (Mill, 1952, p. 299). He advocates allowing every person to follow as s/he wants to progress in her/his life, following that different individual are allowed to live differently. And Mill has carried out this proposition by paying heed to the climate and natural growth of flora-fauna as he locates underlying diversity in unity by defining the relationship betwixt climate and plants. For example, A person X sows ten same plants in her/his garden and another person Y sows ten different plants in the same climate, and a third person Z sows ten of the same plants in different locations where the difference in climate as well. Gradually, persons X, Y, and Z find their nine, eight, and two plants grow full-fledged. Similarly, human beings require diversity in their mode of life to grow in a full-fledged manner of their physical, psychical, spiritual, moral, and aesthetic stature. Taking inspiration from climate and plants development, Mill applies it to human beings and formulates free development of individuality because *the individuality is the same thing with development, and that it is only the cultivation of individuality which produces, or can produce, well-developed human beings* (Mill, 1952, p. 297). Well-developed human beings secure more development in society than the rest of individuals. Here, Mill accentuates the importance of genius and showers accolades on rationality because it enhances the thinking power, which helps to act properly in the discussion as well. Thus, freedom and a variety of situations are necessary for human development because his reverence for diversity divulges his reverence towards ecological sustainability. Not diminishing the variety of situations is an advocation of the function of the ecological life, which places all individuals' development on par with sustainable development, heading a multi-facet societal system which mitigates conflicts and facilitates coexistence with sustainability that gives scope for future regenerations as well. The discussion is a stage that facilitates the true development of society, and Mill opens the path of discussion for those who do not violate others' rights but only hurt. But to grasp total selfish indifference stage only after using the weapon of education because true education makes a person a better human being by inculcating virtue. Finally Mill is asking for this true stage of individuality to get an adequate development of a state which is harmonious towards sustainable development. In the next section of this paper, I examine to what extent utilitarian morality impacts individual liberty and sustainable development.

Individual liberty on utilitarian background

If one concurs with the common idea of utility as a maximum benefit for the maximum people, then the contradiction between individual liberty and utilitarianism is perceptible. However, Mill is a hard-core supporter of the moral principle of utilitarianism. As I have mentioned in the above portion of my paper, Mill's liberty ensures an

individual's liberty and draws a boundary so that no one can interfere within the area. This principle of individual liberty as the development of individuality also has room for sustainable development, which secures present as well as future generations' rights so that they live in harmony. This harmony includes environment preservation policies and the development of individuality. Although, in the principle of utilitarianism, we are only counting heads, on which side more people agreed upon, quashing minorities' rights and their development. This moral principle is based upon merely mathematical counting that justifies democratic government but fails to neutralise the tyranny of the majority. And Mill formulates his notion of individual liberty to turn down the tyranny of the majority because this is the hinderance of free development of individuality which lags behind all mankind to seek true development through free and equal discussions that are subservient to sustainable development. Thus, the moral principle of utility does not fit into Mill's notion of individual liberty and sustainable development. Following that, utilitarianism overturns Mill's notion of individuality as tantamount to rampant development, which causes danger for the humanity and environment too. But, I discharge the charge against Mill's doctrine of liberty that it has emerged antagonistic features by adopting utilitarianism. Certainly, Mill accepts utilitarianism in his doctrine of liberty, but not in a narrow sense where confinement of utility to maximum liberty is a moral principle. Mill, in his writings, asserts that in all forms, being a dissatisfied person is better than a satisfied pig (Mill, 1863, p. 7-9). Here, a person's dissatisfaction signifies that Mill does not apply utility criteria in his doctrine of liberty. Moreover, further analysis shows that Mill adopted the general principle of happiness as a moral principle of utility, but it served in the long run, which latent in his absolute *liberty of thought and discussion* as accepting to know all sides of an argument better. *Better to be Socrates dissatisfied than a fool satisfied. And if the fool, or the pig, are a different opinion, it is because they only their own side of question. The other party to the comparison known both sides* (Mill, 1963, p. 7-9). Subsequently, he advocates utility in a broader sense where this utility embodies development (development of individuality, rationality, and progress) and is restricted only when a person crosses the arena of personal liberty and creates harm to others.

Mill concurs that *utility will best be served by following a secondary or subordinate principle rather than appealing directly to utility* (Lyons, 1994, p. 64). Hence in Mill's doctrine of liberty, features of the utility of the moral principle do not belong to the general principle of happiness, which belongs to the narrow sense of utility. As in his utilitarianism, Mill connects an individual to a reciprocal society; a menace to society is a menace to an individual. and through this notion of harming society, one can trace the sentiment of justice where a just individual is bête-noire of hurting society and oneself too. So, an individual is bound with certain duties towards the rest to maintain the protection of society (Ten, 1980, p. 55). And the protection of society cannot be possible without sustaining the natural resources because resources are imperative for not only development but even the survival of an individual (Aikins, 2014). The connection of an individual to society serves the purpose of true development of a human being and society on the backdrop of sustainable development. As utility criteria for Mill is a connector of collective accountability and individual liberty, applying the utilitarian mode of thought for social development on the backdrop of individual liberty provides a way from collective to individual. Climate change is a quintessential facet that direct damages individuals' wellbeing. Hence, facilitating climate policies does not create hurdles to an individual's liberty by coercive action of the state but rather accelerates the assumption of individual's liberty-man as a progressive being that is subservient to utility. Mill's utilitarian mode of thought is not the sheer assumption of the general principle of overall happiness, which implies upon society at large, but rather has a direct connection of individuals which concedes virtuous individuals' thoughts without mulling other individuals' thoughts. Furthermore, in Mill's account, utilitarianism is not merely about the source of the quantitative cost-benefit calculus, which secures economic development, whereas a doctrine that insists on human sentiments of solidarity and these sentiments of solidarity produces social harmony as it is a generous human sentiment. Such ilk of progressive accomplishment is the underpinning of a natural basis of the sentiment of utilitarian morality because he postulates a social feeling of solidarity naturally in all human beings so that all human beings instinctively inherit the common idea of social being and this state of the common idea obtains the common good, which embraces human well-being than any maxims, and precludes to hurt others wrongful interference (O'Connor, 1997, p. 9-10). As Mill's doctrine is best suited to a democratic state, and India is one of the largest democracies across the globe and the recent verdict of the Supreme Court of India ends the false discourse of development versus environment. It bolsters the discourse that for the progress of the whole state, development and environment should be nurtured together and both are intertwined. In its verdict, *The Supreme Court in a nuanced judgement struck a blow for durable economic development in a state denuded of almost all its forest cover. The legal core of the verdict is that all land in Haryana covered under the Punjab Land Preservation Act will be treated as forest land* (*The Times of India*, July 23, 2022). Through the verdict, the institution places harmony between development and the environment because it preserves Aravalli range which would help to turn down reckless destruction of the landscape. Aravalli is one of the oldest mountains in the world and its rampant destruction for the development and earning money has already extracted a large economic and health cost in the *NCR region*[1]. This verdict showers

[1] NCR is a region of three states Haryana, Rajasthan and Uttar Pradesh. which is surrounded the National Capital Delhi and this region has notably very less forest cover area than the national average.

accolades on Mill's perspective of reconciling the principle of utility with individuality. As Mill's principle of free individuality aligns with utilitarian morality, which has special features of solidarity and care and adequately participates in the progress of the whole society (irrespective of states), including deliquesce the contemporary environmental crisis and sustainability problems such as a powerful earthquake, rampant urbanization, exploitation of natural recourses, metal contamination of rivers and aquatic animals, climate change, acid rain etc. have enough capacity to not only make hurdles to the growth of a state but also ruin the developed state. Therefore, Mill's systematic principle of liberty on the backdrop of utility facilitates social progress, which does not exclude sustainable development for the well-being of human beings due to the inter-dependency of individual progress and environmental sustainability.

Conclusion

Mill's notion of liberty and the sentiment of utilitarian morality offer a view on the adequacy of the harm principle and an absolute right of thought and discussion as a precept of right action and governance which facilitates civilised society that serves the purpose of true development of a state by gaining political and socio-economic development with maintaining the development of sustainability simultaneously. Hence, Mill's true stage of individuality opens the path of enlightened self-interest that advocates a variety of situations as a necessary condition for human development, heading a multi-facet societal system that mitigates conflicts of the free individual within the social whole by including sustainable development as a part of the progressive accomplishment of well-being that widens the scope for future generations as well.

References

1. AIKINS E. K. W., 2014, The Relationship between Sustainable Development and Resource use from a Geographic Perspective, *NRF-a United Nations Sustainable Development Journal*, 3 (4): 261-269.
2. BARKER S., 2006, *Sustainable Development*, Routledge, New York.
3. BELL R., 1994, *Liberty: Contemporary Responses to John Stuart Mill*, ed. Pyle A., Thoemmes Press, Bristol.
4. Berlin I., 1969, *Four Essays on Liberty*, Oxford University Press, New York.
5. DERNBACH J. C., 2003, Achieving Sustainable Development: The Centrality and Multiple Facets of Integrated Decision making, *Indiana Journal of Global Legal Studies*, 10(1).
6. EMAS R., 2015, The Concept of Sustainable Development: Definition and Defining Principles, *GDRS report*, Florida.
7. FRAGNIERE A., 2014, Climate Change, Neutrality and the Harm Principle, *Ethical Perspectives*, 21(1), 73-99.
8. GRAY J., 1983, *Mill on liberty: a Defense*, Routledge & Kegan Paul, London.
9. KLARIN T., 2018, The Concept of Sustainable Development: From its Beginning to the Contemporary Issues, *Zagreb International Review of Economics & Bussiness*, 21(1), 67-94.
10. LYONS D., 1994, *Right, Welfare, and Mill's Moral Theory*, Oxford University Press, New York.
11. MILL J. S., 1952, On Liberty, *Great Books of the Western World* Vol. 43, University of Chicago Press, Chicago.
12. MILL J. S., 1963, Utilitarianism, Parker, Son & Bourn, London.
13. O'CONNOR M., 1997, John Stuart Mill's Utilitarianism and Social Ethics of Sustainable Development, *European Journal of the History of Economic Thought*, 4(3), 478-506.
14. PRAKASH G., 2020, The Path of a Saint: Buddhaghosa's Argument for Sustainable Development, *Journal of Problemy Ekorozwoju/Problems of Sustainable Development*, 15(2), 205-209.
15. SINGH M., 2018, Equality of Resources, Ethical Principles and Sustainable Development, *Journal of Problemy Ekorozwoju/Problems of Sustainable Development*, 13(2), 185-190.
16. SINGH M., 2021, Private morality and State, *Journal of Indian Council of Philosophical Research*, 38(3), 507-521.
17. STRANGE T., BAYLEY A., 2008, *Sustainable development: Linking economy society, environment*, OECD Publications.
18. TEN C. L., 1980, *Mill on Liberty*, Clarendon Press, Oxford.
19. Times of India (Newspaper), 2022, *Saving the Hills*, Ranchi, July 23: 16.

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Relativity of Environmental Sustainability Illustrated by the Red Queen Hypothesis

Względność zrównoważenia w przyrodzie na przykładzie działania Hipotezy Czerwonej Królowej

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Abstract

The worrying phenomenon of our times is a rapid decline in the biodiversity, that is directly related to the disorder in environmental sustainability. However, the question is whether before the appearance of the *Homo sapiens* there was a greater eco-sustainability? Or maybe even without the presence of the man such state would be rather correlated with some natural processes, that happen independently of our interference? The paper attempts to explain the relativity of environmental sustainability described by the Red Queen Hypothesis (RQH). That model presents competition in nature, which may be extrapolated to all interactions in the world of living organisms. The RQH shows that in the evolutionary terms not keeping pace on the run threatens not only progress but also poses an increasing risk of elimination of a given individual. So in that way environmental sustainability is relative and the model explains the probability of a constant extinction, so in fact a fall.

Key words: nature, Red Queen hypothesis, progress and fall, environmental sustainability and unsustainability, the man

Słowa kluczowe: przyroda, hipoteza Czerwonej Królowej, postęp i upadek, środowiskowe zrównoważenie i jego brak, człowiek

Introduction

All activities of living organisms always take place within some environment. The same applies to the man, as being a part of nature, both in the individual and social dimensions. Nowadays, environmental issues are increasingly exposed, which results from the ecological crisis of the modern world and attempts to repair its adverse effects (Bańka, 2002; Ciszek, 2020). Important issue for understanding the idea of environmental sustainability is being aware of the accelerated processes of extinction currently observed on a global scale. However, as J. Weiner (2001) notes, despite such unfavorable trends regarding decline in biodiversity, on the threshold of the 21st. century there have been still existing a multitude of species. Yet, the crisis of environmental sustainability is a fact, connected with the advent of the Anthropocene epoch, that in general describes a human impact on nature. The worrying phenomenon is a rapid decline in the biodiversity, which is affected *inter alia* by anthropogenic climate change. Thus, human activity is at present a major threat to the nature, hence an issue of being responsible for the environment ought to be of the utmost importance (Szyndler, 2022). According to a revolutionary theory of P.J. Crutzen and E.F. Stoermer (2000), *Homo sapiens* and humanity itself has become a crucial geological and ecological force. That means human interference is nowadays particularly visible in the processes of evolution (Bińczyk, 2018). W. Steffen and colleagues (2007), suggest that the Anthropocene began around the early 19th. century with the onset of industrialization, the central feature of which was the enormous expansion in the use of fossil fuels. Nowadays advanced technology allows for the even farther development of tools able to harness the environment

in the previously unknown scale. Mitra and Sameer (2022) state that, such pursuit for a global expansion of the man has become unsustainable as it led to destructive changes in the nature. Even a more advanced notion of the Anthropocene`s idea is proposed by B. McKibben (2006), according to which we are living in the era of the *Second Nature*. That is understood as a nature completely produced by the mankind, while the *First Nature* is gone for ever. As a result, the Anthropocene perceived by the man in this way is also synonymous for living in a fear of gradual loss of space to live. The important attempt towards changing that trend has been in 2015 adopting the 17 Sustainable Development Goals by the United Nations within the Agenda 2030. That is an urgent call for action by all countries, in order to cope with the problem of climate changes, and concerning the life both on land and below the water (Meschede, 2020). That is directly related to the subconscious need of the man to get eco-balance (Chmara, 2019).

However, mankind has become a harmful force to nature since the beginning of agriculture in the Fertile Crescent, historically situated in the present Middle East. That was the very first region where settled farming emerged, resulting from modification of natural vegetation, by growing newly domesticated plants as crops, and then breeding livestock. Although its very local extent, it was in fact an early attempt to interfere with the sustainable development. Thereafter, human thought has been looped by agro-logistics, which led to exploitation of resources, as well as an increasing global warming (Morton, 2016). The farther advance of human population and a present overpopulation of the Earth, is also associated with the growth of agriculture, and expansion of areas occupied by the animal and plant production. A characteristic feature of the 21st. century its also that people want to live a better quality lives, which also makes us interact more aggressively with the natural environment. This is because economic development entails an increase in the consumption of natural resources. The man managed to transform permanently about 75% of the land and exploit over 60% of the oceans. Moreover, consequences of farther greenhouse gas emissions affect the increase in the global warming. Still, both the European continent and Poland, as a part of it, are characterized by considerable diversity of natural landscapes. This is illustrated by abundance of existing so-called patterns of semi-natural landscape features, especially in areas with extensive agricultural production (Edwards et al., 1999). However, the fact remains that in recent decades, species previously identified as common have become rare as a result of more intensive agricultural production (Krebs et al., 1999; Robinson, Sutherland, 2002). Such decline in the biodiversity of agroecosystems is evident in many countries of the European Union, which is also related to the type of functioning agricultural policy (Donald et al., 2002). The increase in agricultural land areas leads to dramatic changes in the structure of landscape, which is now becoming more uniform, and seminatural habitats characterized by rich biodiversity become smaller and more isolated, due to cultural landscape fragmentation (Duelli, Obrist, 2003). Thus taking all of that into consideration, is it actually possible to maintain the idea of environmental sustainability in such a reality that drives the farther human impact on the nature? Or maybe even without the presence of the man such stability would be rather correlated with some natural processes that happen independently of our interference? The paper attempts to explain relativity of environmental sustainability described by the Red Queen Hypothesis.

Mechanisms of evolution and their references to the social sciences

Currently the theory of evolution may be an abundant source of inspiration for the social sciences and humanities. Evolutionism is presented there as a set of various theories describing the development of societies and progress that takes place in their lives. According to A. Gecow (2014), nowadays we can even observe an invasion of biological methods and concepts that are used in areas not related to biology. Putting together the achievements of such different areas of science can help to understand the place and role of a man in nature. The very term evolution, although inseparably associated with Charles Darwin, is in fact a philosophical concept proposed by Herbert Spencer. The latter was a 19th. century representative of organicism and evolutionism in the social sciences in which he popularized this approach. In Spencer`s *Principles of Biology* an original concept of evolutionary development was introduced, which he understood as a change from indefinite, incoherent unity to definite, coherent heterogeneity through constant differentiation (Kwaśnicki, 2021). Therefore, evolution in that case is considered as a process synonymous with progress, and gains in efficiency towards a certain ideal state. The expression *survival of the fittest* has been also coined by Spencer, however it is Darwin who is often credited for that till this day. The revolutionary theory of evolution by natural selection, was in fact the unplanned result of Charles Darwin`s travel around the world. His observations during a five-year long journey have changed the paradigm of the species stability into the evolutionary paradigm (Szafer, 1959). However, Darwin decided to publish his revolutionary concept after many years of hesitation, and was finally encouraged to do so after reading various works from seemingly distant fields of knowledge. One of them was *An Essay on the Principles of Population* by Thomas Malthus, where there was formulated the idea of limiting the birth rate (Bołdyrew, 2009). The conclusion of that thesis was that a significant part of the poorest population remained at similar level, despite the high potential and actual fertility in this group. It was caused, similarly like in the nature, by various determinants limiting increase, among which the most important was the food shortage (Krokos, 1997). Also in natural environment due to the limited capacity of all habitats only some organisms can survive to the breeding period, which means that such

individuals are best suited to natural conditions existing at a given time and place (Szafer, 1959). Such connection of evolutionism with the broadly understood social science, was possible due to application of reasoning by analogy. Evolutionary theories referring to darwinism can be seen there as attempts to study the impact of biological evolution on human culture and society. It can also be considered the beginning of a thought or theory developed in subsequent years regarding the idea of natural selection, but also later in the economics of biology (Zalega, 2015). That indicate the mechanisms which create the sustainability of the environment or on the contrary, those disturbing such balance.

The Red Queen Hypothesis and the concept of progress in nature

For the description of the processes of progress in nature, as well as the opposite state, which could be described as a *fall*, evolutionary biologists use the Red Queen Hypothesis (RQH). It concerns all types of interactions between organisms under conditions of competition. Consequently, all species in order to survive must constantly adapt, and evolve. As J. Weiner wrote (1999), this hypothesis was introduced into science in 1973, by the American evolutionary biologist Leigh Van Valen. He provided evidence from fossil record data that probability of extinction within any group remains constant through time. The RQH explain such pattern involving component members of several major taxonomic groups. Thus, species do not only evolve, but they also coevolve with other species. As a result of that strategy, when thinking about adaptation to the environment, there must be considered other species as a major part of such external world. So, every organism tries to improve the fitness. However, in doing so it modifies the evolutionary response from the partners of interaction. That is why the whole ecological network will also change, triggering further responses (Sole, 2022). The name of the hypothesis was taken from Lewis Carroll`s *Through the Looking-Glass*, where in order to stay in the same place, one must run as fast as it is possible. In this story, the Red Queen gave to Alice a piece of advice: *it takes all the running you can do, to stay in the same place* (Carroll, 1999). That can be translated into biological realities in terms of adaptation and progress: here you have to run as fast as you can to remain in the same position. However, if you want to go elsewhere (farther), you have to run twice as fast. It also follows from this statement that not keeping pace on the run, threatens not only a lack of progress, but also poses an increasing risk of elimination of the participant of a given interaction, and therefore his downfall.

Moreover, the theory of Red Queen was also used to explain the dynamics of some host – parasite systems (Decaestecker et al., 2007). Thus, coevolutionary relationships may play the role in the maintenance of e.g. the sexual reproduction. Especially crucial, but also dangerous in such race are parasites, mainly because of the their great number. Moreover, according to M. Ridley (1993), parasites and their hosts are connected by the *unbreakable evolutionary embrace*. That means the more successful parasites are, which is related to the number of infected hosts, the bigger are the hosts' chances depending on the quality of the defense mechanisms. Leverage is changing on both sides, and the more threatened a given participant of such interaction is, the more intense will be its competitiveness, manifested in creating some new adaptations. However, in the world of the Red Queen there is a constant competition, so in fact nobody wins, but at best one side may gain a little time, thanks to a temporary advantage over the opponent. Thus, it seems that perfect adaptation to the natural environment is just impossible. The explanation for such problem is that the environment from the point of view of a specific species is constantly changing for the worse. This is due to mechanisms of evolution, that tend to introduce new adaptations all the time. That is why the RQH shows the concept of relativity of all progress in nature. In the natural environment less flexible species are excluded faster, and their gene pools are eliminated over time.

The essence of this theory can be captured by the statement that any increase in adjustment for individuals of one species, consisting of improving the ability to avoid competition in the form of parasitism, but also predation, entails a decline in adaptation for many other species competing for the same resources. That is why individuals of each species in order to keep up with others must constantly change the genetic program (Krzanowska et al., 1997). As mentioned, L. Van Valen (1973) noted, that in any group that occupies the same adaptive landscape, the probability of survival is independent of age throughout its existence, and all organisms have an equal probability of extinction. Biological progress and decline have manifested itself at different levels. This may go through competition between individuals from the same species, but also refer to different competing species. Therefore, what follows from this model is a prediction that even if species achieve better environmental adaptation as a result of getting improvements acquired through evolution, their chance of survival will not improve. That is because their competitors in this race also constantly enhance their mechanisms for adaptation, by *arming* themselves. That is why, a chance of extinction – *fall* for the organisms is the same all the time, and in biology we cannot speak of the concept of progress, especially if it is perceived as a transition from less to more biologically advanced forms. The basis for the entire theory is down to *the evolutionary arms race*, where models: host – parasite, but also prey – predator constantly evolve together, to reach some sort of uneasy balance. As a result, different taxonomic groups of species are continually changing, yet they are not getting relatively better in a competitive sense through time. Instead, they are metaphorically running in place and not getting anywhere: like the eponymous Red Queen (Strotz et al., 2018). In the context of above problem, it remains an open question if this evolutionary model illustrates

environmental sustainability, or maybe quite the opposite – a constant unsustainability? Phenomenon of competition is universal for the nature and it is based on the assumption made by M. Ridley (1993), that the greatest enemies for all living organisms are other organisms, that compete for the same, limited resources. As it follows, the occurrence of the Red Queen model is common in nature, but it may be also extrapolated to all human interactions, that perfectly fit into that general pattern as well (Musiał, Musiał, 2021).

Progression versus fall and the idea of environmental sustainability for the man

One of the most important events for the existence of life since its inception has been the production of oxygen by early living organisms. However, at the same time that led to the first ecological catastrophe in Earth`s history, that occurred about 2-2.5 billion years ago. Most of the bacteria thriving on the Earth during that time were anaerobic, which means they metabolized their food without oxygen. Transition from anaerobic organism to aerobic happened extremely slowly, as it took up to 2 billion years to reach the level of oxygen we have today. That episode of dying out, was a mass extinction for the anaerobic organisms, due to transformed environments on Earth, and is today called the Great Oxygenation Event (Olejarz et al., 2021). That first biotic crisis was at the same time one of the most deadly disasters in the history of the planet, but also a major turning point, as made possible the evolution of animals, which needed oxygen to exist at all (Weiner, 1999). New explosion of life, this time in a completely different form, occurred at the beginning of the Phanerozoic, which started about 600 million years ago, and is still a current eon in the geologic time scale. So as J. Weiner (2001) notices, life on the Earth from the very beginning of its existence has been constantly changing the shape and strategies, and therefore it has evolved, *ipso facto* the Red Queen model has been working since the outset of the life.

As already mentioned, the extinction of entire genera or even families of animals and plants in the history of the Earth was associated with changing of the external environmental conditions to which these organisms were strongly adapted (Krzanowska et al., 1997). They died out because they couldn't run beyond their strength in an evolutionary sense, that is to adjust to rapidly changing environmental conditions, as has happened in certain emergencies situations. Decline of such species was caused by various types of geological catastrophes recorded in the history of the planet. There have been a number of such episodes during the Phanerozoic, and the most authors accept the five substantial mass extinctions since the Cambrian. The 5th. event of mass extinction, in the end of the Cretaceous geological period involved the demise of dinosaurs (*Dinosauria*). On the contrary, example of animals that have been successfully coping for millions of years both with a constantly changing environment and the competition with other species are octopuses (*Octopoda*). By many researchers they are considered the most unusual invertebrates living on Earth. This group is evolutionarily very old and has been inhabiting the Earth for over 500 million years, a large part of the Phanerozoic. For visualizing how long is that, useful may be a comparison with the dinosaurs, that became a dominant group of vertebrates around 200 million years. Back then, *Octopoda* had lived and diversified in the oceans for hundreds of millions of years. They survived also several mass extinctions, including Ordovician, Devonian and Permian, as well as the Cretaceous – from the late Mesozoic Era, when the *Age of Reptiles* has come to its end. The reason for the fall of the latter was their extreme adaptation to the ecological niches that had existed before the catastrophe. Such perfect adaptation, which also means *narrow specialization*, in consequence doomed dinosaurs to extinction in the event of disappearance or transformation of their old habitats. Perhaps, the source of success (progress) for an extremely intelligent group of invertebrates, like octopuses, were on the other hand the effective adaptations concerning their cooperation skills with other species of predators in order to capture the victim (Sampaio et al., 2020).

Although the constant struggle between all organisms has been seen as the endless race, in fact that resulted in increasing of the Earth`s biodiversity. According to J. Weiner (1999), at the threshold of the third millennium, the total biodiversity of our planet has been estimated at between 5 and 50 millions of species. That huge discrepancies and uncertainty of assessment indicate that our knowledge is still insufficient, especially in the case of organisms inhabiting isolated and poorly accessible habitats, such as the depths of the ocean. There should be added, that estimated number of organisms currently inhabiting the Earth is only suggested, and probably does not exceed one percent of all species that have lived on our planet through the last 3.5 billions of years. Biological complexity from a scientific perspective is a consequence of usually relatively simple phenomena, which was at the very beginning in a metaphorical term the *arms race* between nucleic acids. A tautological generalization is therefore to say that out of the entire genetic pool, organisms who survived were by chance best adapted to the specific environment at a given time. There are plenty of documented cases of plant and animal species disappearance, thus it may be concluded that they weren't properly adapted to the existing habitats at the particular time. Those five events of mass dying out of the Earth's biodiversity, have been caused by various natural phenomena, and species extinction was a natural process. Most of the organisms that have ever lived on Earth are already extinct, without any human intervention. Due to the existence of mechanisms of evolution, the biodiversity on our planet had been changing millions of years before the *Homo sapiens* emerged. Yet, it seems to be a well-confirmed fact that due to the expansion of human civilization, the rate of species extinction has significantly accelerated in relation to the natural background.

By looking at the history of biodiversity, J. Weiner (2001) points to the fact, that the current, so anthropogenic decline in a number of species is only an episode of little importance for the biosphere. However, a question can be asked how the constant lack of the environmental sustainability may affect the future civilization of a man. Nowadays the distressing phenomenon of a rapid decline in biodiversity is observed, and we are actually facing the 6th. mass extinction. Such symptoms are visible in almost all existing habitats and are influenced by very different factors mainly caused by the dominance of humans. As G. Ceballos and colleagues (2020) note, thousands of populations of critically endangered vertebrate animal species have been lost during the last century. The speeding of such crisis is still increasing, because of the growth of global population of *Homo sapiens*, and the consumption rate as well. However, this time extinction may be underway entirely caused by humans (Cowie et al., 2022). E. Kolbert (2014) in *The Sixth Extinction. An Unnatural History,* presents the mounting evidence that the Earth is currently at the start or perhaps even in the midst of such major episode of mass extinction. As R.H. Cowie and associates (2022) note, according to opinions of some researchers current biotic crisis may be even accepted as a new trajectory of evolution. That is due to the fact, that the man, despite being only a part of nature, desires to manipulate it, in order to pursue his own and very selfish goals. The *Homo sapiens* contributes to the disorder in nature and environmental sustainability in various ways. The intensification of agricultural production has even led to the process of extinction of various types of native livestock breeds, that in fact had been previously selected by the man himself. Yet, the genetic resources of such breeds are the basic biological capital for the livestock production, ensuring food security and sustainable rural development. According to G. Polak and colleagues (2021), native breeds of livestock, despite their unique characteristics and adaptability to local, specific environmental conditions are currently threatened largely due to their diminishing use, resulting of lower profitability. For example, in Poland on a large scale are bred the Holstein-Friesian cattle, which is not native but provide a better production results than the old breeds. As a result e.g. the Polish Red or White-backed cattle are critically endangered.

On the other hand, there are also some voices that deny existing evidences for the 6th. great biotic crisis. They just consider the problem as exaggerated by the conservation and biodiversity scientists, in order to attract greater public and political attention to the biodiversity loss. Also, there have appeared some statements that, as the man is a part of the natural world, human-caused extinctions are a natural phenomenon, and a part of the evolutionary trajectory of life on the Earth (Briggs, 2017; Thomas, 2017). So, in a way, the latter are environmentally sustainable. It was even suggested by C.D. Thomas (2017) in *Inheritors of the Earth,* that the rate of evolution, and therefore speciation is now increasing in the face of changes caused by *Homo sapiens*. Notwithstanding, Cowie and associates (2017) point that there is a mounting evidence that extinction rate is in fact not normal, and the exponential rise in the human population and in human impacts on the natural world are abnormally rapid. The conclusion of such reasoning is that *Homo sapiens* is not just another species evolving in the face of external influences, because of having a conscious choice regarding the future of mankind and of the Earth's biodiversity as well. W. Sztumski (2021) notes that, the possibility of survival of humans depends on the victories over nature. So, in the evolution of *Homo sapiens* there is a constant growth of destruction of the external and internal environment, proportionally to the progress of civilization. The same as illustrated in the Red Queen model, the human environment changes constantly and requires updating. Moreover, despite of creating *the complementary whole*, the human environment does not have to be in symbiosis with the rest of the nature.

The idea of sustainable development notices the existence of global problems and the related threats for human existence, which is supported by more efficient cognition measures, concerning possibilities of detecting the potential and actual threats and dangers faced by the contemporary world (Bukrejewski et al., 2019). The universalism of the Red Queen model means that all organisms, including people are constantly threatened with extinction. Thus, this hypothesis also explains the reasons of the mass extinctions episodes' occurrence. Apart from constant competition, the latter are generated by various factors, e.g. a geological or cosmic catastrophes, such as in the case of Cretaceous extinctions. However, in the critical situations, only *random organisms* are able to survive, because the extremely specialized species die out as first, as a result of the disappearance of their old habitats. The early mammals from the time of the Cretaceous biotic crisis were considered such random species. After the dinosaurs had died out, new and different ecological niches became available, and they could be successfully occupied by very different taxonomic groups. In fact, mammals, including *Homo sapiens* itself, could dominate only thanks to that catastrophe, and therefore for them it was rather a factor generating progress. In such a context, environmental sustainability may seem even unfavorable for us as a species. That is because, as if not for the 5th. mass extinction event from more than 60 million years ago, most likely intelligence would have developed in some other taxonomic group than the *Homo sapiens*. What is more, mammals probably would have never come to domination. Thus, it would have been for us unsustainable. But it also means that our environment is only temporary, and changing swiftly, so the future may not be very propitious. Let this remain a warning, because in some crisis situations the nature will recover after some time, however it is rather doubtful whether this will be a source of progress for the humankind. Perhaps, in order to survive we ought to learn from the strategies used by the octopuses, and become as flexible as it is possible, while at the same time cooperate with other organisms living on the Earth next to us. According to Bukrajewski et al. (2019), the idea of sustainable development is actually a plan

of changes. We can learn that also from the Red Queen model, because the environment around us is constantly transforming. However, at the same time due to the relativity of such modifications, any progress may be perceived as rather utopian.

Concusions

In order to understand the significance of the idea of sustainable development, it is crucial to be aware of the accelerated processes of extinction currently observed on a global scale. Not only is there noted a fast species loss, but the processes of speciation cannot keep up with that decline as well. The whole discussion around the loss of the biodiversity and necessity of maintaining the environmental sustainability may also have some references to the Red Queen model. As the *Homo sapiens* is nowadays a dominant force in nature, the decline in the rest of the biological diversity may be explained by *not keeping up with adaptations in the evolutionary race*. Thus, the further development of our civilization may be in fact responsible for the 6th. mass extinction. But there is also the truth that the nature itself, which in fact is for the man an opponent in such race, is also improving its adaptations. That is because the evolution of one side, always forces the changes of the other party. The well known fact is that, even after the greatest biotic crisis the diversity of life is reborn ultimately. However, we have no answer for the question whether the man will also find himself in such a new reality. Then, life may have already a completely different form, adapted to the new environmentally sustainable conditions, as the constant *arms race* forces continuous changes. Like any other sphere of human activity, also agriculture is nothing but a competition with nature for various resources, such as a space, water, etc. Therefore, the Anthropocene can be understood as living in a fear, that ahead of us will be just less, and less sustainability. Sadly, in this context the Red Queen model has a rather pessimistic tone, as any equilibrium will be temporary, and therefore relative. Such unsustainability is seen as a constant changing or evolving of all the living creatures on Earth as quick as possible, in order to not fall in the evolutionary sense.

References

1. BAŃKA A., 2002, *Społeczna psychologia środowiskowa*, Wydawnictwo Naukowe Scholar, Warszawa.
2. BIŃCZYK E., 2018, *Epoka człowieka. Retoryka i marazm antropocenu*, Wydawnictwo Naukowe PWN, Warszawa.
3. BOŁDYREW A., 2009, *Recepcja teorii ludności T.R. Malthusa w polskiej myśli społecznej na przełomie XIX i XX w., Studia z Historii Społeczno-Gospodarczej XIX i XX Wieku*, 6, Wydawnictwo Uniwersytetu Łódzkiego.
4. BRIGGS J.C., 2017, Emergence of a sixth mass extinction?, *Biological Journal of the Linnean Society*, 122 (2): 243-248.
5. BUKRAJEWSKI P., LATAWIEC A., MATUSZEWSKA A., 2019, Sustainable Development – Utopia or Implementation Possibilities**,** *Problemy Ekorozwoju/ Problems of Sustainable Development*, 14(2): 111-116.
6. CARROLL L., 1999, *Through the Looking-Glass*, Dover Publications Inc.
7. CEBALLOS G., EHRLICH P.R., RAVEN P.H., 2020, Vertebrates on the brink as indicators of biological annihilation and the sixth mass extinction, *PNAS*, 117 (24): 13596- 13602.
8. CHMARA R., 2019, Posthumanistyczny wymiar ekologii, *Sztuka i Dokumentacja*, 20: 105-112.
9. CISZEK M., 2020, The Philosophy of Perceiving the Human Environment from the Perspective of Environmental Social Psychology and Environmental Sociology (Implications for Sustainable Environmental and Health Security), *Problemy ekorozwoju/ Problems of Sustainable Development*, 15(2): 211-222.
10. COWIE R.H., BOUCHET P., FONTAINE B., 2022, The Sixth Mass Extinction: fact, fiction or speculation?, *Biological Reviews*, 97: 640-663.
11. CRUTZEN P.J., STOERMER E.F., 2000, The Anthropocene, *IGBP Global Change Newsletter* 41: 17-18.
12. DECAESTECKER E., GABA S., RAEYMAEKERS J.A., STOKS R., Van KERCKHOVEN L., EBERT D., DE MEESTER L., 2007, Host-parasite 'Red Queen' dynamics archived in pond sediment, *Nature*, 450: 870-873.
13. DONALD P.F., PISANO G., RAYMENT M.D., PAIN D.J., 2002, The Common Agricultural Policy, EU enlargement and the conservation of Europe's farmland birds, *Agriculture, Ecosystems and Environment*, 89: 167-182.
14. DUELLI P., OBRIST M.K., 2003, Regional biodiversity in an agricultural landscape: the contribution of seminatural habitat islands, *Basic and Applied Ecology*, 4: 129-138.
15. EDWARDS P.J., KOLLMANN J., WOOD D., 1999, The agroecosystem in the landscape: implications for biodiversity and ecosystem function, *Agrobiodiversity: Characterization, Utilization and Management*, eds. Wood D., Lenné J.M., CAB International,Wallingford, UK.
16. GECOW A., 2014, Znaczenie perspektywy opisu i wyjaśniania w Biological Turn. Perspektywa informacji celowej w biologii i humanistyce jako podstawa memetyki, *Teksty z Ulicy, Zeszyt memetyczny*, 15: 27-40.
17. KOLBERT E., 2014, *The Sixth Extinction. An Unnatural History*, Henry Holt and Company, New York.
18. KREBS J.R., WILSON J.D., BRADBURY R.B., SIRIWARDENA G.M., 1999, The second silent spring?, *Nature*, 400: 611-612.
19. KROKOS J., 1997, Leksykon filozofii klasycznej, *Studia Philosophiae Christianae*, ed. Herbut J., 34 (1): 1-146.
20. KWAŚNICKI W., 2021, The role of diversity and tolerance in economic development, *Journal of Evolutionary Economics*, 31: 821-851.
21. KRZANOWSKA H., ŁOMNICKI A., RAFIŃSKI J., SZARSKI H., SZYMURA J., 1997, *Zarys mechanizmów ewolucji*, Wydawnictwo Naukowe PWN, Warszawa.
22. MCKIBBEN B., 2006, *The End of Nature*, Penguin Random House Inc.

23. MESCHEDE C., 2020, The Sustainable Development Goals in Scientific Literature: A Bibliometric Overview at the Meta-Level, *Sustainability*, 12(4461): 1-14.
24. MITRA S., SAMEER A., 2022, Storytelling for Behavior Change: Use of Folktales for Promoting Sustainable Behaviors, *Problemy ekorozwoju/ Problems of Sustainable Development*, 17(2): 243-247.
25. MORTON T., 2016, *Dark Ecology: For a Logic of Future Coexistence*, Columbia University Press.
26. MUSIAŁ W., MUSIAŁ K., 2021, *Zastosowanie metody analogii dla poszukiwania wspólnych obszarów poznania w biologii i ekonomii (Using the analogy method to search for common areas of learning in biology and economy)*, Wydawnictwo Uniwersytetu Rolniczego, Kraków.
27. OLEJARZ J., IWASA Y., KNOLL A.H., NOWAK M.A., 2021, The Great Oxygenation Event as a consequence of ecological dynamics modulated by planetary change, *Nature Communications*, 12 (3985): 1-9.
28. POLAK G., KRUPIŃSKI J., MARTYNIUK E., CALIK J., KAWĘCKA A., KRAWCZYK J., MAJEWSKA A., SIKORA J., SOSIN-BZUCHA E., SZYNDLER-NĘDZA M., TOMCZYK-WRONA I., 2021, The risk status of polish local breeds under conservation programs – new approach, *Annals of Animal Science*, 21(1): 125-140.
29. RIDLEY M., 1993, *The Red Queen. Sex and the Evolution of Human Nature*, Viking Books.
30. ROBINSON R., SUTHERLAND W.J., 2002, Postwar changes in arable farming and biodiversity in Great Britain, *Journal of Applied Ecology*, 39: 157-176.
31. SAMPAIO E., SECO M.C., ROSA R., GINGINS S., 2020. Octopuses punch fishes during collaborative interspecific hunting events, *Ecology*, 102 (3): 1-4.
32. SOLE R., 2022, Revisiting Leigh Van Valen's 'A New Evolutionary Law' (1973), *Biological Theory*, 17: 120-125.
33. STEFFEN W., CRUTZEN P.J., MCNEILL J.R., 2007. The Anthropocene: Are humans now overwhelming the great forces of Nature?, *AMBIO: A Journal of the Human Environment*, 36 (8): 614-621.
34. STROTZ L.C., SIMOES M., GIRARD M.G., BREITKREUZ L., KIMMIG J., LIEBERMAN B.S., 2018, Getting somewhere with the Red Queen: chasing a biologically modern definition of the hypothesis, *Biology Letters*, 14 (20170734): 1- 7.
35. SZAFER W., 1959, Narodziny myśli o ewolucji organizmów w stulecie dzieła Karola Darwina 'O powstawaniu gatunków', *Kosmos*, 8 (3): 213-233.
36. SZTUMSKI W., 2021, Reflection on the Human Living Environment in Connection with Sustainable Development, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 16(1): 39-44.
37. SZYNDLER J., 2022, Towards Co-existence. Responsibility in the Anthropocene Debate, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(2): 24-30.
38. THOMAS C.D., 2017, *Inheritors of the Earth: How Nature Is Thriving in an Age of Extinction*, Public Affairs, New York
39. WEINER J., 1999, *Życie i ewolucja biosfery*, Wydawnictwo Naukowe PWN, Warszawa.
40. WEINER J., 2001, Czy niszczenie różnorodności ekologicznej stanowi zagrożenie cywilizacyjne?, *Prace Komisji Zagrożeń Cywilizacyjnych*, PAU: 7-20.
41. VAN VALEN L., 1973, A new evolutionary law, *Evol. Theory*, 1: 1-30.
42. ZALEGA T., 2015, Ekonomia ewolucyjna jako jeden z nurtów współczesnej ekonomii – zarys problematyki. *Studia i Materiały, Wydział Zarządzania Uniwersytetu Warszawskiego*, 2: 157-177.

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Human and Nature: Developing Virtues for Environmental Responsive Behaviour

Człowiek i przyroda: wspieranie cnót dla zachowań proekologicznych

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Abstract

The environmental issues such as deforestation, climate change, ozone layer depletion, greenhouse effect and pollution of air, water and soil rises due to unethical activity of human beings and behaviour of humankind. Environmental degradation and the deterioration of human moral values are inter-connected with each other. So, environmental revolution required a transformation in human behaviour. Virtue ethics could be used as an instrument to develop a pro-environmental behaviour. Virtue ethics is primarily concerned with what kind of people we should be, what kind of characters we should have, and how we should act. This directly develops one's moral character as well as pro-environmental character and behaviour, i.e., wisely use the natural resources; develop the habit to preserve the nature. Virtue ethics would be built to bridge the gap between human behaviour and the needs of environment. This paper emphasizes the implications of virtue ethics to bring changes in human character and behaviour to resolve the current environmental problems.

Key words: environmental sustainability, ethical theories, Aristotelian virtue ethics, habitual moral behaviour

Słowa kluczowe: zrównoważoność środowiskowa, koncepcje etyczne, koncepcja cnót Arystotelesa, zwyczajowe zachowania moralne

1. Introduction

Industrial revolution had begun in the eighteenth century in England, which brought growth in industries or factories and it is followed in almost all parts of the world for their economic and social development. This resulted in drastic change in the society which is directly affecting the natural environment (Berg and Hudson, 1992). This could be illuminated through tremendous increasing temperature of the earth because of the emission of carbon dioxide, carbon monoxide and other gaseous elements released from the industries, vehicles, rocket propellant, fossil fuel and so on. Moreover, science and technology always try to provide solutions for environmental problems, but their failure demands an analysis of human and environment relationship. Till now it is observed the attitude of human towards the environment causes failure in preserving our nature. *Technological or Scientific 'solutions' have often resulted in as many new problems as they have solved* (Jardins, 2000). The population growth and increasing demand of agriculture to fulfil the requirement of the people with the decrease number of farmers have resulted in intensive pressures for increasing the production of agriculture. As a consequence of long-term use of pesticides, such as DDT,Boric Acid, Diazinon, Malathion, etc have affected the environment negatively. Humans affect the food webs through energy production and agriculture, pollution, habitat destruction, overfishing and hunting. It also affects human beings through the food chain. Therefore,

there is a need to bring change in human behaviour and an ethics which deals with human conduct to make the environment deterioration controlled.

Ethics is a moral principle which defines the right and wrong conduct of human beings. It comprehends difficult notions, applications, and explanations about what is right and wrong, and give explanations why things are considered right and wrong. In general terms, *ethics concerns the moral behaviour of individuals based on an established and expressed standard of the group, which is in and of itself a collection of individual values* (Bishop, 2013). A shift in ethics and values is the result of human beings' inclination to adopt a path leading to sustainability. The concept of ethics primarily deals with the study of right and wrong conduct within a defined environment. It gives prior importance for the character building of an individual and it stress about the moral value of human being (Giddy, 2007). Therefore, the application of ethics always serves to define the limitations and boundaries of human activities and duties. Ethics are the moral principles which guide a person's behaviour. These norms are shaped by social norms, cultural practices, and religious influences. Ethics reflect belief about what is right and wrong, what is good and bad in terms of human behaviour (Bishop, 2013).

However, there are different types of ethical theories like Consequentialist, Deontology and Virtue ethics. Consequentialist theory is based on the outcomes of a certain action (Dougherty, 2013). It upholds that an action is right if their consequence is good otherwise it is a bad action. But sometimes the consequences may not be good but the purpose of an action is good. For example, according to ethics *do not betray friends*. But imagine a situation in which significant and good consequences would result if only I would betray a friend. In such a scenario, the utilitarian decision would be to betray the friend. However, critics would claim that this betrayal violates an important ethical principle. For examples, in recent time people are cutting down trees for the industrialization and economic benefits but it results changes in weather, biodiversity loss and many more environmental issues which impact the human life. This action has both the positive and negative impact for the society and environment. For the industrialization we have economically profitable and get more job opportunities but at the same time it is affecting our environment. Deontology theory is *Duty* based ethics, which shows that we have certain duty or responsibility towards the non-human natural world (Kasher, 1978). But we have to protect the nature and wildlife not for the sake of the usefulness of nature but for its existence as an end-in-itself.

Moreover, in order to solve the environmental problems, there is a need to emphasize on the application of virtue ethics which is mainly concerned with what kind of people we should be, what kind of characters we should have, and how we should act (Engstrom and Whiting, 1998). It perpetuates those human beings are rational and they have some responsibilities towards other and non-human nature (Svoboda, 2015). When a person becomes morally responsible towards the society and its surrounding, then their action would be definitely directed towards the welfare and the care of nature through safeguarding the natural resources and preserving it. Virtue ethics is a normative ethical theory and it focuses on living a good life. It discusses about the character of the human beings such as kindness, generosity and honesty which are obligatory for virtue ethics. These are necessary conditions for constitutive elements of human flourishing and wellbeing. Thus, the present study seeks to understand how virtue ethics contributes in the transformation of human behaviour for the protection of the natural environment.

2. An Ethical Understanding of Nature and Its Problems: A Brief Analysis

Ethical theories give a framework for the ethical analysis and evaluation of behaviour and practices. There are three major ethical theories we have discuss in the paper: that is consequentialist, deontological, and virtue ethics. Consequentialism theory talks about the right and wrong consequence of an action. Whether an action is right or wrong is determined by the consequences (Creed, 1987). This theory is grounded on the consequences of an individual action. If the result of an action is desired then the action will be considered as morally right whereas the undesirable results of an action fall under morally wrong category. This moral philosophy is best captured about the general truth that *the ends justify the means* (Wyka et al., 2002). It means the consequences of an action would define whether that the action is good or bad. There is no moral consideration about whether the person is doing the right or wrong action. The judgment of an action is totally dependent on the consequences of that particular action of a person. *Human beings ought to behave in such a way that will bring about good consequences* (Thiroux, 2004). This theory shows that a person should perform in a way that their consequence must be good or ethically right. Utilitarianism holds that a consequence of an action is ethical if it is accepted by majority number of people. Utilitarian view is concerned about human pleasure, which has only intrinsic value. An action is right if it would produce greatest pleasure for greatest number of people. Hence, maximum utility defines the result of an action. *The greatest good for the greatest number necessarily require measuring, comparing, and quantifying* (Jardins, 2000). The good is taken by utilitarian's to be that which has intrinsic value. Yet intrinsic value may not be the sort of thing that can easily be counted, measured, or compared. In this respect if one relates consequentialism theory into contemporary environmental problems than it has been observed that, by destroying environment for the sake of our own profits we are creating dangerous consequences. Let's take an example to understand this issue by the name of feeding the world now-a-days farmers are using a

lot of chemicals in agriculture. This resulted in losing the fertility power of the agricultural fields. Whenever, debates emerged towards environmental sustainability people must think about the consequence. Because if human beings can know that consequence of destroying environment has a very severe consequence then, they will start restrict them self to perform such activity.

Jeremy Bentham and Peter Singer asserts that for the welfare of all sensitive being, not only the humans but also the non-human being who can express their feelings through pleasure and pain also have to be taken into moral considerations (Joseph, 2006). They do not give importance to the intrinsic value of non-sentient objects as they cannot express their emotions or feelings. According to them, in the environment plant, river, mountain, land are the non-sentient objects which do not have intrinsic value. But for the fulfilment of sentient being they have the instrumental value. Human centric ethics (also known as anthropocentric theory) which stem from the consequentialist theory states that only humans have autonomous moral status. This theory stands those attitudes, values, or practices which give preferences to human interests over the interests of other. Thus, human centric notion ascribes intrinsic value to human beings alone.

Immanuel Kant is the important contributor of deontological ethics, emphasizing on duties or obligations towards the other, where people are anticipated to follow certain moral principles which arise in themselves through reasons which guide us what to do or what not to do. This theory gives prior importance on the duty and rules of an individual. According to deontological theory, every action done by human beings is considered as moral and independent of consequences, which therefore, obliges human beings to be liable for their own actions as opposed to other creatures who act in accordance with their instinct (Sreekumar, 2012). This theory describes two fundamental divisions of duty which are direct and indirect duty: duties to oneself and duties to others (Mulia, Behura, Kar, 2016). According to Kant, when an action is done with a sense of duty and vice-versa, then that particular action is considered as meritorious. Thus, the primary concern of duty lies in the relationship between the actions of a person and the autonomy of his will. An action is considered as morally right if it is done according to the duty. For example, cutting down trees in order to maintain a luxurious lifestyle will prove that we are not performing our duty towards nature. We cannot misuse the natural resources for our economic and social benefits. Thus, as rational human being we have some duties and responsibilities towards the natural environment.

Furthermore, it strongly accepts universal principles such as *we should always speak the truth* as a standard to measure the right and wrong conduct. For example, Kant's categorical imperative suggests that every action which we act should be based on universal principles (Murphey, 2005). This theory shows that one should perform an action which should be grounded on universal acceptance of maxims. Every action which based on universal principles is very hard to perform and without the help of consequentialism and virtue ethics this theory is rigid in their conception as Wankel and Stanusch puts (2011). Here another issue may come that what should be One's duty in a particular situation? In this regard it is very much difficult to apply deontological theory in case of environmental problems. Deontological ethics gives prior importance to value the nature because it is our duty to save the nature. Government implies different types of environmental laws to protect the nature like control of water pollution Act in 1978, prevention of air pollution act in 1981 (*Environmental laws*…, 1978, 1981). But this is not enough to save our nature from disaster. For example, despite the implementation of air pollution acts the degradation of the quality of air in India, especially in the metropolitan cities like Delhi, is in worse condition and has become one of the major causes for severe health hazards and even deaths. Therefore, we may reasonably argue, that virtue ethics provide an ideology which gives focus on the behaviour of human beings rather than the action.

Due to the dominance of human activities over nature, the present time is witnessing various natural disasters such as, ozone depletion, deforestation, landslides, tsunami etc. These disasters show that we have to protect the nature. But the question arises how and in what way the eco-system should be preserved. In this context, firstly, human beings should change their attitude towards nature especially with the purpose to protect the nature. The positive attitude towards the nature encourages human beings to reconsider the policies framed for the purpose of preservation of nature. In this reference, it has been perceived those environmental policies are often directed by certain utilitarian concerns (Szostak, 2005).

The term virtue is considered as the character of human being that helps them in attaining a good life (Mintz, 1996). *Virtue* originated from the Greek word *arête*, which signifies *excellence or distinctive power* (Pakaluk, 2005). Generally, the term *excellence* is broadly connected to the human being's moral excellence in such a way that virtue might be delineated as the manifestation of human excellence. In ethics the word virtue is used in two different meanings. Firstly, virtue is a disposition or character traits which emphasizes to act the right action and universal duties in a specific situation. Secondly, *virtue is also a habit of action corresponding to the quality of character or disposition* (Lillie, 1967). It shows that virtue should be practiced in a right way so that it could be a habit of the particular person. For example, if a person is caring for others and it should become his habit not only to care for human beings but also for nature and society.

Virtue ethics says that an ethics should be given priority for the judgment of an agent rather than the deontologist and utilitarianism, viewed as the judgment of an action or the consequences (Simpson, 1992). For moral

philosophy, the good person is essential, and the person will be considered as good if his character is good and who practices moral virtue in his life. In his book Nicomachean ethics, Aristotle says that in reality virtue ethics is not a theory which only we can apply in our life, but it is a practice or exercise. Only way to achieve this is through proper training. It requires a distinct approach which emphasizes human virtues character, in contrast to duties or rules (deontology) or the consequence of actions (Hursthouse, 1999). This implies that virtue ethics is a normative ethical theory and it focuses on living a good life. The concept of the worthwhile life needs to be carefully distinguished from those of the happy life and the dutiful life. This shows that the good life captures the narrative dimension of human well-being. The good life means a happy life which is only possible when we live an ecologically good life. It discusses about the character of the human beings such as kindness, generosity and honesty which are obligatory for virtue ethics. These are necessary conditions for constitutive elements of human flourishing and wellbeing.

In his book *Republic* Plato has described about the four types of virtues like (1) Wisdom, (2) Fortitude or Courage, (3) Temperance and (4) Justice. Plato defines excellence in reason will make a person having full of wisdom at the same time reason will make a person wise. Therefore, Plato states that person having wide range of intellect and wisdom is the ruler of the state. Wisdom is defined as the contemplative, leading, the origin of good judgment government, and hence it is regarded as the distinctive virtue of the ruling classes, who should be the constituent of rational aristocrats. According to Plato courage is the second important virtue as wisdom upholds first position in diving direction to the human beings and then courage is required to escape from the fear of getting hurt (Lillie, 1967). Furthermore, courage is defined as a virtue which put forward to oppose the alluring of pleasure. Temperance is a virtue which fulfils the aspiration or desires of human beings to a proper level and it keeps harmony among all the different groups of the society. *Justice is the highest of the cardinal virtues* (Rogers, 1891) as it incorporates wisdom, courage, and temperance in them. Furthermore, justice could be perceived when the leader regulates in the state wisely; the industrialists do their work in a proper way with energy and likewise. These four virtues are regarded as cardinal virtues. The word *cardinal* derives from the word *cardo*, which signifies *hinge*. Regarding this, the description of cardinal virtue is the virtue which gives us the moral supports in life. Thus, wisdom is the virtue representing rationality, courage or fortitude signifies emotion, *temperance is the obedience of the desires to reason* (Sinha, 1984) and justice is the combination of the functions of the rationality, emotion, and reason in harmony. According to Plato and Aristotle, the objective of human presence should be the pursuance of virtue or excellence. This continuous endeavour for the perfection of character was considered necessarily a human activity by every being for living a better life in the social strata which are defined as happiness (Crossan et al., 2013). It is observed that along with Plato and Aristotle, Epicureans and Stoics are also the Greek philosophers who had developed the virtue ethics. For Epicurus, *virtue* plays the vital role in achieving the greatest pleasure in one's life. The concept of Aristotelian justice seems to be unobserved by Epicurus philosophy but they give importance to prudence and temperance as a virtue. The reason behind it is that Epicurus does not have connection with warriors while Aristotle has the connection. Stoics state that *Good things are those which necessarily benefit whenever they are present, and they are on this account the objects of rational desire; they are in short desirable in themselves. Moreover, according to Epicurus and Stoics, master virtue is paying particular attention to their various treatments of wisdom or particular intelligence* (Russell, 2013). It means that master virtue is that which have specific attention towards the individual management of wisdom and specific intelligence.

Aristotle gives the practical guidance for life in the real world. Regarding Aristotle, *every art and every inquiry, every action and choice, seems to aim at some good and the good has rightly been defined as that at which all things aim* (Thiroux, 2004). Virtue ethics is different form of consequentialism and deontological theories and instead of proposing rules of conduct, it concentrates on being a good person. According to Aristotle, *act as in such a way that a just person would perform* (Flannery, 2013). He explains that virtuous person is not the one who performs just acts, but the one who follows certain rules. He said that moral traits of character is more important than moral acts, therefore such characters should be developed through wisdom or practical intelligence. Practical wisdom provides the ability to see things as they are and to appreciate the particular situations. According to Aristotle, there are certain conditions to be or to feel in particular situations. In contrast, the judgment of an action is primary for ethical theories of Consequentialism and Deontology.

3. Developing Virtues for Environmental Sustainability

The term *environmental* is commonly associated with some type of human impact on natural systems. This context sets it apart from the term *ecological*, which refers to the interconnectedness of elements within a system. An ecological concept of sustainability be developed that is more in line with biological conservation, as stated above in the article *Ecological Sustainability as a Conservation Concept*. Ecological sustainability is *meeting human needs without compromising the health of ecosystems* (Morelli, 2011). This appears incongruent because the word *ecological* is commonly understood to refer to a broader framework than merely human experience. However, the term *environmental* is virtually naturally used to describe human involvement with the

ecosystem. To gain more accuracy, it is reasonable to consider *environmental* as a subset of the broader notion of *ecological*, which refers to the interface of human activities and ecological systems.

The term *sustainable* or *sustainability* underwent a rapid evolution beginning in 1987 with the publication of *Our Common Future*, followed by a more recent decline in coherency to become an often-abused term simply meaning *good* and sometimes used even without a connection to the natural environment or ecological health (Morelli, 2011). It states that, individual professions have endeavoured to construct definitions that make sense in the context of their own areas of competence and contribution, and as a result, meanings for the notion of sustainability have evolved.
The basic understanding of *environmental sustainability* presented in this paper essentially expands our common perception of human activity in order to more clearly connect it with the ecological concept of interdependence, thus delineating the boundaries of this use of *sustainability* to correspond to the overlay of human activity on the functioning of the supporting ecosystem. As a result, environmental sustainability is limited to, and even becomes a subset of, ecological sustainability. Meeting the requirements of the current generation without jeopardising future generations' ability to meet their needs is the most popular definition of sustainable development (Morelli, 2011).
Environmental sustainability can be defined as a state of balance, resilience, and interconnectedness that allows human society to meet its needs while not exceeding the capacity of its supporting ecosystems to regenerate the services required to meet those needs, nor by our actions reducing biological diversity.
As a result, in order to create ecological harmony, Aristotelian Virtue Ethics is essential. Though, Aristotle's virtue ethics emphasizes the importance of practising good deeds that become habitual over time. Our frequent good deeds are necessary for ecological harmony or environmental sustainability. In the next piece, I'll look at how Aristotelian Virtue Ethics might contribute to long-term environmental sustainability.

3.1. Virtues for Environmental Responsive Behaviour

Aristotle talks about the good life for human beings and that can only be possible when one becomes virtuous. Hence for being virtuous Aristotle introduces six types of cardinal virtues. These are courage, prudence, temperance, justice, humanity and truthfulness (Wang &Hackett, 2016). Furthermore, courage is outlined as *the willingness to engage in risk-taking behaviour either when one does not know the consequences or when the consequences might be adverse* (Corsini and Wedding, 2010). This means that courage is inculcated in persons who have unwavering determination to do what is right according to them and not to worry about the dangers of the unpleasant consequences. Prudence is the capability of using wisdom to choose not only what is good but also what is best for the individuals and planet. Temperance is the endorsement of domination to stimulate the production of moral results and also advantages. Justice is a virtue that inspires respect and acceptance of others and provides equal rights and privileges for both human and nature. Humanity motivates human beings to develop a conduct that can be modified in different situations according to different individuals and alleviate the sufferings of others. Lastly, truthfulness is the power to speak honestly and to act ethically despite being judged or disliked.
Moreover, People are born with the perspective to become virtuous and sensible, but they must first go through two stages to achieve these goals: developing proper habits and acquiring practical wisdom. This implies that first a person should develop good character in order to achieve practical wisdom. Therefore, virtue is essential for developing good character in human beings which further improves the intellectual skills. According to Aristotle, the failures of the bad person are caused by psychosomatic forces which arise because of his bad activities and decisions. He doesn't care about acting ethically, because he gets strong pleasure from his bad activities. To prevent such negative inner forces, there is a need to develop proper habit, good manners and emotional thinking from childhood. If these activities are carried out in a proper manner from childhood, then the practice will be transformed into habits which will further help in achieving the ultimate goal of human life. Human beings and natural environment are both interdependent with each other. The study of the ethical affiliation between them is called as environmental ethics which develop an appropriate understanding of human-nature relationship. Further, it decides norms and generates supervision on environmental issues by using these norms. It is therefore argued that virtue ethics is at the core of contemporary environmental ethics.
Environmental virtue ethics reflects the significance of environmentally responsive behaviour needed in life. With habituated virtues human character become ecologically sensitive, then they will seem environmentally responsive behaviour in all environmental interaction and behaviour. Even ecological sensitivity manifests many other virtues which may flourish as environmental responsive behaviours and policies (Ronald Sandler, 2004). For example, it can be demonstrated a virtuous person or ecologically dedicated people always have immense pleasure while performing different works like composting, cleaning green spaces and so on. Natural environment helps one to develop in a moral, spiritual, intellectual, physical way and it too provides health and aesthetic benefits. These natural benefits are more available to some people who are eco-sensitive and responsive towards the experience of nature.

4. Conclusion

Developing Environmental responsive virtues motivate human beings to develop their character to be moral, kind and respectable towards the whole biotic community. In every situation the practice of character building should be implemented as a means of a particular attribute because in present time it is necessary to give attention on environmental problems and to save nature from disaster. Moreover, the environmental issues also demand proper and optimum use of the natural resources to balance the eco-system. That is why we have to use the resources of nature in such a way that it can fulfil the needs of our present generation without comprising the needs of the future generation. Therefore, we need to create awareness about the serious environmental concerns among people and have to unite and work together across the world in order to save the earth. Aristotle follows Socrates and Plato in taking the virtues to be central to a well-lived life. Like Plato, he regards the ethical virtues (justice, courage, temperance and so on) as complex rational, emotional and social skills. What we need, in order to live well with the nature, is a proper appreciation of the way in which such goods as friendship, pleasure, virtue, honour and wealth fit together as a whole. In order to apply that general understanding to particular cases, we must acquire, through proper upbringing and habits, the ability to see, on each occasion, which course of action is best supported by reasons.

References

1. BERG M., HUDSON P., 1992, Rehabilitating the Industrial Revolution, *The Economic History Review, 45*(1): 24-50.
2. BISHOP W., 2013, The Role of Ethics in 21st Century Organizations, *Journal of Business Ethics*, 118(3): 635-637.
3. CREED J., 1978, Is It Wrong to Call Plato a Utilitarian?, *The Classical Quarterly*, 28(2): 349-365.
4. CROSSAN M., MAZUTIS D., SEIJTS G., 2013, In Search of Virtue: The Role of Values and Character Strengths in Ethical Decision Making,*Journal of Business Ethics*,113 567-581.
5. CORSINI R. J., WEDDING D., 2010, *Current Psychotherpi*,Cenage Learning, United States.
6. DOUGHERTY T., 2013, Agent-neutral deontology,*Philosophical Studies: An International Journal for Philosophy in the Analytic Tradition*, 163(2): 527-537.
7. ENGSTROM S., WHITING J., 1998, *Aristotle, Kant, and Stoics: Rethinking Happiness and Duty*,Cambridge University Press.
8. Environmental Laws**,**1978, 1981,http://edugreen.teri.res.in/explore/laws.htm(05.05.2020).
9. FLANNERY K., 2013, *Action and Character According to Aristotle*, Catholic University of America Press, Washington, D.C.
10. GIDDY P., 2007, Does Character Matter? Guardian Values in an Age of Commerce,*Theoria:A Journal of Social and Political Theory*, 113: 53-75.
11. HURSTHOUSE R., 1999, *On Virtue Ethics*, Oxford University Press.
12. WANG G., HACKETT R. D., 2016, Conceptualization and Measurement of Virtuous Leadership: Doing Well by Doing Good, *Journal of Business Ethics*, 137(2): 321-345.
13. JARDINS J. R., 2000, *Environmental Ethics: An Introduction to Environmental Philosophy*, Collage of Saint Benedict.
14. JOHN M., 2011, Environmental Sustainability: A Definition for Environmental Professionals,*Journal of Environmental Sustainability*, 1(1).
15. JOSEPH, 2006, *Environmental Studies (Jntu)*,Tata McGraw-Hill Education, New Delhi.
16. KASHER N., 1978, Deontology and Kant,*Revue Internationale De Philosophie*: 32(126 (4): 551-558.
17. LILLIE W., 1967, *An Introduction to Ethics*, Allied Publishers Private Limited, New Delhi.
18. MINTZ S. M., 1996, Aristotelian Virtue and Business Ethics Education, *Journal of Business Ethics*, 15(8): 827-838.
19. MURPHEY M.G., 2005, *C.I. Lewis: The Last Great Pragmatist*,United States of America, State University of New York Press.
20. PAKALUK M., 2005, *Aristotle Nichomachean Ethics: An Introduction*., United States of America: Cambridge University Press.
21. MULIA P., BEHURA A., KAR S., 2016, Categorical Imperative in Strong Sustainability, *ProblemyEkorozwoju/Problems of Sustainable Development*,11(2): 29-36.
22. PERCY R R. A., 1891, *A Short History of Ethics: Greek and Modern*. London: Macmillan and Co. Limited.
23. SANDLER R., 2004, Towards an Adequate Environmental Virtue Ethic, *Environmental Values*,13(4): 477-495.
24. RUSSELL D.C., (ed.). 2013, *The Cambridge Companion to Virtue Ethics*, Cambridge University Press.
25. SINHA J., 1984, *A Manual of Ethics*, Calcutta: New Central Book Agency.
26. SVOBODA T., 2015, *Duties Regarding Nature: A Kantian Environmental Ethic*, Routledge, New York.
27. SIMPSON P., 1992, Contemporary Virtue Ethics and Aristotle, *The Review of Metaphysics*, 45: 503-524.
28. SREEKUMAR S., 2012, An Analysis of Consequentialism and Deontology in the Normative Ethics of the Bhagavadgītā. *Journal of Indian Philosophy*, 40(3): 277-315.
29. SZOSTAK R., 2005, Interdisciplinarity and the Teaching of Public Polic,*Journal of Policy Analysis and Management*, 24(4): 853-863.
30. THIROUX J. P., 2004, *Ethics: Theory and Practice.* Pearson Prentice Hall.
31. WANKEL C., STANUSCH A. S., 2011, *Handbook of Research on Teaching Ethics in Business and Management Education*. United States of America: Information Science Reference.

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An Analysis of Ethical Theories in the Direction of Sustainable Development: Aristotelian Virtue Ethics is the Greatest Option for Long-term Sustainability

Analiza teorii etycznych w kierunku zrównoważonego rozwoju: etyka cnót arystotelesowskich jako najlepsza opcja dla długoterminowego zrównoważonego rozwoju

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Abstract

Environmental issues such as deforestation, climate change, ozone layer depletion, greenhouse effect, and pollution of air, water, and soil are among the most difficult to address. These are the results of human beings' immoral actions. Humans are the most powerful living beings on the planet, and they have abused their physical and mental abilities to fulfill their greed rather than their needs, resulting in environmental destruction. They have abused nature and exploited it for their own economic gain, giving them control over it. Furthermore, environmental degradation and human moral decline are intertwined, necessitating a moral revolution to reform human conduct for the sake of society, with a focus on Aristotelian Virtue Ethics rather than consequentialist or deontological ethics. The main focus of Aristotelian Virtue Ethics is, on what type of persons we should be, what kind of characteristics we should have, and how we should act. This leads to the development of one's character and environmental attitudes; resulting in the smart use of natural resources and, more particularly, the preservation of the natural environment, ensuring environmental sustainability.

Key words: environmental problems, Consequentialist Theory, Deontology Theory, Aristotelian Virtue Ethics, Environmental sustainability

Słowa kluczowe: problemy środowiskowe, teoria konsekwencjalistyczna, teoria deontologiczna, etyka cnót arystotelesowskich, zrównoważoność

1. Introduction

The most difficult phase in this period is the environmental problem, which includes deforestation, climate change, ozone layer depletion, greenhouse effect, and pollution of air, water, soil, and others. These environmental concerns are shared by people all throughout the world. The principal causes of this environmental degradation include industrial growth, urbanization, overpopulation, and so on, since they degrade the ecological system, which comprises both biotic and abiotic components. The expansion in the number of industries for economic gain is generating environmental damage. For example, the earth's temperature is rising dramatically as a result of basic pollutants such as the release of carbon dioxide, carbon monoxide, and other gaseous components from

factories, cars, rocket propellants, fossil fuels, and so on. This, in turn, causes climate change in our global environment (Grubler, 2003). It causes widespread weather problems and devastates the ecosystem. Environmental concerns are a major source of worry since they have a disproportionately negative impact on the biophysical environment. These activities must be halted because environmental issues pose a threat to the earth and, as a result, will have an impact on human life. We can rescue our world by using eco-friendly power technology, electric hybrid automobiles, public transportation systems, and wind power, among other things. To manage the destruction of the environment, we must adjust our practices and actions. Because environmental challenges pose a significant danger to our global environment, we believe that ethical values must be used in our daily lives in order to protect the environment. One such factor that arouses our considerable ethical concern is care for the environment. The moral principle indicates that, just as we should behave properly with people in our society, we should likewise conduct morally with the environment (Gert, 1998). As a result, our approach to nature or the environment should be ethical in character. This moral concern can lead to changes in our conduct and attitude toward nature, which can aid in the preservation of the natural environment. Humans are rational beings with duties to others and non-human nature (Svoboda, 2015). That is, moral responsibility implies knowledge, competence, choice, and value. When a person accepts moral responsibility for society and its surroundings, his every activity is aimed toward the well and liberty of other creatures. When dealing with nature, we must act with respect and care in light of these environmental issues. That is why we should not over-exploit nature and must exercise caution while exploiting natural resources.

As a result, the current research tries to comprehend how virtue ethics contribute to the transformation of human conduct for the benefit of society and the natural environment as a whole. To bring about a moral revolution, virtue ethics, particularly Aristotelian virtue ethics, is critical. Character is the most important aspect of ethical thought. Furthermore, Aristotelian Virtue Ethics is largely concerned with what type of persons we should be, what kind of personalities we should have, and how we should behave (Engstrom, Whiting, 1998). As a result, it places a premium on developing or refining a person's character. This eventually causes humans to pay attention to environmental issues. There is a need for virtue ethics in the environment to overcome these environmental concerns.

2. Consequentialist theory and Environmentalism

Consequentialism is a philosophy that examines the rightness and wrongness of an action. The goodness or badness of an action's outcomes determines whether it is right or wrong (Creed, 1987, 349). This hypothesis is based on the results of a certain activity. If the consequences are acceptable, the activity is morally good, but the bad outcomes of the action are morally wrong. This moral philosophy is best expressed in terms of the general truth that the ends justify the means (Wyka, Mathews, Clark, 2002). It indicates that the outcomes of an activity determine whether the action is good or negative. There is no moral thought as to whether the person is acting correctly or incorrectly. The evaluation of an activity is based on the results of that person’s specific conduct. Egoism and utilitarianism are two important ethical views. Both of these ideas have the same point of view: However, there is a distinction between both in that egoism emphasizes the repercussions of the individual's (humans) self-interest, whereas utilitarianism emphasizes the universal self-interest (interest of all). A moral action, according to utilitarianism, is one whose consequences are approved by a majority of people. In other words, everyone should do the action or follow the moral code that will provide the most benefit (pleasure) to everyone involved. According to Utilitarianism, the sole intrinsic worth is pleasure or the fulfilment of interest, want, and preference, whereas suffering is regarded an inherent disvalue. As a result, they claim that the appropriate activities are those that provide the greatest pleasure to the largest number of people. Utilitarians such as Jeremy Bentham and Peter Singer have maintained that the moral interests of all sentient creatures, i.e., entities capable of experiencing pleasure or suffering, including non-humans, should be taken into account (Joseph, 2006). Non-sentient items, on the other hand, do not have intrinsic worth since they cannot convey their emotions or sentiments. As a result, non-sentient elements in the environment, such as plants, rivers, mountains, and landscapes, have no inherent worth for them. However, they only serve an auxiliary purpose in the enjoyment of sentient creatures. Human-centered ethics (also known as anthropocentric theory), a branch of consequentialist philosophy, asserts that only humans have autonomous moral worth. This approach promotes attitudes, values, or actions that give precedence to human interests over the interests of other organisms in the environment. Thus, this human-centric theory assigns intrinsic value to human beings alone.

Because of the domination of human activities over nature, we are currently experiencing a variety of natural calamities such as ozone depletion, deforestation, landslides, tsunamis, and so on. All of these disasters demonstrate the need of preserving nature's equilibrium. However, the issue of how and in what method the natural ecosystem or environment may be protected emerges. In this environment, humans must first and foremost adjust their attitude toward nature, particularly in order to safeguard it. The favorable attitude toward nature inspires humans to evaluate the laws enacted for environmental conservation. Certain ethical theories or viewpoints can be used to examine the Values. It has been noticed that environmental policy are frequently influ-

enced by utilitarian concerns of consequentialism (Szostak, 2005, 854). This approach recognizes that nature should be protected in order to serve our interests, and hence the entire approach is founded on particular instrumental values, to use an ethical word. However, from an environmental standpoint, nature should not be fostered on the basis of any intrinsic worth, but rather on the basis of an extrinsic value. In this view, the values are no longer considered as inherent values of nature; rather, they are regarded as instrumental values of nature. Assume we attach moral interest to animals and natural objects, such that ascription of interests implies that they are intrinsic to them. Nature, on the other hand, will be seen as a dummy to which we shall assign values. As a result, ethical values are not inherent in nature. Despite the fact that nature is attributed instrumental values, it is nonetheless relentlessly used for negative reasons. As a result, the damaging treatment of nature should be brought to the notice of humans in order for the implications of environmental values to be realized in order to rescue nature. Environmental ethics is concerned with the values required to develop human-nature partnerships. As a result, virtue ethics such as generosity, compassion, honesty, temperance, sensibility, sensitivity, and respect should be practiced and cultivated in human conduct so that people can come forward with a clear conscience to safeguard the natural environment. We must be mindful of nature for the benefit of future generations. Because we require our natural resources to meet our fundamental requirements. We aim to suggest that we should be reasonable and cautious with our natural resources just for the sake of humans. This demonstrates that, even within the paradigm of human-centered ethics, the instrumental value of nature cannot be neglected. As a result, virtue ethics proposes that both intrinsic and instrumental values are required for environmental conservation.

3. Deontological theory and Environmentalism

The study of good and wrong behavior within a specific setting is central to the idea of ethics. As a result, the use of ethics always serves to define the limits and bounds of human actions and obligations. The ethics that apply to responsibilities or obligations towards others is referred to as Deontology by Kant. The most major and well-known contributor to deontological ethics is Kantian ethics. According to deontology ethics, the ability to act deliberately and rationally is what distinguishes humans. According to deontological theory, every human action is deemed moral and independent of consequences, which obligates humans to be accountable for their activities in contrast to other species that behave instinctively (Sreekumar, 2012, 281). This idea distinguishes two types of obligations: duties to oneself and duties to others. According to Kant, when an activity is performed with a sense of responsibility and vice versa, it is regarded commendable. As a result, the major focus of responsibility is the link between a person's acts and the autonomy of his will. The activities that are done under the responsibility are considered morally right, while the ones that are not are considered morally wrong. Kant regards moral law as the sole moral principle, and this should be represented in every human activity in order to execute appropriate deeds regardless of the circumstances. He goes on to say that responsibility should not be imposed on people, but rather should be done for the sake of the human society. He sees obligations as a moral responsibility to do an act by following to a set of norms and principles regardless of the consequence. Moral responsibility and obligation are justified by ascribing intrinsic value to the entity to which they apply. As a result, deontological theories in environmental ethics provide inherent worth to all environmental components.
According to the Greek philosopher Protagoras, man is the measure of all things. Humans are only the appraisers of all things. They even measure what they are inside. Only humans can evaluate what is going on in the environment in the event of environmental concerns. They can think about what they should do to protect the environment. When people do this, they adopt certain measures and take appropriate procedures. Animals, creatures, species, ecosystems, and the Earth as a whole cannot teach us how to make this assessment. Deontology theory is distinct from consequentialist theory. Deontology theory stresses obligations in which an activity is done regardless of its effects, whereas consequentialist theory emphasizes the outcomes of a certain action. According to these ideas, the rightness and wrongness of an activity are unrelated to the badness or goodness of its results.
It is founded on nature's deontological worth since it is only a responsibility to safeguard nature for the purpose of duty to nature. Similarly, for example, the Prevention and Control of Water Pollution Act of 1978 and the Prevention and Control of Air Pollution Act of 1981. These acts are enacted to conserve natural resources because they are beneficial to humans. To conserve nature, we need both of these fundamental attitudes. The focus of virtue ethics is on the actor rather than the action. For deontologists, virtue is only a quality that may be used to help in the performance of duties. For utilitarians, virtues are character attributes that aid in the pursuit of universal pleasure. A person's character is more significant than the laws or ideals to be followed. As a result, everything is ultimately founded on human welfare and interest.

4. Virtue Ethics

According to virtue ethics, what is fundamental for ethics is not the evaluation of acts or their effects, as deontologists and utilitarians believe, but the judgement of agents (Simpson, 1992, 503). The essential category for

moral philosophy is the good person, and the good person is the person of excellent character, the one who possesses moral virtue. Aristotle begins this chapter by questioning if the Nicomachean Ethics' designated project has been achieved. His response is no, since the goal in practise is not to think but to perform, not to comprehend virtue but to possess and exercise it. Aristotle identifies three factors that influence our ability to be good: nature, habit, and education (Simpson, 1992, 514). There is nothing we can do to secure the first's attendance. That belongs to the genuinely fortunate as a result of divine providence. In terms of the third, instruction, it will only be effective with people whose souls have been trained to appreciate and detest brilliantly. As a result, the second of Aristotle's three points, antecedent habituation, is required for teaching. If instruction is to be effective, the hearer's character must first be predisposed to virtue and already in love with the beautiful. However, the only way to do this is by adequate training beginning at a young age, which cannot be accomplished without the necessary legislation. Virtue ethics is defined as a term of art, first created to differentiate an approach in normative ethics that stresses the virtues, or moral character, in contrast to an approach that emphasizes responsibilities or laws (deontology) or one that focuses the outcome of acts (utilitarianism). As a result, virtue ethics is a normative ethical theory that emphasizes on living a virtuous life. It covers human characteristics such as compassion, generosity, and honesty, which are required for virtue ethics. These are required circumstances for the components of human flourishing and well-being. Socrates, Plato, and Aristotle were the primary proponents of virtue ethics.

Aristotle gives practical guidance for life in the real world. According to Aristotle, every art and every inquiry, every action, and choice seems to aim at some good and the good has rightly been defined as that at which all things aim (Thiroux, 2004). Virtue ethics is a different form of consequentialism and deontological theories. Instead of proposing rules of conduct, it concentrates on being a good person. According to Aristotle, act as in such a way that a just person would perform (Flannery, 2013). He argues that a virtuous person is one who follows specific principles rather than merely performing activities. He stated that moral character qualities are more significant than moral deeds, and that such attributes should be cultivated through knowledge or practical intelligence. Practical knowledge is the capacity to recognize things as they are and understand specific conditions. There are certain requirements to be or feel in specific situations, according to Aristotle. The assessment of an action, on the other hand, is central to the ethical theories of Consequentialism and Deontology. The importance of actual values in life is reflected in environmental virtue ethics. It can be proved, for example, that a moral person or an ecologically oriented person constantly has enormous joy when completing various tasks such as composting, cleaning green places, and so on.

Ethics should always be founded on value, and this implies that doing the right thing for personal gain is not virtuous. Ethics is not about what we love and enjoy, or what makes us happy; it is about what is right and what we should do, whether we like it or not. Furthermore, this should not be based on any resemblance to another human being or on what raises character.

Nature must be treated with care and respect by a decent person. This concept simply states that we are a part of nature, which dispels the myth that we are superior to nature and hence have the right to exploit it. This method resolves the conflict between teleological and deontological views of nature. A virtue like respect for nature is deontological in and of itself. It may also be interpreted as teleological. We appreciate and defend nature as a result of this concept, primarily for the sake of human well-being.

5. The Sustainability and Environmental Problems and Aristotelian Virtue Ethics

According to Aristotle's virtue ethics, pleasure signifies a sequence of good deeds. In the field of virtual ethics, this ensures an attractive unification of prudential and moral viewpoints. Aristotle’s theory sees a value differential between doing the correct thing and doing it as the virtuous person would do, and it also believes that the agent's joys, sufferings, and emotions are important. Moral virtue or excellent character is a propensity to act that may be formed by a person’s habit of conduct. Aristotle maintained in the book Nicomachean Ethics that habits shape character, which is formed via practice, such as learning to play the piano. A person’s character is formed via his numerous individual interactions, hence it is voluntary.

People are born with the potential to be virtuous and sensible, but in order to do so; they must first go through two stages: adopting correct habits and obtaining practical wisdom. This means that in order to gain practical wisdom, a person must first cultivate a decent character. As a result, virtue is necessary for the development of excellent character in humans, which in turn increases intellectual skills. According to Aristotle, a bad person's failures are produced by psychosomatic forces that originate as a result of his terrible actions and judgments. He is unconcerned about operating ethically since he derives much pleasure from his bad actions. To avoid such negative inner energies, healthy habits, excellent manners, and emotional thinking must be instilled in children from an early age. If these tasks are carried out correctly from childhood, the practice will be changed into habits, which will aid in the achievement of the ultimate objective of human existence.

Human beings and the natural environment are inextricably linked. Environmental ethics is the study of their ethical relationship, which provides an acceptable knowledge of the human-nature interaction. Using these

standards, it also decides on norms and creates monitoring on environmental concerns. As a result, environmental virtue ethics is claimed to be at the heart of current environmental ethics.
Environmental ethics is concerned with human ethical responsibilities toward nature, i.e. flora and fauna, and what is beneficial for our environment today. The environment should be loved and cared for. People differ in the context of environmental virtue and vice based on their commitment, educational ideals, and good activities. When it comes to environmental challenges, humans must pay close attention to the ecosystem. Our major responsibility is to safeguard and promote the environment, as well as to raise awareness about it in educational institutions and among the general public. The most effective way to address all environmental challenges is to promote ecological sustainability. Environmental ethics emphasizes human power and choice, recognizing that man has specific values and responsibilities to environment. The importance of actual values in life is reflected in environmental virtue ethics. For example, it can be proved that virtuous or ecologically committed people always have a great deal of fun when completing various tasks such as composting, cleaning green places, and so on. The natural environment aids in moral, spiritual, intellectual, and physical development, as well as providing health and aesthetic advantages. These natural advantages are more accessible to those people who enjoy and relate to nature. For some people, the natural world is a source of enjoyment, regeneration, wisdom, and nurture. Aristotle classified intellectual virtues according to whether they were theoretical or practical in nature. His thoughts on intellectual virtue began with a general study of ethical virtue and then narrowed the research to a specific ethical virtue, culminating in a comprehensive examination of intellectual virtues.

6. Conclusion

According to the preceding study of virtue ethics, virtue ethics is a characteristic motivation to the respectability, security, and brilliance of human activity towards the entire biotic community. Character building should be done as a method of a specific characteristic in every scenario since it is basically necessary at this time to focus on environmental concerns and save nature from disaster. Furthermore, environmental challenges necessitate the appropriate and optimal utilization of natural resources in order to maintain the ecosystem's equilibrium. That is why we must use nature's resources in such a manner that they may meet the demands of the current generation without jeopardizing the needs of future generations. Environmental protection is the activity of safeguarding the natural environment on an individual, corporate, or governmental level in order to benefit both the environment and humanity. As a result, we must raise public awareness about critical environmental challenges and unite and collaborate throughout the globe to safeguard our mother planet. Aristotelian virtue ethics encompasses qualities associated with character and moral virtues. It has been found that humans are not focused on the results of environmental challenges, despite the fact that they are a very essential component of their lives. If we want a better existence, we must consider temporary pleasures, the fate of others, and, similarly, we must become alert to each living and non-living component of the environment in order to conserve it not only for the current generation, but also for future generations.

References

1. BANKS C., 2012, *Criminal Justice Ethics: Theory and Practice*, Third edition, Sage publications.
2. CHOPRA R., 2016, Environmental degradation in India: causes and consequences. *International Journal of Applied Environmental Sciences*, 11(6): 1593-1601.
3. CREED J. L., 1978, Is It Wrong to Call Plato a Utilitarian? *The Classical Quarterly*, 28(2) 349-365.
4. ENGSTROM S., WHITING J., 1998, *Aristotle, Kant, and Stoics: Rethinking Happiness and Duty*, Cambridge University Press.
5. FLANNERY K. L., 2013, *Action and Character According to Aristotle*, The Catholic University of America Press.
6. GERT B., 1998, *Morality: Its Nature and Justification*, Oxford University Press.
7. GRUBLER A., 2003, *Technology and Global Change***,** Cambridge University Press**,** Australia.
8. JOSEPH, 2006, *Environmental Studies (Jntu)***,** Tata McGraw-Hill Education**,** New Delhi.
9. SINGH K., 2009, Environmental Degradation and Measures for Its Mitigation with Special Reference to India's Agricultural Sector, *Indian journal of agriculture and economics*, 64(1): 40-61.
10. SREEKUMAR S., 2012, An Analysis of Consequentialism and Deontology in the Normative Ethics of the 'Bhagavadgītā', *Journal of Indian Philosophy*, 40(3): 277-315.
11. SZOSTAK R., 2005, Interdisciplinarity and the Teaching of Public Policy, *Journal of Policy Analysis and Management*, 24(4): 853-863.
12. SVOBODA T., 2015, *Duties Regarding Nature: A Kantian Environmental Ethic*, Routledge.
13. THIROUX J.P., 2004, *Ethics: Theory and practice*, Pearson Prentice Hall.
14. WYKA K. A., MATHEWS P. J., CLARK W.F., 2002, *Foundations of Respiratory Care*, Cengage Learning.

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Employee Well-being and Sustainable Development: Can Occupational Stress Play Spoilsport

Dobre samopoczucie pracowników i zrównoważony rozwój: negatywna rola stresu zawodowego

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Abstract

This study examines the notion of sustainable development in corporate organizations and argues that businesses' adoption of systems/standards to support their sustainable development practices improves employee health and well-being in significant ways. Additionally, the paper analyses the effect of continual or progressive stress that employees face due to their job obligations, circumstances, surroundings, or other workplace pressures and how this affects the organization's sustainability. Given the growing importance of occupational stress due to technological innovations and global economic progress, it has developed into a worldwide sustainability concern, affecting professionals and all types of employees. Additionally, this study proposes a framework for implementing an integrated management systems (IMS) approach centered on the iterative implementation of sustainable development practices to promote employee health and well-being and minimize workplace demands. Further, the significance of studies exploring the relationship between a company's sustainable development policies, its employees' health, and well-being are explored, and future research direction was discussed.

Key words: sustainable development, well-being, occupational stress, job demands

Słowa kluczowe: zrównoważony rozwój, dobrostan, stres zawodowy, wymagania pracy

Introduction

All 193 members of the United Nations signed up to the U.N.'s Agenda 2030, a set of 17 goals for sustainable development, in September 2015. As a follow-up to the achievement of the Millennium Development Goals, these Global Goals and Agenda 2030 seek to do even more to eradicate all types of poverty. Newly adopted Sustainable Development Goals (SDGs) are unique in that they call on all countries, rich and poor alike, to take action to increase prosperity while safeguarding the planet. Each of the 17 Goals has its own set of objectives and metrics. Putting people and the world first, the 2030 Agenda for Sustainable Development focuses on three aspects of sustainability, i.e., economic, social, and environmental. This framework provides the basis for addressing the myriad issues facing humankind, including those in the workplace. The new agenda has a philosophical core of *leaving no one behind* (Kharas, McArthur, & Ohno, 2020), with the mindset to attain long-term prosperity for all people by eradicating poverty and other inequalities through the implementation of programs that improve education and health, reduce inequities, and encourage trade and industry growth while protecting the environment. The demographic and labor force statistics available with the World Bank suggest that out of 7.75 billion people worldwide, 3.4 billion individuals compose the labor force in 2020 (World Bank, n.d.a), i.e., nearly half the world's population (44%). The World Bank has also forecasted that roughly 600 million additional employment would be needed by 2030 (World Bank, n.d.a) to accommodate the world's expanding population.

Given that the typical individual spends 90,000 hours on an average working or doing anything linked to work throughout their lifetime (Peppercorn, 2019) and the existence of such a massive number of people as labor force, make it is critical to find out the role of the organization in promoting the health and wellbeing of employees while they earn their livelihood. It is pertinent to examine how promoting employee health and wellbeing helps an organization's sustainable growth in this age of global competitiveness and reshaping the business environment via eliminating trade barriers and transaction costs. Increased international and local competition and liberalization have driven firms to innovate and enhance their processes and products. In an attempt to survive in competitive marketplaces, many organizations adopt processes that result in poor working conditions, poor planning, hasty business decisions, dissatisfied employees, a boom-and-bust situation, and a loss of competitiveness. As a result, organizational processes are not sustainable, resulting in a vicious cycle of degradation and failure. Considering that the majority of firms that fail in the market do so because they place a priority on physical and financial capital but neglect to invest in human capital, which is the most critical aspect in an organization's growth and success (Chivaura & Mararike, 1998; Unger, Rauch, Frese, & Rosenbusch, 2011). In this study, we summarize our current knowledge of businesses' involvement in encouraging employee health and well-being and how this practice helps sustainable growth and vice versa. Additionally, the study will examine the impact of occupation-related stress on the interaction between organizational practices that promote health and wellbeing and resultant ramifications for individuals, companies, and employees' interpersonal relationships. The study concludes by outlining a research agenda for resolving unresolved issues about the organization's role in enhancing employee wellbeing and health via sustainable development techniques.

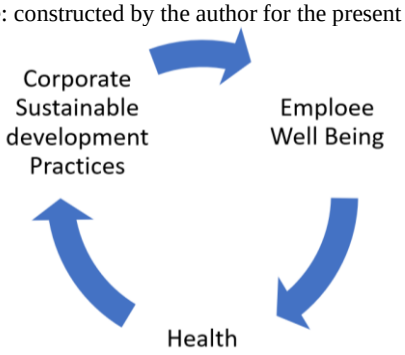
Sustainable Development

Sustainable development (S.D.) establishes a framework for attaining an environment that meets current demands without compromising future generations' capacity to achieve their own with proper regard for society, economy, and ecology (Hardi & Zdan, 1997; World Commission on Environment and Development, 1987). Numerous updates to this conception of sustainable development have taken place since the release of the Brundtland Commission's report (World Commission on Environment and Development, 1987). In the context of businesses, the Chartered Institute of Personnel and Development (CIPD, 2012) defines sustainable development as the concept of enhancing society, the environment, and the economic systems in which an organization operates. Colbert and Kurucz (2007) define sustainability requires a striking balance between economic, social, and environmental performance issues. Boudreau and Ramstad (2005) described it as achieving today's accomplishments without sacrificing tomorrow's requirements. Sustainable development is a guiding concept in philosophy that outlines a specific objective and course of action. Ecology views it as the guiding principle for the design of both artificial and natural structures. While in economics, it is a broad term that refers to the experience of reality. Scholars, however, disagree on defining sustainable development (Eden, 1994; Giddings, Hopwood, & O'Brien, 2002) as it may be limited and interpreted differently depending on the topic of study. Nonetheless, it refers holistically to the long-term sustainability of resources and ecosystems while preserving human living standards; for example, Corporate sustainability refers to the rapid, genuine, and complete growth of a firm. Business strategies and activities that fulfil the demands of the firm and its stakeholders today while also conserving, maintaining, and increasing future resources are described as sustainable development by the International Institute for Sustainable Development (1994).

To conserve, maintain, and increase future resources, organizations must pay attention to problems critical to their survival, establish an internal capacity to regularly notice challenges affecting their long-term holistic development, knowledge & skillset, strengthen their ability to battle opposing forces, and execute changes autonomously. Thus, it requires enterprises to plan for the long-term holistic growth of the company, rather than only short-term financial gains, and to assist all employees in identifying their full potential to improve their quality of life (Di Fabio, 2017). Elkington (1998) established the Triple Bottom Line idea, which asserts that shifting corporate aims make it challenging to divorce or separate intricately tied corporations from the cultures and surroundings in which they operate. While organizations may seek short-term economic benefits, those who do not consider the social and environmental consequences will become unsustainable.

When environmental and social concerns are integrated into the core strategy, measurable economic, social and ecological results may be achieved, resulting in a better work environment and more value for the business, thus meeting all three sustainable development objectives (Lloret, 2016). Achievement of sustainable development objectives results in enhancement of human and environmental resources, which is inextricably linked to worker well-being & health, causing further improvement in such strategies. Given that there is a scarcity of studies addressing this virtuous circle, as illustrated in Figure 1, future studies requires to explore the interplay between sustainable development practices, well-being, and employees and organizational health.

Figure 1. Relation between Corporate sustainable practices, Employee Wellbeing and Health, source: constructed by the author for the present study



Employee Well-being & Health

When companies are trying to move to sustainable development approaches, they face tremendous uncertainty and new hurdles that need them to be proactive, sustainable, and flexible in the event of uncertain operational and commercial contexts. (Boudreau & Ramstad, 2005; Cleveland, Byrne, & Cavanagh, 2015; Macke & Genari, 2019). According to Pfeffer (2010), organizational and work practices may have an even more detrimental and widespread impact on humans and the social environment than their effects on the physical world. Scientific debates around employee wellbeing began relatively recently when the World Health Organization (WHO) defined health as *a state of complete physical, mental and social well-being and not merely the absence of disease or infirmity* (World Health Organization, 2014). Employee health is a proxy for human sustainability and wellbeing since there is evidence that organizational actions about employee management and compensation dramatically influence employee health and wellbeing (Pfeffer, 2010). According to Redington (2005), workers are a critical group of stakeholders for a business. Employees are said to contribute to all aspects of a business, making them a critical asset in assisting the business's growth (Steenkamp & Kashyap, 2010); consequently, human resources are viewed as one of the most critical assets defining an organization's success (Prasetyo & Kistanti, 2020; Tamasevicius, Diskiene, & Stankeviciene, 2020). Focusing on employee wellbeing is crucial for workplace resilience development since it directly impacts employee work behavior, attendance, and on-the-job performance. It also establishes a competitive advantage for a firm (Boles, Pelletier, & Lynch, 2004). Health, wellbeing, human capital, and organizational performance are all dependent and have a significant impact on each other; for example, NextJump, an e-commerce company, has made employee wellbeing a core value. The company believes that if you look after your employees, they will look after your company (Kegan & Lahey, 2016). These methods aided them in reaching a five-year compound annual growth rate of 30 percent in e-commerce sales, which increased by an average of 120 percent during the last three financial years as reported in 2015 (Institute for Health and Productivity Studies, 2015). It indicates that businesses that are actively contributing to their employees' health and wellbeing are getting significant performance benefits. Sometimes individuals experience severe stress because job expectations and pressures do not align with their knowledge and resources. This stress outweighs any potential advantages provided by an organization's support of wellbeing and sometimes presents a danger to employee health. Stress levels vary by profession and demographic group, and an adverse work environment accelerates the ruin and obliteration of an organization.

Occupational Stress: The Spoilsport

Occupational stress is a state when a worker's skills or resources are insufficient to meet the demands of the job, resulting in detrimental physical and emotional reactions or consequences. Occupational stress occurs in all jobs; it is a widespread occurrence connected with an emotional or bodily sense of strain. Employee stress is influenced by job-related, individual, organizational, and environmental variables and has long been regarded as a poisonous component of the work environment, often connected with poor psychological and physical health. The job itself has obligations, ambiguous responsibilities, fluctuating & higher workload, and conflicts, all of which may contribute to employee stress (Gignac & Appelbaum, 1997; Robinson, Clements, & Land, 2003; Tummers, Landeweerd, & van Merode, 2002). Sustainability as a constant process of improvement may initially cause high levels of stress among workers. This tension may reduce over time with ongoing incremental improvements if the change process benefits employees' health and well-being. However, if the transformation process results in excessive workplace stress and uncontrollable negative consequences, it may create a vicious cycle of degradation and obliteration. Workplace stress may have a severe impact on one's physical health as well as one's mental well-being, resulting in a vicious cycle that harms both the individual and the organization and poses severe hazards to workers' health and wellbeing. Additionally, occupational stress may result in exhaustion on all levels: physical, emotional, and mental (Shokrpour , Spickard, Jr, 2002), resulting in absenteeism (Eriksen, 2003; Heo, Leem, Park,

Jung, & Kim, 2015; Van Der Feltz-Cornelis, Varley, Allgar, & de Beurs, 2020), the intention of leaving the workplace (Lo, Chien, Hwang, Huang, & Chiou, 2018; Mosadeghrad, 2013; Said & El-Shafei, 2021; Villanueva & Djurkovic, 2009), loss of caring, significant errors and higher practicing mistakes (Davey et al., 2014; Roll, Siu, Li, & De Witte, 2019), personal dysfunctions (Parker & DeCotiis, 1983), which impact individual performance (Darmody & Smyth, 2016; Motowidlo, Packard, & Manning, 1986; Pithers & Fogarty, 1995), as well as organizational performance (Hamidi & Eivazi, 2010; Keshavarz & Mohammadi, 2011). Additinally, it also affects individual level factors such as work-life quality (Alireza, Rezaeean, Bolhari, & Zare, 2012; Yang, Ge, Hu, Chi, & Wang, 2009), morale (Schaefer & Moos, 1996), motivation (Li et al., 2014), job satisfaction (Hoboubi, Choobineh, Kamari Ghanavati, Keshavarzi, & Akbar Hosseini, 2017; Richardsen & Burke, 1991), mental and social illness such as chronic fatigue (Huang et al., 2019; Williamson & Friswell, 2013), disordered eating (King, Vidourek, & Schwiebert, 2009; Stammers et al., 2020), headaches (Santos et al., 2014; Van der Doef & Schelvis, 2019), elevated blood pressure (Gasperin, Netuveli, Dias-da-Costa, & Pattussi, 2009; Gilbert-Ouimet, Trudel, Brisson, Milot, & Vézina, 2014; Vrijkotte, van Doornen, & de Geus, 2000), enhanced risk of heart disease (Kivimäki & Kawachi, 2015; Kivimäki et al., 2018), musculo - skeletal pains (Buscemi, Chang, Liston, McAuley, & Schabrun, 2017; Carayon, Smith, & Haims, 1999), sleeping problems (Kim et al., 2011; Knudsen, Ducharme, & Roman, 2007), anxiety (Desouky & Allam, 2017; Rada & Johnson-Leong, 2004), suicidal thoughts (Fridner et al., 2009; Loerbroks et al., 2016), and disruption of family life (Repetti & Wang, 2017; Zarra-Nezhad, Moazami-Goodarzi, Hasannejad, & Roushani, 2010).

Stress at work is a severe health hazard in the contemporary workplace. It accounts for a considerable portion of the total physical disease, drug misuse, and family issues that millions of blue- and white-collar employees face. Occupational stress may result in physical stress, impairing employees' attention, focus, and the ability to make decisions and use judgments (Shapiro, Astin, Bishop, & Cordova, 2005). Occupational stress is an ongoing condition induced by job situations that adversely affect employees' career advancement and overall wellbeing. These effects place a burden on scholars of organizational behavior and organizational psychology to assess changes in work and employment patterns (Cascio & Montealegre, 2016) and to rethink organizational structure to make it more organic and evolving in capitalizing on technological advancements while also providing a stress-free environment for employees to grow and develop.

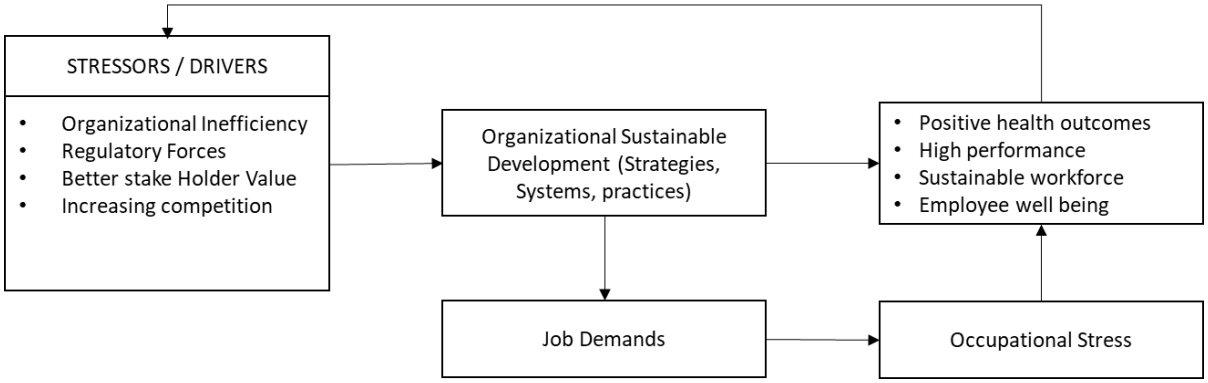
Impact of occupational stress on organization sustainable development practices and employee

The availability of resources and technological advancements and the desire to strive toward more sustainable societies have made health and well-being a top priority in the sustainability debate (Lozano, 2012). Sustainability is a triple-bottom-line strategy that combines social and environmental obligations with financial objectives to provide value for both the business and society (Rankin et al., 2011). Business leaders and managers must realize how economic, social, and ecological benefits are intertwined and how they affect the long-term viability of a sustainability transition. It is necessary to identify and examine the systems and processes that promote sustainable performance and build a vision for sustainability to achieve long-term organizational transformation for sustainability. Managers often miss the variables that lead to resistance to sustainable change and the ones that assist the organizational transformation toward sustainable performance (Kotter & Schlesinger, 1989). Even though manufacturing's enormous environmental and social impact has brought sustainability to the fore, most manufacturing companies continue to prioritize economic sustainability more than social & ecological sustainability (Trianni, Cagno, & Neri, 2017). Zhu (2016), on the other hand, revealed that government regulations, rapid technological progress, and economic benefits had encouraged numerous sectors to investigate changes that promote long-term viability and sustainability. Managing change for sustainability in an organization involves a thorough awareness of the barriers and facilitators (Liu & Bai, 2014). Determine which company activities substantially influence sustainability challenges such as labor practices, workforce diversity, and energy consumption. These beliefs, commitments, and ambitions may be included in a sustainable strategy tailored to the organization's specific needs. Clearly defined goals and objectives will certainly enhance business sustainability performance by focusing on issues that are of importance and need to be addressed. As a result, policies and initiatives for enhancing sustainable performance may be successfully implemented. These might range from simple tweaks to established practices to whole new methods of conducting business. They may take the form of new technological investments, product or process redesigns, or R&D expenses. Additionally, they may include initiatives that encourage ethical sourcing, workforce diversity, and more strict rules of behaviour. Whether proactive or reactive, all of these programmes seek to improve workers' wellbeing and health, resulting in increased performance in the company's operations. Additionally, Companies may also conduct community surveys to gauge public impression of their sustainability initiatives, as well as develop community advisory committees to improve stakeholder relations.

Making such transformations is a substantial task and requires considerable effort to implement throughout a large and complicated organization. Numerous businesses have implemented management systems to improve their processes, but most are fragmented and focused on a restricted scope or a single organization area. These existing management systems, processes, and structures must be enhanced further to provide a complete foundation for

sustainability (Sealy, Wehrmeyer, France, & Leach, 2010), emphasizing quality and economics and balance against the other two components of sustainable development, namely social and environmental. International Standards Organization (ISO) has developed several standards that can be implemented as a stand-alone system to standardize specific processes or as a mutually exclusive set of multiple standards (ISO, n.d.). This integrated use of management systems/standards, called Integrated Management Systems (IMS), assists management in developing the framework necessary for corporate sustainability. Integrated Management Systems (IMS) support businesses as they select, plan, and execute their strategy for identifying, measuring, and managing their duties and risks methodically and appropriately, contributing to sustainable development. Numerous businesses have relied on Integrated Management Systems (IMS) to aid them in picking, planning, and executing their strategic choices. However, without a proper organizational structure and management processes, firms may be unable to gain the full advantages of sustainable performance. As seen in figure 2, businesses need to align plan, structure, and operational processes to better align activities and encourage employees to embrace a long-term strategy that is financially viable and environmentally friendly.

Figure 2. Alignment of plan, structure, and operational processes, source: Constructed by the author for the present study



Employees enthusiastic, motivated, and engaged are crucial sources of competitive advantage (Macey, Schneider, Barbera, & Young, 2011). When workforces are engaged, they are optimistic and enthusiastic about their work and eager to help the organization achieve its goals and objectives (Macey et al., 2011). However, employees' energy and wellness are depleted due to change-related job demands, including mental, physical, psychological, and interpersonal adaptations caused by a change in the work setting. Apart from the demands associated with pressures at work, such as uncertainty in one's position, conflict in one's role, everyday hassles, psychological demands (Albrecht, Bakker, Gruman, Macey, & Saks, 2015), also aids the occupational stress. As a result of the requirement to learn new skills, habits and inculcate the new organizational culture during times of organizational change process, employees are likely to be exposed to higher work demands and disruption of old colleague connections and networks (Richardsen & Burke, 1991). With the increasing need for sustainability, Change-related job demands will almost certainly grow more prominent, considering it is part of the continuing change process inside the company. Additionally, workload, uncertainty, insecurity at work, conflicting roles, ambiguity in the role, and psychological demands have all been identified as occupational and organizational demands (Bordia, Hunt, Paulsen, Tourish, & DiFonzo, 2004; Goksoy, 2012; Hetty van Emmerik, Bakker, & Euwema, 2009; Rafferty & Griffin, 2006; Simpson, 1998; Smollan, 2015) that can have a detrimental effect on employee attitudes toward organizational transformation process. According to Lee, Sharif, Scandura, & Kim (2017), when workers face such job pressures, *they are more likely to react adversely to the shift and disengage from organizational transformation* may worsen work-related stress and create a vicious cycle by depleting energy and impacting the amount of strain and burnout, eventually resulting in adverse employee outcomes such as tiredness, a sense of occupational stress, and decreased wellbeing. (Fein, Skinner, & Machin, 2017).

Agenda for Research

Sustainability is a complex subject that requires further theoretical and empirical investigation to grasp fully, notably its function in boosting employee health and wellbeing and vice versa. Additionally, stress is seen as a universal phenomenon that affects all working-class people. Hence, the significance of occupational stress in adopting sustainable measures by corporations/organizations must also be investigated. Organizational practices such as excessive work overload, job instability, inadequate training, insufficient remuneration, and limited career options cause stress in the workforce (Menéndez-Espina et al., 2019; *Occupational health: Stress at the workplace*, 2014; Wong, Chan, & Ngan, 2019). The work environment, which may include resource constraints, interpersonal conflicts, and ineffective management approaches, maybe stressful (Bhui, Dinos, Galant-Miecznikowska, de Jongh, & Stansfeld, 2016; Michie, 2003; Mulki, Jaramillo, Goad, & Pesquera, 2015; Snyder et al., 2020). Workers in

Healthcare, Education, and Informational Technology sector have been the focus of most studies that examined how workplace stress affects their health and well-being (De Simone, Cicotto, & Lampis, 2016; Dhar & Dhar, 2010; Guglielmi & Tatrow, 1998; Thong & Yap, 2000; Zhang et al., 2020). Prior research on manufacturing employees has primarily focused on occupational exposure to study associated health risks (Capleton & Levy, 2005; Lai & Huang, 2019; Myers et al., 2003; Yari, Asadi, & Varmazyar, 2016), however little attention has been paid to their psychological health and wellbeing and its relations with organizational sustainable development practices. Sustainability integrates economic, social, and environmental concerns into organizational plans; it is necessary to understand its impact on organizations and stakeholders. Several critical concerns that need to be addressed are:

a) Who are the various stakeholders with whom organizations may work to accomplish various sustainability goals?
b) What is the nature of the interaction between the organization and its stakeholders in terms of sustainability??
c) What kind of partnership between an organization and its stakeholders promotes sustainability most effectively?
d) Does occupational stress play a detrimental role in corporate sustainability?
e) How standards/systems be integrated to help organizations in achieving sustainability?

Developing robust theories and successful economic, environmental, and social sustainability practices is critical in organizational behavior research. Future research efforts in sustainability may offer some insight on some of the topics mentioned above. The relationship between sustainability representations and behavioral consequences is intriguing and warrants more research exploration. The role of stakeholders in achieving sustainability necessitates collaborative capacity building to boost business performance (Bal, Bryde, Fearon, & Ochieng, 2013; Fallon, 2013). A more productive and sustainable workforce that is better equipped to work together as a team requires a commitment to a common goal, optimism about success, receptive to knowledge sharing, and capable of coping with occupational stress.

Conclusion

In concluding this research, it is critical to recollect the paper's objective of recognizing the role of workplace and organizational sustainability practices on employees' health and well-being and the detrimental influence of occupational stress on employees due to the organizational change process to promote sustainability in the organization . When considering the function of industries in a nation, whether manufacturing, service or any other, each must play a unique role. Their contribution will be critical to the country's adopted Sustainable Development Goals (SDGs). Organizations must establish priorities that will guide their actions toward achieving the SDGs, ensuring that their effect benefits, not hinders, their sustainability and contributes to the advancement of society, nation, and the world at large.

Achieving sustainability in organizations requires the engagement of all stakeholders and organizational leadership commitment at all levels to ensure broad participation and consensus building in adopting sustainable development practices by the organizations. However, uncertainty, demands, and volatility in today's world of work put pressure on the workforce and cause occupational stress, which endangers employees' psychological and physical wellbeing and the organizational goal of achieving sustainability. Consequently, employees' outputs are of inferior quality, and they cannot meet their common work objectives and support the organization's sustainability initiatives. Additionally, a greater risk of stressed personnel acquiring different illnesses, poorer organizational identification, higher turnover intentions, worse job satisfaction, and uncordial industrial relations result in higher financial costs to organizations.

Further, overburdened and under-motivated employees are less likely to develop new innovative ideas for creating services/products to help organizations sustain in the marketplace. Thus, an organization cannot accomplish its sustainability goals unless the people who work are content, healthy, engaged, and experiencing just the right amount of stress to spur productivity and innovation.

To maintain a competitive edge in the face of an epidemic like the COVID-19 outbreak, companies must use technology and data in new ways to reconfigure their primary processes, increase the breadth and scale of innovation to improve decision-making, gain speed and agility. However, as a consequence of these changes, employees will experience a significant rise in stress. Though eliminating all work-related stress is impossible, however, implementing meaningful changes to reduce stress requires the implementation of an integrated management system that gradually improves processes and procedures to provide employees with resources to manage their stress in high-demand situations better and involves all stakeholders intending to create a healthy organization as part of a healthy society by including all stakeholders and promoting sustainability. However, an organization's focus on short-term financial gains and a lack of humanistic principles may have severe implications for employee health and psychology, negatively impacting business outcomes and disrupting industrial relations. With each new round of conflicts and fights that the organization is involved in, the situation only worsens and causes a constant threat to the organization's existence. Being constantly engaged in survival strategy rather than development strategy,

organizations fail to recognize & work towards the United Nations' 2030 Agenda for Sustainable Development Goals, which will be destructive to the organization, its members, society, nation, and the world at large.

This highlights the critical link between organizational sustainable development practices, Employee wellbeing, and Occupational stress. Given the lack of research exploring this relationship, it is necessary to investigated the association between them.

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References

1. ALBRECHT S.L., BAKKER A.B., GRUMAN J.A., MACEY W.H., SAKS A.M., 2015, Employee engagement, human resource management practices and competitive advantage: An integrated approach, *Journal of Organizational Effectiveness: People and Performance*, 2(1): 7-35, DOI: 10.1108/JOEPP-08-2014-0042.
2. ALIREZA B., REZAEEAN A., BOLHARI J., ZARE F., 2012, The impact of occupational stress on quality of work life among the staff of e-workspace, *International Journal of Psychological and Behavioral Sciences*, 6(7): 1739-1743, DOI: 10.5281/ZENODO.1083047.
3. BAL M., BRYDE D., FEARON D., OCHIENG E., 2013, Stakeholder Engagement: Achieving Sustainability in the Construction Sector, *Sustainability*, 5(2): 695-710, DOI: 10.3390/su5020695.
4. BHUI K., DINOS S., GALANT-MIECZNIKOWSKA M., DE JONGH B., STANSFELD S., 2016, Perceptions of work stress causes and effective interventions in employees working in public, private and non-governmental organisations: a qualitative study, *BJPsych Bulletin*, 40(6): 318-325, DOI: 10.1192/pb.bp.115.050823.
5. BOLES M., PELLETIER B., LYNCH W., 2004, The Relationship Between Health Risks and Work Productivity, *Journal of Occupational and Environmental Medicine*, 46(7): 737-745, DOI: 10.1097/01.jom.0000131830.45744.97.
6. BORDIA P., HUNT E., PAULSEN N., TOURISH D., DIFONZO, N., 2004, Uncertainty during organizational change: Is it all about control?, *European Journal of Work and Organizational Psychology*, 13(3): 345-365, DOI: 10.1080/13594320444000128.
7. BOUDREAU J. W., RAMSTAD P. M., 2005, Talentship, talent segmentation, and sustainability: A new HR decision science paradigm for a new strategy definition, *Human Resource Management*, 44(2): 129-136, DOI: 10.1002/hrm.20054.
8. BUSCEMI V., CHANG W. J., LISTON M. B., MCAULEY J. H., SCHABRUN S., 2017, The role of psychosocial stress in the development of chronic musculoskeletal pain disorders: protocol for a systematic review and meta-analysis, *Systematic Reviews*, 6(1): 1-5, DOI: 10.1186/s13643-017-0618-0.
9. CAPLETON A. C., LEVY L. S., 2005, An overview of occupational benzene exposures and occupational exposure limits in Europe and North America, *Chemico-Biological Interactions*, 153: 43-53, DOI: 10.1016/j.cbi.2005.03.007.
10. CARAYON P., SMITH M. J., HAIMS M. C., 1999, Work Organization, Job Stress, and Work-Related Musculoskeletal Disorders, Human Factors, *The Journal of the Human Factors and Ergonomics Society*, 41(4): 644-663, DOI: 10.1518/001872099779656743.
11. CASCIO W. F., & MONTEALEGRE R., 2016, How Technology Is Changing Work and Organizations, *Annual Review of Organizational Psychology and Organizational Behavior*, 3(1): 349-375, DOI: 10.1146/annurev-orgpsych-041015-062352.
12. CHIVAURA V. G., MARARIKE C. G., 1998, *The human factor approach to development in Africa*, University of Zimbabwe Publications, Mount Pleasant, Harare, Zimbabwe.
13. CIPD, 2012, *Responsible and Sustainable Business: HR leading the way – A collection of 'thought pieces',* Chartered Institute of Personnel and Development, London.
14. CLEVELAND J. N., BYRNE Z. S., CAVANAGH T. M., 2015, The future of HR is RH: Respect for humanity at work, *Human Resource Management Review*, 25(2): 146-161, DOI: 10.1016/j.hrmr.2015.01.005.
15. COLBERT B., KURUCZ E., 2007, Three Conceptions of Triple Bottom Line Business Sustainability and the Role for HRM, *Human Resource Planning*, 30(1): 21-29.
16. DARMODY M., SMYTH E., 2016, Primary school principals' job satisfaction and occupational stress, *International Journal of Educational Management*, 30(1): 115-128, DOI: 10.1108/IJEM-12-2014-0162.
17. DAVEY A., BANSAL R., SHARMA P., DAVEY S., SHUKLA A., SHRIVASTAVA K., 2014, Occupational stress among staff nurses: Controlling the risk to health, *Indian Journal of Occupational and Environmental Medicine*, 18(2): 52, DOI: 10.4103/0019-5278.146890.
18. DE SIMONE S., CICOTTO G., LAMPIS, J., 2016, Occupational stress, job satisfaction and physical health in teachers, *European Review of Applied Psychology*, 66(2): 65-77, DOI: 10.1016/j.erap.2016.03.002.
19. DESOUKY D., ALLAM H., 2017, Occupational stress, anxiety and depression among Egyptian teachers, *Journal of Epidemiology and Global Health*, 7(3): 191-198, DOI: 10.1016/j.jegh.2017.06.002.
20. DHAR R. L., & DHAR M., 2010, Job stress, coping process and intentions to leave: A study of information technology professionals working in India, *The Social Science Journal*, 47(3): 560-577, DOI: 10.1016/j.soscij.2010.01.006.
21. DI FABIO A., 2017, The Psychology of Sustainability and Sustainable Development for Well-Being in Organizations, *Frontiers in Psychology*, 8: 1534, DOI: 10.3389/fpsyg.2017.01534.
22. EDEN S. E., 1994, Using sustainable development: The business case, *Global Environmental Change*, 4(2): 160-167, DOI: 10.1016/0959-3780(94)90050-7.
23. ELKINGTON J., 1998, *Cannibals with forks: the triple bottom line of 21st century business*, New Society, Stony Creek, CT.

24. ERIKSEN W., 2003, Work factors as predictors of sickness absence: a three month prospective study of nurses' aides, *Occupational and Environmental Medicine*, 60(4): 271-278, DOI: 10.1136/oem.60.4.271.
25. FALLON W., 2013, Sustainability, stakeholders and the nature of the firm., *Sustainability in Australian Business: Principles and Practice*, ed. Moscardo G., John Wiley and Sons Australia, Milton, Qld. 33-66.
26. FEIN E. C., SKINNER N., MACHIN M. A., 2017, Work Intensification, Work–Life Interference, Stress, and Well-Being in Australian Workers, *International Studies of Management & Organization*, 47(4): 360-371, DOI: 10.1080/00208825.2017.1382271.
27. FRIDNER A., BELKIC K., MARINI M., MINUCCI D., PAVAN L., SCHENCK-GUSTAFSSON K., 2009, Survey on recent suicidal ideation among female university hospital physicians in Sweden and Italy (the HOUPE study): Cross-sectional associations with work stressors, *Gender Medicine*, 6(1): 314-328, DOI: 10.1016/j.genm.2009.04.006.
28. GASPERIN D., NETUVELI G., DIAS-DA-COSTA J. S., PATTUSSI M. P., 2009, Effect of psychological stress on blood pressure increase: a meta-analysis of cohort studies, *Cadernos de Saúde Pública*, 25(4): 715-726, DOI: 10.1590/S0102-311X2009000400002.
29. GIDDINGS B., HOPWOOD B., O'BRIEN G., 2002, Environment, economy and society: fitting them together into sustainable development, *Sustainable Development*, 10(4): 187-196, DOI: 10.1002/sd.199.
30. GIGNAC A., APPELBAUM S. H., 1997, The impact of stress on customer service representatives: a comparative study, *Journal of Workplace Learning*, 9(1): 20-33, DOI: 10.1108/13665629710160421.
31. GILBERT-OUIMET M., TRUDEL X., BRISSON C., MILOT A., VÉZINA M., 2014, Adverse effects of psychosocial work factors on blood pressure: systematic review of studies on demand–control–support and effort–reward imbalance models, *Scandinavian Journal of Work, Environment & Health*, 40(2): 109-132, DOI: 10.5271/sjweh.3390.
32. GOKSOY A., 2012, The impact of job insecurity, role ambiguity, self-monitoring and perceived fairness of previous change on individual readiness for change, *Journal of Global Strategic Management*, 1(6): 102-111, DOI: https://doi.org/10.20460/jgsm.2012615790.
33. GUGLIELMI R. S., TATROW K., 1998, Occupational Stress, Burnout, and Health in Teachers: A Methodological and Theoretical Analysis, Review of Educational Research, 68(1): 61-99, DOI: 10.3102/00346543068001061.
34. HAMIDI Y., & EIVAZI Z., 2010, The Relationships Among Employees' Job Stress, Job Satisfaction, and the Organizational Performance of Hamadan Urban Health Centers, *Social Behavior and Personality: an international journal*, 38(7): 963-968, DOI: 10.2224/sbp.2010.38.7.963.
35. HARDI P., ZDAN T. J., 1997, Assessing sustainable development: principles in practice, *International Institute for Sustainable Development*, Winnipeg.
36. HEO Y. S., LEEM J. H., PARK S. G., JUNG D. Y., KIM H. C., 2015, Job stress as a risk factor for absences among manual workers: a 12-month follow-up study, *Industrial health*, 53(6): 542-552, DOI: 10.2486/indhealth.2015-0021.
37. HETTY VAN EMMERIK I. J., BAKKER A. B., EUWEMA M. C., 2009, Explaining employees' evaluations of organizational change with the job-demands resources model, Career Development International, 14(6): 594-613, DOI: 10.1108/13620430910997312.
38. HOBOUBI N., CHOOBINEH A., KAMARI GHANAVATI F., KESHAVARZI S., AKBAR HOSSEINI A., 2017, The Impact of Job Stress and Job Satisfaction on Workforce Productivity in an Iranian Petrochemical Industry, *Safety and Health at Work*, 8(1): 67-71, DOI: 10.1016/j.shaw.2016.07.002.
39. HUANG H., LIU L., YANG S., CUI X., ZHANG J., WU H., 2019, Effects of job conditions, occupational stress, and emotional intelligence on chronic fatigue among Chinese nurses: a cross-sectional study, *Psychology Research and Behavior Management*, 12: 351-360, DOI: 10.2147/PRBM.S207283.
40. INSTITUTE FOR HEALTH AND PRODUCTIVITY STUDIES, 2015, *Next Jump*, Johns Hopkins University, Baltimore, https://www.jhsph.edu/research/centers-and-institutes/institute-for-health-and-productivity-studies/_docs/promoting-healthy-workplaces/NEXT%20JUMP.pdf (31.10.2021).
41. ISO, *Sustainable Development Goals*, https://www.iso.org/sdgs.html (01.11.2021).
42. KEGAN R. & LAHEY L. L., 2016, *An everyone culture: becoming a deliberately developmental organization*, Harvard Business Review Press, Boston, Massachusetts.
43. KESHAVARZ M. & MOHAMMADI R., 2011, Occupational stress and Organizational performance, Case study: Iran, *Procedia – Social and Behavioral Sciences*, 30: 390-394, DOI: 10.1016/j.sbspro.2011.10.077.
44. KHARAS H. J., MCARTHUR J. W., OHNO I., 2020, *Leave no one behind: time for specifics on the Sustainable Development Goals*, Brookings Institution Press, Washington, D. C.
45. KIM H., KIM B., MIN K., MIN J., HWANG S., PARK S., 2011, Association between Job Stress and Insomnia in Korean Workers, *Journal of Occupational Health*, 53(3): 164-174, DOI: 10.1539/joh.10-0032-OA.
46. KING K. A., VIDOUREK R., SCHWIEBERT M., 2009, Disordered eating and job stress among nurses, *Journal of Nursing Management*, 17(7): 861-869, DOI: 10.1111/j.1365-2834.2009.00969.x.
47. KIVIMÄKI M., KAWACHI I., 2015, Work Stress as a Risk Factor for Cardiovascular Disease, *Current Cardiology Reports*, 17(9): 74, DOI: 10.1007/s11886-015-0630-8.
48. KIVIMÄKI M., PENTTI J., FERRIE J. E., BATTY G. D., NYBERG S. T., JOKELA M., VIRTANEN M., ALFREDSSON L., DRAGANO N., FRANSSON E. I., GOLDBERG M., KNUTSSON A., KOSKENVUO M., KOSKINEN A., KOUVONEN A., LUUKKONEN R., OKSANEN T., RUGULIES R., SIEGRIST J., SINGH-MANOUX A., SUOMINEN S., THEORELL T., VÄÄNÄNEN A., VAHTERA J., WESTERHOLM P. J. M., WESTERLUND H., ZINS M., STRANDBERG T., STEPTOE A., DEANFIELD J., 2018, Work stress and risk of death in men and women with and without cardiometabolic disease: a multicohort study, *The Lancet Diabetes & Endocrinology*, 6(9): 705-713, DOI: 10.1016/S2213-8587(18)30140-2.
49. KNUDSEN H. K., DUCHARME L. J., ROMAN P. M., 2007, Job stress and poor sleep quality: Data from an American sample of full-time workers, *Social Science & Medicine*, 64(10): 1997-2007, DOI: 10.1016/j.socscimed.2007.02.020.

50. KOTTER J. P., SCHLESINGER L. A., 1989, *Choosing Strategies for Change, Readings in Strategic Management*, eds. Asch D. and Bowman C., Macmillan Education UK, London, 294-306.
51. LAI A. J., HUANG C. Y., 2019, *Effect of Occupational Exposure to Noise on the Health of Factory Workers*, Procedia Manufacturing, 39: 942-946, DOI: 10.1016/j.promfg.2020.01.395.
52. LEE K., SHARIF M., SCANDURA T., KIM J., 2017, Procedural justice as a moderator of the relationship between organizational change intensity and commitment to organizational change, *Journal of Organizational Change Management*, 30(4): 501-524, DOI: 10.1108/JOCM-08-2015-0139.
53. LI L., HU H., ZHOU H., HE C., FAN L., LIU X., ZHANG Z., LI H., SUN T., 2014, Work stress, work motivation and their effects on job satisfaction in community health workers: a cross-sectional survey in China, *BMJ Open*, 4(6): e004897–e004897, DOI: 10.1136/bmjopen-2014-004897.
54. LIU Y., BAI Y., 2014, An exploration of firms' awareness and behavior of developing circular economy: An empirical research in China, *Resources, Conservation and Recycling*, 87: 145-152, DOI: 10.1016/j.resconrec.2014.04.002.
55. LLORET A., 2016, Modeling corporate sustainability strategy, *Journal of Business Research*, 69(2): 418-425, DOI: 10.1016/j.jbusres.2015.06.047.
56. LO W. Y., CHIEN L. Y., HWANG F. M., HUANG N., CHIOU S. T., 2018, From job stress to intention to leave among hospital nurses: A structural equation modelling approach, *Journal of Advanced Nursing*, 74(3): 677-688, DOI: 10.1111/jan.13481.
57. LOERBROKS A., CHO S. I., DOLLARD M. F., ZOU J., FISCHER J. E., JIANG Y., ANGERER P., HERR R. M., LI J., 2016, Associations between work stress and suicidal ideation: Individual-participant data from six cross-sectional studies, *Journal of Psychosomatic Research*, 90: 62-69, DOI: 10.1016/j.jpsychores.2016.09.008.
58. LOZANO R., 2012, Towards better embedding sustainability into companies' systems: an analysis of voluntary corporate initiatives, *Journal of Cleaner Production*, 25: 14-26, DOI: 10.1016/j.jclepro.2011.11.060.
59. MACEY W. H., SCHNEIDER B., BARBERA K. M., YOUNG, S. A., 2011, *Employee Engagement: Tools for Analysis, Practice, and Competitive Advantage*, Wiley, Hoboken.
60. MACKE J., GENARI D., 2019, Systematic literature review on sustainable human resource management, *Journal of Cleaner Production*, 208: 806-815, DOI: 10.1016/j.jclepro.2018.10.091.
61. MENÉNDEZ-ESPINA S., LLOSA J. A., AGULLÓ-TOMÁS E., RODRÍGUEZ-SUÁREZ J., SÁIZ-VILLAR R., & LAHSERAS-DÍEZ H. F., 2019, Job Insecurity and Mental Health: The Moderating Role of Coping Strategies From a Gender Perspective, *Frontiers in Psychology*, 10: 286, DOI: 10.3389/fpsyg.2019.00286.
62. MICHIE S., 2003, Reducing work related psychological ill health and sickness absence: a systematic literature review, *Occupational and Environmental Medicine*, 60(1): 3-9, DOI: 10.1136/oem.60.1.3.
63. MOSADEGHRAD A. M., 2013, Occupational Stress and Turnover Intention: Implications for Nursing Management, *International Journal of Health Policy and Management*, 1(2): 169-176, DOI: 10.15171/ijhpm.2013.30.
64. MOTOWIDLO S. J., PACKARD J. S., MANNING M. R., 1986, Occupational stress: Its causes and consequences for job performance, *Journal of Applied Psychology*, 71(4): 618-629, DOI: 10.1037/0021-9010.71.4.618.
65. MULKI J. P., JARAMILLO F., GOAD E. A., PESQUERA M. R., 2015, Regulation of emotions, interpersonal conflict, and job performance for salespeople, *Journal of Business Research*, 68(3): 623-630, DOI: 10.1016/j.jbusres.2014.08.009.
66. MYERS J. E., THOMPSON M. L., RAMUSHU S., YOUNG T., JEEBHAY M. F., LONDON L., ESSWEIN E., RENTON K., SPIES A., BOULLE A., NAIK I., IREGREN A., REES D. J., 2003, The Nervous System Effects of Occupational Exposure on Workers in a South African Manganese Smelter, *Neuro Toxicology*, 24(6): 885-894, DOI: 10.1016/S0161-813X(03)00081-0.
67. PARKER D. F., DECOTIIS T. A., 1983, Organizational determinants of job stress, *Organizational Behavior and Human Performance*, 32(2): 160-177, DOI: 10.1016/0030-5073(83)90145-9.
68. PEPPERCORN S., 2019, *Why You Should Stop Trying to Be Happy at Work*, https://hbr.org/2019/07/why-you-should-stop-trying-to-be-happy-at-work (24.09.2021).
69. PFEFFER J., 2010, *Building Sustainable Organizations: The Human Factor*, SSRN Electronic Journal, DOI: 10.2139/ssrn.1545977.
70. PITHERS R. T., & FOGARTY G. J., 1995, Symposium on teacher stress. Occupational stress among vocational teachers, *British Journal of Educational Psychology*, 65(1): 3-14, DOI: 10.1111/j.2044-8279.1995.tb01127.x.
71. PRASETYO P. E., KISTANTI N. R., 2020, Human capital, institutional economics and entrepreneurship as a driver for quality & sustainable economic growth, *Entrepreneurship and Sustainability Issues*, 7(4): 2575-2589, DOI: 10.9770/jesi.2020.7.4(1).
72. RADA R. E., JOHNSON-LEONG C., 2004, Stress, burnout, anxiety and depression among dentists, The Journal of the American Dental Association, 135(6): 788-794, DOI: 10.14219/jada.archive.2004.0279.
73. RAFFERTY A. E., GRIFFIN M. A., 2006, Refining individualized consideration: Distinguishing developmental leadershipand supportive leadership, *Journal of Occupational and Organizational Psychology*, 79(1): 37-61, DOI: 10.1348/096317905X36731.
74. RANKIN A., GRAY A.W., BOEHLJE M., ALEXANDER C. E., RANKIN A., GRAY A. W., BOEHLJE M., ALEXANDER, C. E., 2011, Sustainability Strategies in U.S. Agribusiness: Understanding Key Drivers, Objectives, and Actions, *International Food and Agribusiness Management Review*, DOI: 10.22004/AG.ECON.117601.
75. REDINGTON I., 2005, *Making CSR Happen: the contribution of people management*, Chartered Institute of Personnel and Development, London.
76. REPETTI R., WANG S., 2017, Effects of job stress on family relationships, *Current Opinion in Psychology*, 13: 15-18, DOI: 10.1016/j.copsyc.2016.03.010.
77. RICHARDSEN A. M., BURKE R. J., 1991, Occupational stress and job satisfaction among physicians: Sex differences, *Social Science & Medicine*, 33(10): 1179-1187, DOI: 10.1016/0277-9536(91)90234-4.

78. ROBINSON J. R., CLEMENTS K., LAND, C., 2003, Workplace stress among psychiatric nurses. Prevalence, distribution, correlates, & predictors, *Journal of Psychosocial Nursing and Mental Health Services*, 41(4): 32-41.
79. ROLL L. C., SIU O., LI S. Y. W., DE WITTE H., 2019, Human Error: The Impact of Job Insecurity on Attention-Related Cognitive Errors and Error Detection, *International Journal of Environmental Research and Public Health*, 16(13): 2427, DOI: 10.3390/ijerph16132427.
80. SAID R. M., EL-SHAFEI D. A., 2021, Occupational stress, job satisfaction, and intent to leave: nurses working on front lines during COVID-19 pandemic in Zagazig City, Egypt, *Environmental Science and Pollution Research*, 28(7): 8791-8801, DOI: 10.1007/s11356-020-11235-8.
81. SANTOS I. S., GRIEP R. H., ALVES M. G. M., GOULART A. C., LOTUFO P. A., BARRETO S. M., CHOR D., BENSEÑOR, I. M., 2014, Job stress is associated with migraine in current workers: The Brazilian Longitudinal Study of Adult Health (ELSA-Brasil), *European Journal of Pain*, 18(9): 1290-1297, DOI: 10.1002/j.1532-2149.2014.489.x.
82. SCHAEFER J. A., MOOS R. H., 1996, Effects of work stressors and work climate on long-term care staff's job morale and functioning, *Research in Nursing & Health*, 19(1): 63-73, DOI: 10.1002/(SICI)1098-240X(199602)19:1<63::AID-NUR7>3.0.CO;2-J.
83. SEALY I., WEHRMEYER W., FRANCE C., LEACH M., 2010, Sustainable development management systems in global business organizations, ed. Holt D., *Management Research Review*, 33(11): 1083-1096, DOI: 10.1108/01409171011085912.
84. SHAPIRO S. L., ASTIN J. A., BISHOP S. R., CORDOVA M., 2005, Mindfulness-Based Stress Reduction for Health Care Professionals: Results From a Randomized Trial, *International Journal of Stress Management*, 12(2): 164-176, DOI: 10.1037/1072-5245.12.2.164.
85. SIMPSON R., 1998, Presenteeism, Power and Organizational Change: Long Hours as a Career Barrier and the Impact on the Working Lives of Women Managers, *British Journal of Management*, 9 (s1): 37-50, DOI: 10.1111/1467-8551.9.s1.5.
86. SMOLLAN R. K., 2015, Causes of stress before, during and after organizational change: a qualitative study, *Journal of Organizational Change Management*, 28(2): 301-314, DOI: 10.1108/JOCM-03-2014-0055.
87. SNYDER J. D., BOAN D., ATEN J. D., DAVIS E. B., VAN GRINSVEN L., LIU T. & WORTHINGTON E. L., 2020, Resource Loss and Stress Outcomes in a Setting of Chronic Conflict: The Conservation of Resources Theory in the Eastern Congo, *Journal of Traumatic Stress*, 33(3): 227-237, DOI: 10.1002/jts.22448.
88. SPICKARD JR A., 2002, Mid-Career Burnout in Generalist and Specialist Physicians, *JAMA*, 288(12): 1447-1450, DOI: 10.1001/jama.288.12.1447.
89. STAMMERS L., WONG L., BROWN R., PRICE S., EKINCI E., SUMITHRAN P., 2020, Identifying stress-related eating in behavioural research: A review, *Hormones and Behavior*, 124: 104752, DOI: 10.1016/j.yhbeh.2020.104752.
90. STEENKAMP N., KASHYAP V., 2010, Importance and contribution of intangible assets: SME managers' perceptions, *Journal of Intellectual Capital*, 11(3): 368-390, DOI: 10.1108/14691931011064590.
91. TAMASEVICIUS V., DISKIENE D., STANKEVICIENE A., 2020, Human Resource Management Practice in Lithuania: Evidences and Challenges, *Montenegrin Journal of Economics*, 16(1): 207-226, DOI: 10.14254/1800-5845/2020.16-1.14.
92. THONG J. Y. L., YAP C. S., 2000, Information systems and occupational stress: a theoretical framework, *Omega*, 28(6): 681-692, DOI: 10.1016/S0305-0483(00)00020-7.
93. TRIANNI A., CAGNO E., NERI A., 2017, Modelling barriers to the adoption of industrial sustainability measures, *Journal of Cleaner Produ*ction, 168: 1482-1504, DOI: 10.1016/j.jclepro.2017.07.244.
94. TUMMERS G. E. R., LANDEWEERD J. A., VAN MERODE G. G., 2002, Work organization, work characteristics, and their psychological effects on nurses in The Netherlands, *International Journal of Stress Management*, 9(3): 183-206, DOI: 10.1023/A:1015519815319.
95. UNGER J. M., RAUCH A., FRESE M., & ROSENBUSCH N., 2011, Human capital and entrepreneurial success: A meta-analytical review, *Journal of Business Venturing*, 26(3): 341-358, DOI: 10.1016/j.jbusvent.2009.09.004.
96. VAN DER DOEF M. P., & SCHELVIS R. M. C., 2019, Relations Between Psychosocial Job Characteristics and Work Ability in Employees with Chronic Headaches, *Journal of Occupational Rehabilitation*, 29(1): 119-127, DOI: 10.1007/s10926-018-9769-7.
97. VAN DER FELTZ-CORNELIS C. M., VARLEY D., ALLGAR V. L., DE BEURS E., 2020, Workplace Stress, Presenteeism, Absenteeism, and Resilience Amongst University Staff and Students in the COVID-19 Lockdown, *Frontiers in Psychiatry*, 11: 588803, DOI: 10.3389/fpsyt.2020.588803.
98. VILLANUEVA D., DJURKOVIC N., 2009, Occupational stress and intention to leave among employees in small and medium enterprises, *International Journal of Stress Management*, 16(2): 124-137, DOI: 10.1037/a0015710.
99. VRIJKOTTE T. G. M., VAN DOORNEN L. J. P, DE GEUS E. J. C., 2000, Effects of Work Stress on Ambulatory Blood Pressure, Heart Rate, and Heart Rate Variability, *Hypertension*, 35(4): 880-886, DOI: 10.1161/01.HYP.35.4.880.
100. WHO, 2020, *Occupational Health: Stress at the workplace*, https://www.who.int/news-room/questions-and-answers/item/ccupational-health-stress-at-the-workplace (01.11.2021).
101. WILLIAMSON A., FRISWELL R., 2013, Fatigue in the workplace: causes and countermeasures, Fatigue, *Biomedicine, Health & Behavior*, 1(1-2): 81-98, DOI: 10.1080/21641846.2012.744581.
102. WONG K., CHAN A. H. S., NGAN S. C., 2019, The Effect of Long Working Hours and Overtime on Occupational Health: A Meta-Analysis of Evidence from 1998 to 2018, *International Journal of Environmental Research and Public Health*, 16(12): 2102, DOI: 10.3390/ijerph16122102.
103. WORLD BANK, n.d.a, *Labor force, total*, https://data.worldbank.org/indicator/SL.TLF.TOTL.IN?contextual=population-and-labor (19.10.2021).
104. WORLD BANK, n.d.a, *Small and Medium Enterprises (SMEs) Finance*, https://www.worldbank.org/en/topic/smefinance (19.10.2021).
105. WCED (WORLD COMMISSION ON ENVIRONMENT AND DEVELOPMENT), 1987, *Our common future*, Oxford University Press, New York.

106. WORLD HEALTH ORGANIZATION, 2014, *Constitution of the World Health Organization*, Geneva, https://apps.who.int/iris/bitstream/handle/10665/151605/9789241650489_eng.pdf?sequence=1&isAllowed=y (31.10.2021).
107. YANG X., GE C., HU B., CHI T., WANG L., 2009, Relationship between quality of life and occupational stress among teachers, *Public Health*, 123(11): 750-755, DOI: 10.1016/j.puhe.2009.09.018.
108. YARI S., ASADI A. F., VARMAZYAR S., 2016, Assessment of Semi-Quantitative Health Risks of Exposure to Harmful Chemical Agents in the Context of Carcinogenesis in the Latex Glove Manufacturing Industry, *Asian Pacific Journal of Cancer Prevention*, 17(sup3): 205-211, DOI: 10.7314/APJCP.2016.17.S3.205.
109. ZARRA-NEZHAD M., MOAZAMI-GOODARZI A., HASANNEJAD L., ROUSHANI K., 2010, Occupational Stress and Family Difficulties of Working Women, *Current Research in Psychology*, 1(2): 75-81, DOI: 10.3844/crpsp.2010.75.81.
110. ZHANG X., ZHAO K., ZHANG G., FENG R., CHEN J., XU D., LIU X., NGOUBENE-ATIOKY A. J., HUANG H., LIU Y., CHEN L., & WANG W., 2020, Occupational Stress and Mental Health: A Comparison Between Frontline Medical Staff and Non-frontline Medical Staff During the 2019 Novel Coronavirus Disease Outbreak, *Frontiers in Psychiatry*, 11: 555703, DOI: 10.3389/fpsyt.2020.555703.
111. ZHU Q., 2016, Institutional pressures and support from industrial zones for motivating sustainable production among Chinese manufacturers, *International Journal of Production Economics*, 181: 402-409, DOI: 10.1016/j.ijpe.2015.11.009.

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Role of Sericulture in Achieving Sustainable Development Goals

Rola jedwabnictwa w wypełnianiu Celów zrównoważonego rozwoju

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Abstract

The present study attempted to scenario analysis study of sericulture resource which would cover its significance and provide the entire gamut of mulberry silk in order to create appropriate planning and thereby playing a significant role in enhancing GDP of silk dominant regions of the economy. This review study analyses our present knowledge of the current scenario of sericulture sustainability, potential, growth and silk crafts of a silk producing regions with the aim of supporting the regions' sustainable growth and development. It conducts bibliometric analysis of highly cited scientific research publications on sericulture sustainability using the Scopus and web of science databases. We investigate sericulture's contribution in accomplishing UN Sustainable Development Goals, and we claim that a better knowledge of sericulture's contribution to sustainable development is critical for assuring inclusive sustainable regional development.

Key words: Silk farming, silk growth, silk crafts, Sustainable development goals

Słowa kluczowe: uprawa jedwabiu, wzrost jedwabiu, rzemiosło jedwabne, Cele zrównoważonego rozwoju

Introduction

By 2030, the 17 Sustainable Development Goals (SDGs) set forth by the United Nations are intended to promote a balance between environmental preservation and human well-being (UN, 2015). All of the SDGs are built on the biosphere, but maintaining biodiversity is still a worldwide issue (Arroyo-Zeledón, 2018). Examining how sericulture within the world's rich biodiversity can help the SDGs be achieved has the potential to connect sustainable development policy. In recent years, there has been a lot of attention on utilising local resources for agricultural sustainability. Proper exploitation and management of local resources, as well as the development of diverse agro-based enterprises, have the potential to create a regional balance between rural and urban sectors together with providing sustainable livelihood. The natural environment plays an integral role in the growth of sericulture resources. The mulberry crop is the foundation of sericulture resource, which is directly responsible for the creation of silk cocoons. Silk farming is the practise of cultivating silk-producing organisms. The term comes from the Greek word sericos, which means silk, and the English word culture, which means rearing. It includes interlinkage

of activities such as mulberry plant cultivation, silkworm rearing to generate silk cocoons, cocoon reeling to untwist silk filament, yarn production, weaving, and silk fabric processing (Kumaresan, 2008; Anitha, 2011). It provides income generation to farm families throughout the year (Kamili et.al., 2000; Roopa et.al., 2015; Lakshmannan et al., 2011).

Mulberry silk is well-known in the textile industry which represents the second largest industry after agriculture in India (Wang et. al., 2010). It is a significant economic subsidy income-generating activity for rural people in mountainous areas (Misra, 2000) and offers livelihood in industries, which are a key activity in the metropolitan economy. China is the world's largest producer of silk, followed by India, Uzbekistan, Thailand, and Brazil. In Europe, the United States of America (USA) is the biggest silk consumer and importer, followed by Switzerland, the United Kingdom, and Germany. (International sericulture commission, 2019)

The main crop for the growth of sericulture is mulberry plantations. On the other hand, mulberry trees have long been grown specifically for the purpose of breeding silkworms. Its importance to ecology was disregarded. (Ghosh et.al., 2017). Mulberry is used in many industries, including sericulture, to process mulberry products, which offers prospects for a sustainable way of life. It offers a variety of ecosystem services that improve human well-being while preserving the planet's life support mechanisms (Ghosh et. al., 2017). The provision of ecosystem services naturally aids in achieving global sustainable development (Huang et. al., 2012). The extent to which sericulture helps in achieving the entire set of SDGs has not, however, been thoroughly investigated. Through the regulation of environmental restoration, afforestation, carbon sequestration, and soil conservation, existing research has emphasised the significance of mulberry in achieving multiple SDGs (Qin et. al., 2012: Singhal et. al., 2010; Zhang et. al., 2018). We specifically identify the actual and potential contributions of sericulture in achieving the SDGs and provide evidence to demonstrate how interconnected mulberry is with its backward and forward linkages from the viewpoint of an integrated system. (Yuan et. al., 2017). We examine the SDGs as well as the potential role that sericulture could play in accomplishing specific SDG objectives. This review study analyses our present knowledge of the current scenario of sericulture sustainability, potential, growth, and silk crafts of a silk producing region with the aim of supporting the region's sustainable growth and development. The Scopus and Web of Science databases are used to conduct bibliometric evaluations of highly cited scientific research papers on sericulture sustainability.

Mulberry silk production

Mulberry silk is produced by silkworms (Bombyx mori) that eat mulberry leaves and make silk cocoons in 28-30 days, following which they spin cocoons. Finally, the reelers buy the silk cocoons and turn them into silk yarn. Sericulture is an economic activity that entails the development of mulberry plants and the breeding of silkworms using agricultural labour to produce silk threads (Reddy et. al., 2008). India's silk industry is world-renowned, producing Mulberry silk, Tasar silk, Eri silk, and Muga silk. It plays an integral role in the textile industry. India is the second largest producer of silk with 31906 metric tonnes (2018) and contributes 15% of the overall world raw silk production which ensures sustainable development of region (Manjunath et. al., 2015).

Global Scenario of Silk Textiles Growth

Geographically speaking, Asia accounts for about 95% of global output and produces the majority of the world's silk. China produces the most silk in the world, with 152005 metric tonnes produced each year in 2019. In order to raise the standard of living for women and advance gender equality while simultaneously promoting the Sustainable Development Goals, sericulture has been making substantial efforts to spread it throughout numerous parts of Africa, South Asia, and Latin America. (International sericulture commission, 2019). It is considered a lucrative industry with high employment potential (Dezmirean et. al., 2013; Popescu, 2018). Increasing demand for textile products and for silk products in Asia is driving growth in the global silk market. China and India are the world's top two producers of silk, respectively (Long et. al., 2006). Asia is the region rich in raw materials because it produces the most raw silk in the world. Increased demand from the textile industry helped enhance the use of silk. Technology improvements in the sericulture sector are projected to benefit the silk market. (Lakshmanan, 2011).

Brazil, on an average of 2.6 hectares, produces 610 metric tonnes of silk yarn every year, improving the standard of living for rural communities. (Porto, 2014). In 2020, China produced 153,000 metric tonnes of silk, and India produced 51,900 metric tonnes. India contributes 16.10 percent, with contributions also coming from Brazil (3.82%), Thailand (2.91%), Japan (7.31%), and Korea (1.17%). (Devaiah et. al., 1999). China's average growth rate in silk production is more than 9%, compared to India's growth rate of around 5.60%. (Singh, 2011).

Mulberry silk is the most popular form of silk. The textile industry makes extensive use of mulberry silk. It is also used to enhance the qualities of base fibres in blends with other natural fibres such as cotton. (Barcelos et. al., 2021) The demand for mulberry silk is likely to raise as silk quality improves, propelling the silk market forward.

Art of silk fabric decoration is one of the oldest arts in the world. Chinese were the first to begin to manufacture silk fabrics.

China, Brazil and India gained popularity for silk over time, and these three nations are credited with creating ornamental art made of silk cloth. One of the primary categories of arts and crafts in China today that is fiercely competitive in terms of talent and performance quality is silk decoration. Bratac is completely processing raw materials and reeling silk yarns in Brazil (Porto, 2014). More than 2,500 people work for the Brazilian-owned enterprise Bratac in its various sectors. The enterprise employs roughly 3,500 rural households in the production of cocoons and provides indirect employment for about 30,000 people. It was established in 1989 and chose to employ the raw materials from damaged cocoons and other standard silk industry by-products. The business purchases by-products and raw materials from Bratac and crafts them into yarns for its manufacturing. According to the World Bank's 2021 income classification, sericulture plays a critical role in subsistence options, which are typically landless and marginal.

Silk growth in India

Karnataka is one of the top mulberry sericulture producing states, followed by Andhra Pradesh, Tamil Nadu, West Bengal, and Jammu & Kashmir, which together account for 98.5 percent of the country's silk production. India's raw silk requirement was roughly 27,005 metric tonnes, while the country only produced 19,696 metric tonnes and imported 8,000-9,000 metric tonnes from China (Qadri et al., 2010). Currently, there is an increase in the consumption of silk products in developed countries. It leads to high demand on the global market and plays an important role in foreign exchange earnings for developing countries around the world, resulting in the transition from sericulture to manufacturing.

India is the second largest producer of raw silk and the largest consumer of raw silk and silk fabrics in the world. In India, the silk business is fuelled by both exports and strong domestic demand. Silk fabrics are widely used in the domestic market for ceremonies, religious rituals, weddings, festivals, and other events. Silk is utilised as a raw material for both clothes, as well as furnishings. Although silk is now viewed as a luxury item in India, with a price that is much higher than other fabrics, we foresee a growth in the consumption of silk fabrics in the country as disposable incomes continue to rise.

Performance of Silk Growth in Jammu and Kashmir

Practically speaking, silk is manufactured in every part of the Kashmir valley. The silk industry, which was first established by Emperor Zain-ul-Abidin, is a small and medium-scale industry that plays a significant role. It is critical for the long-term survival of small and marginalised households. Mulberry silk cocoons are well-known in the Kashmir valley and they produce a very fine fibre that can be compared to the best in the world (Global Investor Summit 2020).

Jammu and Kashmir is a bivoltine sericulture union territory of India with a variety of agro-climatic zones and different mulberry genetic resources that are known around the world for generating superb and attractive silken products (Trag et. al., 2011; Bhat et.al., 2014) It has huge potential for sericulture development (Annual Report Statistics, Central Silk Board 2018). Mulberry is grown on 9,066 hectares in Jammu and Kashmir, producing 939 metric tonnes of cocoons and 212 metric tonnes of raw silk in 2018-19. (Economic Survey Jammu and Kashmir 2018-19). Sericulture plays a significant role in the economy of J&K, involving more than 25,000 raising households and generating an annual income of Rs 7.28 crores. (Annual Plan 2010-11, Planning and Development Department, Jammu and Kashmir). In Kashmir valley, Trend of silk cocoons production has seen annual compound growth rate of 1.59% which shows positive growth rate from 1990-91 to 2019-20 as compared to reducing trend of mulberry plantation which is -1.14% (Mushtaq et.al., 2021; Mir et al 2018; Ganaie et.al., 2012).

Jammu and Kashmir has enormous potential to manufacture and use raw silk locally, establishing a strong backward and forward connection that can revitalise our industrial sector, enhance the sericulture industry for cocoon growers, and create sustainable growth that coordinate cocoon silk production and marketing (Jammu and Kashmir Trade and Export Policy report 2018; Khan et. al., 2015).

Silk products have a ready market in Kashmir, both nationally and internationally; nevertheless, the government must pay quick attention to this business in order to enhance the socioeconomic status of weavers (Yousuf et. al., 2013). The Government of India's Central Silk Board introduced Silk Samagra for sericulture development in the country, including Jammu and Kashmir (J&K), with the goal of improving quality and production. (Press Information Bureau 2019). Sericulture is an agricultural allied sector that generates income through backward and forward linkages that supply various value added goods (Barcelos, 2021). It promotes Kashmir's crafts and cultural industry. (Bhat et. al., 2020; Chauhan et. al., 2016; Trag et. al., 2011). Sericulture is currently seeing resurgence; thanks to the World Bank's assistance for the Kashmir valley in reviving the glory of silk industry, which encourages farmers and stakeholders to participate in this sector. It leads to the sustainable development of sericulture. (Global Investor Summit 2020).

Silk Crafts in Kashmir Valley

Kashmir is famous for its silk carpets, which are constructed of silk yarn and wool (Tazima, 1978). Weavers of silk carpets create Kashmir silk carpets of exceptional quality and creativity that have influenced countries throughout Central Asia. It resulted in a strong demand from the international market, providing a significant source of income for the people of Jammu and Kashmir. The carpet weaving industry was centred on Srinagar. Because of their beauty, strength, and longevity, Kashmiri carpets have acquired international recognition and made a niche for themselves. Unlike the regularly available tufted carpets, they are hand woven, unmatched, and hand knotted. Handmade and hand knotted carpets have a lengthy life expectancy due to the delicate and intricate knots tied by hand. As a result of the indelible impression they create on the beholder, these find customers in both national and international marketplaces. One of the valley's most important sources of livelihood is the craft, which is combined with tourism and adventure tourism. It also provides an additional source of income and sustainable livelihood.

The Kashmir valley's temperate environment is ideal for Bivoltine silk cocoon development, and it is known for creating excellent, attractive silk fabric and silk items of high quality. Sericulture is the backbone of the Kashmir economy, contributing to the region's social and economic prosperity. The silk arts and craftsmanship of the Kashmir Valley reflect the region's rich cultural legacy and play an important role in the creation of new artistic trends in the Union territory of Jammu and Kashmir. Kashmir offers a wide range of internationally recognised hand-knotted floor coverings, including silk carpets and rugs. The Kashmir Valley's Himalayan geography is socioeconomically conducive to sericulture's growth and development, allowing rearers to achieve silk farming sustainability. (Revive Silk Industry in Jammu & Kashmir, 2021).

Broad significance of Sericulture to Sustainable Development Goals

The framework for achieving a better, more sustainable future for everybody is found in the Sustainable Development Goals. They deal with the issues that the entire world is facing, such as poverty, inequality, climate change, environmental degradation, peace, and justice. By gradually altering the methods we create and use technologies, sustainable development constantly motivates us to protect and improve our natural resources. Harmonizing three key factors – economic growth, social inclusion, and environmental protection is essential for sustainable development. All of these factors are important for the welfare of people and societies and are interrelated. Before being distributed to other parties in the supply chain for the intended product, silk is first grown through three preliminary stages. The first phases involve growing mulberry leaves, raising silkworms, and transporting and packing cocoons. Depending on the producer, these steps can be improved to reduce their negative environmental effects and accomplish sustainability goals. Sericulture offers opportunities for income diversity with low start-up costs through a range of products and services. Sericulture promotion programmes in China, Brazil, and India have improved the lives of smallholder farmers by boosting farm output and providing them with a new source of income. Sericulture has the ability to contribute to a sustainable, circular economy and may even help reduce carbon emissions if supply chain management is done carefully. However, in other parts of Africa, difficulties in enhancing livelihoods through sericulture have been linked to a lack of training, expertise, and access to tools. Sericulture vocational training could increase indigenous communities' access to employment prospects, entrepreneurship, and economic diversification opportunities, as well as empower women in traditionally patriarchal societies to advance gender equality. (Babu, 2015; Kasi, 2013; Roy et.al. 2020).

Sericulture is a viable option for livelihood diversification that can immediately raise household and per capita income while also providing better financial prospects (Giacomin et.al., 2017: Gangopadhyay, 2008) and sustained income increase for residents in rural areas, irrespective of social and economic status. An initiative for environmentally friendly travel that supports the growth of the silk industry and tourism in China, Brazil, and Mysore. It promotes the arts and crafts sector and innovative high-quality products (Armito etal 2014: Barcelos et.al., 2020 khan et.al., 2015; Zhang et.al., 2018) According to research studies (Singhal et. al., 2010, Wang et.al., 2013, Yuan and Zhao, 2017, Grzekowiak et.al., 2022), mulberries contain bioactive qualities that point to the presence of substances with antibacterial, anti-inflammatory, antioxidant, antitumor, and anticancer actions. Therefore, it is appropriate to describe it as a plant that is most suited for meeting current requirements without endangering those of future generations. According to the International Sericulture Commission 2019, these initiatives support local economies and, in the case of Africa, South Asia, and Latin America, aid in promoting the region's natural features while generating more prospects for employment through greater tourism activity. Currently, UNESCO has designated sericulture as an Intangible Cultural Heritage.The primary benefit of the silk industry is that the majority of its consumers are high earners from other areas and industrialised countries, while the majority of its producers are small-scale weavers, reelers, and growers (Wang et.al., 2010; Rana et.al., 2015; karthik et. al., 2012). The marginal farmers would have economic options as a result.

Table 1. Sericulture's contribution to pertinent SDGs

Sustainable Development Goals	Examples of supporting literature	Sericulture contribution towards achieving SDGs
No poverty (SDG 1)	Giacomin et.al., 2017; Prakasam et.al., 2014 ; Gangopadhyay, 2008	Sericulture offers economic diversity as income generation resilient livelihood for poor and vulnerable communities
Good Health and Well being (SDG 3)	Chen et.al., 2016; Zhang et al 2018 ; Yang et.al., 2010	Mulberry provides nutritional and medicinal properties which includes strong bioactive compounds
Quality Education (SDG 4)	Rajeshwar et.al., 2019 ; Popescu, 2018	Vocational training in sericulture provides equal opportunities for employment, training and entrepreneurship
Gender Equality (SDG 5)	Kasi et.al., 2013; Roy et..al., 2020; Babu, 2015	Sericulture provided equal access to economic and natural resources for both men and women
Economic growth (SDG 8)	Armito et.al., 2014; Barcelos, 2020 ; Grześkowiak et. al., 2022	Silk farming contributes to GDP of nations & diversify livelihood opportunities
Industry, innovation and infrastructure ((SDG 9)	Wang et.al., 2013; Yuan et.al., 2017 ; Khan et.al., 2015; Singh et.al., 2010	Silk farming promotes silk tourism and textiles which supports art and crafts industry and new value products
Climate action ((SDG 13)	Huang et.al., 2012; Ghosh et.al., 2017	Mulberry plantations improve air quality which leads to sustainable cities and communties.
Reduced inequality (SDG 10)	Reddy et.al., 2008; Popescu, 2018; Barcelos et.al., 2021	Improved Livelihoods from sericulture supports sustainable income and contributes to inclusive social and economic development

Sericulture is an agro-based industry where the food plants for silkworms must be grown in order to care for the animals. The majority of the food plants are perennial, thus the agricultural area has a lot of greenery. Sericulture is a labor-intensive industry, and very little carbon is produced throughout the manufacturing process. (Qin et.al., 2012; Ghosh et.al., 2017; Astidillo et.al., 2014).

The main goal of a sustainable sericultural development strategy for developing nations should be to increase the productivity of land that is already being farmed while reducing costs and improving input efficiency with little to no negative effects on people and the environment. In order to reduce input misuse and land degradation, a healthy soil, plant, and environment system must be established. Modifying current farming methods in the area of soil nutrient restoration to encourage the adoption of mulberry, sericulture is a creative way to promote eco-friendly farming.

Conclusion

Given the current demand for silk in the world, sericulture appears to have the potential to become a successful sector. In nutshell, it could be pointed out that sericulture plays a sustainable role as it brings in additional areas under cultivation, generates more income, provides greater employment opportunities, and helps in the overall development of the region. The expansion of sericulture in developing countries appears to have a favourable growth rate in the formation and efficiency of silk cocoons, thanks to the cultivation of enhanced types of mulberry trees which plays an important role as far as ecological balance is concerned.

With all the above mentioned attributes of the silk industry, it is appropriate to call sericulture an ideal industry for a sustainable future. In developing countries, sericulture is built on the adoption of technology breakthroughs from various sericulture institutes, as well as tree type mulberry plantings that aid farmers in growing silk cocoon and producing silk thread more efficiently. There is need of a comprehensive and holistic strategy, as well as human resource development and effective supply chain management in pre-cocoon (Mulberry plantation, silkworm rearing) and post-cocoon sectors (reeling, weaving and yarn) all of which must be handled simultaneously. Sericulture, with its sectoral parts of production, provides livelihood security to many population segments specialised in cultivation, rearing, reeling, and weaving which ensures sustainable growth and inclusive development of a region.

Sericulture contributes to the expansion of the rural economy and the creation of a balanced economic sector. As a result, developing countries has been able to enhance its output of silk cocoons and yarn due to the geo-economic feasibility of sericulture. The future growth plan should concentrate on Sustainable sericulture regional expansion in developing countries of economically viable regions. Furthermore, since, the women participation rate in sericulture sector is very high, we need to extend this sector to large areas. Accordingly, more women are able to draw their income from this sector. It can be an ideal tool not only for eco-friendly environment but for gender equality and women empowerment as well.

References

1. ANITHA R. 2011, Indian silk industry in the global scenario, *International Journal of Multidisciplinary Management Studies*, 1: 100-110.
2. ARROYO-ZELEDÓN M.S.; ZÚÑIGA-ARIAS G., 2018, Conservation of Biodiversity and Poverty in Costa Rica: Analysis by Planning Regions, ABRA, 38: 33.
3. ARIMOTO Y., NAKAJIMA K., OKAZAKI T., 2014, Sources of productivity improvement in industrial clusters: The case of the Japanese silk-reeling industry, *Regional Science and Urban Economics*, 46: 27-41, DOI: 10.1016/j.regsciurbeco.2014.02.004.
4. ASTUDILLO M. F., THALWITZ G., VOLLRATH F., 2014, Life cycle assessment of Indian silk, *Journal of Cleaner Production*, 81: 158-167, DOI: 10.1016/j.jclepro.2014.06.007.
5. BABU K.M., 2015, Natural textile fibres: Animal and silk fibres, *Textiles and Fashion*, Wood Head Publishing: Cambridge, UK, DOI: 10.1016/B978-1-84569-931-4.00003-9.
6. BARCELÓ'S S., SALVADOR R., GUEDES M., FRANCISCO A., 2020, Opportunities for Improving the Environmental Profile of Silk Cocoon Production under Brazilian Conditions, *Sustainability*, 12: 32.
7. BARCELOS S.M.B.D., SALVADOR R., BARROS M.V, DE FRANCISCO A.C., GUEDES G., 2021, Circularity of Brazilian silk, promoting a circular bio economy in the production of silk cocoons, *J Environ Manage*., DOI: 10.1016/j.jenvman.2021.113373.
8. BHAT M. A., BUHROO Z. I., AZIZ A., QADIR J. AZAM M., 2020, An Overview of Current Scenario of Sericulture Industry in Jammu and Kashmir, India, *Int. J. Curr. Microbiol. App. Sci*, 9(6): 3813-3824.
9. BHAT T., CHOURE T., 2014, Study of Growth and Instability in Raw Silk production and Marketing in India, *European Journal of Business and Management*, 6(14).
10. CHOUHAN S., MITTAL V., BABULA L., SHARMA S., GANI M., 2016, Situation Analysis of Sericulture Industry in Jammu and Kashmir, *Bio Bull*, 2(1): 52-57.
11. DEVAIAH M. C., REDDY D.N., 1999, Sericulture an Overview, *Advances in Mulberry Sericulture*, CVG Publications, Bangalore, India.
12. GANGOPADHY A.Y., 2008, Silk Industry in India – A Review, *Indian Science & Technology*; NISTDS, CSIR, New Delhi.
13. GANIE N. A., DAR K. A., KHAN I. L., SHARMA R.K., SAHAF K. A., 2018, Sericulture – A Viable Option for Sustainable Livelihood and Employment Generation for Rural Population of J & K., *Global J. Biosci. Biotecnol.* 7(1): 200-203.
14. ANIE N., KAMILI A., BAQUAL M.F., SHARMA R.K., DAR K.A., KHAN I.L., 2012, Indian Sericulture industry with particular reference to Jammu and Kashmir, *I.J.A.B.R.*, 2(2): 194-202.
15. GHOSH A., DEBNIRMALYA G. TANMAY C., 2017, Economical and environmental importance of Mulberry: a Review, *Int. J. Plant Environ.*, 3(2): 51-58.
16. GIACOMIN A.M., GARCIA J.B., ZONATTI J.R., SILVA-SANTOS W.F., LAKTIM M.C., BARUQUE-RAMOS J., 2017, Brazilian silk production: Economic and sustainability aspects, *Procedia Eng*, 200: 89-95.
17. GLOBAL INVESTOR'S SUMMIT, 2020, *Report Policy for Sericulture Development for Bivoltine Silk*, Jammu & Kashmir.
18. GOVERNMENT OF INDIA, MINISTRY OF TEXTILES, 2019, *Annual Report Statistics 2017-18*, Central Silk Board, Karnataka.
19. GOVT OF INDIA, MINISTRY OF TEXTILES, 2019, *Growth of Silk Production*, Press Information Bureau.
20. GOVT. OF JAMMU AND KASHMIR, DIRECTORATE OF ECONOMICS AND STATISTICS, 2020, *Economic Survey 2018-19*, 1: 10-11.
21. GOVERNMENT OF JAMMU AND KASHMIR, PLANNING AND DEVELOPMENT DEPARTMENT, 2011, *Annual Plan Report 2010-2011*.
22. GOVERNMENT OF JAMMU AND KASHMIR, INDUSTRIES AND COMMERCE DEPARTMENT, 2018, *J & K Trade and Export Policy 2018*, Report.
23. GRZEŚKOWIAK J., ŁOCHYŃSKA M., FRANKOWSKI J., 2022, Sericulture in Terms of Sustainable Development in Agriculture, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(2): 210-217.
24. *India*, 2020, 61(2): 169-179, DOI: 10.32381/PROD.2020.61.02.5.
25. ISC-2019, INTERNATIONAL SERICULTURAL COMMISSION, 2019, *Silk producing countries in world, Statistics*, United Nations.
26. KAMILI A., MASOODI A., 2000, *Principles of Temperate Sericulture*, Kalyani Publishers, Ludhiana, India, 257 p.
27. KARTHIK T, GOPALAKRISHNAN D., 2012, Eco-friendly fibres of the future, *Asian Text J.*, 21: 67-71.
28. KASI E. 2013, *Role of Women in Sericulture and Community Development: A Study from a South Indian Village*, SAGE, DOI: 10.1177/2158244013502984.

29. KHAN G.A., AHMAD N., GANI M., MIR S. 2016 Entrepreneurial Opportunities in Temperate Sericulture and Relevant Constraints, *Indian Horticulture Journal*, 6(Special): 112-119.
30. KUMARESAN P., 2008, Performance of Large Scale Farming In Sericulture – An Economic Analysis, *Indian J. Agric. Econ.*, 63(4): 902-2016-67978.
31. LAKSHMANAN S., BALASARASWATHI S., MANI A., 2011, Rural Labour Employment through Mulberry Sericulture: An Analysis of Cross Sectional Study, *Journal of Rural Development*, 30(2): 155-167.
32. LONG L., ZHUOZHONG H., 2006, Sericulture and Silk Production in China, *Indian Silk*, 45(31): 7-11.
33. MANJUNATH M., NARAYANASWAMY K. C., SAVITHRAMMA, HARISH B. S. , KUMAR H .V., 2015, Scenario of Mulberry and Cocoon Production in Major Silk-Producing States of India – Application of Exponential Growth Function, *Indian J. Econ. Dev.*, 3(8): 1-8.
34. MIR M., BANDAY M., KHAN I., BAQUAL M.F., RAJA R., 2018, Efficacy of Mulberry-Based Intercropping In the PirPanjal and Shiwaliks Regions in Himalayas, *J. Sci. Agric. Engg.*, 8(25): 56-60.
35. MISRA S., 2000, Races of silkworm and cultivation of their food plants with special reference to mulberry, *Sericulture in India*, vol. II, eds. Agrawaland H.O., Seth M.K., II. Bishensingh Mahendra Palsing, Publication, Dehradun, India: 233-240.
36. MUSHTAQ R., SINGH H., MIR M.R., RAJA T.A., AHMED P., 2021, Evaluation of Trend analysis of Sericulture Resource Development in North-Western Himalayan Region of Kashmir valley, *Mysore journal of Agricultural sciences*, 55(3).
37. POPESCU A., 2018, Considerations upon the Trends in the World Silk Trade. Scientific Papers Series Management, *Econ. Engg. Agric. Rural Dev.*, 18(1): 385-400.
38. PORTO A. 2014. Sericicultura no Estado de Sao Paulo, *Boletim de Industria Animal*, 71(3): 291-312.
39. PRAKASAM K., RAVI G., 2014, Sericulture – An ideal enterprise for sustainable income in Erode District of Tamil Nadu, *Language in India*, 14(9).
40. PURUSOTTAM, SUBHASHREE, SASMITA, 2015, Women in Developing Sustainable Livelihood System through Sericulture in Rural India, *Odisha Review*.
41. QADRI S., MALIK M., SABHAT A., MALIK F., 2010, Adoption of improved Sericultural practices by Sericulturists in border area of Kashmir, *International Journal of Agricultural and Statistics Sciences*, 6(1): 197-201.
42. QIN N., WANG X., XIANG Z., 2012, Ecological issues of mulberry and sustainable development, *J. Resour. Ecol.*, 3(4): 330-339,
43. RAJESHWAR J., AHIRE R., PATANGE N., 2019, Sericulturists knowledge regarding improved practices of sericulture, *Journal of Pharmacognosy and Phytochemistry*, 8(4): 2061-2064.
44. RANA S., PICHANDI S., KARUNAMOORTHY A., BHATTACHARYYA S., PARVEEN R., 2015, Fangueiro, Carbon Footprint of Textile and Clothing Products, *Handbook of Sustainable Apparel Production*, ed. Muthu S.S., CRC Press, Boca Raton 141-165.
45. REDDY D. SRINIVASA RAO D., REDDY J.V. KRISHNA R., 2008, Impact of integrated Sericultural technologies on mulberry leaf yield and cocoon yield at farmers level, *Indian J. Seric.*, 47.
46. ROOPA H., MURTHY C., 2015,Trends in Arrivals and Prices of Cocoons in Shirahatti Market at Haveri District, *International Journal of Commerce and Business Management*, 8(1): 131-134.
47. ROY C. MUKHERJEE S., 2020, A Study on Productivity & Empowerment of Women Intensive Sericulture Sector of West Bengal, *A Quarterly Journal of The National Productivity Council.*
48. SINGH R. D., 2011, Sericulture scenario – Chinese dominance and Indian strategies, *Golden Jubilee National Conference on Sericulture Innovations: Before and Beyond*, January 28th & 29th CSRTI, Mysore: 201-202.
49. SINGHAL K., KHAN M.A., DHAR A. B., BINDROO. B., 2010, Approaches to industrial exploitation of mulberry (Mulberry sp.) fruits, *J. Fruit Ornam. Plant Res.*, 18:83-99.
50. TAZIMA Y., 1978, *The Silkworm-An Important Laboratory Tool*, Kodamishu Publishing Co. Tokyo, Japan.
51. TRAG A., MISRI A., BASHARATH D., 2011, Strategies for the Development of Sericulture in J & K State in the New Millennium, *National Seminar on Mulberry Sericulture Research in India*, Kssr & Di, Bengaluru, 26 & 28th Nov. 11-17.
52. U.N., 2015, *Transforming our world: The 2030 Agenda for Sustainable Development*, United Nations, Department of Economic and Social Affairs, New York.
53. WANG L. XIANG C. WANG C. TANG X., 2013, Anti diabetic and antioxidant effects and phytochemicals of mulberry fruit (Morus alba L.) polyphenol enhanced extract, *PLoS ONE*, 8(7).
54. WANG X., RAJKHOWA R.A., TSUZUKI T., 2010, Recent Innovations in silk biomaterials, *Journal of Fiber Bioengineering and Informatics*, 2(2010): 202-207.
55. YOUSUF T., KHAN I., BHAT T., 2013, Socio-economic profile of silk weavers: A Micro-level study of Srinagar city, *European Acad. Res*., 1(3): 319-331.
56. YUAN Q., ZHAO L., 2017, The Mulberry (Morus Alba L.) Fruit-A review of characteristic components and health benefits, *J. Agric. Food Chem*., 65: 10383-10394, DOI:10.1021/acs.jafc.7b03614.

57. ZHANG H., MA Z., LUO X., 2018, Effects of mulberry fruit (2018L) consumption on health outcomes: a mini-review, *Antioxid. Basel Switz.*, 7(5).

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Geopolitical Risk, Globalization and Environmental Degradation in South Africa: Evidence from Advanced Quantiles Approach

Ryzyko geopolityczne, globalizacja i degradacja środowiska w Afryce Południowej: dowody z zaawansowanego podejścia kwantylowego

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Abstract

Sustainable development involves the incorporation of socio-economic concerns and environmental protection into the economic decision-making process, in such a way that, any developmental effort would eventually be favorable to immediate and future generations. It is against this backdrop this study investigates the effects of geopolitical risk and globalization on environmental degradation in South Africa over the period 1985Q1-2018Q4. This study improves on existing studies and raises concerns on the potential twin-effect of geopolitical risk and globalization on the environment. We deviate from the existing studies that make use of the mean causality approaches that do not consider possible dependence in the conditional tail of the series distribution. To examine whether the causality exists among the series, we make use of the novel Troster (2018) Granger non-causality in condition quantiles, which captures the pattern of causality in various quantiles. Empirical results show that there is feedback causality nexus between geopolitical risk and CO_2 emissions. In majority of the quantiles, feedback causality is also observed between globalization and CO_2 emissions. We find a bidirectional Granger causality nexus between geopolitical risk and environmental degradation, and between globalization and environmental degradation. Globalization and geopolitical risk negatively influence environmental degradation. We conclude that environmental degradation is not driven by globalization and geopolitical risk in South Africa, among other policy suggestions.

Key words: geopolitical risk, globalization, environmental degradation, advanced quantiles approach, South Africa

Słowa kluczowe: ryzyko geopolityczne, globalizacja, degradacja środowiska, zaawansowane podejście kwantylowe, Afryka Południowa

1. Introduction

South Africa's classification of sustainable development (*hence SD*) is subjective to the generally acknowledged designation delivered by the Brundtland Commission. This definition is rooted in the nation Constitution. This Constitution (Section 24 (b), (ii)) ensures that the citizenry have the right to be *environmentally protected, for the benefit of present and future generations, through reasonable legislative and other measures that secure ecologically sustainable development and use of natural resources while promoting justifiable economic and social development*. The nation has passed its sustainable developmental efforts and programs in the law. Thus, SD according to the National Environmental Management Act (1998) is *the integration of social, economic, and environmental factors into planning, implementation, and decision-making so as to ensure that development serves present and future generations.* This study lay emphasis on the environmental sustainability aspect of sustainable development since environmental sustainability is a necessary and sufficient condition for an all-inclusive sustainable development.

In order to deviate from the existing studies on drivers of environmental degradation, this study investigates the effects of geopolitical risk and globalization on environmental degradation in South Africa. There are two (2) major reasons for selecting South Africa as a case study to examine the interaction and interconnectedness among these series. First is the issue of globalization, which in this present-day economy, can never be overemphasized in making economic and environmental decisions; most specifically, with the grievous impacts of the COVID-19 pandemic on all spheres of life. Integration of the world economies continues to hasten in various areas such as economic, social, and political fields, international investments and trade activities beginning to grow in various parts of the world (Rafindadi & Usman, 2019). On one hand, Rafindadi and Ozturk (2017) argue that in Africa, South Africa has the most productive mechanized economic system. On the other hand, the economy was once sheltered from the grievous effect of globalization by the isolation and sanctions of the apartheid in the 90s. The isolation and sanctions of the apartheid period did not only affect the economy but also all aspects of life (socio-cultural) in the country. Thus, this development makes it imperative to investigate whether the pressure the world economies are facing, most especially South Africa, is as a result of globalization. Empirically, the nexus between globalization and environmental degradation is limited for Africa (Rafindadi, 2016), let alone South Africa (Salahuddin et al., 2019). Thus, it becomes expedient to examine the interrelation among these series, as policy implications from this study will be useful for the government, policymakers and interested individuals in the country and across Africa for effective economic and environmental decision-making.

Second is the issue of geopolitical risk. Over the years, the incidence of geopolitical risk and conflicts has been on the increase in virtually every part of the world. Nations have experienced increased terrorism, wars, political tensions, and conflicts, to say the least. Geopolitical risk has economic, social and political impacts, which have been reported to impact on environmental degradation[1]. For example, the multiplier impacts of some specific geopolitical events, such as the September 11 (9/11) Trade Tower attack in the US, Bombay attack and China-US trade wars, among others have impacted on investors and affected business decisions across the globe. Institutions such as the International Monetary Fund (IMF), World Bank and Central Bank now consider geopolitical risk as a significant driver of economic performance, while limited studies on the subject matter have argued the importance of geopolitical events on the economy (see Lee et al., 2021; Saint Akadiri et al., 2020; Tiwari et al., 2019; Wang et al., 2019) and on the environment (see Anser et al., 2021; Zhao et al., 2021).

South Africa has had its share of geopolitical events, globalization and carbon emissions over the years, with the nation being the 12th largest emitter of greenhouse gases including fluorinated gases, nitrous oxide, methane, water vapor and carbon dioxide (CO_2). Figures 1 and 2 provide graphical plots of the patterns among the series over the sampled period. It is paramount to state here that empirical literature on geopolitical risk is limited. Thus, this study is an addition to literature, as findings from this study would provide policymakers with useful information on the danger of geopolitical risk on the environment, for both the immediate and the future generations in South Africa and the entire African continent.

Furthermore, the influence of geopolitical risk on carbon emissions (environmental degradation) produces diverse outcomes. In some schools of thought (Jiao et al., 2022; Tomiwa et al., 2022; Anser et al., 2021; Sweidan, 2021), geopolitical risk positively impacts (escalates) environmental degradation. They are of the opinion that increase in geopolitical risk endangers the environment. Riti et al. (2022), in their study of BRICS countries, find that geopolitical risk positively impacts environmental degradation at aggregate level, and inversely relates with environmental degradation at the disaggregated level. This is in line with the findings of Zhao et al. (2021) that geopolitical risk negatively influences environmental degradation, while some other authors (such as Saint Akadiri et al., 2020) find no significant relationship among the series. In terms of globalization, Güngör et al. (2021) and Akadiri et al. (2020a, 2020b), using the autoregressive distributed lag model (ARDL), conclude that globalization exerts a negative impact on environmental degradation in South Africa. This outcome corroborates that of Baloch

[1] For a detailed literature review on geopolitical risk, globalization and carbon emissions, please see Anser et al. (2021), Zhao et al. (2021) and Salahuddin et al. (2019). For brevity, we could not delve into a detailed analysis on the subject matter.

et al. (2021) for OECD countries. On the other hand, Usman et al. (2020) via ARDL model, Le and Ozturk (2020) using second-generation panel techniques, and Farooq et al. (2022) all conclude that globalization (either economic or political) influences environmental degradation in the United States. These studies resonate with the findings of Adebayo et al. (2022), Akadiri and Adebayo (2021), Uzuner et al. (2020) and Saint Akadiri et al. (2019a). However, Saint Akadiri et al. (2019b), using ARDL model, find no significant impact of globalization on environmental degradation in Turkey. Most of the studies do not examine collectively the impact of geopolitical risk and globalization on environmental degradation in a multivariate study, using the advanced quantiles approach. This study therefore seeks to fill the identified gap.

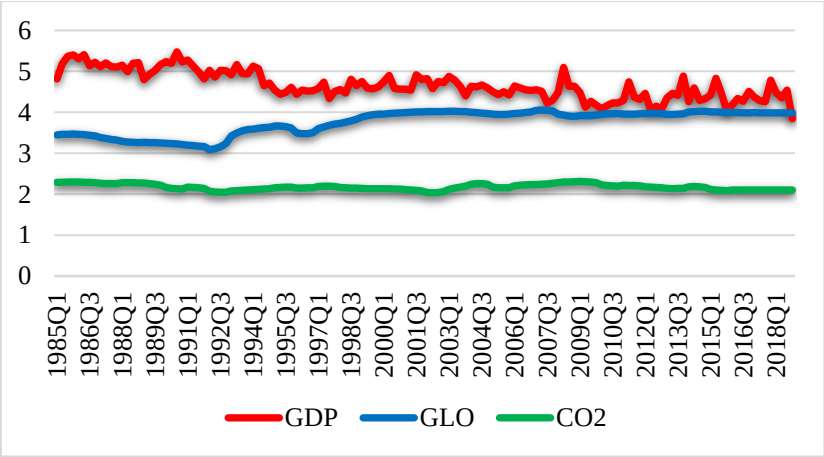

Figure 1. Trend of log of geopolitical risk, globalization and carbon emissions.

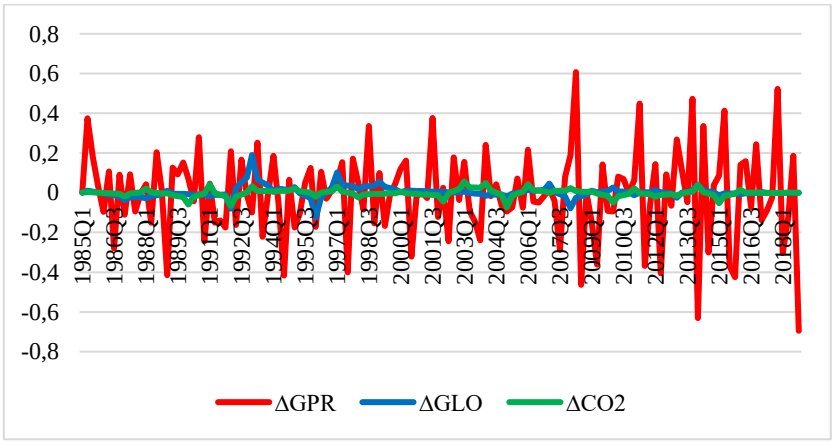

Figure 2. Trend of log difference of geopolitical risk, globalization and carbon emissions.

Salahuddin et al. (2019), in their empirical investigation, examine the nexus among urbanization, globalization and carbon emissions in South Africa over the period 1980-2017. For empirical analysis, the study makes use of the ARDL cointegration model for estimation and Toda-Yamamoto causality technique for testing predictive ability. Having confirmed a long-run equilibrium relationship among the series, further empirical results show that urbanization and globalization index both influence carbon emissions in the long run, while no predictive relationship is confirmed among the series. The study recommends the use of renewable energy in the South African energy mix for a renewable energy-based sustainable environment. This current paper is an improvement on the study. We make use of a relatively newly developed advanced Granger causality technique as proposed by Troster (2018), since the conventional mean causality approach does not consider possible dependence in the conditional tail of the distribution.

As discussed earlier, this current study seeks to investigate the effects of geopolitical risk and globalization on environmental degradation in South Africa over the period 1985Q1-2018Q4. Based on the authors' knowledge, this study is the first or among the scanty studies on the interaction and interconnectedness among geopolitical risk, globalization and environmental degradation (carbon emissions) in South Africa. This study improves on the existing study of Salahuddin et al. (2019) on globalization in South Africa and raises concerns on the potential impact of geopolitical risk on the environment of the sampled country, which based on our knowledge, is limited. This study deviates from the existing studies that make use of the mean causality approaches that do not consider

possible dependence in the conditional tail of the distribution. To examine whether the causality exists across the distribution, the novel Troster (2018) Granger non-causality in condition quantiles that captures the pattern of causality in various quantiles is used.

Empirical results show that there is feedback causality nexus between geopolitical risk and CO_2 emissions. In majority of the quantiles, feedback causality is also observed between globalization and CO_2 emissions. From a policy standpoint, using advanced quantile Granger causality techniques, this study has been able to substantiate that environmental degradation is not driven by globalization and geopolitical risk in the sampled country. However, policymakers must prevent heightened geopolitical risk and put in place stringent policies that would prevent adverse effects of globalization on the environment.

The rest of this study is outlined as follows. Section 2 discusses the literature review in brief. Section 3 presents the data and methodology adopted for empirical analysis. Section 4 presents the empirical results, followed by a discussion of findings. Section 5 proffers concluding remarks with potential policy suggestions for emerging economies, most specifically South Africa.

2. Data and Methods

2.1. Data

The major aim of this study is to examine the interaction and interconnectedness among geopolitical risk, globalization and environmental degradation in South Africa over the period 1985-2018. In addition, we seek to test whether geopolitical risk and globalization index contribute to environmental degradation level in the sampled country. To effectively achieve this objective, we employ the advanced and newly developed quantile technique as proposed by Troster (2018), using quarterly time series dataset. Data on geopolitical risk and globalization are sourced from Caldara and Iacoviello (2017) and Gygli et al. (2018), while data on carbon emissions metric tons per capita is sourced from the World Bank Development Indicators.

2.2. Unit root and quantile cointegration

We examine the stationarity properties of the series via the augmented Dickey-Fuller (ADF) and Phillips-Perron (PP) tests. The novelty of this paper is based on the use of an advanced quantile approach to examine the impact of various frequencies of geopolitical risk and globalization on the shapes, locations and scales of environmental degradation in South Africa. In line with the study of Mishra et al. (2019), this current study uses the quantile cointegration test proposed by Xiao (2009)[2] to examine the effects of geopolitical risk and globalization on environmental degradation across various frequencies. This technique circumvents the endogeneity limitations of traditional cointegration models by disintegrating the random disturbances of the cointegration equation into a pure innovation term and lead-lag terms. The Xiao (2009) quantile cointegration test is given as follows:

$$V_t = \varphi + \pi' Q_t + \sum_{j=-k}^{k} \Delta z'_{t-j} \beta_j + \upsilon_t \quad (1)$$

and

$$Y_{\omega}^{V}(V_t|I_t^V \,.\, I_t^z) = \varphi(\omega) + \pi(\omega)'^{Q_t} + \sum_{j=-k}^{k} \Delta z'_{t-j} \beta_j + H_u^{-1}(\omega) \quad (2)$$

A quadratic term of the predictor is added to the quadratic cointegration model as follows:

$$Y_{\omega}^{V}(V_t|I_t^V \,.\, I_t^z) = \varphi(\omega) + \pi(\omega)'^{Q_t} + \vartheta(\omega)' z_t^2 + \sum_{j=-k}^{k} \Delta z'_{t-j} \beta_j + \sum_{j=-k}^{k} \Delta z_{t-j}^{2'} \phi_j H_u^{-1}(\omega) \quad (3)$$

The null hypothesis is given as $H_0 = \pi$, across all quantiles. Thus, this current study uses the rule of Mishra *et al.* (2019) as a test statistic across all quantiles and conducts 1000 Monte Carlo simulations to estimate the critical values of the test statistic.

2.3. Q-Q Regression

For sound empirical analysis, this study makes use of the quantile-on-quantile regression (QQR) method. This advanced quantile method is robust for analyzing the connection between macroeconomic series outside the mean of the data. The QQR method was advanced by Sim and Zhou (2015) and it combines nonparametric estimation with the quantile regression. It is an addition to the Koenker and Bassett Jr. (1978) quantile technique as it povides a more inclusive description of the relations among series. The QQR examines the impact of geopolitical risk and globalization on carbon emissions, not only on the conditional mean of the explained series but also on its quantiles. This offers a more complete linkage when compared with the least squares method. In addition, as suggested by Cleveland (1979) and Stone (1977), traditional linear regression is useful when estimating the exact quantile of the explanatory series on the explained series. Therefore, to examine the role across quantiles of the explanatory series on diverse quantiles of the explained series, we combine standard quantile regression with linear regression. This will enhance empirical outcomes and provide a basis on which to comprehend the hidden nexus among the series under investigation.

[2] Xiao (2009) is an extension of the Engle and Granger (1987) test.

To empirically examine the linkages and impacts of geopolitical risk and globalization on environmental degradation in South Africa, the QQR approach is used to investigate the influence of different quantiles of X on the various quantiles of Y. The model is expressed as follows:

$$Y\_t = Y\hat{}\theta(X\_t) + \varepsilon\_t\hat{}\theta \quad (4)$$

Where Y_t is the explained series in period t and X_t is the explanatory series in time t. θ depicts the θth quantile on the distribution of X. Furthermore, μ_t^θ is the quantile error term, where the estimated θth quantile is equal to zero (0). In addition, bandwidth selection is crucial because it aids to shorten the target point and shifts the outcome's speed. If the bandwidth 'h' is wide, the variance will decrease, while the estimate deviation will also decrease, and vice versa. We thus make use of bandwidth value of h = 0.05 as suggested by Sim and Zhou (2015).

2.4. Quantiles Granger causality

We use the Troster (2018) causality test to detect the causal relationship among geopolitical risk, globalization and environmental degradation in South Africa. As suggested by Granger (1969), if Xi does not cause Zi, it implies that there is no causal linkage between Xi and Zi. If vector $\left(\mathcal{M}_i = \mathcal{M}_i^{\mathcal{Z}}, \mathcal{M}_i^{\mathcal{X}}\right) \in \Re^e, e = o + q$, with $\mathcal{M}_i^{\mathcal{X}}$ is the past proof of set of $\mathcal{X}_i$ $\mathcal{M}_i^{\mathcal{X}} = (\mathcal{X}_{i-1,} \dots \dots \mathcal{X}_{i-q,})' \in \Re^q$. Furthermore, equation 5 shows the H_o hypothesis:

$$\mathcal{H}_o^{\mathcal{X}\nrightarrow\mathcal{Z}}: \mathcal{FZ}\left(\mathcal{Z}\middle|\mathcal{M}_i^{\mathcal{Z}}, \mathcal{M}_i^{x}\right) = \mathcal{FZ}\left(\mathcal{Z}\middle|\mathcal{M}_i^{\mathcal{Z}}\right) \text{for all } \mathcal{X}\epsilon\Re, \quad (5)$$

$\mathcal{FZ}\left(.\middle|\mathcal{M}_i^{\mathcal{Z}}, \mathcal{M}_i^{x}\right)$ is observed as the conditional scattering function of $\mathcal{Z}i$ as long as $\mathcal{M}_i^{x}, \mathcal{M}_i^{z}$ in the domain of Ho shown by eq. 5. Based on the Troster (2018) research work, in evaluating Dt test which captures the QA (·) framework for all $\pi\in\Gamma\subset[0,1]$. Below is an illustration.

$$QAR(1): m_1\left(\mathcal{M}_i^{\mathcal{Z}}\middle|\partial(\pi)\right) = \lambda 1(\pi) + \lambda 2(\pi)\mathcal{Z}_{i-1} + \mu t\psi_{\mathcal{X}}^{-1}(\pi) \quad (6)$$

Where the values ∂here the val(π)and e re-evaluated by the supreme probability in quantiles grid space that is equal, and $\psi_{\mathcal{X}}^{-1}(.)$ is the opposition to a traditional dispersion function. We further amend the sign between the series via evaluating the QAF model in eq. 6 with the lagged parameter set to another value. We reveal the QAR in eq. 7:

$$\mathcal{Q}_{\pi}^{\mathcal{Z}} = \left(\mathcal{Z}_i\middle|\mathcal{M}_{\mathrm{i}}^{\mathcal{Z}}, \mathcal{M}_{\mathrm{i}}^{\mathrm{x}}\right) = \lambda 1(\pi) + \lambda 2(\pi)\mathcal{Z}_{i-1} + \eta(\pi)\mathcal{X}_{i-1} + \mu t\psi_{\mathcal{X}}^{-1} \quad (7)$$

3. Results and Discussion of Findings

Table 1 presents the data summa. The skewness value reports that carbon emissions, globalization and geopolitical risk are positively skewed. The Kurtosis value also reports that all the variables are leptokurtic, while CPU is platykurtic. In addition, the Jarque-Bera (JB) test statistic reveals that all the series are non-normal. We test for stationarity properties of the series using the conventional augmented Dickey-Fuller (ADF) and Philip-Perron (PP) unit root tests. The outcomes are reported at the right-hand side of Table 1. From the results, we find that all the series are integrated at first difference *I*(1).

Table 1. Descriptive Statistics and Unit Root Test Outcomes

	Descriptive Statistics								Unit Root Tests	
	Mean	Median	Max	Min	SD	Skewness	Kurtosis	JB	ΔADF	ΔPP
CO_2	8.8242	8.6907	10.0776	7.6479	0.6450	0.3183	2.0519	7.3901**	-4.559*	-5.909*
GLO	44.4801	51.890	57.7485	21.897	11.665	-0.6146	1.7263	17.7556*	-4.828*	-5.319*
GPR	113.450	99.414	239.2361	46.697	41.430	0.9039	3.0765	18.5540*	-6.875*	-4.361*

*Note: * and ** denote 1% and 5% levels of significance respectively.*

Having established the nonlinearity properties of the series, the BDS test as proposed by Broock et al. (1996) is then employed to identify the series' nonlinearity features. The BDS nonlinearity test results are reported in Table 2. From the results, we confirm the nonlinearity feature of all the series. These results reinforce the JB test statistic results reported in Table 1. The use of linear econometric techniques (such as ARDL, FMOLS, CCR, VECM, OLS) thus becomes inappropriate and would generate outcomes that are spurious or misleading. Consequently, this paper employs nonlinear techniques, such as quantile cointegration advanced by Xiao (2009) to confirm the cointegration relation among the series.

Table 2. BDS Test

	Z-stat (Pvalue)	Z-stat (Pvalue)	Z-stat (Pvalue)
M2	38.685*	37.825*	18.198*
M3	40.025*	40.073*	20.665*
M4	41.635*	42.936*	22.594*
M5	44.269*	47.206*	24.876*
M6	48.244*	53.042*	27.838*

*Note: * denotes significance level of 1%.*

Table 3 reports the cointegration test results among the series. Based on the results, we observe that the cointegration vector shifts across the distribution. We find an evidence of a long-run cointegration relation among carbon emissions, globalization and geopolitical risk for the sampled country. Thus, we conclude that in South Africa, the series under investigation have a common pattern of movement in the long run.

Table 3. Quantile Cointegration Test Outcomes

Model	Coefficient	$Sup_{\tau}\|V_{\pi}(\tau)\|$	CV1%	CV5%	CV10%
$\mathbf{CO_{2t}}$ **Vs** $\mathbf{GPR_t}$	β	8947.43	5128.84	3973.66	2963.25
	α	825.680	537.479	418.843	198.874
$\mathbf{CO_{2t}}$ **Vs** $\mathbf{GLO_t}$	β	7579.85	3980.85	2275.53	1785.84
	α	618.963	356.284	269.974	143.363

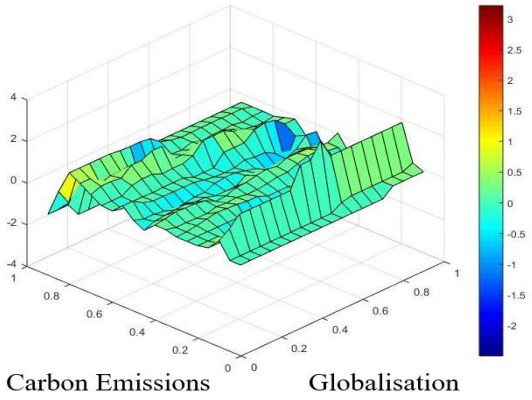

Figure 3. Effect of Globalization on CO_2

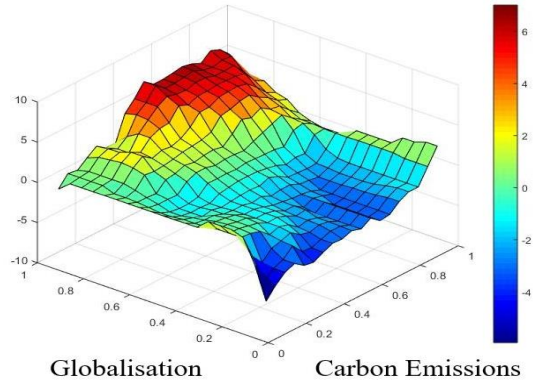

Figure 4. Effect of CO_2 on Globalization

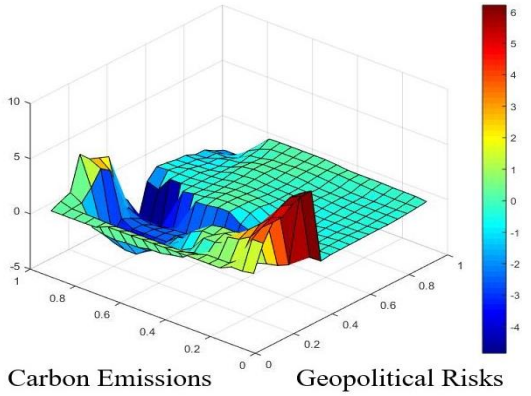

Figure 5. Effect of CO_2 on Geopolitical Risks

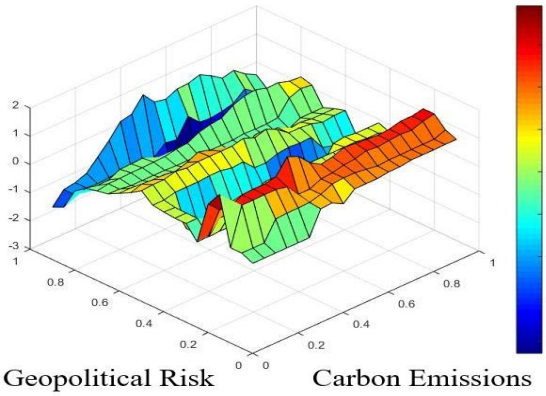

Figure 6. Effect of Geopolitical Risks on CO_2

Figures 3-6 report the effects of the series on one another. The figures are virtual representations of the existing predictive relationships among the series in 3D graphical plots. We further make use of the S_T Granger causality in quantiles test. Table 4 reports S_T and the probability values for the natural logarithms of the series. Note that the S_T Granger causality test is conducted for an equally spaced grid of nineteen (19) quantiles T, precisely between 0.05-0.95 respectively. Summarily, across the quantiles (0.10-0.95), the effect of globalization on CO_2 emissions is negative. While in the lower and middle quantiles (0.1-0.65), the effect of CO_2 emissions on globalization is negative, it is positive in the upper tail (0.70-0.95). This outcome is at variance with the study of Salahuddin *et al.* (2019) which finds no causal relation between globalization and carbon emission in South Africa.

In addition, in all quantiles (0.25-0.95), the effect of geopolitical risk on CO_2 emissions is negative, with the exemption of the lower tail (0.1-0.20) which shows slight evidence of a positive effect of geopolitical risk on CO_2 emissions. These findings resonate with the study of BRICS by Zhao et al. (2021), where it is confirmed that geopolitical risk inversely relates with carbon emissions in Russia and South Africa. Also, in the lower tail (0.1-0.25), the effect of CO_2 on geopolitical risks is positive; however, it is negative in the middle and upper quantiles. Overall, results show that there is feedback causality nexus between geopolitical risk and CO_2 emissions. In majority of the quantiles, feedback causality is likewise observed between globalization and CO_2 emissions.

Table 4. Granger Causality in Quantiles Outcomes

Quantiles	GPR→CO_2	CO_2→GPR	GLO→CO_2	CO_2→GLO
0.05	0.0102	**0.0102**	**0.0102**	**0.0102**
0.05	0.2688	0.3501	**0.0204**	0.2959
0.10	0.1290	0.1022	**0.0102**	**0.0102**
0.15	0.1398	0.4526	**0.0102**	**0.0102**
0.20	0.0645	**0.0102**	**0.0102**	**0.0102**
0.25	0.0753	**0.0102**	**0.0102**	**0.0102**
0.30	0.5806	**0.0102**	**0.0102**	0.4358
0.35	0.0108	**0.0102**	**0.0102**	0.1222
0.40	0.2366	0.0664	**0.0102**	0.3162
0.45	0.4301	0.1258	0.2755	0.1735
0.50	0.5591	0.9796	0.0612	0.7245
0.55	0.4194	0.1163	**0.0102**	**0.0102**
0.60	0.2366	0.0508	**0.0102**	**0.0408**
0.65	0.1720	**0.0102**	**0.0102**	0.5592
0.70	0.2903	**0.0102**	**0.0102**	0.4312
0.75	0.1935	**0.0102**	**0.0102**	**0.0102**
0.80	**0.0108**	**0.0102**	**0.0102**	**0.0102**
0.85	0.0538	**0.0102**	**0.0102**	**0.0102**
0.90	**0.0102**	**0.0102**	**0.0102**	**0.0102**
0.95	**0.0102**	0.6224	0.4592	0.3163

Table 4 unveils the sub-sampling pvalues of the DT test. The dismissal of the null hypothesis at the 5% significance level is illustrated in bold.

4. Concluding Remarks

This paper examines the interaction and interconnectedness among geopolitical risk, globalization and environmental degradation in South Africa over the period 1985Q1-2018Q4. In addition, we test whether geopolitical risk and globalization index contribute to the environmental degradation level in the sampled country. To effectively achieve this objective, we employ an advanced and newly developed quantile technique as proposed by Troster (2018), using quarterly time series dataset. We confirm the nonlinearity of the series, using the BDS test, which affirms that the series are nonlinear in nature, while the unit root confirms that the series are integrated at first difference. The results of the quantile cointegration also confirm the existence of a long-run equilibrium relation among quantiles of geopolitical risk, globalization and carbon emissions respectively. Additionally, we employ the novel Granger causality technique to ascertain the direction of causality in quantiles of the observed series, specifically in extreme fluctuations.

Overall, results show that there is feedback causality nexus between geopolitical risk and CO_2 emissions. In majority of the quantiles, feedback causality between globalization and CO_2 emissions is also observed. Thus, there is a bi-directional Granger causality nexus between geopolitical risk and environmental degradation as well as between globalization and environmental degradation. Empirical findings substantiate the dynamic nexus among geopolitical risk, globalization and environmental degradation in South Africa. We find that both globalization and geopolitical risk negatively influence environmental degradation in the sampled country. Summarily, using the advanced quantile Granger causality technique, this study has been able to substantiate that environmental degradation is not driven by globalization and geopolitical risk in the sampled country. However, policymakers should avoid heightened geopolitical risk and put in place stringent policies that would prevent adverse effects of globalization on the environment. We are of the opinion that policies that support green economy should be pursued to control the adverse effects of globalization and geopolitical risk, since a greener economy can be a useful weapon to buffer against potential globalization and geopolitical risks for oil and gas exporting/importing nations of Africa, most especially South Africa.

Conclusively, this study is confined to South Africa because the available geopolitical risk data does not cover all African countries. In addition, due to data availability, we could not capture the impact of COVID-19 pandemic in this study. As posited in Abubakar et al., (2021) COVID-19 exercise indirect effects, towards sustainable environment. It net impact on the environment has been positive; in terms of reduction in oil exploration activities, pollution and greenhouse emissions respectively. Thus, future researches may focus on examining the interactions among the observed series for Africa at large by incorporating the COVID-19 pandemic, to substantiate and further strengthen findings from this study in this new normal . Also, the use of more advanced methods, such as econometric techniques that capture regime switch, is suggested to carry out future studies.

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References

1. ABUBAKAR L., SALEMCITY A. J., ABASS O. K., OLAJUYIN A. M., 2021, The impacts of COVID-19 on environmental sustainability: A brief study in world context, *Bioresource Technology Reports*, 15: 100713.
2. ADEBAYO T. S., AKADIRI S. S., AKPAN U., ALADENIKA B., 2022, Asymmetric effect of financial globalization on carbon emissions in G7 countries: Fresh insight from quantile-on-quantile regression, *Energy & Environment*, DOI: 0958305X221084290.
3. AKADIRI S. S., ADEBAYO T. S., 2021, Asymmetric nexus among financial globalization, non-renewable energy, renewable energy use, economic growth, and carbon emissions: impact on environmental sustainability targets in India, *Environmental Science and Pollution Research:* 1-13.
4. AKADIRI S. S., ALOLA A. A., BEKUN F. V., ETOKAKPAN M. U., 2020, Does electricity consumption and globalization increase pollutant emissions? Implications for environmental sustainability target for China, *Environmental Science and Pollution Research*, 27(20): 25450-25460.
5. AKADIRI S. S., LASISI T. T., UZUNER G., AKADIRI A. C., 2020, Examining the causal impacts of tourism, globalization, economic growth and carbon emissions in tourism island territories: bootstrap panel Granger causality analysis, *Current Issues in Tourism*, 23(4): 470-484.
6. ADEBAYO T. S., AKADIRI S. S., AKANNI E. O., SADIQ-BAMGBOPA Y., 2022, Does political risk drive environmental degradation in BRICS countries? Evidence from method of moments quantile regression, *Environmental Science and Pollution Research*, 29(21): 32287-32297.
7. ANSER M. K., SYED Q. R., APERGIS N., 2021, Does geopolitical risk escalate CO_2 emissions? Evidence from the BRICS countries, *Environmental Science and Pollution Research*, 28(35): 48011-48021.
8. ALOCH M. A., OZTURK I., BEKUN F. V., KHAN, D., 2021, Modelling the dynamic linkage between financial development, energy innovation, and environmental quality: Does globalization matter?, *Business Strategy and the Environment*, 30(1): 176-184.
9. BROOCK W. A., SCHEINKMAN J. A., DECHERT W. D., LEBARON B., 1996, A test for independence based on the correlation dimension, *Econometric reviews*, 15(3): 197-235.
10. CALDARA D., IACOVIELLO M., 2018, Measuring geopolitical risk, *FRB International Finance Discussion Paper*, (1222).
11. CLEVELAND W. S., 1979, Robust locally weighted regression and smoothing scatterplots, *Journal of the American statistical association*, 74(368): 829-836.
12. ENGLE R. F., GRANGER C. W., 1987, Co-integration and error correction: representation, estimation, and testing, *Econometrica: Journal of the Econometric Society:* 251-276.
13. FAROOQ S., OZTURK I., MAJEED M. T., AKRAM R., 2022, Globalization and CO_2 emissions in the presence of EKC: A global panel data analysis, *Gondwana Research*, 106: 367-378.
14. GÜNGÖR H., ABU-GOODMAN M., OLANIPEKUN I. O., USMAN O., 2021, Testing the environmental Kuznets curve with structural breaks: The role of globalization, energy use, and regulatory quality in South Africa, *Environmental Science and Pollution Research*, 28(16): 20772-20783.
15. GRANGER C. W., 1969, Investigating causal relations by econometric models and cross-spectral methods, *Econometrica: Journal of the Econometric Society:* 424-438.
16. GYGLI S., HAELG F., POTRAFKE N., STURM J. E., 2018, *The KOF globalisation index-revisited.*
17. JIAO Y., XIAO X., BAO X., 2022, Economic policy uncertainty, geopolitical risks, energy output and ecological footprint – Empirical evidence from China, *Energy Reports*, 8: 324-334.
18. KOENKER R., BASSETT J.R.G., 1978, Regression quantiles. *Econometrica: journal of the Econometric Society:* 33-50.
19. LE H. P., OZTURK I., 2020, The impacts of globalization, financial development, government expenditures, and institutional quality on CO_2 emissions in the presence of environmental Kuznets curve, *Environmental Science and Pollution Research*, 27(18): 22680-22697.
20. LEE C. C., OLASEHINDE-WILLIAMS G., AKADIRI S. S., 2021, Geopolitical risk and tourism: Evidence from dynamic heterogeneous panel models, *International Journal of Tourism Research*, 23(1): 26-38.
21. MISHRA P., PANDEY C. M., SINGH U., GUPTA A., SAHU C., KESHRI A., 2019, Descriptive statistics and normality tests for statistical data, *Annals of cardiac anaesthesia*, 22(1): 67.
22. RAFINDADI A. A., 2016, Does the need for economic growth influence energy consumption and CO_2 emissions in Nigeria? Evidence from the innovation accounting test, *Renewable and Sustainable Energy Reviews*, 62: 1209-1225.
23. RAFINDADI A. A., OZTURK I., 2017, Dynamic effects of financial development, trade openness and economic growth on energy consumption: Evidence from South Africa, *International Journal of Energy Economics and Policy*, 7(3): 74-85.
24. RAFINDADI A. A., USMAN O., 2019, Globalization, energy use, and environmental degradation in South Africa: Startling empirical evidence from the Maki-cointegration test, *Journal of Environmental Management*, 244: 265-275.
25. RITI J. S., SHU Y., RITI M. K. J., 2022, Geopolitical risk and environmental degradation in BRICS: Aggregation bias and policy inference, *Energy Policy*, 166: 113010.
26. SAINT AKADIRI S., ALKAWFI M. M., UĞURAL S., AKADIRI A. C., 2019, Towards achieving environmental sustainability target in Italy. The role of energy, real income and globalization, *Science of the Total Environment*, 671: 1293-1301.
27. SAINT AKADIRI S., ALOLA A. A., AKADIRI A. C., 2019, The role of globalization, real income, tourism in environmental sustainability target. Evidence from Turkey, *Science of the Total Environment*, 687: 423-432.
28. SAINT AKADIRI S., ELUWOLE K. K., AKADIRI A. C., AVCI T., 2020, Does causality between geopolitical risk, tourism and economic growth matter? Evidence from Turkey, *Journal of Hospitality and Tourism Management*, 43: 273-277.

29. SALAHUDDIN M., ALI M., VINK N., GOW J., 2019, The effects of urbanization and globalization on CO_2 emissions: evidence from the Sub-Saharan Africa (SSA) countries, *Environmental Science and Pollution Research*, 26(3): 2699-2709.
30. SIM N., ZHOU H., 2015, Oil prices, US stock return, and the dependence between their quantiles, *Journal of Banking & Finance*, 55: 1-8.
31. STONE C. J., 1977, Consistent nonparametric regression, *The annals of statistics*, 595-620.
32. SWEIDAN O. D., 2021, Is the geopolitical risk an incentive or obstacle to renewable energy deployment? Evidence from a panel analysis, *Renewable Energy*, 178: 377-384.
33. TIWARI A. K., DAS D., DUTTA A., 2019, Geopolitical risk, economic policy uncertainty and tourist arrivals: Evidence from a developing country, *Tourism Management*, 75: 323-327.
34. TROSTER V., 2018, Testing for Granger-causality in quantiles, *Econometric Reviews*, 37(8): 850-866.
35. USMAN O., AKADIRI S. S., ADESHOLA I., 2020, Role of renewable energy and globalization on ecological footprint in the USA: Implications for environmental sustainability, *Environmental Science and Pollution Research*, 27(24): 30681-30693.
36. UZUNER G., AKADIRI S. S., LASISI T. T., 2020, The asymmetric relationship between globalization, tourism, CO_2 emissions, and economic growth in Turkey: Implications for environmental policy making, *Environmental Science and Pollution Research*, 27(26): 32742-32753.
37. WANG X., WU Y., XU W., 2019, *Geopolitical risk and investment*, SSRN 3305739.
38. XIAO Z., 2009, Functional-coefficient cointegration models, *Journal of Econometrics*, 152(2): 81-92.
39. ZHAO W., ZHONG, R., SOHAIL, S., MAJEED, M. T., ULLAH, S., 2021, Geopolitical risks, energy consumption, and CO_2 emissions in BRICS: An asymmetric analysis, *Environmental Science and Pollution Research*, 28(29): 39668-39679.

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Boko-Haram Insurgency and Rural Livelihood Dilemma: Implication for Sustainable Development in North-East Nigeria

Rebelia Boko-Haram i dylemat braku środków do życia na wsi: implikacje dla zrównoważonego rozwoju północno-wschodniej Nigerii

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Abstract

The Boko-Haram insurgency has affected livelihoods in the Northeast in all ramifications. This study reviewed scholarly submissions on the drivers and impact of the insurgency in the area. The outcome of the review showed that the insurgency is driven mainly by poverty, religious extremism, and politics. Equally, the insurgency has affected rural livelihoods entirely and has exacerbated food insecurity, unemployment, and poverty. This is because critical infrastructure like schools, hospitals, markets, and electricity/telecommunication facilities have been largely destroyed, and residents of some communities are still displaced. Hence, to better the livelihood of the people in communities where normalcy has been restored, there is the need to promote agriculture and trade by securing the communities and enhancing access to affordable agricultural inputs.

Key words: insurgency, rural development, sustainable livelihood, North-East Nigeria

JEL Classification: H53, H56, H75, J18, O18

Słowa kluczowe: rebelia, rozwój obszarów wiejskich, zrównoważone źródła utrzymania, północno-wschodnia Nigeria

1. Introduction

The North East Region of Nigeria has a great potential for economic development as enshrined in its vast land mass, natural resource endowment, and population among others. The region is made up of six states, namely; Adamawa, Bauchi, Borno, Gombe, Taraba, and Yobe. It covers approximately 284,646 square kilometres which represents about 30.8 percent of the nation's land mass (Dlakwa, 2004). According to the National Bureau of Statistics (NBS, 2019), the area's population is a little over 26 million inhabitants and accounts for about 12% of the total population of the country. Politically, 14.47% of the nation's 774 Local Government Areas are situated in the region. However, this potential has not ascended the region to the required height in terms of development, as it remains one of the less developed regions in Nigeria (RPCA, 2016). In terms of poverty, 71.9% of the people are wallowing in income poverty, while the multidimensional poverty incidence was 0.47 (NBS, 2019). Also, concerning the quality of life, the region's average Human Development Index (HDI) was 0.38, which is less than the average national score of 0.521 (UNDP, 2018). Different reasons are adduced to be responsible for the backwardness situation of the region. The region is among the world's most unstable ecologically due to the extreme effects of environmental degradation, particularly deforestation and desertification (Nicholson et al., 1998). The emergence of the Boko-Haram insurgency has further degraded this fragile economic and ecological system for over a decade, which unleashed violence across the region and beyond. As a consequence of the insurgency and

counter-insurgency measures undertaken at national and regional levels, a large number of the inhabitants were killed, while millions were displaced from their homes to live as Internally Displaced Persons and refugees in neighbouring countries like the Niger republic, Chad, and Cameroon (Brechenmacher, 2019).

Globally, armed conflict slows down development and weakens its basis (Sheriff & Ipinmoye, 2015). Only a nation that prioritizes human security can achieve sustainable development. This is due to the importance of human security in achieving sustainable development (Ewalefoh, 2019). A guiding principle of sustainable development is achieving human development goals while preserving the capacity of natural systems to supply the natural resources and ecosystem services that are essential to the economy and society (Mensah, 2019). Developments are considered sustainable when it satisfies current requirements without jeopardizing the capacity of future generations to satisfy their wants (Emas, 2015). Therefore, the growing concern about insecurity in Nigeria inhibits investment (both domestic and foreign), poses a serious threat to the protection of lives and property, and hinders the achievement of sustainable development (Ukwayi & Anam, 2017). Shehu & Abba (2020) contend that when individuals lose their lives and means of support, disasters worsen poverty and turn back development. Similar to this, a lack of resources makes people more vulnerable and raises their chance of suffering as a result of being exposed to violence.

The rural communities in the region are mostly affected and ravaged by the insurgents. Unfortunately for the region, this important segment makes up 60% of its population (UNDP, 2016), and their livelihood and sustenance largely (80-90%) depend on agriculture, particularly crop production, fisheries, and the raising of livestock (FAO, 2016). The combined efforts of the Nigerian military and its neighbouring counterparts to exterminate the *Boko-Haram* insurgents from the region in 2015, were resisted by the group and as a result, a lot of rural communities were made desolate due to the enormity of the destruction in retaliation. This is how the northeast's rural areas came to be in such a deplorable state (Thurston, 2016). The insurgents have destroyed schools, hospitals, bridges, and other critical rural infrastructure. The security situation in the region escalated North in 2018 because of the resurgence of the insurgents' attack after about three years of reduced activities, and this has substantially jeopardised the likelihood of attaining stability and socio-economic development in the region (Granville, 2020). Maclean (2018) claims that because of the frequent assaults and suicide bombs, the military has prioritised protecting metropolitan areas over protecting rural areas, leaving the latter with scant protection.

Today, apart from the over 20,000 lives claimed by the conflict, most of whom are from rural areas, the conflict significantly destroyed physical infrastructure, disrupted social services, and dislocated social cohesion among the people (World Bank, 2015). This unpleasant situation has displaced over two million people in terms of internal displacement, refugees, and returnees (UNHCR, 2017). These people flee their homes, living behind most of their productive assets, like farms, livestock, and other financial capital. As people leave villages and many are left alone, decreased interconnectedness has had a severe impact on the economy. Because of the limited mobility of people, commodities, and services due to damaged infrastructure, ongoing terrorism, and restricted borders has severely hampered trade. As important commercial routes became inaccessible, the volume of trade drastically decreased.

With the remarkable successes gained over the *Boko-Haram* in recent times, the government of Nigeria and other donor agencies has established recovery and stabilisation programmes as part of the Northeast rebuilding and development agenda. However, the existence of pockets of the insurgents, particularly around the rural communities in the region remains a clog in their wheel of progress (Aminu et al., 2018). The insurgents continue to stage arbitrary attacks on the roads and some communities, limiting the inputs and markets supply chain. Again, the presence of the insurgence around the rural communities has become an impediment for the people to reach out to their far distance farms which are more productive and constrained to cultivate only the marginal farmlands. Because these people depend mostly on farming and related activities, low productivity in the sector would infringe on their socio-economic well-being.

The *Boko-Haram* terrorism, mostly in North East seems to have been the subject of numerous studies, opening up a discussion on how it has affected rural communities and the factors that determine rural livelihoods. Therefore, the essence of this review was to provide details of how the insurgency has affected rural livelihood in the region, and make recommendations on how rural areas someone can sustainably develop. The review looked at how the conflict affected some critical economic sectors such as education, health, agriculture, infrastructure, etc. This is to bring to the fore some fundamental issues that will guide the policy in achieving recovery plans as well as attaining sustainable development in the area. The study sought literature from published journals, periodicals, and other documents from the national government and international donor agencies.

2. History and Evolution of *Boko-Haram* Insurgency

The *Boko Haram* sect was formed in Maiduguri around the year 2002, and the real name of the sect was *Jama'atu Ahlis-Sunnah Lidda'awati Wal Jihad.* However, due to its anti-western posturing against western education, it was popularly referred to as *Boko-Haram* (Gilbert, 2014). The hitherto non-violent Islamic sect turned armed movement in 2009 (Geraud and Marc-Antoine, 2018) after an armed insurrection was crushed in 2009, particularly with

the extrajudicial killing of its leader Mohammed Yusuf. This expanded the scope of the activities of the group to other states within and outside the northeast region, leading to the destruction of the lives of security personnel and other civilian members of the society (Avis, 2020). Besides this, the group increased the tempo of their activities by subjugating towns and villages after the destruction of social amenities like hospitals, schools, and markets, to mention a few. As a result of this, their version of the sharia law brutally governed territories captured by the group. The areas captured were in Borno, Yobe, and Adamawa states. The continuous violence compelled the government to declare a state of emergency in Borno State and later extended to Yobe and Adamawa states, which lasted until 2014 (ACAPS, 2014; Brechenmacher, 2019). Different schools of thought at various times adduced reasons that drive the formation of the movement and its activities (World Bank 2015).

3. The Drivers of the *Boko-Haram* Insurgency

According to the source and the researcher, there are still conflicting theories about the conditions that caused the *Boko-Haram* insurgency in north-eastern Nigeria. However, there is mounting proof that socioeconomic derivations, extreme religious ideologies, and political variables accounted for a substantial part of the reasons (Adelaja et al., 2018). McGuire (1992) asserts that religion has one of the strongest, most profound effects on family, communal, socioeconomic, and politics; religious ideals guide people's decisions, and religious values aid in interpreting everyday experiences. Islamic fanaticism has contributed to *Boko-Haram*'s emergence, and the group's radical religious doctrine, which they use to defend violent activities (Asch, 2018). Specifically, the group is premised to be promoting Sharia law and creating an Islamic state in Northern Nigeria. For both individuals and groups, religion continues to be a significant source of social identity and moral authority. As a result, it has declared war on any organisation or notion that it considers being hostile to Islam. But many religious leaders, both inside and outside of the Northeast contest this assertion (Adesoji, 2011; Onuoha, 2012; Thomson, 2012). Onuoha (2014) asserts that the main element driving the acceptance of radical religious ideas, particularly among youth, is ignorance of religious teaching.

Furthermore, politics could be at the centre of the *Boko-Haram* insurgency in Northeast Nigeria (Iyekekpolo, 2016; Mbah et al., 2017). Poor governance that has affected civil liberties, promoted corruption, and weakened government institutions leading to political instability can foment the incidence of terrorism (Eubank and Weinberg, 2001). Many studies attribute the *Boko-Haram* insurrection to the nation's political class (Mbah et al., 2017). Apart from corrupt practices as well as the upper class's haughty displays of riches, Mohammed & Ahmed (2015) claimed that the main reason for the insurgency was indeed a lack of political will. According to Botha et al. (2017), politicians have created the *Boko-Haram* insurgency. The *Boko-Haram* violence, according to Mustapha (2021), is a manifestation of Nigeria's failed democratic governance, which has led to a high rate of unemployment. Walker (2012) argued that the huge threat caused by poverty in the Northeast region can only be removed by widespread reforms that improve the livelihood of the Northerners.

Equally, Kwaja (2011) opined that disenfranchisement and inequality were key contributing factors to the *Boko-Haram* insurgency. According to Adenrele (2012) and Akinola (2015), poverty and political alienation have substantially contributed to the emergence and continued existence of Boko Haram. This has resulted in poor social and economic outcomes in terms of all development indices such as poverty, healthcare, nutrition, employment, and the paucity of social services and infrastructure (Ngbea, 2014; Marks, 2016; Adeyeye et al., 2021). Additionally, the region's high rates of chronic poverty have been assisted by the absence of substantial infrastructure, economic integration, and effective policies to support agriculture and industrial development. Poverty has thus made it easier for insurgents to attract new members and reduced the right of the government or its institutions to control the threat (O'Connor et al., 2021; Okunlola & Okafor, 2022). The notion that insurgency thrives in poverty and underdevelopment, which makes the poor vulnerable and susceptible to terrorist ideas and recruiting, was also confirmed, according to Dada (2018).

4. Impact of the *Boko-Haram* Insurgency on Rural Communities and Its Implication on Sustainable Development

4.1. Rural Livelihoods

The strategies and activities that produce the capabilities for a household's sustenance and long-term well-being make up rural livelihoods (Onwuaroh et al., 2017). Ikpe (2017) asserts that Boko Haram's actions have significantly disrupted the area's key economic activity. The conflict's detrimental effects on the rural economy and way of life severely weakened the region's demographic well-being. In the northeast, there were as there are less meaningful jobs even before the crisis, and there are even fewer now. Agriculture accounted for the majority of labour force participation (43%) as well as the non-agricultural, primarily unorganised sector (39 percent). Based on the submission of the World Bank (2015), the rate of labour involved in agriculture substantially declined (to about

27%) at the peak of the insurgency (2012-2013). This showed that the insurgency has considerably reduced agricultural activity and restricted access to land for raising crops and livestock. Since agricultural production has decreased, food prices have increased and households are now more susceptible to shocks and stressors. This has caused a significant increase in unemployment, food insecurity, and poverty in the area. In real terms, the crisis caused the poverty rate to increase from 47.3% in 2011 to roughly 71% in 2019. (Eme & Ibietan, 2012; NBS, 2019; Avis, 2020).

Due to the level of damages done to infrastructure like markets, health and education facilities, and houses to mention a few, there has been a large-scale humanitarian crisis in the area. Due to the number of checkpoints put in place by the security agents and the government's militarized counter-terrorism strategy, quite a number of rural farmers were forced to relocate, and others are prohibited from traveling to their farms (Dabugat, 2013). As a result of rising food insecurity and mounting demands on already stretched and damaged basic social services, this has widened socioeconomic status gaps historically evident in the northeast (Margarita, 2013; Council on Foreign Relations, 2018; World Bank, 2015). The conflict has also eroded social cohesion with social interaction becoming increasingly challenging in an atmosphere of violence that has followed, due to communal, property, and land disputes, and retaliation for conflict-related violence (Brechenmacher, 2019, World Bank, 2015). To be placed succinctly, the conflict has depleted all the rural livelihood assets of the people, placing them in a precarious situation requiring sustained livelihood support.

4.2. Food Security and Nutrition

Improving food security and eradicating hunger through the promotion of sustainable agriculture are key priorities of the sustainable development goals of the United Nations (Banik, 2019). The *Boko-Haram* conflict has significantly diminished household capacity to carry on with ordinary livelihoods, as well as market function and trade flows, despite the northeast being a region that produces food and serves as a supply route for livestock marketing within and outside the country (Sunday et al., 2017). According to Mwangi et al (2014), the conflict has affected the food supply and nutrition of people across various parts of the region, particularly in Borno, Yobe, and Adamawa states. The conflict has caused a reduction in crop output, increased prices of inputs food, and also increased transportation costs. This is partly attributed to the killing of a substantial (about 13,000) number of rural farmers by the insurgents (Mustapha, 2015; Council on Foreign Relations 2015). Equally, a large number (over a million) of fishermen from the area had migrated to other neighbouring countries like Chad, Cameroun, and Niger republic. This had a negative impact on fishery activity in the area and the livelihood of the people. Similarly, livestock activities also suffered similar consequences, as it hampered the livestock markets in terms of access to locations, frequency of operations, and attendance of participants (Nigerian National Bureau of Statistics & UNICEF, 2014). Because of the insurgency, nearly 15 million people in the area were food insecure. A detailed breakdown of the food insecure population showed that 5.2 million experienced acute food shortages and 54,000 were threatened famine (United States Agency for International Development, 2015).

Some areas of the communities affected by the violence have continued to face these difficulties. For instance, Okechukwu (2014) showed that the operations of *Boko-Haram* terrorists in the region have seriously jeopardized the Federal Government's efforts to increase agricultural output in the Chad Basin. It was determined that numerous hectares of Borno's productive land that had been prepared for the growing of crops had already been deserted as a result of the rebels' actions. It was learned that almost all of the farmers engaged in rice farming and certain other agricultural pursuits were left the huge area of the Chad Basin due to the rebels' actions. Food shortages and a spike in prices are the results of the Chad Basin's agricultural activities being suspended (Adebayo, 2014). Correspondingly also, the Chicken Association of Nigeria (PAN) has expressed alarm about the *Boko-Haram* militants' actions, claiming that restricting access to trade and supplies, is having a negative impact on sales of poultry goods in Northern Nigeria. Oduntan (2014) claimed that the terrorists' actions had caused a continuous decline in sales since some feed ingredients, such as maize and groundnuts, which were typically acquired from the affected states, were unavailable. Additionally, exporting to nearby nations like Chad, Cameroon, and Niger had already become problematic.

Tari et al. (2016) investigated the impact of sect activities on a few chosen households' food status in Northern Adamawa State. The study found that the insurgency has a big impact on how to secure food for households. Additionally, it was noted that the number of homes with food insurance remains worrying and that malnutrition, rates among children, remain widespread in the studied areas. In a similar vein, Mercy Corps (2017) observed that terrorism and counter-terrorism tactics have persisted to cause peasants to worry about their wellbeing, which has limited their ability to engage in farming. Besides physical safety, further difficulties included poor road conditions, restrictions, inspections, and rising transportation costs. Even in areas where farmers are still able to grow crops, it is difficult for them to convey their products to urban areas where it is needed because militants have destroyed transportation infrastructure, and vehicles driving on isolated routes run the risk of being ambushed. The volume of agricultural products produced in Nigeria as well as that exported to other nations has decreased as a result of the prohibition on motorbikes, which is the dominant mode of transportation for all of these people in rural areas. Farmers rarely venture outside of places where they feel completely safe to farm as a result of these

circumstances, which has led to overcrowding in secure areas and the fragmentation of the land. Additionally, the usage of modified seeds is highly restricted in the region due to the high cost of inputs.

Similar research was conducted by Ojo et al. (2018) on the impact of the insurgency on food crops in Nigeria's Borno and the Gombe States. According to the study's findings, farmers were utilizing less farm equipment than was necessary, such as fewer pesticides, fertilizer, seeds, and farmland. It was found that the insurgency had a considerable and detrimental effect on the productivity of farmers farming food crops in the study area. In 2019, Eneji et al. examined the impact of insecurity on Gombe State's agricultural productivity. Many farmers have been forced to abandon their farms by the insurgency in search of safety and security, which has had a negative influence on agricultural productivity, hindered the sector's growth and development, and reduced its ability to contribute to national security. In addition, Augustine et al. (2019) looked at how the *Boko-Haram* resurgence affected cattle output in the Adamawa State, Nigeria, Mubi region. According to the study, strikes by Boko Haram have significantly decreased cattle populations. In a similar vein, Adewuyi & Michael (2020) evaluated how the insurgency affected the production of different crops in the Borno State, Nigeria, Chibok Local Government Area. According to the study, rising insurgent activity had a significant negative impact on the area's rural farmers' ability to produce. In addition, Yakubu et al. (2021) evaluated the impact of the *Boko-Haram* Insurgency on crop output in the Nigerian state of Borno's Hawul Local Government Area. According to the study, there was a large rise in farm operation costs following the conflict, which caused drop-in farm productivity. The well-being and way of life of farmers in the affected areas can be negatively impacted by this decrease in crop yield.

Beyond just affecting agricultural output, the insurgency also has a negative impact on farmers' income and nutritional status. According to research by Onwuaroh et al. (2017) on the effect of the insurgency on farmers' income in northern Nigeria, insurgent operations hurt farmers' revenue. Musab & Otovwe (2021) looked at how the *Boko-Haram* insurgency affected several rural residents' nutritional status in the Gulani Local Government Area of Yobe State, Nigeria. The conclusion implied that the insurgency had an impact on the accessibility, quantity, and cost of basic consumables. This suggests that the *Boko-Haram* insurgency will continue to present a significant threat to farming operations and the nutritional status of farmers.

4.3. Healthcare

Enhanced healthcare service provision is critical to the improvement in the quality of life of citizens and achieving sustainable development (Oyibocha et al., 2014). Because a secure environment is necessary for maintaining quality health services, the relationship between security and healthcare is complicated (Boerma et al., 2019). Even before the emergence of the *Boko-Haram* conflict, populations in northern Nigeria lacked appropriate access to high-quality healthcare. However, the conflict that has existed in the area for more than ten years due to the *Boko-Haram* insurgency has made matters worse. The fighting has caused workers to be displaced as well as the destruction of the few health centres in the majority of the impacted communities. Even after Nigeria celebrated the eradication of polio, insurgents who were holding towns and villages prevented the region from receiving an equitable distribution of the polio vaccine, leading to the resurgence of new cases (Tyndall et al, 2020). Similar restrictions, such as a lack of knowledge about services and high transportation expenses, prevent the majority of IDPs in host societies from accessing health services. In terms of the spread of communicable diseases like cholera and polio in the area, this has had very severe health consequences.

The health and well-being of the populace as well as the efficient operation of the nation's healthcare system are both threatened by various health effects brought on by the insurgency (Boerma et al., 2019). Olarewaju (2021) claims that the *Boko-Haram* humanitarian crisis has resulted in high fatalities (over 37,500) and large-scale displacements (of over 2 million people), with serious consequences in Borno, Adamawa, Yobe, and Gombe states. The negative impact of conflict on maternal and child health is extensive and includes things like lack of shelter, unsafe and sanitary conditions, food shortages, a shortage of medical professionals, and restricted access to high-quality treatment. Nigeria, which is currently the eighth-most populous nation in the world, is responsible for 20% of all maternal fatalities worldwide, with an alarming maternal mortality ratio of 800 maternal deaths per 100,000 live births. Given the scarcity of operational healthcare facilities in the region, this consequence might be the worst in the Northeast. Dunn (2018) also looked at the connection between violent conflict and malnutrition among children in Northeast Nigeria. The findings imply that poor child health outcomes in Northeast Nigeria's conflict zones may be related to social service disruptions and increased food insecurity in a region already lacking in resources. The findings highlight the significance of suitable programs and policies to care for children in war zones, even when other undiscovered causes may also lead to violence-associated waste.

Sato (2019) also assessed the Boko-Haram conflict in north-eastern Nigeria for its causal impact on vaccination rates. Conflict situations have a significant negative impact on the likelihood of vaccination; if an armed struggle breaks out within 10 Kilometres of a child's home, the probability that such a child will receive any immunization is 47.2 percent lower. BCG, as well as DPT1, have odds ratios of 0.55 and 0.52, respectively. Additionally, the study also indicated that less educated people are more affected by armed conflict than educated people are. In a similar line, Ekhator-Mobayode et al. (2022) investigated whether an increase in Intimate partner violence (IPV) is related to the *Boko-Haram* insurgency. The study found that, after adjusting for known correlates of IPV such

as partner's alcohol use, prior exposure to IPV, and IPV being accepted as a social norm, the existence of *Boko-Haram* increases the likelihood that women may face sexual and physical IPV by roughly 4 percent points.

4.4. Education

According to the United Nations' Sustainable Development Goals, all students should possess the knowledge and skills necessary to advance sustainable development (O'Flaherty & Liddy, 2018). To understand the discourse on the impact of education in the Northeast region we need to flash back on some critical facts in the sector. According to the country's educational perspective, almost 10.5 million children are out of school. Additionally, 62 percent of those who are not in school reside in Northern Nigeria, where almost half of the men and 61 percent of the women have never attended school. The Boko-Haram conflict has badly harmed the otherwise appalling status of education in the North-eastern states. Conflict and instability have a direct and compounding detrimental effect on children's access to school, the availability of learning environments and resources, and the competence of instructors, according to the HNO (2014). From 2009 through 2015, well over 910 schools were destroyed by the insurgent organization, while 1,500 others were closed down. Once more, by 2016, 19,000 teachers had been driven from their homes and almost 600 had died. 600,000 of the nearly one million youngsters who have been uprooted have no access to any form of schooling. A third of elementary school students and a fourth of secondary school students in junior levels did not attend class (OCHA, 2014).

Given the 2014 kidnapping of more than 200 female students from the Government Girls Secondary School in Chibok, the situation became frightening for young girls (Hassan, 2014). Parents were demotivated from sending their kids to school as a result, and those who were already enrolled were pulled out. All of these incidents occurred in a region that was already educationally impoverished before the insurgency, and additional attacks will weaken the area and the educational sector generally in the near future by increasing the proportion of young people who have dropped out of school, are uneducated, are unemployed, and at risk of being attracted to terrorists' activities (Segun et al., 2016; Awortu, 2015). The *Boko-Haram* insurgency has impacted the quality of manpower planning and the overall performance of tertiary institutions, as a result of the decreased level of productivity of staff. This was also caused by the exit of some competent staff to other safer regions, according to a recent study in the area by Ojeleke et al. (2022).

4.5. Critical Infrastructure

Infrastructure is necessary to stimulate economic growth and poverty eradication (Fay et al., 2011). The type and size of infrastructure, however, are decisions that have an impact on the well-being of the people and achieving sustainable development (Yusuf, 2012). The social and economic well-being of Nigeria's population is undoubtedly impacted by the scarcity and deterioration of infrastructure throughout the country (Amalu, 2015). A low level of life is indicated by the condition of the three categories of vital infrastructures, namely utility, physical, and social (Kanayo et al., 2013). Since it began in 2009, the *Boko-Haram* conflict has impacted numerous types of infrastructure. Due to the war in the area, homes, roads, bridges, classrooms, medical facilities, and public structures have all suffered different levels of damage (Mbah et al., 2017). Networks for electricity, energy, and telecommunication have been severely damaged. For instance, IEDs, suicide attacks, and other explosive devices damaged about 530 telecom base stations in 2012 (Onuoha, 2014). Additionally, the infrastructure for water and sanitation in the areas affected by the violence was devastated to the tune of 75% (UNDP, 2020; World Bank, 2015).

Road movements have remained dangerous and challenging due to the destruction of public infrastructure. As shown in Figure 2, the mobility of products and people has therefore been constrained. Poor road conditions have come to light as a significant problem that hinders a farmer's capacity to transport goods to markets and further erodes the distribution system for agricultural supplies. This means that farmers will be unable to learn about new technology and methods for a while, in addition to having difficulty obtaining seeds as well as other resources (Merrick and Li, 2014; Mercy Corps, 2017). Agriculture output has been decimated because of the insecurity, and prices have increased elsewhere in the nation (Kathleen, 2014).

In an effort to rebuild the war-ravaged Northeast, the World Bank (2015) assessed the region's level of damages incurred. It was reported that the conflict had caused about US$9 billion in economic damages. It was further revealed that Borno, Adamawa, and Yobe states incurred damages to the tune of $5.9 billion, US$1.6, and US$1.2 billion respectively. Agriculture and homes (over 400,0000 lost about $3.5 billion in damages. Ikpe (2017) contends that the conflict has changed governments' priorities in expending public funds on capital projects.

4.6. Commerce and Trade

Trade between Northeast Nigeria and indeed the rest of Nigeria was greater before the insurgency, but the wanton destruction of the infrastructure impacted the private sector by impairing the operations of small and medium-sized businesses and markets (World Bank, 2015). Markets have frequently been impacted, and security personnel has also shuttered markets for safety (Brenchenmaches, 2019; Idika-Kalu, 2020). The government's determination to keep its borders largely closed with neighbouring nations including Cameroon, Chad, and the Niger Republic

severely impacted trade, according to Merrick and Li (2014). Whereas these connections still exist, there has been currently very little to no trade because borders are still blocked. Reduced connectivity has had a severe negative impact on the economy as villagers are being abandoned and others are isolated. Because of the limited mobility of people, commodities, and services due to damaged infrastructure, ongoing violence, and restricted movement along the borders, trade has been seriously affected. As important commercial routes became blocked, the trading volume drastically decreased (World Bank, 2015).

Ikpe (2017) asserts that instability has a detrimental impact on trade through disruption of trade flows, a rise in the costs of the transaction, risks to formal sector financial activities, and a decline in investment as a result of uncertainty. Losing institutions and transport channels have impacted trade, particularly in agriculture. It has drawn attention to higher transaction costs associated with Boko- Haram's demands for forced payments and tribute from farmers, as well as higher transport costs and lower trade volumes. This directly contributed to increased food prices in the area and elsewhere. One of Nigeria's biggest potential sources of income has been lost because of the collapse of the agricultural export industry in the northern states. Additionally, this has led to a decline in agricultural consumption. The robust fisheries sector in the area had also collapsed, and wildlife has also suffered. Due to this, the important agricultural commodity markets for export in the northern states have been severely damaged, cutting off one of Nigeria's biggest potential sources of income (Merrick and Li, 2014). Additionally, some impacted communities' operating hours have been restricted because of an enforced curfew. Restoring these commercial connections will improve the region's chances for income generation and sustainable livelihoods (Mercy Corps, 2017; Mohammed & Ahmed, 2015; Hoinathy & Tayo, 2022). According to Onwusiribe et al. (2015), this is due to the conflict's spill over effects on many other parts of the nation. Their study evaluated how the insurgency affected the productivity of food vendors in Nigeria's Abia State. The study's conclusions demonstrated that the violence has decreased the amount of commerce, profitability, as well as the number of players in the market.

4.7. Socio-Cultural Setting and Tourism

The northeast has a rich culture due to the diversity of the people, and the environment has some landforms and wild animal that has generated some reasonable revenue over the years. However, along with markets and cultural landmarks, religious buildings including churches and mosques also sustained considerable damage. Insurgents from the *Boko-Haram* sects had also seized control of Sambisa Forest and had been causing environmental damage, endangering wildlife, and frightening tourists (Buhari & Stephen, 2018). Sukur town, which was designated by UNESCO as a global historic monument in 1999, is located in Madagali LGA in Adamawa State and was extensively devastated by the *Boko-Haram* insurgency. The *Boko-Haram* conflict has severely damaged the local tourism economy, according to the Federation of Tourism Association for Nigeria. The story for Sukur is altered by the *Boko-Haram* attacks that occurred between 2014 and 2017 in Madagali as well as other local government areas of Adamawa, which are considered to be the crown jewels of Nigeria's tourism industry.

5. Conclusions

The Boko-Haram conflict has negatively impacted the livelihood and subsequent growth and sustainable development in the Northeast, notably in the three affected states of Adamawa, Borno, and Yobe. Even though some impacted rural areas have made significant progress toward returning to normalcy, the harm done cannot be undone quickly. Agricultural production and trade, the impacted people's main sources of income, are the two important ways to empower them. This is due to the fact that, despite the agricultural sector's poor performance, which falls short of economic expectations, the sector can help the socio-economic development of those who live in rural areas. This can be achieved by affording the affected people access to improved farm inputs like higher quality seeds and fertilizer among others. There is also the need to boost security in farming communities to facilitate access to farmlands and markets for trading. This is in addition to the gradual provision of basic amenities like hospitals, schools, electricity, and water among others. Equally, the government at all tiers must also give religious beliefs and ideologies more importance to stop a repeat of this tragic incident. Therefore, effective value reorientation programs should be included in the support being given to the affected communities.

References

1. ACAPS, 2014, *Nigerian Boko-Haram insurgency*, ACAPs Briefing note Boko Haram insurgency.
2. ADEBAYO A., 2014, Implications of Boko-Haram terrorism on national development in Nigeria: A Critical Review, *Mediterranean Journal of Social Sciences*, 5(16): 23-95.
3. ADELAJA A. O., LABO A. PENAR E., 2018, Public opinion on the root causes of terrorism and objectives of Terrorosism: A 'Boko-Haram' case study, *Perspective on Terrorism*, 12(3): 35-43.
4. ADENRELE A. R., 2012, 'Boko-Haram' insurgency in Nigeria is a symptom of poverty and political alienation, *IOSR Journal of Humanities and Social Science*, 3(5): 21-26.
5. ADESOJI A. O., 2011, Between 'Maitatsine' and 'Boko-Haram': Islamic fundamentalism and the response of the Nigerian state, *Africa today*, 57(4): 99-119.

6. ADEWUYI K.A., MICHAEL A., 2020, Assessment of the Impact of 'Boko-Haram' Insurgency on Food Crop Production in Chibok Local Government Area of Borno State, Nigeria, *Global Journal of Human-Social Science: A Arts & Humanities – Psychology*, 20(12), 50-54.
7. ADEYEYE S. A. O., ASHAOLU T. J., BOLAJI O. T., ABEGUNDE T. A., OMOYAJOWO A. O., 2021, Africa and the Nexus of poverty, malnutrition and diseases, *Critical Reviews in Food Science and Nutrition*, 4:1-16.
8. AKINOLA O., 2015, 'Boko-Haram' insurgency in Nigeria: Between Islamic fundamentalism, politics, and poverty, *African Security*, 8(1): 1-29.
9. AMALU N. S., 2015, Impact of 'boko haram' insurgency on human security in Nigeria, *Global Journal of Social Cciences*, 1(14): 35-42.
10. AMINU A. A., MODU A. U., MAINA A. M., 2018, Effect of 'Boko-Haram' Insurgency on Human Capital Development in Selected Tertiary Institutions in Borno State, Nigeria, *Leadership, Security and National Development*, Proceedings of the 12th annual Conference: 1-6.
11. AUGUSTINE C., DANIEL J. D., ABDULRAHMAN B. S., MOJABA D. I., LUBELE M. I., YUSUF J., KATSALA G. J., 2019, Impact of 'Boko-Haram' insurgency on poultry production in Mubi region of Adamawa State, Nigeria, *Nigerian Journal of Animal Science*, 21(3):145-150.
12. AVIS W. R., 2020, War economy in North East Nigeria, *K4D knowledge, evidence & learning for development*, Helpdesk Report 734, Institute of Development Studies, Brighton, UK.
13. AWORTU B. E., 2015, 'Boko-Haram' Insurgency and Underdevelopment of Nigeria, *Research on Humanities and Social Sciences*, 5(6):213-220.
14. BANIK D., 2019, Achieving food security in a sustainable development era, *Food Ethics*, 4(2):117-121.
15. BOERMA T., TAPPIS H., SAAD-HADDAD G., DAS J., MELESSE D. Y., DEJONG J., BARROS A. J., 2019, Armed conflicts and national trends in reproductive, maternal, new-born and child health in sub-Saharan Africa: what can national health surveys tell us?, *BMJ global health*, 4(4), e001300, DOI: 10.1136/bmjgh-2018-001300.8.
16. BOTHA A., EWI M., SALIFU U., ABDILE M., 2017, Understanding Nigerian citizens' perspectives on 'Boko-Haram', *Institute for Security Studies Monographs*, 2017(196): 1-112.
17. BRECHENMACHER S., 2019, Stabilizing north eat Nigeria-after book haram, *Carnegie endowment for international peace*.
18. BUHARI L., STEPHEN O., 2018, Interrogating the Impact of 'Boko-Haram' Insurgence on the Cultural and Natural Heritage Protection in Northern Nigeria, *International Journal of Humanities Social Sciences and Education (IJHSSE)*, 5(10): 145-151.
19. COUNCIL ON FOREIGN RELATIONS, 2018, *'Boko-Haram' 's Deadly Impact*, https://www.cfr.org/article/*Boko-Haram*s-deadly-impact.
20. DABUGAT K. K., 2013, Special report: Food security challenges in West Africa: A focus on agriculture, *West Africa Insight*, October.
21. DADA O. D., 2018, 'Boko-Haram' in Northeast Nigeria, *Rural Development as Paramount Counterinsurgency Strategy*, SSRN 3603029.
22. DUNN G., 2018, The impact of the 'Boko-Haram' insurgency in Northeast Nigeria on childhood wasting: a double-difference study, *Conflict and health*, 12(1): 1-12.
23. EKHATOR-MOBAYODE U. E., HANMER L. C., RUBIANO-MATULEVICH E., ARANGO D. J., 2022, The effect of armed conflict on intimate partner violence: Evidence from the 'Boko-Haram' insurgency in Nigeria, *World Development*, 153: 105780.
24. EMAS R., 2015, The concept of sustainable development: definition and defining principles, *Brief for GSDR:* 10-13140.
25. EME O. I., IBIETAN J. 2012. The cost of 'Boko-Haram' activities in Nigeria, *Arabian Journal of Business and Management Review (OMAN Chapter)*, 2(2):10.
26. ENEJI M. A., BABAGARIO B., AGRI G. E., 2019, The Effect of Insecurity on Agricultural Productivity in Nigeria: The Case Study of Gombe State, *Sumerianz Journal of Business Management and Marketing*, 2(2):59-69.
27. EWALEFOH J. O., 2019, Has the giant gone to sleep? Insecurity and sustainable development in the North East, Nigeria, *Journal of Sustainable Development in Africa*, 21(2): 25-43.
28. EWI M., SALIFU U., 2017, *Money talks: A key reason youths join 'Boko-Haram',* Institute for security studies, http://frantic.53-eu-west-1amazonaws.com.
29. FAO, 2016, Result of Analysis of current situation of Acute food and Nutrition Insecurity, *'Cadre Harmonise' for Identifying Risk Areas and Vulnerable Populations in Sixteen States of Nigeria*, October: 5.
30. FAY M., TOMAN M., BENITEZ D., CSORDAS S., 2011, Infrastructure and sustainable development, *Postcrisis Growth and Development: A Development Agenda for the G*, 20(22): 329-382.
31. GILBERT L., 2014, Prolongation of 'Boko-Haram' Insurgency in Nigeria: the International Dimensions, *Research on Humanities and Social Science*, 4 (11):150-156.
32. GRANVILLE C. K., 2020, *The impact of 'Boko-Haram' Insurgency on the people of Borno State*, Welden Dissertation and Doctoral Studies, Welden University.
33. HASSAN M., 2014, 'Boko-Haram' Insurgency and the Spate of Insecurity in Nigeria: Manifestation of Governance Crises, *Research on Humanities and Social Sciences*, 4(18): 9-18.
34. HNO, 2014, *Nigeria*, reliefweb.int/report/Nigeria/2015-humanitarianneeds-overview-nigeria-december-2014.
35. HOINATHY R., TAYO T., 2022, Lake Chad Basin Socio-economic resilience in the shadow of 'Boko-Haram', *ISS West Africa Report*, 2022(38):1-24.
36. IDIKA-KALU C., 2020, The Socioeconomic Impacts of 'Boko-Haram' Insurgency in the Lake Chad Basin Region, *Terrorism and Developing Countries*, Intech Open.
37. IKPE E., 2017, Counting the development costs of the conflict in North-Eastern Nigeria: the economic impact of the 'Boko-Haram'-led insurgency. *Conflict, Security & Development*, 17(5), DOI: 10.1080/14678802.2017.1371987.

38. IYEKEKPOLO W. O., 2016, 'Boko Haram': understanding the context, *Third World Quarterly*, 37(12): 2211-2228.
39. KANAYO O., UYI KIZITO E., UDEFUNA P., 2013, The Challenges and Implications of Sustainable Development in Africa: Policy Options for Nigeria, *Journal of Economic Cooperation & Development*, 34(4): 20-28.
40. MACLEAN R., 2018, Nigerians Forced Out by 'Boko-Haram' Return to Ruins and Continuing Risk, *Guardian*, July 27, https://www.theguardian.com/global-development/2018/jul/27/nigeriansforced-out-by-*Boko-Haram*-return-to-ruins-and-continuing-risk.
41. MARGARITA F., 2013, Conflicts, rural development and food security in West Africa, *ESA working paper*, 04-02: 2-19.
42. MARKS Z., 2016, Poverty and conflicts, *GSDRC professional development reading pack*, 52, http://gsdre.org/wp-conflcit/uploads/2022/11/poverty_and_conflicts-RP.pdf.
43. MBAH P., NWANGWU C., EDEH H. C., 2017, Elite Politics and the Emergence of 'Boko Haram' Insurgency in Nigeria, *Trames: A Journal of the Humanities & Social Sciences*, 21(2): 177-178.
44. MCGUIRE M., 1992, *Religion: The Social Context*, 3rd ed., Wadsworth, Belmont, CA.
45. MERCY CORPS, 2017, *Northeast Nigeria joint livelihood and market recovery assessment*, https://www.mercy-corps.org/.
46. MENSAH J., 2019, Sustainable development: Meaning, history, principles, pillars, and implications for human action: Literature review, *Cogent social sciences*, 5(1): 1653531.
47. MERRICK M., LI Q., 2014, The effects of 'Boko-Haram' insurgency on business and trade, http://Africabordermonitor.Com/Media.php.
48. MOHAMMED D. T., AHMED F. F., 2015, The effect of insurgency on Borno state economy, *Journal of Economics and Sustainable Development*, 6(16): 94-102.
49. MUSAB M., OTOVWE A., 2021, Impact of 'Boko-Haram' insurgency on the nutritional status of two communities in Gulani Local Government Area, Yobe State, Nigeria, *Global Journal of Pure and Applied Sciences*, 27(4): 367-374.
50. MUSTAPHA M., 2015, '*Boko-Haram' insurgency gnawing at Nigeria's food supply,* Bloomberg business, http://www.bloomberg.com.
51. MWANGI K., JIDEOFOR A., DJIRE M., JIRG A.J., KEVGNA A., TEMESGEN T. D., PUGLIESE J.E., WESTBURY A, 2014, *The impact of conflict and political instability on agricultural investment in Mali and Nigeria*, Africa Growth Initiative at Brookings.
52. NATIONAL BUREAU OF STATISTICS (NBS), 2020, *2019 Poverty and inequality in Nigeria: executive summary*, Federal Republic of Nigeria.
53. NATIONAL BUREAU OF STATISTICS (NBS), 2012, *Annual Abstract Statistic 2012*, Federal Republic of Nigeria.
54. NGBEA G., 2014, Poverty in northern Nigeria, *Asian Journal of Humanities and Social Studies*, 2(2): 1-10.
55. NICHOLSON S., TUCKER C. BA M., 1998, Desertification, drought and surface vegetation: An example from the west African Sahel, *Bulletin of the American Meteorological Society*, 79(5): 815-829.
56. O'CONNOR R., BETANCOURT T. S., ENELAMAH N. V., 2021, Safeguarding the lives of children affected by 'Boko-Haram': application of the SAFE model of child protection to a rights-based situation analysis, *Health and human rights*, 23(1): 27.
57. ODUNTAN A., 2014, Poultry farmers concerned over 'Boko-Haram' insurgence, http://Agronigeria.Com.Ng/2014/06/10.
58. O'FLAHERTY J., LIDDY M., 2018, The impact of development education and education for sustainable development interventions: a synthesis of the research, *Environmental education research*, 24(7): 1031-1049.
59. OJELEKE O., GROOT W., BONUEDI I., PAVLOVA M., 2022, The impact of armed conflicts on health-care utilization in Northern Nigeria: A difference-in-differences analysis, *World Medical & Health Policy*: 1-41.
60. OJO M. A., USMAN M. A., MOHAMMED S. U., OJO A. O., OSEGHALE A. O., 2018, Effect of insurgency on food crop farmers' productivity in Borno and Gombe States, Nigeria, *Ife Journal of Agriculture*, 30(3): 43-55.
61. OKUNLOLA O. C., OKAFOR I. G., 2022, Conflict–Poverty Relationship in Africa: A Disaggregated Approach, *Journal of Interdisciplinary Economics*, 34(1): 104-129.
62. OLAREWAJU O. A., 2021, Insecurity in northern Nigeria: Implications for maternal and child health, *Clinical Epidemiology and Global Health*, 12: 100869.
63. ONUOHA F. C., 2012, The audacity of the 'Boko-Haram': Background, analysis and emerging trend, *Security Journal*, 25(2): 134-151.
64. ONUOHA F. C., 2014, *Why do youth join 'Boko-Haram'?* US Institute of Peace, Washington, DC.
65. ONWUAROH A. S., YUSUF R. O., YUSUF O., AKPU B., 2017, Impact of Insurgency on Income of Farmers in North-eastern Nigeria, *Dutse Journal of Pure and Applied Sciences (DUJOPAS)*, 3(2): 101-113.
66. ONWUSIRIBE C. N., NWAIWU B. N., OKPOKIRI C. I., 2015, Assessment of north insurgency and performance of food dealers in Abia State, Nigeria, *Scientific Papers: Management, Economic Engineering in Agriculture & Rural Development*, 15(3): 217-224.
67. OYIBOCHA E. O. A., IRINOYE O. B., SAGUA E., OGUNGIDE–ESSIEN O., EDEKI, J., OKOME O. L. F., 2014, Sustainable healthcare system in Nigeria: Vision, strategies and challenges, *IOSR Journal of Economics and Finance*, 5(2): 28-39.
68. RPCA, 2016, *Food and nutrition insecurity in North-East Nigeria*, Food Crisis Prevention Network.
69. SATO R., 2019, Effect of armed conflict on vaccination: evidence from the 'Boko-Haram' insurgency in north-eastern Nigeria, *Conflict and health*, 13(1): 1-10.
70. SEGUN M, ADEDEJI I.D., DONNELLY E., 2016, *'Boko-Haram' impacts on education in North East Nigeria,* African programme meeting summary, The Royal institute of international affairs, Chatham House.
71. SHEHU M., ABBA A., 2020, Humanitarian crisis and sustainable development: perspectives and preferences of internally displaced persons in the northeastern Nigeria, *Journal of International Humanitarian Action*, 5(1):1-10.

72. SHERIFF G.I., IPINMOYE A.O., 2015, The political economy of reconstruction and rehabilitation of north eastern Nigeria in the post-'Boko Haram' era: the gap in contribution between Africa and Europe, *International Journal of Multidisciplinary Research and Modern Education*, 1(1): 179-190.
73. SUNDAY A., O.O, OYEDEJI R., 2017, Appraising the Effect of 'Boko-Haram' Insurgency on the Agricultural Sector of Nigerian Business Environment, *Journal of Law and Governance* 11(1): 223-248.
74. TARI V. A., KIBIKIWA M. G., UMAR K., 2016, The effects of 'Boko-Haram' insurgency on food security status of some selected local government areas in Adamawa State, Nigeria, *Sky J. Food Sci*, 5(3): 12-18.
75. THOMSON V., 2012, 'Boko-Haram' and Islamic Fundamentalism in Nigeria, *Global security studies*, 3(3).
76. THURSTON A., 2016, *The disease is unbelief: 'Boko-Haram' 's religious and political worldview*, Center for Middle East Policy, Brookings.
77. TYNDALL J. A., NDIAYE K., WELI C., DEJENE E., UME N., INYANG V., WALDMAN R. J., 2020, The relationship between armed conflict and reproductive, maternal, newborn and child health and nutrition status and services in northeastern Nigeria: a mixed-methods case study, *Conflict and health*, 14(1): 1-15, DOI: 10.1186/s13031-020-00318-5.
78. UKWAYI J.K, ANAM B., 2017, Internally Displaced Persons and Emerging Security Challenges: an Assessment of the Bakassi Refugee Camp in Cross River State, Nigeria, *International Journal of Development Strategies in Humanities, Management and Social Sciences*, 7(2): 125-200.
79. UNDP, 2016, *Livelihood and economic recovery assessment 2016, North east Nigeria*, UN.
80. UNDP, 2018, *National Human Development Report 2018: Achieving Human Development in Northeast Nigeria: towards an understanding of the humanitarian development-peace nexus*, UN.
81. UNDP, 2020, *Assessing the impact of conflict on development in North-east Nigeria*, UN.
82. UNHCR, 2017, *Nigerian situation*, Supplementary appeal January-December, UN.
83. USAID, 2015, *Nigeria – Complex Emergency*, USA.
84. WALKER A., 2012, *What Is* '*Boko-Haram'*? United States Institute of Peace; Special Report 308, www.usip.org.
85. WORLD BANK, 2015, *North East Nigeria: Recovery and Peace Building Assessment*, http://documents.worldbank.org/curated/en/753341479876623996/pdf/110424-v1-WP-NorthEastNigeriaRecoveryandPeaceBuildingAssessmentVolumeIweb-PUBLIC-Volume-1.pdf.
86. YAKUBU A., BABA B. A., THLAWU P., GADZAMA A. A., 2021, Assessment of the Effect of 'Boko-Haram' Insurgency on Crop Production in Hawul Local Government Area, Borno State, Nigeria, *Journal of Agricultural Economics, Environment and Social Sciences*, 7(1): 266-277.
87. YUSUF A. K., 2012, An appraisal of research in Nigeria's university sector, *Journal of Research in National Development*, 10(2): 321-330.

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Systematic Approach to Sustainable Development in Agricultural and Food Systems – Example of Republic of Sakha (Yakutia) and the Arctic Zone

Systematyczne podejście do zrównoważonego rozwoju systemów rolno-spożywczych – przykład Republiki Sacha (Jakucja) i Arktyki

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Abstract

The relevance of the study is conditioned by the need to apply a systematic approach to the investigation of agricultural production features as a complex dynamic structure that functions in an unstable market environment and depends on the influence of natural changes. In this regard, this study aims to identify socio-economic, natural, and environmental factors that affect the sustainable development of agricultural sectors, as well as predict the impact of material, technological, and climatic factors on the health and stability of the entire system. The leading method for studying this problem is the method of a systematic approach, which allows investigating agricultural production as a complex dynamic structure that functions in an unstable market environment and depends on the influence of natural factors. In addition, this study involved the following research methods: the method of structural analysis, comparative, statistical, and deduction methods, classification method. The study presents the factors directly or indirectly influencing the development of northern agriculture, predicts the impact of these factors on the stability of the system, and shows possible ways to overcome the negative impact. The regional management system directly affected the level of food self-sufficiency of the Sakha Republic. To improve the current situation, it is necessary to review the mechanisms of interaction between state institutions and agricultural producers. Furthermore, there is an entire list of factors that negatively affect the functioning of the agricultural sector of Yakutia. The situation requires an immediate design of a policy for the development of rural areas through the socio-economic development of villages in the region. The research materials are of practical value for the governing bodies of the agro-industrial complex of the Republic of Sakha (Yakutia), as well as teachers and students studying the issues of sustainable development of agriculture.

Key words: agro-industrial complex, development factors, employment level, rural areas, the Arctic

Słowa kluczowe: kompleks rolno-przemysłowy, czynniki rozwoju, poziom zatrudnienia, obszary rolnicze, Arktyka

Introduction

Agriculture constitutes a branch of the economy that provides the population with food, as well as supplies raw materials for industrial sectors. Agriculture forms a crucial part of the global economy, and one in eight people on the planet works in agriculture. Sciences such as land reclamation, agronomy, crop production and botany, forestry and many others are used for the successful functioning of agricultural activities. Such a complex of knowledge and techniques directly ensures the food security of the state. On average, the governments of developed countries allocate 32-35% of the value of gross agricultural output to agricultural subsidies, which substantially affects food independence from other countries. It is the national security causes that lie at the heart of this economically irrational decision, since it would be much cheaper to import products from less developed countries. Apart from the food blockade prevention, the policy of maximum support and development of domestic agricultural production leads to an improvement in the standard of living of the population engaged in agricultural work, the influx of new labour power in the perspectively depressed regions, as well as economic growth in interrelated areas: processing industry, mechanical engineering, mining and chemicals, enterprises of procurement, transportation, storage, sale of food, etc. (Rodnina, 2019).

Russia's centuries-old interest in the Far North and the Arctic territories is connected to the natural wealth of these lands. The development of the natural resources available in these territories and the use of economic and location conditions for economic activities in the interests of national security can lead to the economic and social development of the entire country (Hevchuk & Christoffers, 2021). In addition to Russia, over the past 30 years, the Arctic has attracted the interest of many states, and not only those bordering it. Countries that have never before claimed to be a subject of international relations in the Arctic region have begun to create scientific centres for the study and development of recommendations for solving Arctic problems. Such interest is explained by the fact that the ice cover of the Arctic Ocean is rapidly decreasing, which leads to the prospects for the development of economic activity in the Arctic zone (Kravchuk, 2019). However, the current situation in the food markets of the northern regions suggests that market self-regulation does not contribute to the required amount of development of agricultural production. To date, large-scale work is ongoing in the Arctic zone of the Russian Federation for the organisation and development of the main bases of the agro-industrial complex within the framework of the adopted Development Strategies of Russia and the regions. These Strategies are developed up to 2030-2035, and include investment projects in the field of exploration and extraction of minerals, financing the construction of transport, energy and housing infrastructure, as well as a set of measures to ensure the food security of the district (Strategy for the development…, 2008; Decree of the President…, 2020; Denisov et al., 2020).

Residents of the Republic of Sakha (Yakutia) (RS (Ya)) are engaged in conventional agriculture and cattle breeding; however, in a sharply continental climate, their crafts acquire an extreme nature. Therefore, winter-grazing horse herding and northern domestic reindeer herding are practised next to the usual types of agriculture in this region. Severe natural conditions in the form of permafrost and a high level of seasonality, as well as the current state of the agro-industrial complex of Yakutia, require a more thoughtful medium-term strategy for the development of the industry and a qualitative assessment of its potential. State regulation should also be applied to overcome problems in areas related to agriculture. Low population density, large territory, and poorly developed transport communication jeopardise the production of processing, storage, and marketing of agricultural products (Neustroyev et al., 2016; Dayanova et al., 2018).

80% of the lands of the Far Eastern Federal District are located in permafrost areas with a negative average annual temperature. This means that the natural and climatic conditions for farming in this region are unfavourable and even extreme. After the start of the reforms, the amount of productive agricultural land began to decline rapidly (Federal Law…, 2006). Nowadays, the total area of land occupied for agricultural purposes is only 81.3% compared to the period prior to the reforms. The area of arable land was reduced to 80.4%. The authors of this study consider the return and attraction of new land suitable for cultivation into economic circulation to be a promising task for the development of the agro-industry of the Far Eastern Federal District. The same can be said about agricultural organisations. From 2003 to 2006, their number decreased from 1.234 to 873. Such changes occurred due to the tendency to change the specialisation of land resources under the control of agricultural organisations (management enterprises) and a decrease in the number of agricultural industries. To date, the situation has stabilised – the number of agricultural organisations has returned to the previous level. However, the research of the potential lost due to the reforms was not carried out by scientists (Reimer et al., 2016).

Notably, the experience of agricultural enterprises in the Soviet Union bears evidence to collective farms and state farms providing employment for the rural population and contributing to the development of public infrastructure. However, in the future, being in the conditions of a planned economy focused on the privatisation of land and property of agro-industrial complexes, new economic entities began to focus exclusively on achieving economic indicators. Therewith, the state ignored other needs of the population, which resulted in an increase in unemployment among the local population, a drop in income, and the neglect of local infrastructure (not in demand in the agro-industrial complex).

After the collapse of the Soviet Union, the hopes that local residents who lost their jobs in collective farms and state farms would start doing business did not justify themselves. Just as there was no change in the rural economy according to the territorial model of rural development. The few entrepreneurial locals who started trading, brokering, and providing services were unable to generate the required number of jobs. It is unlikely that any enterprise other than an agricultural one would be able to provide the required number of recruitment opportunities in rural areas. Even before the beginning of the new millennium, rural settlements began to deteriorate inexorably. To survive, local residents began to move en masse to large industrial centres and economically developed cities, where all family members had the opportunity to find work. Thus, when assessing the potential of rural areas, it is necessary to assess the dynamics of changes in the structure of the agricultural sector in order to fully understand the processes occurring in it and their causes (Tikhonov, 2017).

Materials and Methods

The primary method of this study is a systematic approach to the investigation of agricultural production features as a complex dynamic structure that functions in an unstable market environment and depends on the influence of natural changes. In addition, this study involved the following research methods: the method of structural analysis, comparative, statistical, and deduction methods, classification method. The system approach was used for a detailed consideration of the object of study as a system with many interrelated and interacting elements. A comparative method is a method by which two or more objects are compared to each other. The objects of comparison can be phenomena, ideas, and results of research; using the comparative method, common and different in the objects under study is distinguished for the purpose of subsequent classification and typology. In this paper, the comparative method was used to compare the results of studies of quantitative agricultural indicators for different time periods. The statistical method is a set of interrelated methods of studying mass objects and phenomena in order to obtain quantitative characteristics and identify general patterns by eliminating random features of individual observations. It was used to describe phenomena and processes in quantitative terms.
The method of structural analysis constitutes a methodological variation of the system approach. Structural analysis involves the study of a system using its graphical model representation, which begins with a general overview and then becomes detailed, acquiring a hierarchical structure with an increasing number of levels. The method of structural analysis was used in this study to systematise information about the factors affecting sustainable development in agricultural and food systems. The synthesis method is a way of collecting the whole from the functional parts. In combination with the method of analysis, the synthesis method allows getting an idea of the relations between the components of the study subject. The synthesis method was used to organise information about the influence development factors on each other. Deduction is a method of research where knowledge about processes and phenomena is developed during the transition from general statements to particular and individual judgments. Deduction is characterised by an ascent from the abstract to the concrete. The classification method is a general scientific method of systematisation of knowledge, which is aimed at organising a certain set of studied objects of various fields, knowledge, and activities into a system of subordinate groups, according to which these objects are distributed based on their similarity in certain essential properties. In this paper, the classification method was used to distinguish growth and degradation factors in the category.
The research also included a theoretical analysis of recent scientific publications. Researchers and scientists in the field of agricultural production and regional economy often consider and study issues related to the prospects for the development of the Far Eastern Federal District. In recent years, scientists from all over the world have been exploring problems and ways to improve food self-sufficiency in extreme climatic conditions and the development of local agricultural infrastructure.

Results

Many countries prioritise assistance to agricultural producers in their agricultural policies. For advanced economies, this figure starts at $150/ha (Table 1).

Table 1. The level of agriculture financing

Country	$/ha
European Union	300
Japan	473
USA	324
Canada	188
Russia	10

Understanding the importance of agriculture as a factor of state security, economically developed countries guarantee budget support for local food producers. Apart from financial state support, the sustainable development of

the agro-industrial complex depends on a number of factors that determine its positive change. These are the following socio-economic and natural-ecological factors:

- dynamic and efficient development of agro-industrial sectors;
- specific features that are manifested in a strong dependence on natural conditions, seasonality and features of the reproductive process;
- transformation of family farms into agro-industrial and commercial enterprises;
- reducing tension in the agricultural labour market;
- efficiency of the use of labour resources.

At present, the importance of a comprehensive analysis of the sustainability of the agricultural sector is increasing, aimed at positioning its constituent features based on complete and reliable information about the processes taking place in the agro-industrial complex. The conditions for effective and sustainable development of agriculture are created through the coordination, integrated approach, and impact on the interrelated processes of food, socio-ecological systems, and human activity systems. For rural regions of the Sakha Republic, at present, the problem of unemployment and the outflow of the skilled part of the population to large cities is typical. Thus, a vicious circle is formed, where the weak infrastructure and social development of rural regions stops the population from developing agriculture, which is a vital and system-forming industry for the region's economy. One worker in the field of agriculture requires eight more jobs in other enterprises (processing, industry, trade, etc.). Such demographic trends hinder the development of the agricultural sector, as well as lead to the degradation of villages. Over the past two decades, the number of rural populations in the republic has decreased by 11.5 thousand people, and the number of people employed in agriculture has decreased by almost the same number. During the same period, according to SakhaYakutiyaStat (Federal State Statistics Service, 2021), the number of people employed in agriculture decreased by almost a third (10.9% to 7.1%).

The lack of a comprehensive and long-term approach to the development of territories in Russia leads to the fact that the specific features of particular regions are not taken into account and, accordingly, the maximum benefit is not extracted from it. In addition, the *optimization* policy leads only to the elimination of social institutions, which is even more pronounced in rural areas. The negative consequences in the form of an outflow of the population to the cities, a substantial decrease in the levels of education and healthcare, and the desolation of entire settlements were not long in coming. The situation is also complicated by the low productivity of the agro-industrial complex, which is directly interrelated with municipal processes. By developing the agricultural industry, it is possible to substantially improve the situation not only in the Sakha Republic, but also to increase the level of self-sufficiency in food throughout Russia (Table 2). This can be done by developing and forming new economic relations, creating methods for regulating processes in the agro-industrial complex, as well as in its components, and investing in the development of rural regions (Trusova et al., 2021). Such a policy should be positioned not only as the protection of national security, but also as a socio-economic one, which will hold not only the state authorities, but also representatives of local government, businessmen, scientists, and the rural population accountable for its success and ensuring a high quality of life for people.

Table 2. The level of self-sufficiency in basic agricultural products in the Republic of Sakha (Yakutia), %, source: Federal State Statistics Service, 2021.

Products/Years	2010	2011	2012	2013	2014	2015	2016	2017	2018	2019
Meat	29.5	27.8	28.5	28.5	26.5	26.6	26.1	26.1	25.1	26.4
Milk	62.8	62.1	59.6	58.1	58.2	57.9	58.1	58.7	58.6	56.7
Eggs	55.6	55.7	58.3	60.8	61.1	60.8	54.9	54.7	53.9	57.5
Potato	60.5	58.0	60.8	62.3	61.5	58.2	63.0	62.5	66.1	67.1
Gourds	44.6	42.2	43.4	47.5	46.7	44.5	46.6	45.4	39.3	38.0

At the beginning of this millennium, the state allowed the agricultural market to self-regulate. The state administration initiated a policy of a targeted approach because a full and successful transition to market relations failed to occur. Within its framework, the implementation of such programmes was launched:

1. *Presidential programme of socio-economic development of the village of the Republic of Sakha (Yakutia) for 2002-2006* dated 2002;
2. *Socio-economic development of the village of the Republic of Sakha (Yakutia) for 2007-2011* dated 2007;
3. *Development of agriculture and regulation of markets for agricultural products, raw materials and food for 2012-2020* dated 2012;
4. *Draft Strategy for the socio-economic development of the Republic of Sakha (Yakutia) for the period up to 2030 with the definition of the target vision up to 2050* dated 2016 (Electronic fund…, 2021).

These programmes set both the levels of agricultural production and the planned increase in self-sufficiency of the population with agricultural products. Despite the work of state programmes, the value of agricultural products produced in the Sakha Republic has decreased by 7.3% (adjusted for inflation) since 2000, while the same indicator has increased by 35.8% throughout Russia. The cost of livestock products fell by 14.3% between 2000 and 2017.

However, looking at the levels of agricultural production before the innovations of the 1990s, it can be seen that productivity remained at a higher level compared to current indicators (Table 3).

Table 3. Production of the main types of agricultural products in the RS(Ya) on average for the period 1986-1990 and 1995-2019, thousand tonnes.

Types of products	1986-1990 (average)	1995	2000	2005	2010	2015	2019	2019 to 1986-1990 (average), %
Meat	67.2	60.9	32.1	39.7	42.5	35.4	36.8	54.7
Milk	258.3	202.2	164.3	197.3	191.6	164.5	161.5	62.5
Cereals	30.7	17.1	30.3	15.6	11.1	8.6	10.5	34.2
Potato	80.6	66.5	74.6	88.5	71.5	71.9	81.4	100.9
Vegetables	28.5	24.1	37.1	36.9	34	35.2	26.7	93.6

Table 3 demonstrates that the only increase in production during the period under review occurred in the field of crop production (1.3 times). At the same time, the decline in the amount of grain grown continues to progress. Such processes in the agriculture of the Sakha Republic can be explained by a sharp reduction in the number of target areas by 61.5%. Therewith, prior to the reform, agricultural activities were also carried out in extreme natural and climatic conditions. However, neither permafrost, nor low population density, nor infertile soil have become obstacles to the successful production of agricultural products. This suggests that unfavourable conditions associated with the climate cannot be the reason for the decline in production levels. Considering the situation with the number of animals for 1985-2019, the following figures can be brought up:

1. The number of cattle decreased by 61.8%;
2. The number of horses decreased by 11.2%;
3. The number of deer increased by 62.5%.

Such an impressive reduction in the number of livestock was caused by the reorganisation of state farms into personal subsidiary farms. After the collapse of the Soviet Union and the suspension of state financing of state farms, their property and land were transferred for privatisation to former employees. However, it was not possible to maintain the previous production volumes without benefits and cash injections from the state; therefore, the new owners of farms were forced to reduce the number of livestock and reduce the area of cultivated land, which led to a drop in the level of all agricultural production. When the number of main farm animals decreased by a third in 2000, the State Programme for the Development of the Family Economy was established (Electronic fund…, 2021). It resulted in commodity and cash loans to support local farms. The leading producers of agricultural goods for 1985 in Yakutia were 116 government-run cooperatives and 199 enterprises of the agro-industrial complex. On average, these enterprises had a total of 53.8 thousand employees per year, and their salary was 320 roubles, which is 54 roubles lower than the average salary in the republic. This situation has developed due to the low profitability of agricultural production. And only due to the increase in purchase prices and subsidising unprofitable state farms, it was possible to achieve a positive marginality of production. Profitability of agricultural production for 1985:

1. Milk – 16.9%.
2. Meat – 10.9%.
3. Crop production – 10-31%.

Today, Yakutia is actively developing farm enterprises and cooperation between personal subsidiary farms and agricultural enterprises. State support is also provided to some organisations. Apart from the fact that Yakutia occupies one of the leading places in the development of agriculture, the number of people employed in farming in the region is the largest in the country – 9 people per 1,000 rural population. As a result, the volume of agricultural production by large organisations dropped from 78% in 1990 to 27% in 2010 and has not reached the same level to this day (Table 4). Therewith, the increase in the level of production by households and farms does not cover the overall reduction in production volumes (Table 4).

Table 4. Structure of agricultural production in the RS(Ya) in 1980-2019 by farm categories, %

Categories of farms	1980	1990	1995	2000	2005	2010	2015	2019
Agricultural organisations	79.5	78	50.2	20.8	19.8	27	28.2	27.3
Households of the population	20.5	22	39.5	67.5	57.9	47.5	46.8	46.9
Farms	-	-	10.3	11.7	22.3	25.5	25	25.8

For future sustainable development, the Republic of Sakha has a number of advantages that can determine the line and pace of further changes in the agro-industrial complex of the region. To achieve the best result, the goal should be full self-sufficiency of agricultural products in the entire internal market.

Advantages:

1. The resources of the republic in the form of forage lands and large areas of deer pastures.

2. The predominant development of conventional branches of agriculture – herd horse breeding and northern domestic reindeer herding.
3. The largest number of cattle among all the northern regions of Russia, the active development of cattle breeding.
4. A large number of cattle and horses.
5. Relatively environmentally friendly dairy, meat, fish, and other products.
6. Strong demand for local agricultural products.
7. Development of the trade brand of natural food products of local production *Made in Yakutia*.

To achieve the goal, it will be necessary to overcome the following negative factors:
1. The need to conduct agriculture in extreme climatic conditions, a strong dependence on them.
2. Poor infrastructure and a low prospect of financial investments in it in the near future.
3. Low natural soil fertility.
4. Low crop yields and animal productivity compared to more southern regions.
5. There are no implemented working innovations, weak scientific and technical equipment of the agro-industrial complex.
6. Outdated production facilities, incomplete utilisation of production capacities.
7. Lack of established internal end markets for products, weak quality control system.
8. Financial instability of agricultural enterprises.

Apart from the already existing factors that have a positive and negative impact on agricultural and food development in the Sakha Republic, there are also opportunities and risks that need to be factored in.

Opportunities:
1. Reconstruction and modernisation of capabilities of the agro-industrial complex.
2. Use of modern technologies and launch of new production facilities.
3. Development of seed farms, increasing the share of local zoned seeds of agricultural crops.
4. Increase in the gross harvest of agricultural crops due to the simultaneous increase in yield and acreage.
5. Development of selection and breeding work in order to increase the productive and improve the reproductive qualities of farm animals.
6. Development of veterinary medicine to reduce the level of morbidity and mortality of farm animals.
7. Increase in the level of processing of agricultural and food production, taking into account the resource potential, consumer demand, and the logistics system.
8. Establishment and development of organic production, certification system of food quality control.

Risks:
1. Permafrost and a short growing season.
2. Natural disasters in the form of droughts, floods, and forest fires.
3. Diseases of farm animals, damage to agricultural plants by diseases and pests.
4. Increase in the level of inflation, tariffs, and prices for material resources (fixed assets, seeds, energy carriers, fertilisers, protective equipment, etc.).
5. The urbanisation of the population, the outflow of personnel from the agro-industrial complex.
6. Reduction in the level of state support.

After analysing the results obtained, it is possible to determine the factors that hinder development and methods for overcoming them (Table 5).

Table 5. Factors hindering sustainable development and ways to overcome them

Inhibitory factors	Ways of sustainable development of agriculture
Problems of rural social and industrial infrastructure development	A systematic approach to investing in rural infrastructure
Disparity in prices for agricultural and industrial products	Subsidising of costs for purchasing labour resources
Low innovation activity of agricultural enterprises	Encouragement of the introduction of new technologies into production
Lack of human resources	Programmes for attracting personnel to villages. Educational policy
Low material and technical equipment	Logistical support measures
Low level of reclamation	Conducting land reclamation works
Low fertility and efficiency of agricultural land use	Measures to improve agricultural land and attract them to work
Lack of financial state support	Implementation of financial state support
Imperfection of existing forms of management	Development of cooperatives, clusters
Lack or imperfection of strategic plans	The need to create development strategies
Low financial stability	Financial recovery measures
Inefficiency of forms of state support	Design of development programmes with various forms of state support (co-financing from the federal budget, subsidies in various areas), the provision of grants. Development of public-private partnerships. Project financing. The territory of advanced development.

Discussion

In the first paper considered, N. Rodnina (2018) explores the problems and their solutions in the field of domestic food aid in Russia. In her work, the author argues that the regions of Russia need not only to analyse the agro-industrial complex (agribusiness) and the food market, but also to assess the production opportunities in the agribusiness sectors, to determine and justify the areas for the development of a competitive agribusiness in the long term. Therefore, it is necessary to add an assessment of the self-sufficiency of food in the region to the main criterion for assessing the level of food supply, taking into account the physiological needs of the population in food. Therewith, not only indicators are of great importance, but also their threshold values, limit values, non-compliance with which prevents the normal development of expanded reproduction, leads to the development of negative, destructive trends in the field of healthcare and social security of the population. As for the regions themselves, the future growth of the agricultural sector depends entirely on the success of the regional national policy, its adaptation to rapidly changing economic conditions (Rodnina, 2018).

In the next paper reviewed, L. Danilova and N. Vasilyev (2018) considered organic agriculture as a new area of development of the agro-industrial complex in the Sakha Republic. The authors point out that organic agriculture can help achieve new strategic objectives of the republic, referring to the Decree of the Head of the Republic of Sakha *On strategic areas of socio-economic development of the Republic of Sakha (Yakutia)* dated 2018 (Electronic fund…, 2021). This decree instructs to guarantee the development of non-resource export-oriented industries with high added value and to ensure the development of competitive sectors in the agro-industrial complex, the share of exports of which, by 2024, would be at least 20% of the products produced. Since the current level of self-sufficiency of the republic has barely exceeded 50%, the authors see this task as poorly feasible. However, if one considers Yakutia not as a region of production of a large number of agricultural products and does not demand unattainable results, setting as an example other subjects of the Russian Federation or agricultural countries, it turns out that Yakutia can become a supplier of high-quality and unique products of folk crafts. When entering foreign markets, it is necessary to focus on products that will have a competitive advantage over their counterparts. For example, the products in the field of herd horse breeding, reindeer husbandry, collection of wild berries, plants, etc. To ensure the competitiveness of Yakut products, organic certification is necessary, without which it will be impossible to interest consumers in the foreign market. At the moment, given the low indicators of industrial agriculture, organic agriculture can contribute to the socio-economic development of the republic. Admittedly, organic agriculture will not be able to fully replace intensive agriculture, but striking a stable balance between economic well-being and the preservation of a prosperous habitat can lead to a sustainable development vector (Danilova & Vasilyev, 2018).

In the study of trends in the development of the agro-industrial complex of the Far Eastern Federal District, scientists V. Reimer et al. (2016) identify the critical level of technological development of the main part of the economic entities of the agricultural sector of the Far Eastern Federal District economy as a condition for the introduction of both radical and improving innovations. Evidently, the financial capabilities of agricultural producers will be a determining factor in choosing the area and scale of implementation of innovative technologies. The payback period for modernisation projects will also play an important role. However, the focus solely on improving innovations cannot fundamentally change the vector of development of the agro-industrial complex of the Far East. But apart from the use of radical innovations, an adequate mechanism is required to activate the process of reproduction of the agro-industrial complex on an innovative basis, ensuring synchronisation of innovation activities both vertically and horizontally, as well as generating prerequisites for the development of informal economic cluster-type structures (Khodakovsky et al., 2020).

The study by A. Danilova investigates the state support of agriculture in difficult natural conditions. In her study, the author argues that for most developed countries, the successful functioning of the agro-industrial complex and agriculture in particular is largely conditioned upon state support. The Republic of Sakha, which is in severe climatic conditions, also needs such support. The agro-industrial complex of the republic develops and operates in extreme conditions, a zone of risky agriculture due to extremely low temperatures in winter, large annual, seasonal, and daily fluctuations in air temperatures, which is extremely unfavourable for the cultivation of grain and most types of vegetable crops. Because of this, in the agriculture of the republic, for the production of the same volume of goods, as in regions more favourable from a climatic standpoint, 25-30% more oil products are spent, and the cost of servicing equipment increases by 30-35%. Due to the vastness of the territory, the radius of cargo transportation increases by 2-3 times compared to the average indicators for the Russian Federation (Danilova, 2020).

In the last study reviewed, E. Tikhonov notes that the small size of settlements and district centres, as well as the large distances between them, in tandem with weak transport infrastructure, stop businessmen from installing productive and processing capacities in such regions. There is an obvious division of territories into industrial clusters, agricultural areas, and depressed areas with a high level of unemployment. Small entrepreneurs also do not receive adequate support for small businesses in the regions. These barriers become insurmountable for local residents, especially for those who would like to engage in non-agricultural production: logging, woodworking, fishing, hunting, gathering wild plants, etc. (Tikhonov, 2017).

Conclusions

Agriculture will develop efficiently and sustainably under conditions of full provision of the domestic market with high-quality products, rationalisation and modernisation of production facilities, improving the standard of living of rural residents and combatting unemployment. For the harmonious development of northern agriculture, it is necessary to maintain a balance between the industrial development of natural resources and the preservation of traditional crafts of indigenous peoples and their way of life. This approach will prevent demographic desertification of the Arctic territories and preserve the unique landscapes. In addition, the opportunity for the extraction of rare delicacies by indigenous peoples should not be missed: fish, game, venison, valuable pharmacological raw materials. These industries will help preserve human capital, which will have a beneficial effect on the regulation of employment and the labour market optimisation, and prevent the concentration of production in certain territories. The protracted organisational and economic crisis in the agricultural sector of the economy also requires a solution. To overcome this crisis, it is necessary to develop realistic and effective state strategies for the development of the social and industrial infrastructure of the region.

The regional management system directly affected the level of food self-sufficiency of the Sakha Republic. To improve the current situation, it is necessary to review the mechanisms of interaction between state institutions and agricultural producers. Furthermore, there is an entire list of factors that negatively affect the functioning of the agricultural sector of Yakutia. This includes a low level of material and technical support of production; unfavourable climatic conditions, infertile land, poor forage land; low population density, which entails the point nature of farming, logistics costs, the predominance of one type of production in each of the district regions, which is why the demand for goods of local producers remains at an extremely low level; general poverty of the population, unemployment. To overcome these problems, it is necessary to take a fresh look at the issue of rural population outflow to metropolitan cities. The situation requires an immediate design of a policy for the development of rural areas through the socio-economic development of villages in the region. In particular, this refers to the areas of education, medicine, transport infrastructure and logistics of local industries for the production of new jobs.

References

1. DANILOVA A.E., 2020, State Support of Agriculture under Hard Natural Conditions (on the Example of the Republic of Sakha (Yakutia), *Bulletin of the Kursk State Agricultural Academy*, 2: 46-54.
2. DANILOVA L.I., VASILYEV N.P., 2018, Organic Agriculture as a New Vector for the Development of the Agro-Industrial Complex in the Republic of Sakha (Yakutia), *Problems of the Modern Economy*, 68: 216-218.
3. DAYANOVA G.I., EGOROVA I.K., BAISHEVA A.F., KRYLOVA A.N., 2018, Sustainable Development of Agriculture in the Republic of Sakha (Yakutia): Retrospective Analysis and Bifurcation Point, *International Agricultural Journal*, 6(366): 28-30.
4. DECREE OF THE PRESIDENT OF THE RUSSIAN FEDERATION *ON THE STRATEGY FOR THE DEVELOPMENT OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION AND ENSURING NATIONAL SECURITY FOR THE PERIOD UP TO 2035*, 2020, http://static.kremlin.ru/media/events/files/ru/J8FhckYOPAQQfxN6Xlt6ti6XzpTVAvQy.pdf (25.02.2021).
5. DENISOV V.I., CHERNOGRADSKIY V.N., POTRAVNY I.M., IVANOVA P.YU., 2020, Directions of Balanced Socio-Economic Development of the Arctic Zone of Russia (on the Example of Yakutia), *Forecasting Problems*, 4: 66-72.
6. ELECTRONIC FUND OF NORMATIVE-TECHNICAL AND NORMATIVE-LEGAL INFORMATION OF THE CONSORTIUM *KODEKS*, 2021, https://docs.cntd.ru/ (12.03.2021).
7. FEDERAL LAW *ON THE DEVELOPMENT OF AGRICULTURE*, 2006, http://www.consultant.ru/document/cons_doc_LAW_64930/ (10.03.2021).
8. FEDERAL STATE STATISTICS SERVICE, 2021, https://eng.rosstat.gov.ru/ (12.03.2021).
9. HEVCHUK A.V., CHRISTOFFERS B., 2021, Methodological Support for the Analysis of Debt Security in Agribusiness and Measures to Improve Its Level, *Scientific Bulletin of Mukachevo State University. Series 'Economics'*, 8(3): 18-30.
10. KHODAKOVSKY Y., PRYSIAZHNIUK O., PLOTNIKOVA M., BULUY O., 2020, Innovation and Investment Bases of Management Decisions in Entrepreneurship, *Scientific Horizons*, 8(93): 21-30.
11. KRAVCHUK A.A., 2019, Mechanism for Ensuring the National Security of the Russian Federation in the Arctic, *Bulletin of Tomsk State University*, 447: 96-104.
12. NEUSTROYEV M.P., IVANOV R.V., ABRAMOV A.F., OKHLOPKOVA P.P., CHUGUNOV A.V., SAVVINOV D.D., DAYANOVA G.I. (eds.), 2016, *The System of Farming in the Republic of Sakha (Yakutia) for the Period 2016-2020*, Yakutsk Research Institute of Agriculture named after M.G. Safronov, Yakutsk.
13. REIMER V., MANAKOV N., SAIDMURODOV S., 2016, Trends in the Development of the Agrarian Sector of the Economy of the Russian Far East, *International Agricultural Journal*, 1: 10-13.
14. REIMER V.V., TIKHONOV E.I., MANAKOV N.S., 2016, Trends in the Development of the Agro-Industrial Complex of the Far Eastern Federal District, *Far Eastern Agrarian Bulletin*, 2(38): 134-142.
15. RODNINA N.V., 2018, Domestic Food Aid in the Russian Federation: Problems and Solutions, *Regional Economics: Theory and Practice*, 16(3): 484-494.

16. RODNINA N.V., 2019, Strategic Objectives of the Yakutia Agro-Industrial Complex: Are There Any Solutions?, *Regional Problems of Economic Transformation*, 10: 62-65.
17. RODNINA N.V., 2020, Problems of the Arctic Traditional Industries in Yakutia, *Arctic and North*, 41: 76-77.
18. STRATEGY FOR THE DEVELOPMENT OF THE ARCTIC ZONE OF THE RUSSIAN FEDERATION AND ENSURING NATIONAL SECURITY FOR THE PERIOD UP TO 2020, 2008, https://legalacts.ru/doc/strategija-razvitija-arkticheskoi-zony-rossiiskoi-federatsii-i/ (19.03.2021).
19. TIKHONOV E.I., 2017, The Structure of the Agricultural Sector and Its Impact on the Development of Rural Areas, *Far Eastern Agrarian Bulletin*, 1(41): 119-128.
20. TRUSOVA N., DEMCHENKO I., KOTVYTSKA N., HEVCHUK A., YEREMENKO D., PRUS YU., 2021, Foreign-Economic Priorities of the Development of Investment Infrastructure of Agri-Food Production Entities, *Scientific Horizons*, 24(5): 92-107.

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Regional Development Environment, Local Government's Character Behavior, and Sustainability: Empirical Evidence from China

Środowisko rozwoju regionalnego, działania władz lokalnych i zrównoważony rozwój: dowody empiryczne z Chin

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Abstract

After the rapid economic growth through reform and opening-up over 40 years, Chinese governments are seeking transformation for high-quality and sustainable development currently. Regional economic development is related to internal and external environments as well as local government's character behaviors. Employing Neuro Linguistic Programming (NLP) and Consciousness-Context-Behavior (CCB) theory, we construct a theoretical framework to measure the relationships between regional development environment (RDE), local government's character behavior (LGCB), and regional sustainable capability (RSC). We collect the data of 30 provinces in mainland China from 2001 to 2020 to conduct hypothesis testing and empirical analysis. The results show that both RDE and LGCB are associated with RSC, and LGCB significantly mediates the relationship between RDE and RSC. However, the effects of different RDE elements on RSC are heterogeneous. Our study enriches regional sustainable development theory. It arouses us to better understand LGCB and attach importance to the roles of RDE and LGCB in regional sustainability. The enlightenment is important to global developing countries.

Key words: regional development, sustainable capability, character behavior, development, environment, empirical analysis

Słowa kluczowe: rozwój regionalny, zrównoważona zdolność, działania, rozwój, środowisko, analiza empiryczna

1. Introduction

As an emerging economy, China's miracle in economic development over the past 40 years are worthy of other developing countries' attentions (Lu et al., 2019). Based on reform and opening-up, it has created many opportunities for rapid development in the past decades through industrialization, infrastructure investment and population growth. However, at the cost of rapid development, the problems such as environmental degradation, unbalanced development and increased pressure on social stability have emerged, challenging Chinese future development (Lu et al., 2019). Because of a clear understanding of such challenges, Chinese government has put forward the goal of high-quality development in current transition period, and proposed *mass entrepreneurship and innovation* and *carbon peaking and carbon neutrality* strategies. China is a country with numerous provinces, of which the sustainable development issues are diverse and complex. Different provinces' efforts for sustainability are rich and universal, suitable for the learning of other developing regions.

The United Nations has put forward 17 goals in regard to sustainable development including the eradication of poverty and hunger, as well as health and well-being. Around the goals, scholars have carried out many studies (Khizar et al., 2021; Sajjad and Shahbaz, 2020). They aim to enhance sustainable capability from economic, social and environmental perspectives. In developed countries, the key to sustainable capability is market power. They would optimize market mechanism and adjust public policies for capital access, so as to let social and commercial capital enter the areas requiring the enhancement of sustainable development capability (Sheth and Parvatiyar, 2021). Unlike them, China's central and local governments play a more important role in economic and social development (Lin and Hong, 2022). In China, government will is the most powerful force to drive regional sustainable development. Through fiscal investment and transfer payment, governments can support the areas that need to enhance sustainable development capability. Policies can be released to lead social and market capital to enter certain fields or prevent them from entering areas protected by governments (Hong et al., 2020). State-owned enterprises can indirectly motivate private capital to enter the supported areas (Li et al., 2020). In a word, government behaviors play a crucial role in China's regional sustainable development.

The effectiveness of China's central government actions involving sustainable development is related to its socialist road, democratic centralism and Confucian culture (Tan et al., 2021). However, there are huge differences in the conditions and goals of sustainable development faced by different regions. Local governments should maintain consistency with the central government in governance behavior, but the differences make them heterogeneous. The heterogeneity is mainly driven by two factors. First, the behavior pattern of a local government is consistent in a certain period of time. During the long-term governance, Chinese local governments of various regions have formed their own unique characters, which influence their thoughts and actions. Second, the occurrence of behaviors needs the opportunities created by environmental conditions (Hou et al., 2021). The advantages, characteristics, and constraints of sustainable development vary with the development environments of different regions. Hence, RDE has an important impact on local governments' decisions on the strategies and measures for sustainable development, and affects the effect of strategy implementation.

Our study aims to measure the relationships between RDE, LGCB, and RSC. It expands regional sustainable development theory and inspires developing countries to better understand the rules of sustainable capability's formation and make strategies for sustainable development. We collect the data of 30 regions in mainland China from 2001 to 2020. Hong Kong, Macao and Taiwan are not considered because their data formats are inconsistent with mainland regions. Tibet is also excluded because of many lacking data. We use entropy-weighted TOPSIS method to measure the variables. Panel regression analysis is used to test the proposed hypotheses, so as to form new theoretical viewpoints. We focus on answering the question *how do RDE and LGCB affect RSC?*

2. Literature Review

2.1. Sustainability science and sustainable capability

Sustainable development was defined as the development that meets present needs without jeopardizing the ability of future generations to meet their needs (WCED, 1987). With the deepening of human research on future development, it has been constantly developed to be an interdisciplinary concept involving agriculture, economy, education, and ecology (Kajikawa et al., 2007). The key to achieving sustainable development goals is to cultivate sustainable capability. A triangular framework of regional sustainable development was proposed from economic, ecological and social perspectives. The framework has already included the contents of sustainability in population growth, resource utilization, and agricultural development and sci-tech progress (Hou et al., 2021).

2.2. Government character and character behavior

Organizational character is the common personality shared by different individuals in an organization (Guo et al., 2008). Neubert et al. (2009) defined it as the traits developed by organizations for meeting challenges or taking opportunities. Moore (2015) proposed that it can be measured by the degree of virtue an organization possesses or the degree of wisdom and virtue the organization uses in the pursuit of success and excellence.

LGCB refers to the behaviors consistent with and driven by the character traits of local government organizations. Big Five theory is suitable for depicting it. Governments with different characters show different behavioral preferences. For example, Nam (2015) found that an open government would be committed to opening government data and promoting people's freedom of access to information for leading citizens' autonomy and collaboration. LGCB has a significant effect on RSC. For instance, Navarro-Galera et al. (2019) showed that information disclosure and sharing by open governments can enhance people's trust and improve the efficiency of public services, in turn, enhance regional sustainability.

2.3. Regional development environment

RDE is the sum of the geographical location of a region and its economic, political, sci-tech, cultural, and demographic environments. It provides opportunities and constraints for local governments to generate sustainable de-

velopment strategies and implement sustainable development programs (Ji and Darnall, 2020). Sustainable capability improvement is a systematic issue, which relies on the interaction between local government's internal resources and external development environments (Galera et al., 2015). The environmental factors of RSC include financial environment, political environment, industrial structure and technologies, ecological environment and carrying capacity, resource conditions and policies, infrastructure, and demographic and social conditions.(Yahya et al., 2022).

3. Theories

According to NLP theory, the logic of human to recognize and process things is divided into six layers: environment, behavior, ability, belief, identity and system. Among them, the first three are called low layers, which we can realize. The changes in high layers radially affect the changes of low layers. Low-layer changes cumulatively affect high-layer changes, when low-layer changes accumulate to a certain extent (Kotera and Sweet, 2019).
According to CCB model, individuals form cognition and consciousness of external events based on their personalities and values, and the consciousness further stimulates individual behaviors by the strengthening of environmental factors. Environmental factors constitute the conditions for the occurrence of individual behaviors. However, specific actions are still driven by individual's personality traits (Wang and Wang, 2011).
In the study, NLP and CCB theories in individual field were introduced to explore the relationships in regional sustainable development system. From organizational perspective, the mechanism for improving RSC was summarized into three aspects. First, cognitive mechanism. As a conscious subject, a local government actively perceive the development environment of its region, evaluate the opportunities and threats within environments, and then make strategic responses to improve RSC. Second, practical mechanism. In regional sustainable development system, a local government accumulates knowledge, and improve its capabilities through continuous practices and reforms in sustainable development. The promotion of practical effects and efficiencies is reflected as the improvement of RSC. Moreover, the local government could actively explore and exploit its characters for formulating good strategies and taking actions to promote sustainable development. Third, integrative mechanism. The actions taken by local governments in sustainable development are not only related to their characters, but also restricted by RDE. Therefore, local governments' best plans for actions is to select appropriate behavioral strategies based on the comprehensive evaluation of the pros and cons of their development environments and their unique preferences driven by characters, and then improve their sustainable capabilities through dynamic behavioral adjustment. In other words, the improvement of RSC is the result of the integration of cognitive mechanism and practical mechanism.
Along with the logic of antecedent-behavior-consequence (ABC), we set RDE as the antecedent, LGCB as the mediating behavior, and RSC as the consequence, to generate a theoretical framework for our research, as shown in Figure 1.

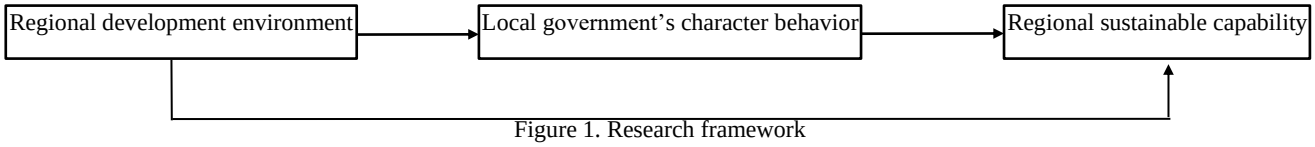


Figure 1. Research framework

4. Hypothesis

4.1. The relationship between RDE and LGCB

The occurrence of LGCB needs the support of place, platform and resources provided by RDE. Behaviors highly rely on environmental conditions. They are the results stimulated by favorable environmental factors. Good environments can create opportunities for local governments. First, cultural environment strengthens governments' creative behaviors. Wang et al. (2017) found that extroversion culture can strengthen the impacts of organizational resources and leadership on local government innovative behaviors. Second, technological environment supports the openness of government. Data open access and information disclosure are main manifestations of government open behavior. Alderete (2018) indicated that many governments around the world were using information and communication technologies to construct transparent, efficient and inclusive organization. Third, economic and social environments have an impact on government's social responsibility. Dongwoo and Jung (2019) stated that the capabilities and behaviors of local governments to shoulder social responsibilities are constrained by their financial budgets. Local governments in developed regions are more capable and inclined to be responsible. Fourth, ecological environment enables local governments to carry out agreeable behaviors. Xu and Sun (2021) proposed that improving urban living environment has become an important measure for Chinese governments to fulfil their duties and improve the relationship with citizens. Ecological environment and resource conditions constitute the basis of the implementation of residential environment improvement. Finally, social harmony is the foundation of local government's stability maintenance behaviors. Only by establishing law-based government and creating harmonious culture can we break the dilemma of maintaining stability. We therefore propose the hypothesis H1: there is a significant positive correlation between RDE and LGCB.

4.2. The relationship between RDE and RSC

Regional sustainable development is supported by various environments. RDE provides resources and creates platform for the formation and promotion of RSC. First, the role of intellectual environment. Wang et al. (2006) conducted an integrative analysis of human capital, environmental factors and sustainable economic development capability of 31 Chinese regions. They found that with the continuous economic growth in China, the pressure of ecological environment protection was gradually increasing, and human capital investment has become the main power supporting the sustainable development of regional economy. Second, the role of educational environment. As reported by Kemmis and Mutton(2012), Australian government proposed that educational level determines the future of the country and put school education and social education on the agenda of sustainable development. Third, the role of political environment. Carayannis et al. (2021) measured the relationship between democracy and environment and found that countries with higher political freedom are more likely to have higher environmental performance. Fourth, the role of social environment. According to Sol et al. (2018), the promotion of regional sustainability is carried out in a network of social governance, which is rooted in regional social culture, and the RSC is enhanced in the process of mutual learning and collaboration among network nodes. Network characteristics and social culture have positive effects on sustainability. Fifth, the role of economic environment. Peng et al. (2007) confirmed through the investigation of rural areas in China that industrial structure transformation has an impact on regional environmental changes, and industrial structure upgrading is conducive to optimizing the relationship between people and environment, thus promoting the realization of the goals of regional sustainable development. Sixth, the role of infrastructure environment. Xu and Wu (2018) presented that in China, one of effective measures for maintaining sustainable economic development in the transition period is to increase investment in transportation infrastructure. Finally, the role of ecological environment. Kammerbauer (2001) proposed that ecological sustainability is related to the complexity, stability, and elasticity of ecosystems, which with different characteristics have different capabilities in resource generation and waste degradation. Strengthening ecosystem health is in favor of the carrying capacity of regional ecological environment. Therefore, the research hypothesis H2 is proposed: there is a significant positive correlation between RDE and RSC.

4.3. The relationship between LGCB and RSC

Regional sustainable development is a long-term and systematic task led by local governments. The improvement of RSC needs to be supported by continuous actions. The characteristics and behaviors of local governments therefore affect it. First, the influence of government's open behavior. From the perspectives of monopoly economy and social welfare, Soderbaum and Brown (2010) proposed that an open, pluralistic and democratic economic development model and relevant policies made by local governments promote regional sustainable development. Second, the impact of innovative governments' actions. Studies have shown that local governments' strategies in ecological innovation, knowledge and technological innovation, and organizational and management innovation contribute to the improvement of regional sustainability (Tsai and Liao, 2017). Third, the impact of government accountability. Responsible governments develop longer strategic plans, provide better infrastructure resources and public services, use resources more cautiously and efficiently, and their attentions are paid more to self-reform or the protection of regional environments (Ji and Darnall, 2020). Fourth, the impact of governments' agreeable behaviors. The appropriate behaviors implemented by local governments improve the image of government organizations and enhance residents' satisfaction with government public services and the loyalty to the city (Kim, 2017). Finally, the impact of governments' stability maintenance behaviors. One of important goals of government is to maintain social stability. In today's China, maintaining stability is the most important political function of the central government. The measures in maintaining stable military input, financial and price stability, and public opinion monitoring and governance enhance people's confidence in work, life and a bright future, and inject vitality into sustained economic and social prosperity (Shin, 2019). The hypothesis H3 is proposed as follows: there is a significant positive correlation between LGCB and RSC.

4.4. The mediating effect of LGCB

According to the behavioral theory in psychology, the occurrence of behaviors requires stimuli and a series of stress responses. For a local government, its decisions has great influence on regional development, so its behaviors should be rational (Whitehead et al., 2011). The occurrence of rational behaviors not only needs the stimulus from environments, but also the environments can provide opportunities for the rational behaviors to obtain benefits. Superior RDE is therefore necessary for the occurrence of LGCB, since it plays a role in providing stimulus and creating high yield conditions.

According to dynamic capability theory, the notion refers to timely strategic and action adjustments made by an organization in order to seize opportunities or avoid threats when facing dynamic changes in external environments. The psychological quality and experience skills accumulated in behavioral practices help reintegrate resources and realize the value of innovations (Klievink and Janssen, 2009). Regional sustainability is a kind of dynamic capability. Its formation and evolution processes can be interpreted by dynamic capability theory (Linde et al., 2021). According to it, RDE plays a stimulating role in generating dynamic capability, and LGCB forms the

process that carries the improvement of dynamic capability. Hence, the hypothesis H4 is proposed: LGCB plays a significant mediating role in the relationship between RDE and RSC.

5. Methodology

5.1. Variables

Dependent variable: *RSC*. The study takes economic, social and ecological sustainability as the main structure of regional sustainability. In addition, we consider the sustainability in population, resource, agriculture, science and technology, and education involved in sustainable development goals of United Nations as the support structure of *RSC* (Hou et al., 2021). Inspired by Smetana et al. (2016), we develop the measurement index system of *RSC* on basis of National Bureau of Statistics of China, as shown in Table 1. Similar to Li et al. (2018), an entropy-based TOPSIS model is constructed to comprehensively evaluate *RSC*. The evaluation results are taken as the value of the dependent variable.

Table 1. The indicators for evaluating *RSC*

Structure	Dimension	Elements	Observed indicators
Main structure	Economic sustainability	a. industrial structure; b. economic growth; c. labor efficiency	a. share of tertiary industry; b. GDP deflator; c. total labor productivity
	Ecological sustainability	a. sewage treatment; b. carbon emissions; c. waste treatment	a. daily sewage treatment capacity; b. carbon emission intensity; c. harmless treatment capacity of household garbage
	Social sustainability	a. unemployment management; b. administrative punishment; c. crime	a. unemployment rate; b. local fiscal forfeiture revenue; c. crime rate
Support structure	Population sustainability	a. population growth; b. population quality; c. aging	a. natural growth rate; b. average years of schooling; c. proportion of elderly population
	Resource sustainability	a. energy consumption; b. energy production; c. land	a. energy consumption per unit output value; b. total amount of energy production; c. relative land resource carrying capacity
	Agricultural sustainability	a. modernization; b. pesticide use; c. production capacity	a. total power of agricultural machinery; b. pesticide use; c. grain output
	Sci-tech sustainability	a. sci-tech achievements; b. technology trade; c. new product output	a. the number of granted invention patents; b. the proportion of technological market turnover in GDP; c. the proportion of new product output value in total industrial output value
	Sustainable education	a. compulsory education; b. college teachers; c. output capacity	a. junior middle school educated population; b. the number of full-time college teachers; c. the number of graduates

Independent variable: *RDE*. We focus on six dimensions including economic environment (*EcE*), infrastructure (*InE*), ecological environment (*ElE*), social environment (*SlE*), intellectual environment (*IlE*) and political environment (*PIE*) to measure *RDE* (Gao and Meng, 2021). Among them, the first three are hard environments that provide resources, funds, places, and facilities for sustainable development, and the latter three serve as soft environments which focus on the creation of harmonious culture and friendly relations. Inspired by Wang and Li (2020), we develop the evaluation index system of *RDE* as in Table 2 on basis of the accessibility of data. Entropy-based TOPSIS method is used for measuring the variable.

Table 2. The indicators for measuring *RDE*

Structure	Dimension	Elements	Observed indicators
Hard environment	EcE	a. marketization; b. urbanization; c. consumption	a. degree of marketization; b. urbanization rate; c. total retail sales of consumer goods
	InE	a. transportation; b. communication; c. living facilities	a. highway mileage; b. long-distance optical cable line length; c. gas penetration rate
	ElE	a. forest; b. water; c. wetland	a. forest coverage rate; b. total water resources; c. wetland area
Soft environment	SlE	a. community affairs; b. social recreation; c. social welfare	a. number of residential committee units; b. TV program coverage; c. social welfare homes units
	IlE	a. educational environment; b. cultural environment; c. innovative environment	a. number of basic education schools; b. number of public library industry institutions; c. number of R&D personnel
	PIE	a. public scale; b. personnel quality; c. trade union organization	a. the proportion of employees of civil administration departments in total population; b. the proportion of employees of civil administration departments with a bachelor's degree or above; c. the number of basic trade union organizations

Mediating variable: *LGCB*. Drawing on Big Five theory, we measure LGCB from five dimensions including innovative behavior (*IB*), open behavior (*OB*), responsible behavior (*RB*), agreeable behavior (*AB*) and behavior for maintaining stability (*SB*). Among them, *IB* refers to the behaviors of local governments to realize novel and unique social and economic value by supporting enterprise innovation and social reform; *OB* refers to the behaviors of local governments to encourage foreign cultural exchanges and trade for export-oriented growth; *RB* refers to the behaviors of local governments to fulfil their duties and actively undertake social responsibilities; *AB* refers to the behaviors to construct livable environments and develop friendly relationships between government and people, and between people and environments; and finally *SB* refers to the behaviors to actively maintain social stability and stimulate coordinated and steady development. Since there is a lack of literature on *LGCB* at present, we selected observed indicators from China Statistical Yearbook, and independently developed the indicator system, as shown in Table 3. The method for variable measurement is entropy weight TOPSIS.

Table 3. The indicators for measuring *LGCB*

Dimension	Elements	Observed indicators
IB	a. R&D investment; b. education investment; c. cultural investment	a. the proportion of R&D expenditure in fiscal expenditure; b. education expenditure in fiscal expenditure; c. the number of mass cultural exhibitions
OB	a. international trade; b. foreign investment	a. total amount of import and export; b. foreign investment; c. registered capital of foreign-invested enterprises
RB	a. medical care; b. elderly care; c. public service	a. the proportion of medical assistance expenditure in government expenditure; b. the number of people receiving social pension insurance; c. the proportion of civil affairs expenditure in government expenditure
AB	a. consumption security; b. employment security; c. income security	a. consumer price index; b. the proportion of spending on social security and employment in government spending; c. the elasticity of personal income
SB	a. medical supervision; b. social security; c. labor security	a. the number of health supervision institutes; b. the proportion of financial public safety expenditure in financial expenditure; c. the number of labor cases

Control variables. According to Song and Hwang (2018) and Sun et al. (2022), the control variables were set as follows. a. Area of land (*AL*) was set as a variable to control the difference caused by regional scale. b. The number of prefecture-level cities (*NC*) was set as a variable to control the difference caused by the size and number of cities in the region. c. The number of enterprises above designated size (*NE*) was set as a variable to control the economic differences between regions. d. The urban-rural consumption gap (*UG*) was set as a variable to control the urban-rural heterogeneity and contradictions within a region. e. The shortest distance to port (*DP*) was set as a variable to control the geographical advantages of a region.

5.2 Data

The sample of our study is 30 regions in mainland China. Tibet is not included due to serious data deficiency. The time window is set from 2001 to 2020. Data sources include EPS database, CSMAR database, China Economic Net, China Statistical Yearbook, China Industrial Statistical Yearbook, China Energy Statistical Yearbook, China Population and Employment Statistical Yearbook, and China Education Statistical Yearbook. Some missing data are supplemented from the statistical yearbook of each region.

Data collection and processing follow the following procedures. a. We collected the data of the observed indicators, and predicted missing data with multiple interpolation method. b. In order to meet the requirements of comprehensive evaluation, extreme value processing method was adopted to process data in advance. The processed data are dimensionless, less affected by extreme values, and the value interval is [0,1]. c. In order to reduce the influence of the volatility of data on research results, the data were processed by tail shrinkage before regression analysis.

5.3. Methods

Our study consists of two steps for data analysis. First, we used comprehensive evaluation method to measure the variables. The method is entropy-based TOPSIS. Entropy is a widely used method to determine weights objectively. Its principle is that the weight is proportional to the difference of the data of an indicator (Smieja, 2015). The observed indicators of each variable are all quantitative with a large number of samples, suitable for the entropy weighted method. TOPSIS is an information aggregation method based on both positive and negative ideals. Its evaluation results are obtained through the measurement of closeness between the evaluation object and ideals (Shih et al., 2007).

Second, we used panel regression model to test the hypotheses. Hausman test found that the fixed-effect model was more suitable for our study, so we constructed a hierarchical regression analysis model with fixed effects to measure the direct effects. Bootstrap program was used to test the mediating effect of *LGCB*. The test was completed by SPSS process plug-in, wherein the confidence interval was set as 95% and the sampling times as 5000.

6. Results

6.1. Evaluation results

The entropy-based TOPSIS method was used to comprehensively evaluate the values of *RDE*, *LGCB*, and *RSC* of 30 regions on the mainland during the twenty-year period, from 2001 to 2020. The mean level and change trend of the evaluation results are shown in Figure 2. As can be seen from the figure, *RDE*, *LGCB*, and *RSC* of all observed regions in China have shown an obvious growth trend in the period, and most variables have tended to grow at the same rate. ElE is an exception, almost stable in the past without a significant growth trend. To some extent, the trend of accompanying development reflects and proves the possible causal relationships between our concerned variables.

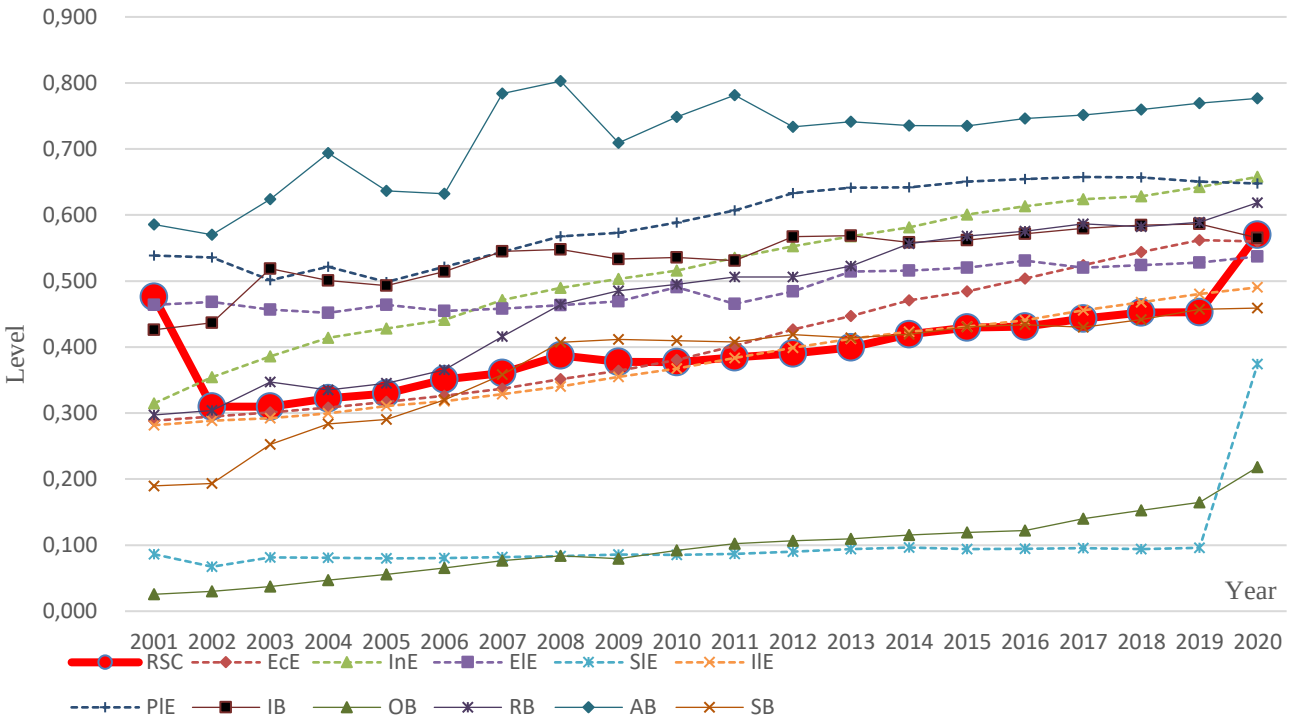


Figure 2. The average level of *RDE*, *LGCB*, and *RSC* of Chinese regions from 2001 to 2020

The average level and annual growth rate of *RSC* in different regions from 2001 to 2020 were calculated and divided into high and low levels according to the mean value. The results were thus presented in four quadrants, as shown in Figure 3. According to the figure, some of China's eastern coastal regions, such as Beijing, Shanghai, Zhejiang and Guangdong, have relative advantages in both the level and growth rate of *RSC*, which are consistent with their economic development level after entering the new century. The average level of *RSC* in the regions of northeast and central China such as Heilongjiang, Liaoning, Anhui, Hubei and Hunan are in the middle, but their growth rates are obviously low, revealing low potential in sustainable development. On the contrary, a few western region such as Guizhou, Yunnan and Xinjiang have got a faster pace, according to their relatively higher growth rate. In the future, they are expected to achieve leapfrog development based on the support of national policies and their efforts on characteristic tourism and energy resource development. Their sustainable development model is worthy for other countries or regions that have similar conditions in resource and environment. Finally, the regions such as Gansu, Qinghai, and Hainan of which the performances in *RSC* are worst are western or island regions. They have the common problem of lack of conditions for economic and ecological development.

The evaluation results in Figure 2 and Figure 3 not only show the status quo, trends and problems of *RSC* of Chinese regions from a macro perspective, but also provide inspirations for other countries and regions in *RSC* development. The consistency between our findings and the current situation of China's regional economic development reveals strong explanatory power of *RSC* variable. The results also indicate the scientificity of the evaluation index system and entropy-based TOPSIS model in our research. Hence, the results of comprehensive evaluation can support the following regression analysis.

To prepare for regression analysis, a descriptive statistical analysis was conducted. The results are shown in Table 4. The mean value and standard deviation of variables are in line with expectations, and no significant anomaly has been found. There are significant positive correlations among most variables, laying a good foundation for confirming our research hypotheses.

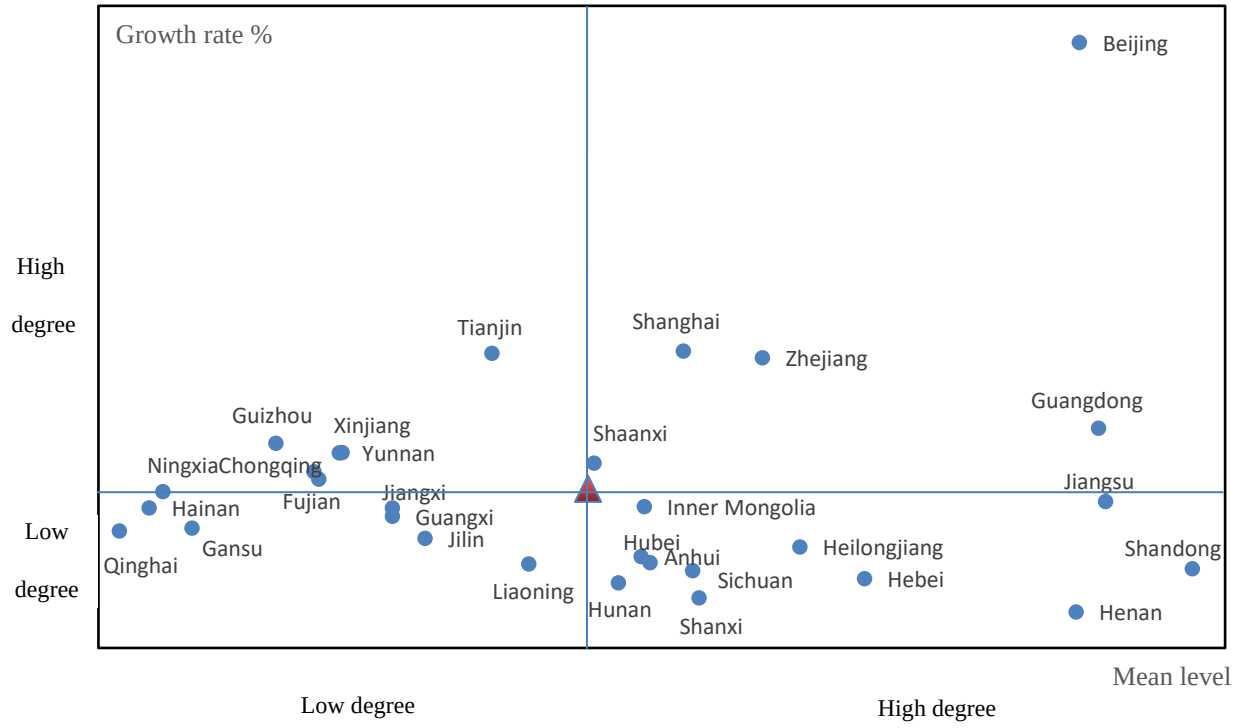


Figure 3. Average level and annual growth rate of 30 regions' *RSC* from 2001 to 2020 (demarcation point: mean level=0.399, growth rate=0.991%)

Table 4. Descriptive statistical analysis

Variable	Mean	SD	Correlations										
			2	3	4	5	6	7	8	9	10	11	12
1. *RSC*	0.399	0.102	0.691***	0.474***	0.035	0.611***	0.674***	0.639***	0.505***	0.537***	0.551***	0.179***	0.592***
2. *EcE*	0.410	0.154		0.529***	-0.001	0.485***	0.608***	0.616***	0.658***	0.770***	0.709***	0.252***	0.664***
3. *InE*	0.516	0.140			0.423***	0.496***	0.743***	0.672***	0.363***	0.256***	0.752***	0.423***	0.670***
4. *ElE*	0.489	0.173				0.245***	0.233***	0.176***	-0.091*	-0.044	0.200***	0.008	0.242***
5. *SlE*	0.101	0.088					0.583***	0.500***	0.398***	0.424***	0.474***	0.089*	0.492***
6. *IlE*	0.378	0.161						0.831***	0.651***	0.467***	0.671***	0.168***	0.756***
7. *PlE*	0.592	0.135							0.635***	0.440***	0.638***	0.144***	0.651***
8. *IB*	0.536	0.138								0.606***	0.489***	0.007	0.669***
9. *OB*	0.097	0.144									0.451***	0.048	0.617***
10. *RB*	0.473	0.132										0.551***	0.685***
11. *AB*	0.716	0.082											0.288***
12. *SB*	0.371	0.149											

N=600; *** p<0.001; ** p<0.01; * p<0.05.

6.2. Direct effects

Table 5 shows the effect of *RDE* on *LGCB*. The odd models are benchmark model containing only control variables, while the even models are saturated model containing total variables. Comparing the difference of R^2 (ΔR^2) between the paired odd and even models, we found that *RDE* has significant and strong marginal explanatory

power for the five dimensions of *LGCB*. Among them, the effects on *RB* and *SB* are particularly strong. Table 5 also shows that *EcE* has a significant positive effect on all dimensions of *LGCB*, revealing the decisive role of *EcE* in local development. *InE* has significant positive impacts on local governments' *RB*, *AB* and *SB*, but has negative impacts on their *IB* and *OB*. The effect of *ElE* on *LGCB* is not as strong as expected. *ElE* has positive effects on *RB* and *SB*, but has negative effects on *IB* and *AB*. Surprisingly *SlE* has a weak effect on *LGCB*, only positively related to local governments' *OB*. Consistent with our expectation, *IlE* has a significant and strong effect on *LGCB*, effectively promoting *IB*, *OB*, *AB* and *SB*. Finally, the effect of *PlE* on *LGCB* is weak. *PlE* has a significant positive impact on *IB*, but also has weak negative impacts on *OB* and *SB*, and even has no significant effect on *AB* and *RB*. In general, most dimensions of *RDE* have significant positive impacts on *LGCB*, but a few environmental factors also have negative effects or the assumed relationship is not significant. Therefore, we formed our conclusion that H1 has partially passed the test.

Table 5. Direct effects of *RDE* on *LGCB*

Models		*IB*		*OB*		*RB*		*AB*		*SB*	
		M1	M2	M3	M4	M5	M6	M7	M8	M9	M10
Constant		0.452***	0.388***	-0.138***	-0.029	0.184***	0.137***	0.611***	0.618***	0.113**	0.098**
Control variables	*AL*	-0.158***	-0.065*	0.017	0.097***	-0.170***	-0.244***	-0.069**	-0.082***	0.067*	0.020
	NC	0.014	-0.079***	-0.105***	-0.027	0.078***	-0.051***	0.017	-0.020	0.063***	-0.109***
	NE	0.109***	-0.009	0.123***	-0.072*	0.522***	0.102***	0.260***	0.036	0.226***	-0.136***
	UG	0.400***	0.195***	0.490***	0.254***	0.171***	-0.067***	-0.058**	-0.122***	0.389***	0.134***
	DP	-0.057	-0.024	0.132***	0.052*	-0.179***	-0.168***	-0.098***	-0.066**	-0.022	-0.003
Explanatory variables	*EcE*		0.158**		0.640***		0.301***		0.125**		0.247***
	InE		-0.186***		-0.296***		0.457***		0.424***		0.279***
	ElE		-0.086***		-0.016		0.073***		-0.063**		0.050*
	SlE		-0.023		0.138**		0.002		-0.060		-0.026
	IlE		0.460***		0.149***		0.141***		-0.060		0.510***
	PlE		0.151**		-0.133**		0.030		-0.073		-0.099*
Goodness of fit	R^2	0.466	0.649	0.568	0.725	0.472	0.771	0.180	0.369	0.420	0.698
	Adj R^2	0.461	0.642	0.565	0.720	0.467	0.767	0.173	0.357	0.415	0.692
	ΔR^2	0.466	0.183	0.568	0.157	0.472	0.299	0.180	0.189	0.420	0.278
	ΔF	103.543***	50.999***	156.288***	55.756***	106.105***	127.986***	26.123***	29.335***	86.055***	89.962***
	DW		1.795		1.681		1.451		0.749		1.361

*** p<0.001; ** p<0.01; * p<0.05. DW displays the value of Durbin-Watson.

Table 6 shows the direct effect of *RDE* on *RSC*. The models M11 and M18 are benchmark model and saturated model respectively. From the difference of R^2 between the two models, it can be seen that the interpretation power of *RDE* on *RSC* reaches 27.8%, which is relatively strong. The models M12-M17 show the impacts of a single dimension of *RDE* on *RSC* respectively. The results show that all dimensions have significant effects on *RSC*. All effects are positive except that the effect of *ElE* is negative. As shown by M18, when all dimensions of *RDE* work together, the driving force for improving *RSC* comes from *SlE*, *EcE*, *IlE* and *PlE*, while the effects of *InE* and *ElE*

are significantly negative. *InE* has changed from a independently positive effect to a jointly negative effect, implying that substitution effects exist among different dimensions of *RDE*. Since the correlation between *InE* and *IlE* is the largest value in matrix, we guess that *IlE* could replace *InE* to some extent in the development of *RSC*. To sum up, the hypothesis H2 is also partially accepted.

Table 6. Direct effects of *RDE* on *RSC*

Model		M11	M12	M13	M14	M15	M16	M17	M18
Constant		0.128***	0.159***	0.115***	0.132***	0.145***	0.095***	-0.018	0.103***
Control variables	*AL*	0.020	0.054**	0.000	0.055*	0.016	0.023	0.043	0.115***
	NC	0.057***	0.092***	0.024	0.065***	0.022	-0.062***	-0.008	0.020
	NE	0.241***	-0.009	0.162***	0.247***	0.176***	0.139***	0.160***	0.087***
	UG	0.149***	-0.054**	0.125***	0.150***	0.080***	0.028	0.041*	-0.085***
	DP	0.044	-0.003	0.059*	0.059*	0.055**	0.073***	0.075**	0.050**
Explanatory variables	*EcE*		0.507***						0.284***
	InE			0.161***					-0.223***
	ElE				-0.064**				-0.073***
	SlE					0.500***			0.336***
	IlE						0.423***		0.224***
	PlE							0.381***	0.155***
Goodness of fit	R^2	0.355	0.541	0.375	0.363	0.493	0.538	0.480	0.681
	Adj R^2	0.350	0.537	0.369	0.357	0.488	0.533	0.475	0.675
	ΔR^2	0.355	0.186	0.020	0.008	0.138	0.183	0.125	0.326
	ΔF	65.455***	240.837***	19.048***	7.672**	161.161***	234.217***	142.928***	100.242***
	Durbin-Watson	1.075	1.072	1.038	1.115	1.216	1.003	1.109	1.393

The explained variable is *RSC*. *** p<0.001; ** p<0.01; * p<0.05.

Table 7 shows the effect of *LGCB* on *RSC*. The models M19-M23 show the independent effect of each *LGCB* dimension, while model M24 shows the joint effects of all *LGCB* dimensions. According to the results of M19-M23, five *LGCB* dimensions all have significant positive effects on *RSC*, and the effects of *OB*, *SB* and *RB* are particularly strong, while the effect of *AB* is weaker. The result of M24 shows that when all *LGCB* dimensions act together, the effect of *AB* becomes no longer significant. The explanatory power of *LGCB* to *RSC* reaches 12.9%. It is concluded that the hypothesis H3 has been supported.

Table 7. Direct effects of *LGCB* on *RSC*

Model		M19	M20	M21	M22	M23	M24
Constant		0.028	0.167***	0.080**	0.048	0.097***	0.111**
Control variables	*AL*	0.055*	0.015	0.064**	0.029	0.001	0.039
	NC	0.054***	0.087***	0.037**	0.055***	0.040***	0.057***
	NE	0.217***	0.205***	0.104***	0.206***	0.179***	0.127***
	UG	0.060*	0.008	0.104***	0.156***	0.043*	-0.040
	DP	0.056*	0.006	0.091***	0.057*	0.050*	0.046
Explanatory variables	*IB*	0.222***					0.073*
	OB		0.287***				0.174***
	RB			0.263***			0.132**
	AB				0.132**		-0.051
	SB					0.272***	0.125***
Goodness of fit	R^2	0.404	0.427	0.417	0.365	0.447	0.484
	Adj R^2	0.397	0.421	0.411	0.358	0.442	0.476
	ΔR^2	0.048	0.071	0.061	0.009	0.092	0.129
	ΔF	47.993***	73.901***	62.283***	8.678**	98.943***	29.508***
	Durbin-Watson	1.123	1.142	1.008	1.049	0.953	1.031

The explained variable is *RSC*. *** p<0.001; ** p<0.01; * p<0.05.

6.3 Mediating effects

All control variables, independent variables and mediating variables were introduced to build model M25. Its regression analysis result is shown in Table 8. Comparing the R^2 of M25 and M11, we found that the change is 0.343, indicating that the joint effect of *RDE* and *LGCB* has a marginal explanatory power of 34.3% on the improvement of *RSC*. Comparing the R^2 of M25 and M18, the change is 0.017, much smaller than the ΔR^2 (0.326) of M18 to M11. Therefore, *RSC* is still mainly explained by *RDE*. The results of comparative analysis show that

the improvement of *RSC* is affected by both direct effect and mediating effect. The direct effect of *RDE* is the dominating one, but *LGCB*'s partial mediating role is auxiliary.

Table 8. Joint effects of *RDE* and *LGCB* on *RSC*

Model		M25
Constant		0.122***
Control variables	*AL*	0.104***
	NC	0.019
	NE	0.100***
	UG	-0.056**
	DP	0.047*
Independent variables	*EcE*	0.315***
	InE	-0.303***
	ElE	-0.087***
	SlE	0.346***
	IlE	0.243***
	PlE	0.186***
Intervening variables	*IB*	-0.141***
	OB	-0.053
	RB	-0.032
	AB	0.043
	SB	0.120**
Goodness of fit	R^2	0.698
	Adj R^2	0.689
	ΔR^2	0.343
	ΔF	60.055***
	Durbin-Watson	1.444

The explained variable is *RSC*. *** p<0.001; ** p<0.01; * p<0.05.

Table 9. Total effect analysis

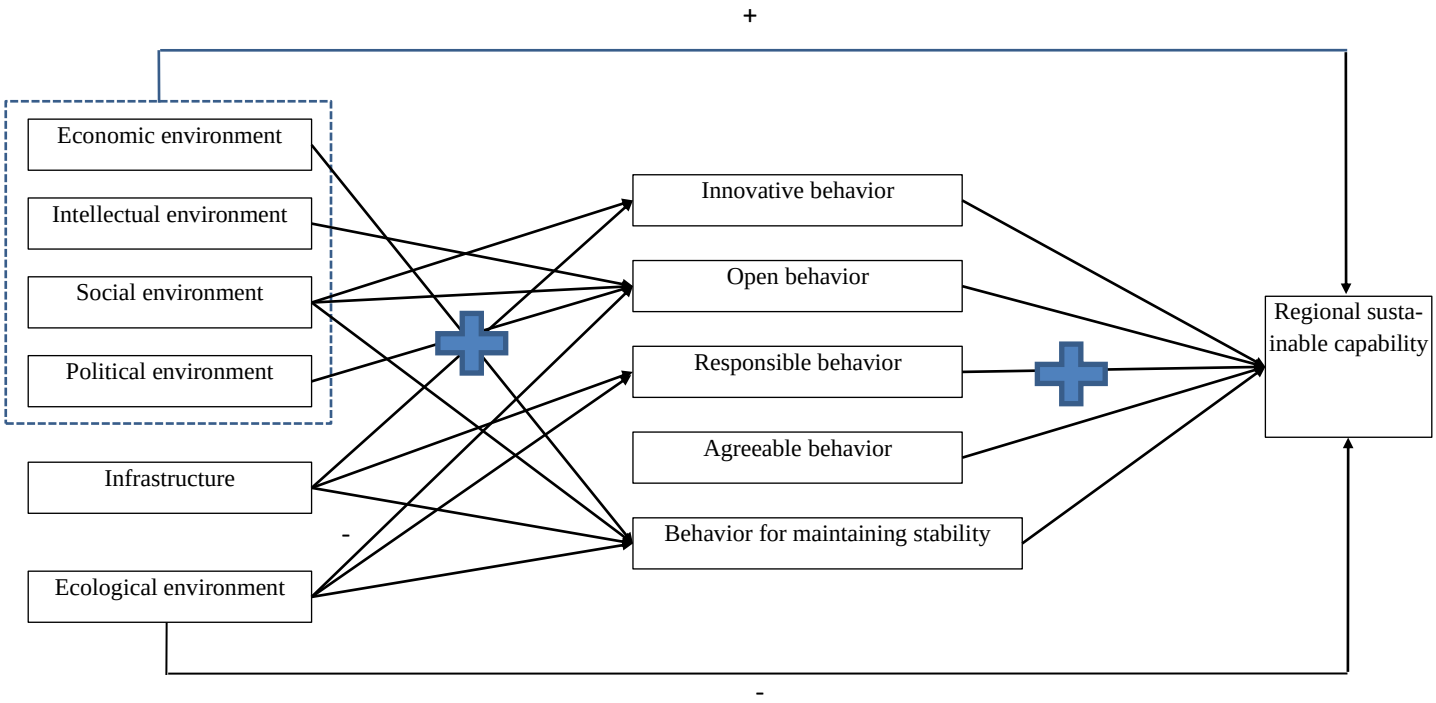
Indirect effect							Direct effect			Total effect
Independent variables	Mediating variables	Effect	Boot SE	95% confidence interval		Significant	Effect	95% confidence interval		
				LLCI	ULCI			LLCI	ULCI	
EcE	*IB*	0.004	0.016	-0.027	0.037	No	0.440	0.350	0.530	0.507
	OB	0.015	0.019	-0.023	0.054	No				
	RB	-0.015	0.027	-0.068	0.039	No				
	AB	-0.012	0.014	-0.040	0.012	No				
	SB	0.076	0.034	0.011	0.145	Yes				
InE	*IB*	0.015	0.008	0.000	0.032	Yes	-0.049	-0.147	0.048	0.161
	OB	0.005	0.007	-0.005	0.021	No				
	RB	0.113	0.036	0.043	0.185	Yes				
	AB	-0.017	0.020	-0.058	0.020	No				
	SB	0.094	0.039	0.015	0.165	Yes				
ElE	*IB*	-0.003	0.004	-0.010	0.004	No	-0.100	-0.145	-0.055	-0.064
	OB	-0.010	0.005	-0.021	-0.003	Yes				
	RB	0.028	0.009	0.013	0.047	Yes				
	AB	0.001	0.002	-0.004	0.006	No				
	SB	0.018	0.008	0.004	0.036	Yes				
SlE	*IB*	0.015	0.009	0.002	0.038	Yes	0.387	0.310	0.465	0.500
	OB	0.039	0.015	0.015	0.074	Yes				
	RB	0.018	0.015	-0.011	0.051	No				
	AB	0.000	0.003	-0.005	0.006	No				
	SB	0.040	0.022	0.001	0.087	Yes				
IlE	*IB*	-0.184	0.017	-0.051	0.015	No	0.407	0.329	0.486	0.423
	OB	0.047	0.015	0.022	0.081	Yes				
	RB	-0.019	0.025	-0.067	0.031	No				
	AB	0.003	0.008	-0.014	0.018	No				
	SB	0.003	0.033	-0.061	0.070	No				
PlE	*IB*	-0.003	0.015	-0.032	0.027	No	0.307	0.235	0.379	0.381

In order to deeply explore the mediating path of *LGCB*, Bootstrap program was used to conduct sampling statistical test on the direct and mediating effects. The results are shown in Table 9. It shows that six dimensions of *RDE* are

significant to the total effect on *RSC*. In addition to the negative total effect of *ElE*, the total effects of other dimensions are all positive, confirming the core idea of our study. As for the negative effect of *ElE*, resource curse theory may explain it. Table 9 also shows that only a part of mediating paths are significant. However, on the significant paths, the coefficients are all positive. In summary, the hypothesis H4 is partially accepted. In detail, *LGCB* plays a full mediating role in the relationship between *InE* and *RSC*, but only plays partial mediating roles in the relationship between other environmental factors and RSC.

6.4. Path analysis

Through the summary of the above results, the impacting paths of *RDE* and *LGCB* on *RSC* can be drawn as in Figure 4. There is heterogeneity in the effects of *RDE* dimensions on *RSC*. *EcE*, *IlE*, *SlE* and *PlE* have the same affecting mechanism. They directly improve *RSC* and also indirectly affect it by the mediation of *LGCB*. *InE* cannot directly influence *RSC*, but exerts an indirect effect through promoting *LGCB*. Though *ElE* promotes local governments' *RB* and *SB*, thus indirectly affecting *RSC*, it is more of a cursed resource, against the development of *RSC*. The current situation of regional development in China is in line with the findings. Some regions (e.g. Yunnan, Xinjiang, Jiangxi, Shanxi and Liaoning) with abundant natural resources and beautiful ecological environments are backward in the development of economy, society, science and technology, causing trouble in sustainability.



Only the relationships between *ElE* and *OB*, and between *ElE* and *RSC* are negative.
Figure 4. Affecting paths among *RDE*, *LGCB*, and *RSC*

7. Discussion

First, it confirms and also challenges resource dependence theory from perspective of regional sustainable development. The theory emphasizes the role of environment in organization's survival and development. RDE significantly supports or restrictively influences the improvement of RSC (Zhong et al., 2021). Our results largely agree with the view. However, it is in doubt that all environmental factors positively affect regional sustainable development. Liu et al. (2021) and Hou et al. (2019) presented that the long-term sustainable development of a region is dependent on the utilization of natural resources, but our study seems to challenge their conclusions and supports resource curse theory conversely, which is opposite to resource dependence theory to some extent. In fact, many scholars (e.g. Dou et al., 2022) have paid attention to the problem of resource curse in regional sustainability. The phenomenon is obvious in China, a country with rich natural resources. In China many regions are rich in resource but poor in economy. Irrational development of resources even causes them a lot of problems such as fragile ecology, environmental pollution, and single industrial structure, which threaten their sustainability (Gu et al., 2011). It is therefore not surprising that *ElE* has a significant negative impact on *RSC* in China. Compared with previous studies, our contribution is that we distinguish two directions of environmental actions – curse or blessing. It provides theoretical enlightenment for developing countries to make better strategies for sustainable development.

Second, it deepens the theory of organizational character in the field of government management. It is a tradition that compare government organization to human being. However, so far, government character was mostly used to discuss the balance or coordination of government and market, i.e. the visible hand and invisible hand (Jabbar, 2016). Up to now prior studies focused on the exploration of the roles of government as a broker, social people, and a housekeeper or servant (Ozsoy, 2009). They discussed social, economic, and cultural behaviors of governments, but few touched on the psychological and characteristic behaviors (Chu et al., 2017). Different from them, our study integrated many new notions such as open government, innovative government, and responsible government together, and extracted local government's character traits from different behavior patterns of government. We introduced Big Five theory to construct the framework of the study, expanding the application of organizational character theory. It made a new classification for government behaviors, deepening our understanding of government's behaviors and functions.

Third, it enriches dynamic capability theory. Dynamic capability is a strategic management theory widely used to explain the generation of organizational capability. It effectively explains how organizations cope with changes in external environments and achieve sustainable competitive advantage on basis of the adaption of dynamic strategy (Klievink and Janssen, 2009). However, the research on the relationship between government's dynamic capacity and regional sustainable development is still lack. According to Foss (2016), only a full study of the micro mechanism can help us explore the root of the formation and improvement of organizational performance at the macro level. Consequently, even if dynamic capability theory can be used to reveal the formation rules of *RSC*, it is also necessary to explore the microscopic mechanism. Our study meets the requirement. We introduced NLP and CCB theories into the personification of local government's behaviors, and used ABC analysis framework to generate the integrative logic of our study. We then proposed a new theory to explain the mechanisms for enhancing *RSC*, including cognitive mechanism, practical mechanism and integrative mechanism. The combination of epistemology and practice has taken us a big step forward in exploring the theory of regional sustainability. It makes up for the deficiency of Andersson et al. (2022) in predicting the formation of *RSC* from resource- or behavior-based perspective, lacking knowledge as an important antecedent.

Finally, it helps us understand the role of infrastructure construction in regional sustainable development. In a long period, the rapid growth of China's economy was driven by continuous high investment in infrastructure. Prior studies have proved that the investments in housing construction, transportation, and municipal administration can significantly promote the growth of regional economy (Ma, 2019). However, in recent years, the governance philosophy of Chinese governments has transformed and upgraded. They tended to advocate high-quality development on basis of innovation, coordination, green, openness and sharing. To some extent, our study coincides with the development idea of Chinese governments. As found in the study, the direct effect of *InE* on *RSC* is negative, but it has an indirect positive effect through the mediation of *LGCB*. The discovery challenges the results of the studies simply answering whether infrastructure investment has a positive or negative effect on *RSC*, and explains the motivation of Chinese governments to change their concepts and patterns for sustainable development.

8. Conclusions and Implications

8.1. Conclusions

Based on the data analysis of 30 regions in mainland China from 2001 to 2020, we empirically examined the relationships among *RDE*, *LGCB*, and *RSC*. Our conclusions are mainly in three aspects. First, environmental factors affecting the improvement of *RSC* include *EcE*, *SlE*, *ElE*, *InE*, *IlE* and *PlE*. However, their effects on are heterogeneous. Among them, *EcE*, *SlE*, *IlE* and *PlE* not only have direct positive effects on *RSC*, but also indirectly make positive effects through the mediation of *LGCB*. In contrast, *ElE* has a negative effect on *RSC*, while the effect of *InE* mainly depends on the mediation of *LGCB*. Second, local governments conduct five character behaviors. They significantly and positively promote *RSC*. Third, RDE and LGCB should be integrated. We proposed three mechanisms for promoting *RSC*, i.e. cognitive mechanism, practical mechanism and integrative mechanism.

8.2. Implications

The theoretical implications of our study mainly include three aspects. First, we put forward a new theoretical framework of *RSC*. The framework was constructed by following dynamic capability theory, and was grounded in NLP and CCB theories. It explains the influence of *RDE* and *LGCB* on the improvement of *RSC*. The framework enriches the sustainable development theory from the perspectives of resource-based view and dynamic capability. Second, we introduced Big Five theory to research the character behaviors government organizations, thus establishing the theory of local government's character behavior. The theory expands the application of Big Five theory and makes a new contribution to organizational psychology. Third, we established a comprehensive evaluation index system for measuring *RDE*, *LGCB*, and *RSC* respectively. Although the indicators were selected in Chinese context, they are also in favor of the measurement of relevant variables in future work.

The practical implications also mainly include three aspects. First, we inspire local governments to attach great importance to the construction of *RDE* on basis of the consideration of the heterogeneity of different environmental

dimensions. In post-industrial era, local governments should pay more attention to the construction of soft environments, for example, the measures of talent training, sci-tech innovation, social change, and political reform. We need to understand the disadvantages of *InE* investment and avoid the curse effect caused by *ElE*, so as to lead our countries to overcome middle-income trap. In addition, the mass entrepreneurship and innovation strategy, ecological civilization construction strategy, supply-side reform and the belt and road strategy implemented by Chinese governments in recent years are exemplary measures to improve intellectual, ecological and economic environments, which are worthy of the learning of other developing and emerging countries. Second, we inspire local governments to consciously implement character behaviors. The underlying virtues and characteristics strengthen their roles in promoting local governments to make correct decisions and achieve high achievements in sustainability. Finally, we advise local governments to develop and improve *RSC* by following the logic of environment, behavior and capability, which provides continuous power for development fundamentally.

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References

1. ALDERETE M. V., 2018, The Mediating Role of ICT in the Development of Open Government, *Journal of Global Information Technology Management*, 21(3): 172-187.
2. ANDERSSON S., SVENSSON G., MOLINA-CASTILLO F. J., OTERO-NEIRA C., LINDGREN J., KARLSSON N. P. E., LAURELL H., 2022, Sustainable Development – Direct and Indirect Effects Between Economic, Social, and Environmental Dimensions in Business Practices, *Corporate Social Responsibility and Environmental Management*, early access, DOI: 10.1002/csr.2261.
3. CARAYANNIS E. G., CAMPBELL D. F. J., GRIGOROUDIS E., 2021, Democracy and the Environment: How Political Freedom is Linked with Environmental Sustainability, *Sustainability*, 13(10): 5522.
4. CHU C. C., TSAI S. B., CHEN Y. H., et al., 2017, An Empirical Study on the Relationship Between Investor Protection, Government Behavior, and Financial Development, *Sustainability*, 9(12): 2199.
5. DONGWOO Y., JUNG J. K., 2019, Social Responsibility and Local Government: Soft Budget Constraint and Internal Decision Making Process, *The Korean Journal of Local Government Studies*, 23(1): 437-452.
6. DOU S. Q., YUE C., XU D. Y., WEI Y., LI H., 2022, Rethinking the 'Resource Curse': New Evidence from Nighttime Light Data, *Resources Policy*, 76: 102617.
7. FOSS N. J., 2016, Reflections on a Decade of Microfoundations Research, *Revista de Administracao*, 51(1): 117-120.
8. GALERA A. N., BERJILLOS A. D., LOZANO M. R., VALENCIA P. T., 2015, Identifying Motivation of the Local Governments to Improve the Sustainability Transparency, *Transylvanian Review of Administrative Sciences*, 45E: 149-167.
9. GAO Y., MENG Y., 2021, Study on Construction and Evaluation Method of Eco-Environment Index System for Regional Economic Development, *Fresenius Environmental Bulletin*, 30(4): 3394-3401.
10. GU S., ZHANG X., ZHONG S., XIE M., LU J., 2011, Features and Functional Orientation of Underdeveloped Resource-Rich Regions, *Resources Science*, 33(1): 10-17.
11. GUO S., XI Y., LANG C., 2008, Organizational Personality: The Homogeneity of Individuals in the Organization, *Management Review*, 20(1): 17-25.
12. HONG D. L., CHIEN S. S., LIAO Y. K., 2020, Green Developmentalism and Trade-offs between Natural Preservation and Environmental Exploitation in China, *Environment and Planning E – Nature and Space*, 3(3): 688-705.
13. HOU C. X., ZHANG M. M., WANG M. M., FU H. L., ZHANG M. J., 2021, Factors Influencing Grazing Behavior by Using the Consciousness-Context-Behavior Theory - a Case Study from Yanchi County, China, *Land*, 10(11): 1157.
14. HOU X. H., LIU J. M., ZHANG D. J., 2019, Regional Sustainable Development: The Relationship between Natural Capital Utilization and Economic Development, *Sustainable Development*, 27(1): 183-195.
15. JABBAR H., 2016, The Visible Hand: Markets, Politics, and Regulation in Post-Katrina New Orleans, *Harvard Educational Review*, 86(1): 1-26.
16. JI H. J., DARNALL N., 2020, How Do External Conditions Affect the Design of Local Governments' Sustainability Strategies? *Regulation & Governance*, early access, DOI: 10.1111/rego.12334.
17. KAJIKAWA Y., OHNO J., TAKEDA Y., MATSUSHIMA K., KOMIYAMA H., 2007, Creating an Academic Landscape of Sustainability Science: An Analysis of the Citation Network, *Sustainability Science*, 2(2): 221-231.
18. KAMMERBAUER J., 2001, The Dimensions of Sustainability: Ecological Fundamentals, Paradigmatic Models and Pathways, *Interciencia*, 26(8): 353-359.
19. KEMMI, S., MUTTON R., 2012, Education for Sustainability (EfS): Practice and Practice Architectures, *Environmental Education Research*, 18(2):187-207.
20. KHIZAR H. M. U., IQBAL, M. J., RASHEED, M. I., 2021, Business Orientation and Sustainable Development: A Systematic Review of Sustainability Orientation Literature and Future Research Avenues, *Sustainable Development*, 29(5): 1001-1017.
21. KIM S. D., 2017, The Effect of City Image on Public Administration Satisfaction and City Loyalty: Moderating Effect of Regional Pride, *Journal of Channel and Retailing*, 22(3):39-67.
22. KLIEVINK B., JANSSEN M., 2009, Realizing Joined-up Government – Dynamic Capabilities and Stage Models for Transformation, *Government Information Quarterly*, 26(2): 275-284.

23. KOTERA Y., SWEET M., 2019, Comparative Evaluation of Neuro-Linguistic Programming, *British Journal of Guidance & Counselling*, 47(6): 744-756.
24. LI B., SHI Z. Y., TIAN C., 2018, Spatio-Temporal Difference and Influencing Factors of Environmental Adaptability Measurement of Human-Sea Economic System in Liaoning Coastal Area, *Chinese Geographical Science*, 28(2): 313-324.
25. LI C. L., YUAN R. S., KHAN M. A., PERVAIZ K., SUN X. R., 2020, Does the Mixed-Ownership Reform Affect the Innovation Strategy Choices of Chinese State-Owned Enterprises?, *Sustainability*, 12(7): 2587.
26. LIN L., HONG Y. R., 2022, Developing a Green Bonds Market: Lessons from China, *European Business Organization Law Review*, 23(1): 143-185.
27. LINDE L., SJODIN D., PARIDA V., WINCENT J., 2021, Dynamic Capabilities for Ecosystem Orchestration: A Capability-based Framework for Smart City Innovation Initiatives, *Technological Forecasting and Social Change*,166: 120614.
28. LIU M. J., QIN Q., ZOU Q. C., WANG Y., WEN Y. L., 2021, Natural Resource Dependence of Communities Around the Giant Panda Protected Land Based on Livelihood Capital, *Agriculture - Basel*, 11(11): 1123.
29. LU Y. L., ZHANG Y. Q., CAO X. H., et al., 2019, Forty Years of Reform and Opening Up: China's Progress toward a Sustainable Path, *Science Advances*, 5(8): eaau9413.
30. MA X., ZHAO K. C., LI Y. X., ZHU,H. Y., 2019, Infrastructure Investment and Sustainable Development in Coastal Areas in China, *Journal of Coastal Research*,94: 67-72.
31. MOORE G., 2015, Corporate Character, Corporate Virtues, *Business Ethics – A European Review*, 24: S99-S114.
32. NAM T., 2015, Challenges and Concerns of Open Government: A Case of Government 3.0 in Korea, *Social Science Computer Review*, 33(5): 556-570.
33. NAVARRO-GALERA A., ORTIZ-RODRIGUEZ, D., ALCARAZ-QUILES, F. J., 2019, A Stimulus to Transparency on Sustainability in European Local Governments through Population, Socioeconomic, Financial and Legal Factors, *Spanish Journal of Finance and Accounting*, 48(4): 525-554.
34. NEUBERT M., CARLSON D., KACMAR K. M., ROBERTS J., CHONKO, L., 2009, The Virtuous Influence of Ethical Leadership Behaviour: Evidence from the Field, *Journal of Business Ethics*, 90(2): 157-170.
35. OZSOY, I., 2009, From Economic Man to Social Man, *Bilig*, 48: 177-206.
36. PENG J., WANG Y., YE M., WU J., ZHANG Y., 2007, Environmental Impact Assessment of Industrial Structure Change in a Rural Region of China, *Environmental Monitoring and Assessment*, 132(1-3): 419-428.
37. SAJJAD A., SHAHBAZ W., 2020, Mindfulness and Social Sustainability: An Integrative Review, *Social Indicators Research*, 150(1): 73-94.
38. SHETH J. N., PARVATIYAR A., 2021, Sustainable Marketing: Market-Driving, not Market-Driven, *Journal of Macromarketing*, 41(1): 150-165.
39. SHIH H. S., SHYUR H. J., LEE E. S., 2007, An Extension of TOPSIS for Group Decision Making, *Mathematical and Computer Modelling*, 45(7-8): 801-813.
40. SHIN D., 2019, The Determinants of Military Spending: Focusing on Democratic Accountability and Government Stability, *Journal of Governance Studies*, 14(3): 23-50.
41. SMETANA S., TAMASY C., MATHYS A., HEINZ V., 2016, Measuring Relative Sustainability of Regions Using Regional Sustainability Assessment Methodology, *Geographical Analysis*, 48(4): 391-410.
42. SMIEJA M., 2015, Weighted Approach to General Entropy Function, *IMA Journal of Mathematical Control and Information*, 32(2): 329-341.
43. SODERBAUM P., BROWN J., 2010, Democratizing Economics Pluralism as a Path toward Sustainability, *Ecological Economics Reviews*, 1185: 179-195.
44. SOL J., VAN DER WAL M. M., BEERS P. J., WALS A. E. J., 2018, Reframing the Future: The Role of Reflexivity in Governance Networks in Sustainability Transitions, *Environmental Education Research*, 24(9): 1383-1405.
45. SONG Y. J., HWANG J. S., 2018, A Study on Future Preparation Factors Affecting the Regional Strategy for Futures: Focusing on Sustainability and Competitiveness Factors, *Legislation and Policy Studies*,10(3): 33-71.
46. SUN W., WANG C., LIU C. G., WANG L., 2022, High-speed Rail Network Expansion and its Impact on Regional Economic Sustainability in the Yangtze River Delta, China, 2009-2018, *Sustainability*, 14(1): 155.
47. TAN R., HU R. M., VATN A., 2021, What Does Sustainability Demand? An Institutionalist Analysis with Applications to China, *Journal of Chinese Governance*, 6(4): 486-514.
48. TSAI K. H., LIAO Y. C., 2017, Sustainability Strategy and Eco-Innovation: A Moderation Model, *Business Strategy and the Environment*, 26(4): 426-437.
49. WANG J. M., WANG J. H., 2011, The Influencing Elements of the Public Low-Carbon Consumption, and the Governments' Regulatory Policies (in Chinese), *Management World*, 4: 58-68.
50. WANG Q., LI, W., 2020, Research Progress and Prospect of Regional Resources and Environment Carrying Capacity Evaluation, *Ecology and Environmental Sciences*, 29(7): 1487-1498.
51. WANG, T. K., JU, H. J., JIM, J. B., 2017, The Influencing Factors on Innovation of Local Governments: Focusing on the Moderating Effect of the External-Focus Culture, *The Korea Local Administration Review*, 31(4): 199-220.
52. WANG YU., FAN Y., WEI Y., 2006, Study on the Impact of Human Capital on the Regional Sustainability, *Application of Statistics and Management*, 25(2): 149-155.
53. WCED (World Commission on Environment and Development), 1987, *Our common future*, Oxford University Press, New York.
54. WHITEHEAD M., JONES R., PYKETT J., 2011, Governing Irrationality, or a More Than Rational Government? Reflections on the Rescientisation of Decision Making in British Public Policy, *Environment and Planning A – Economy and Space*, 43(12): 2819-2837.

55. XU W., SUN T., 2021, Evaluation of Rural Habitat Environment in Under-Developed Areas of Western China: A Case Study of Northern Shaanxi, *Environment Development and Sustainability*, early access, doi: 10.1007/s10668-021-01881-4.
56. XU X., WU Q., 2018, A Model for Optimizing Regional Structure of Transport Infrastructure Investment based on Sustainability of Economic Growth, *Journal of Highway and Transportation Research and Development*, 35(11): 144-152.
57. YAHYA F., ABBAS G., HUSSAIN M., WAQAS M., 2022, Financial Development and Sustainable Competitiveness in Arctic Region: A Dynamic Panel Data Analysis, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(1): 267-278.
58. ZHONG R., PEI F. S., YANG K. Q., XIA Y., WANG H. L., YAN G. X., 2021, Coordinating Socio-Economic and Environmental Dimensions to Evaluate Regional Sustainability – Towards an Integrative Framework, *Ecological Indicators*, 130: 108085.

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The Configuration Effect of Tea Enterprises' Sustainable Production Technologies in China: Based on the FsQCA Method

Wpływ konfiguracji technologii zrównoważonej produkcji przedsiębiorstw herbacianych w Chinach: w oparciu o metodę FsQCA

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Abstract

Using the survey data of 45 tea enterprises in Fujian Province, China, this paper adopted fuzzy set qualitative comparative analysis (fsQCA) to study the adoption of the sustainable production technologies by tea enterprises. The results show that there are two configurations for the path to achieve the adoption of high sustainable production technologies. The core condition combination of the first configuration is the existence of sustainable development capabilities, the degree of government support, and the resource and environmental endowment, while that of the second configuration is the existence of enterprise expected value, industrial organization mode and the resource and environmental endowment. Moreover, the path achieving non-highly sustainable production technologies adoption mainly summarized as a configuration. Specifically, the core condition is the absence of sustainable development capabilities, enterprise development strategies, and the resource and environmental endowments. Furthermore, some practical policy recommendations were put forward based on the above conclusions in this paper.

Key words: agricultural enterprise, sustainable production technologies, fsQCA, China

Słowa kluczowe: przedsiębiorstwo rolne, technologie zrównoważonej produkcji, fsQCA, Chiny

Introduction

Agriculture is very closely linked to the UN Sustainable Development Goals (Grześkowiak et al., 2022). Organic agriculture plays an important role in the realization of the UN Sustainable Development Goals (Šeremešić et al., 2021). As one of the most important tea producing countries in the world, China plays an important role in the global tea trade. Tea economy is an important part of China's agricultural economy, and its sustainable development affects the overall process of agricultural sustainable development. It is generally believed that the implementers of sustainable development behavior mainly include the government, the public and enterprises. Among them, the enterprise is the most basic and key factor in the implementation of sustainable development behavior (Ai and Wang, 2018). In the process of business management, environmental and non-environmental decisions may affect the sustainable development of the industry, and the growth mode, efficiency and technological innovation of the enterprise constitute the basis of the sustainable development of the industrial economy. For instance, enterprises adopting voluntary environmental protection strategy can not only effectively solve the problems of environmental pollution and ecological damage caused by the rapid development of industry, but also an important path to promote the sustainable development of industry (Huybers and Bennett, 2003). Therefore, the development strategy of enterprises should pursue the mutual unity of internal economy and external economy (Wu et al., 2017).

Under the market economy, green enterprises with high resource utilization and good development prospects can effectively ensure the high quality and sustainable development of the industry. On the contrary, enterprises will eventually be revealed in their true colors under the effect of price discovery mechanism. For instance, in the field of agriculture, some tea enterprises manufacture and sell fake and inferior products, or forge the origin of products to obtain the credit weighting of national geographical indications, and ultimately obtain more profits. However, although the above practices can make enterprises obtain more economic benefits in the short term, in the long run, they will cause great damage to the industrial credit, damage the national geographical indication product protection system, seriously damage the market order, and cause unfair competition in the product market. Therefore, the enterprise's expected value and internal resource capacity will affect the enterprise behavior, and then affect the sustainable development of the industry. However, there is still a lack of sufficient research on which factors will affect the implementation path of sustainable production technology of tea enterprises, leading to many defects in policy-making.

1. Literature review

Currently, many scholars have done some research on the adoption of sustainable production technology. Specifically, when enterprises make decisions on sustainable production technology, they tend to pay attention to the current high cost burden and ignore the long-term advantages of sustainable production technology. When an enterprise's sustainability decisions are out of process, strategy, and long-term vision, its business activities may have a negative impact on the environment and society (Calabrese et al., 2019). However, the research shows that the two sales modes of *sustainable development* and *pollution for growth* coexist in China's industrial enterprises, but the industrial enterprises adopting the *sustainable development* sales mode can achieve faster sales growth than the *pollution for growth* mode through clean and environmentally friendly production technology (Zhang et al., 2020). In addition, the green transformation of traditional enterprises may lead to the decline of short-term profits, thus hindering the sustainable development of the industry. Therefore, we should focus on the relative value and long-term benefits of the green development of traditional enterprises. Furthermore, the external environmental factors such as the pressure of external stakeholders will also affect the choice of enterprises, and then affect the sustainable development of the industry. Therefore, it is necessary to continuously develop cooperative economic organizations, implement industry autonomy, and actively guide the upstream and downstream industries to establish a close connection mechanism, and take the road of industrial management.

Actually, many policies and measures to promote the sustainable development of agriculture need the support and cooperation of relevant industries and enterprises, so as to achieve effective industrial integration. For instance, industrial cluster, industrial ecology and industrial symbiosis are important factors for enterprises to promote the sustainable development of the industry, which need the integration and cooperation among enterprises in the whole industry chain. On the contrary, low industrial concentration, unreasonable product structure and low level of application and development will hinder the sustainable development of the industry. Therefore, the enterprises in the industrial cluster are the community of interests of symbiotic development. The competition and cooperation between enterprises and the resulting cluster effect are the source of the realization of industrial clusters' competitive advantages and sustainable development (Tracey et al., 1999). One possible explanation is that the competition and cooperation behavior of enterprises can jointly stimulate consumption demand and develop the market, and even jointly resist the threat of competition (Scott and Storper, 2003). It can also realize the spillover of the overall benefits of the cluster by sharing cluster resources and complementing advantages. The cooperation, cluster development, support initiatives, competitive rivalry, and differentiation behaviors of enterprises are interconnected and have an impact on sustainable development (Felzensztein et al., 2019). Therefore, in order to realize the sustainable development of industry, we must improve the level of specialization, intensification and ecology, especially realize the linkage optimization of enterprise resource status and industrial environment. Additionally, it can also effectively realize the sustainable development of the industry through such modes as the start-up of production base, the promotion of processing enterprises, the promotion of circulation enterprises and the interaction of cooperative organizations. Building an industrial symbiosis system with ecosystem characteristics is a new way to realize the sustainable development of the industry, and industrial symbiosis requires enterprises to cooperate with each other and use the waste produced by each other, so as to realize the optimization of resources (Huang et al., 2019). The government's sustainable financial subsidies, tax incentives and restrictive administrative policies will also affect the decision-making model of enterprises, change the production behavior and structure of enterprises, and thus promote the sustainable development of the industry (Zhou et al., 2015; Liao, 2018; Yang et al., 2018; Zhu et al., 2020). In addition, other scholars have successively analyzed theoretical discussions and practical models of industrial sustainable development from the enterprise level (Veiga and Magrini, 2009; Boscoianu et al., 2018).

However, the existing studies mainly focus on the impact of corporate behavior on the sustainable development of enterprises or regional economy, and ignore the importance of corporate behavior on the sustainable development of industry, which leads to more consideration of the short-term economic interests of enterprises in the

study, but little mention of the long-term sustainable development of industry. In addition, due to the great differences in the sustainable development path of different industries, the existing studies ignore the industrial heterogeneity, mainly take industry and the tertiary industry as examples, and lack of in-depth research on agriculture, which leads to the policy recommendations may not be applicable to the sustainable development of agriculture. Therefore, this study takes tea enterprises in Fujian as an example, and applies fuzzy set qualitative comparative analysis to explore the implementation path of sustainable production technology of tea enterprises, in order to provide reference and policy suggestions for improving agricultural sustainable production technology and promoting agricultural sustainable development.

2. Materials and methodologies

2.1. Methodologies

Traditional quantitative research methods focus on the statistical significance of the impact factors on the result variables, and measure the marginal net effect of the single influencing factors on the result variables, mainly manifested in the unidirectional linear relationship and causal symmetry of the influencing factors (Liu et al., 2017). However, due to the various macro and micro environments faced by enterprise management become more and more complex, the influencing factors of enterprise management decision-making are also more and more complex. The results no longer rely solely on the linear effect of a single explanatory variable, but depend on the interdependence and joint effect of conditional variables. Therefore, the limitations of traditional quantitative research methods on related topics are gradually emerging. Based on this, as an effective integration of qualitative and quantitative research methods, especially from a holistic perspective, qualitative comparative analysis (QCA) has gradually been widely used in the field of strategy, organization and management research (Kraus et al., 2017; Greckhamer et al., 2018; Thomann and Maggetti,2020). For instance, Papatheodorou and Pappas (2017) used the QCA method to explore the complex relations among economic recession, job vulnerability, and tourism decision making. Also, the QCA method was applied to examine the achievement of customer engagement with social media (Gligor et al., 2019). The significant advantage of QCA method in considering the combination of multiple factors and conditions is consistent with the configuration effect analysis of multiple conditions on the sustainable production technology of tea enterprises. The fsQCA method can deal with the conditional variable and result variable of fixed distance and fixed ratio, that is, it can deal with the problem of variable degree change and partial membership, so it has more advantages. In view of the dual attributes of both qualitative and quantitative research, fsQCA method is used to analyze the configuration effect of the conditional variables used in the sustainable production technology of tea enterprises.

2.2. Data source

The peculiarities of the tea industry have resulted in the existence of more specialized farmer cooperatives, that is, mutual-aid economic organizations based on tea production operators or tea production and operation service providers and users. Therefore, the tea cooperatives that have been registered in accordance with the law by the administrative department for industry and commerce are included in the category of tea enterprises to conduct interviews and investigations. In addition, since the case selection criteria of fsQCA method not only require ensuring the full homogeneity of the case population, making the cases similar and comparable, but also ensuring the greatest difference in the case population (Qin and Yang, 2020), 45 tea enterprises and tea professional cooperative societies in Fujian (hereinafter referred to as tea enterprises) (Table 1) are finally selected as samples for research.

Table 1. The source distribution of the selected tea enterprises

Indicator	Category	Frequency	Proportion (%)	Cumulative proportion (%)
Type	Enterprise	36	80.0	80.0
	Professional cooperative	9	20.0	100.0
Scale	10 persons and below	10	22.2	22.2
	11–20 persons	12	26.7	48.9
	21–30 persons	4	8.9	57.8
	31–40 persons	0	0.0	57.8
	41–50 persons	2	4.4	62.2
	51 persons and above	17	37.8	100.0
History	3 years and below	3	6.7	6.7
	4–6 years	7	15.6	22.3
	7–9 years	9	20.0	42.3
	10–12 years	10	22.2	64.5
	13–15 years	3	6.7	71.1
	16 years and above	13	28.9	100.0
Part-time	Yes	25	55.6	55.6
	No	20	44.4	100.0

2.3. Variable selection

2.3.1. Result variable

The adoption of sustainable production technology (ASPT) is the result variable of the research on the sustainable development of tea enterprises. The composition of this index mainly includes the attitude, intention and behavior of tea enterprises towards the adoption of sustainable production technology. Generally, in order to effectively realize sustainable development of tea industry, as the main body of industrial development, enterprises must realize sustainable development. Moreover, the adoption of sustainable production technology is an essential key link and path for tea enterprises to successfully realize sustainable development. On the basis of consulting tea experts and considering the development of tea industry, sustainable tea production technologies mainly refer to five types, namely the optimization of tea tree species structure, the green prevention and control technology of tea plant diseases and insect pests, the construction and management technology of ecological and organic tea gardens, soil testing and formula fertilization technology in tea gardens, and tea garden interplanting and intercropping technologies.

2.3.2. Conditional variables

The adoption of sustainable production technology by enterprises is affected by the interweaving of many factors, and the fsQCA method can be used to effectively analyze the configuration effects of conditional variables. Therefore, based on the existing research, six conditional variables are finally selected to analyze the configuration of sustainable production technology adopted by tea enterprises, including sustainable development ability (SUDA), enterprise development strategy (ENDS), government support (GOSU), enterprise expected value (ENEV), industrial organization model (INOM) and resource and environmental endowment (REEE). The sustainable development ability reflects the harmonious unity of economic, social and environmental indicators of tea enterprises, indicating that the enterprises are on a good development path. In short, the sustainable development ability of enterprises is very important for enterprises. Realizing the sustainable development of enterprises is one of the keys to promote the sound and rapid development of China's economy, which determines the quality and sustainability of social and economic development. Specifically, tea enterprises with high sustainable development ability can make full use of healthy financial resources and rich material foundation, adopt sustainable production technology, and improve the scientific and technological competitiveness and brand awareness of tea products. Additionally, the enterprise development strategy can reflect the overall development direction and specific realization path of tea enterprises, which is closely related to the adoption of sustainable production technology. Generally, enterprises with relatively perfect and feasible development strategies tend to pay more attention to long-term interests, so they may increase their preference for the adoption of sustainable tea production technology.

The degree of government support reflects the guiding and encouraging role of the government in the sustainable technology adoption of tea enterprises. Specifically, the government can guide the production behavior of tea enterprises through agricultural financial subsidies to make them adopt more sustainable production technologies. The government can also give preferential tax and enterprise financing policies to tea enterprises that actively adopt sustainable production technology, so as to further guide the positive behavior of tea enterprises. In addition to financial subsidies and policy preferences, in order to effectively promote the sustainable development of the tea industry, the government will also take appropriate restrictive policy measures, such as restricting the use of pesticides and chemical fertilizers. In short, the government's incentive and restrictive measures will affect the adoption of sustainable production technology by tea enterprises. Furthermore, enterprise expected value is another important factor affecting the adoption of sustainable technology. In essence, an enterprise is an economic organization for profit. Its expectation of future economic benefits brought by operation and management decisions will obviously affect the current operation and management decisions. Therefore, when a tea enterprise is confident that the tea industry can achieve sustainable development, or that it can continue to obtain sufficient economic benefits from tea planting and production activities, or that the adoption of sustainable production technology will bring more economic benefits than the traditional production mode, the enterprise is more likely to adopt sustainable production technology.

Industrial organization model will also affect enterprises to adopt sustainable production technology. The industrial organization model is embodied in industrial agglomeration, industrial ecology and industrial symbiosis. If a region has a relatively complete tea industry chain, tea enterprises in the region can obtain more scale effects and technological progress at a lower cost and adopt sustainable production technology. If a region has good natural resource endowment and industrial development planning, for instance, the development of tea economy will not cause serious damage to the environment and ecology, enterprises in the region are more likely to adopt sustainable production technology. Industrial symbiosis reflects that there is competition and cooperation among tea enterprises at the same time. Enterprises with strong concept of industrial symbiosis are usually more willing to try to innovate tea production technology. In addition, resource and environmental endowments mainly reflect other resources and constraints inside and outside the enterprise, such as the degree to which the operation and management of the enterprise is affected by stakeholders and the correlation between the enterprise and other industries. For instance, with the continuous development of industrial integration, many tea enterprises have begun to step

into the secondary industry and the tertiary industry, further develop and expand tea derivatives, and integrate them with tourism resources. Enterprises with high resource and environmental endowment usually have good inclusiveness and are more willing to introduce and blend production technologies. The above conditional variables are effectively measured by the average value of 7-level Likert scale. The logical framework of sustainable production technology adopted by tea enterprises is shown in Figure 1.

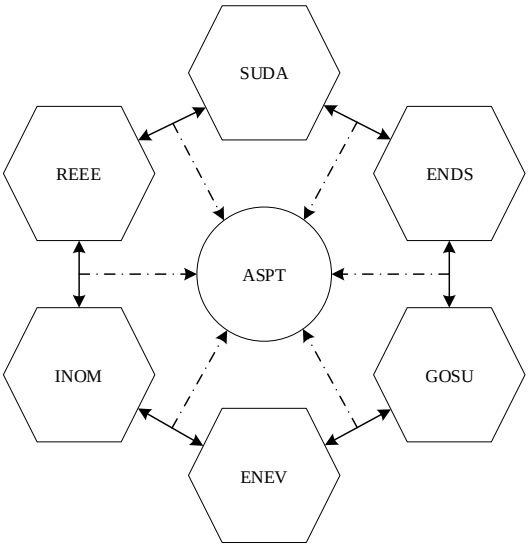

Figure 1. The logical framework of sustainable production technology adoption

3. Empirical results

3.1. Descriptive statistics

The Cronbach's alpha coefficient values of sustainable development ability, enterprise development strategy, government support, enterprise expected value, industrial organization model, resource and environmental endowment, and adoption of sustainable production technology are 0.928, 0.895, 0.877, 0.885, 0.843, 0.889 and 0.960, respectively, indicating that the measurement questionnaire has high internal consistency. In addition, the KMO values of the above measurement indicators all meet the basic standards. Specifically, the significance of the Bartlett sphericity test is 0.000, and each indicator can be reduced to a factor with a characteristic value greater than 1, indicating that the measurement questionnaire has a relatively high structural validity. Therefore, the conclusions of reliability test and validity test also prove that the questionnaire used by tea enterprises in sustainable production technology is scientific and reasonable. We take the average value of all measurement items contained in each variable as the assignment of the variable. Descriptive statistics and correlation analysis are shown in Table 2.

Table 2. Descriptive statistics and correlation coefficients of all variables

Indicator	**Mean**	**St. D**	**SUDA**	**ENDS**	**GOSU**	**ENEV**	**INOM**	**REEE**	**ASPT**
SUDA	5.44	1.317	1.000						
ENDS	5.64	1.261	0.841***	1.000					
GOSU	4.95	1.694	0.694***	0.601***	1.000				
ENEV	5.80	1.182	0.828***	0.749***	0.680***	1.000			
INOM	5.64	1.392	0.679***	0.768***	0.480***	0.741***	1.000		
REEE	5.63	1.313	0.817***	0.738***	0.704***	0.858***	0.758***	1.000	
ASPT	6.10	1.341	0.805***	0.837***	0.638***	0.819***	0.834***	0.836***	1.000

Note: *** indicates that the correlation coefficient is significant at the level of 1%.

3.2. Calibration of variables

Generally, fsQCA method calibrates the original assignment of condition variables and the result variable to the corresponding fuzzy subordination value between 0 and 1 by selecting the appropriate critical value of complete subordination, critical value of incomplete subordination and critical value of the junction point, so as to further study. However, there is no unified standard for variable calibration. At present, the mean and standard deviation can reflect the basic characteristics of the data, and the questionnaire data of Likert scale faces challenges in variable calibration (Botey et al., 2020). Combined with the actual situation shown by the research sample data, according to the theoretical and practical external knowledge or standards, we select the average value of the result variable and the conditional variables as the critical value of the intersection. Similarly, we select the mean minus one standard deviation as the critical value of incomplete subordination, and select the mean plus one standard

deviation as the critical value of complete subordination. Ultimately, the anchor points of the result variable and conditional variables are shown in Table 3. After the variable calibration, we carry out the necessary conditional analysis to test whether the conditional variable and its negative conditional variable are a subset of the result variable and whether the result variable can be fully explained by a single conditional variable. Then, after the necessary condition tests of the conditional variables and their negative conditional variables, all possible logical combinations of the conditional variables corresponding to the result variables, namely the truth table, are obtained. When obtaining the truth table, according to the conventional research steps, combined with the approximate balance of the number of truth table rows with values of 0 and 1, we set the research sample frequency threshold to 1 and the consistency threshold to 0.95, and finally determine the number of cases entering the research.

Table 3. The calibration of conditional variables and the result variable

Type	**Name**	**Anchor point**		
		Complete subordination	Junction point	Incomplete subordination
Result variable	ASPT	7.445	6.104	4.763
Conditional variables	SUDA	6.761	5.444	4.127
	ENDS	6.898	5.637	4.376
	GOSU	6.642	4.948	3.254
	ENEV	6.982	5.800	4.618
	INOM	7.036	5.644	4.252
	REEE	6.943	5.630	4.317

3.3. Necessary condition analysis

Before the configuration analysis of conditional variables, we first test the necessity of the result variable caused by a single conditional variable, that is, to verify whether a single conditional variable belongs to the necessary condition constituting the result variable. Generally, consistency and coverage indicators are used as the judgment criteria. The former is mainly used to characterize the extent to which the result set constitutes a subset of the condition set, while the latter is mainly used to characterize the empirical correlation of the necessary conditions when the condition variables pass the consistency test (Li et al., 2021). If the conditional variable is proved to be a necessary condition for constituting the result variable, it is likely to be eliminated by the reduced solution in the truth table analysis. Therefore, this conditional variable should be excluded during configuration analysis. Generally, the rule of thumb holds that when the consistency index of the conditional variable is greater than 0.9, it can be considered that the conditional variable is a necessary condition to form the result variable (Li et al., 2021). The consistency and coverage index of the necessity test of conditional variables are shown in Table 4.

Table 4. Necessity test of conditional variables

Conditional variables	**ASPT**		**~ ASPT**	
	Consistency	Coverage	Consistency	Coverage
SUDA	0.809	0.870	0.450	0.332
~ SUDA	0.380	0.501	0.824	0.747
ENDS	0.804	0.862	0.476	0.350
~ ENDS	0.394	0.523	0.812	0.740
GOSU	0.737	0.815	0.484	0.368
~ GOSU	0.428	0.548	0.756	0.664
ENEV	0.833	0.866	0.516	0.368
~ ENEV	0.392	0.541	0.812	0.769
INOM	0.841	0.891	0.418	0.304
~ INOM	0.343	0.462	0.850	0.785
REEE	0.864	0.910	0.396	0.286
~ REEE	0.322	0.437	0.875	0.816

Note: ~ indicates not of logical operation.

As shown in Table 4, among all conditional variables constituting the adoption of sustainable production technology, the maximum value of consistency index is 0.864 of resource and environmental endowment. Similarly, among all the conditional variables constituting ~ sustainable production technology, the maximum value of consistency index is 0.875 of ~ resource and environmental endowment. The above two are less than 0.9, which means that all single conditional variables do not constitute the necessary conditions for the adoption of sustainable production technology and ~ sustainable production technology. Since the conditional variables did not pass the consistency test, it is not necessary to further demonstrate the coverage index. The above results further show that the explanatory ability of single conditional variable to result variable is weak, so it is necessary to study the configuration effect of conditional variable combination on result variable.

3.4. Combination condition analysis

Before the combination condition analysis, it is necessary to set the consistency threshold and frequency threshold and construct the truth table. Combined with the research needs, we set the consistency threshold to 0.935 and the research sample frequency threshold to 1, which meets the general standard of qualitative comparative analysis method. Through the standard analysis process of qualitative comparative analysis software, the specific combination relationship of condition variables, namely configuration effect, is analyzed.

The configuration effect of conditional variables adopted by tea enterprises for sustainable production technology is analyzed through the software fsQCA (Version 3.1). The configuration analysis results of high sustainable production technology and non-high sustainable production technology adopted by tea enterprises are shown in Table 5 and Table 6 respectively. Table 5 and Table 6 report the intermediate solutions of configuration analysis for high sustainable production technology adoption and non-high sustainable production technology adoption respectively. Combining intermediate solution and reduced solution, we can effectively identify the core conditions and edge conditions in the combination of specific conditional variables. Generally, the conditions existing in both intermediate solutions and reduced solutions are called core conditions, and the conditions existing only in intermediate solutions are called edge conditions (Guo and Zhang, 2021).

Table 5. Configuration analysis of high sustainable production technology adoption

Conditional variables	**Path 1**	**Path 2**	**Path 3**	**Path 4**
SUDA	●	●	●	⊗
ENDS			●	⊗
GOSU	●	⊗	●	●
ENEV	●	●		●
INOM	⊗	●	●	●
REEE	●	●	●	●
Consistency	0.955	0.978	0.947	0.975
Original coverage	0.199	0.251	0.543	0.161
Unique coverage	0.051	0.106	0.351	0.024
Consistency of solutions	0.955			
Coverage of solutions	0.728			

Note: ● indicates that the core condition exists; ● indicates that the edge condition exists; ⊗ indicates that the core condition does not exist; ⊗ indicates that the edge condition does not exists; blank indicates that the condition variable in the path can exist or not, and its existence or not has no impact on the result variable.

Table 6. Configuration analysis of non-high sustainable production technology adoption

Conditional variables	**Path 1**	**Path 2**
SUDA	⊗	⊗
ENDS	⊗	⊗
GOSU		⊗
ENEV	⊗	●
INOM	⊗	
REEE	⊗	⊗
Consistency	0.973	0.962
Original coverage	0.601	0.262
Unique coverage	0.415	0.076
Consistency of solutions	0.964	
Coverage of solutions	0.677	

Note: ● indicates that the core condition exists; ● indicates that the edge condition exists; ⊗ indicates that the core condition does not exist; ⊗ indicates that the edge condition does not exists; blank indicates that the condition variable in the path can exist or not, and its existence or not has no impact on the result variable.

3.4.1. Configuration analysis of high sustainable production technology

The configuration analysis of high sustainable production technology shows that there are four main paths to realize the adoption of high sustainable production technology by tea enterprises, as shown in Table 5. Specifically, it can be divided into two main configurations according to the similarities and differences of core conditions. The core conditional variable combination of the first configuration is the existence of sustainable development capacity, government support and resource and environmental endowment, including Path 1 and Path 3. The core conditional variable combination of the second configuration is the existence of enterprise expected value, industrial organization model and resource and environmental endowment, including Path 2 and Path 4. The overall consistency and coverage of the four paths using configuration analysis in high sustainable production technology are 0.955 and 0.728 respectively, which are higher than 0.8 and 0.7 respectively, indicating that the overall explanatory power of path configuration is strong and the results are reliable. The overall consistency and coverage of the four paths analyzed by the configuration analysis of enterprises adopting high sustainable production technology are

0.955 and 0.728 respectively, which are higher than 0.8 and 0.7 respectively, indicating that the overall explanatory power of path configuration is strong and the results are reliable. In addition, by comparing the original coverage of the four paths, the original coverage of Path 3 is higher than that of the other three paths, which explains 54.3% of the result variable. In contrast, the other three paths explain 19.9%, 25.1% and 16.1% of the result variables respectively, indicating that most tea enterprises realize the adoption of high sustainable production technology through Path 3.

In Path 1, tea enterprises with high sustainable development ability perform better than other enterprises in economic, social and environmental indicators, which comprehensively reflects the potential and ability of enterprises in promoting industrial sustainable development. The positive effect on the sustainable development of the industry makes the government more willing to increase the financial support, tax preference and policy preference for these tea enterprises, so as to help them establish a good competitive advantage in the field of tea. This advantage not only ensures that the operation and management decisions of tea enterprises are not easy to be affected by other stakeholders, but also can be closely related to other industries. This connection expands the vision of operation and management of tea enterprises, further urges tea enterprises to focus on long-term interests and sustainable development, strengthen the research and development of advanced production technology, and improve the expected results of tea sustainable development.

In Path 2, when tea enterprises have high expected value for industrial sustainable development and sustainable production technology, they may have a positive attitude and intention to adopt sustainable production technology in order to obtain more economic benefits. The existence of industrial organization model shows that the location of tea enterprises has a relatively complete tea industry chain, and there is a good competition and cooperation relationship between tea enterprises. Similarly, the existence of resource and environmental endowments indicates that the tea products and their derivatives produced by tea enterprises have high geographical indication recognition, and there is a close relationship between tea enterprises and other industries. When the above conditions are combined, tea enterprises may adopt high sustainable production technology. Additionally, tea enterprises with high sustainable development capacity have more sufficient resources and capacity to adopt sustainable production technology.

In Path 3, the sustainable development ability of tea enterprises comprehensively reflects the coordination and unity of economic, social and environmental indicators, indicating that enterprises pay more attention to social responsibility and resource and environmental awareness. This may greatly enhance the attitude, willingness and behavior of tea enterprises to adopt sustainable production technologies, such as reducing the use of pesticides and fertilizers. The government's financial support enables tea enterprises to have more financial resources, attract professional and technical talents, carry out the R&D and application of sustainable production technology, and give appropriate support to the financing needs of enterprises. In addition, some restrictive measures taken by the government for the tea industry, such as requiring a total ban on the production and sales of tea presses, urge tea enterprises to adopt sustainable production technology, especially for tea enterprises with relatively high sustainable production capacity. In addition, when the tea products in the area where the tea enterprises are located belong to geographical indication protection products, and there is a close relationship between the tea enterprises and other industries, the tea enterprises are more likely to adopt high sustainable production technology to improve the quality of tea products and their derivatives, so as to meet the needs of consumers for tea products and their derivatives in specific geographical areas. The perfection of enterprise development strategy shows that tea enterprises balance the relationship between short-term interests and long-term interests, and formulate the implementation path to achieve enterprise objectives. The perfection of industrial organization model shows that the tea industry chain is relatively complete, and there is mutual competition and cooperation among tea enterprises. Therefore, tea enterprises can obtain relatively low marginal production costs and are prone to scale effects.

Compared with other paths, path 4 requires all conditional variables to exert configuration effect in order to realize the adoption of high sustainable production technology. The existence of industrial organization model and resource and environmental endowment shows that tea enterprises have a good external environment for the adoption of high sustainable production technology. The expected value of enterprises reflects the comprehensive prediction of tea enterprises on the future development of the industry. Combined with the external environment that helps to drive the adoption of high sustainable production technology, tea enterprises are more likely to choose sustainable production technology. Government financial support and preferential tax policies further promote the adoption of sustainable production technology in the tea industry. Similarly, the government's restrictive policies for the industry further guide and strengthen the operation and management decision-making behavior of tea enterprises. Compared with other paths, this path emphasizes the driving role of external factors.

3.4.2. Configuration analysis of non-high sustainable production technology

The configuration analysis of non-high sustainable production technology shows that there are mainly two paths that can lead to the adoption of non-high sustainable production technology by tea enterprises, as shown in Path 1 and Path 2 in Table 6. These two paths have the same core conditions, that is, there is no sustainable development ability, enterprise development strategy and resource and environmental endowment. The overall consistency and

coverage of the two paths in the configuration analysis of non-high sustainable production technology are 0.964 and 0.677 respectively, indicating that the overall explanatory power of path configuration is relatively strong and the results are relatively reliable. In addition, by comparing the original coverage of the two paths, the original coverage of Path 1 is higher than that of Path 2, which explains 60.1% of the result variable. Path 2 explains 26.2% of the result variable, indicating that most tea enterprises lead to the adoption of non-high sustainable production technology through Path 1.

In Path 1, the existence of government support has no substantial impact on the adoption of non-highly sustainable production technologies. When tea enterprises do not have high sustainable development capacity, it is easier to adopt non-high sustainable production technologies in pursuit of short-term economic benefits, such as extensive use of pesticides and chemical fertilizers to improve tea planting and production efficiency. The imperfection of enterprise development strategy also shows that tea enterprises tend to short-term interests, and there is no clear implementation plan for the realization of enterprise objectives. The lack of resource and environmental endowment shows that tea products and their derivatives do not have a better competitive advantage, and the operation and management decisions of tea enterprises are more vulnerable to the influence of stakeholders, such as existing competitors and potential competitors. One possible explanation is that the bad competitive environment and adverse external conditions make tea enterprises more inclined to pursue short-term economic benefits and produce the adoption of non-high sustainable production technology.

In Path 2, the existence of industrial organization model has no substantive impact on the adoption of non-high sustainable production technology. Like the conclusion shown in Path 1, tea enterprises are more likely to adopt non-high sustainable production technology in order to obtain sufficient economic benefits and maintain the normal operation and development of enterprises when they do not have relatively high sustainable development ability and relatively perfect enterprise development strategy, and have limited resource and environmental endowment. The essential attribute of profit makes enterprises pay more attention to short-term interests. Compared with Path 1, the lack of government support and the existence of enterprise expected value are equivalent to the lack of enterprise expected value and industrial organization model. Therefore, the action direction and degree of enterprise expected value should be studied more deeply in combination with the configuration effect of conditional variables.

4. Conclusions

In this paper, fsQCA method is used to analyze the configuration effect of conditional variables of high sustainable production technology adoption and non-high sustainable production technology adoption in tea enterprises. The main conclusions of the paper are as follows: (1) There are two main paths to produce highly sustainable production technology. The core conditional variable combination of the first configuration is the simultaneous existence of sustainable development capacity, government support and resource and environmental endowment. The core conditional variable combination of the second configuration is the existence of enterprise expected value, industrial organization model and resource and environmental endowment. Combined with the core conditions and edge conditions, there are four main ways for tea enterprises to adopt high sustainable production technology. (2) There is mainly a configuration of the path adopted to produce non -high sustainable production technology, and its core variables are the absence of sustainable development capability, enterprise development strategy and resource and environmental endowment. Combined with the core conditions and edge conditions, there are two main ways for tea enterprises to adopt non-high sustainable production technology.

Therefore, in order to improve the adoption of sustainable production technology by agricultural enterprises, some practical suggestions can be put forward from the perspective of enterprises, government and the linkage between enterprises and government, especially to strengthen the combination of influencing factors of sustainable production technology adoption. It should be noted that strengthening the adoption of sustainable production technologies by agricultural enterprises usually does not require the joint action of all conditional variables. Firstly, tea enterprises should make full use of internal and external resources, strengthen and enhance their sustainable development ability, ensure that enterprises can be in an invincible position and enhance their core competitiveness in the face of complex competitive environment. Secondly, the government should fully change its functions and strengthen its regulatory role in the effective allocation of resources by the market. For instance, the government should constantly improve the financial support, tax preferential policies and restrictive policies for industrial development, and strengthen the incentive and guidance for the adoption of sustainable production technology by enterprises. Thirdly, we should strengthen mutual coordination between enterprises and the government and jointly create a fertile soil conducive to agricultural development.

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References

1. AI F. Y., WANG M. Z., 2018, Economic benefit evaluation of industrial enterprises based on BP neural network optimization algorithm, *Latin American Applied Research*, 48(3): 223-227.
2. BOSCOIANU M., PRELIPCEAN G., LUPAN M., 2018, Innovation enterprise as a vehicle for sustainable development - A general framework for the design of typical strategies based on enterprise systems engineering, dynamic capabilities, and option thinking, *Journal of Cleaner Production*, 172: 3498-3507.
3. BOTEY M., VAQUERO-DIEGO M., SASTRE F. J., 2020, Perceived emotional intelligence of university professors based on the nature of the subject taught, *Technological Forecasting and Social Change*, 161, 120292.
4. CALABRESE A., COSTA R., LEVIALDI N., MENICHINI T., 2019, Integrating sustainability into strategic decision-making: A fuzzy AHP method for the selection of relevant sustainability issues, *Technological Forecasting and Social Change*, 139: 155-168.
5. FELZENSZTEIN C., DEANS K. R., DANA L., 2019, Small firms in regional clusters: Local networks and internationalization in the Southern Hemisphere, *Journal of Small Business Management*, 57(2): 496-516.
6. GLIGOR D., BOZKURT S., RUSSO I., 2019, Achieving customer engagement with social media: A qualitative comparative analysis approach, *Journal of Business Research*, 101: 59-69.
7. GRECKHAMER T., FURNARI S., FISS P. C., AGUILERA R. V., 2018, Studying configurations with qualitative comparative analysis: Best practices in strategy and organization research, *Strategic Organization*, 16(4): 482-495.
8. GRZEŚKOWIAK J., ŁOCHYŃSKA M., FRANKOWSKI J., 2022, Sericulture in terms of sustainable development in agriculture, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 17(2): 210-217.
9. GUO K., ZHANG T. T., 2021, Research on the development path and growth mechanism of unicorn enterprises, *Mathematical Problems in Engineering*, 2021, 9960828.
10. HUANG M. X., WANG Z. Z., CHEN T., 2019, Analysis on the theory and practice of industrial symbiosis based on bibliometrics and social network analysis, *Journal of Cleaner Production*, 213: 956-967.
11. HUYBERS T., BENNETT J., 2003, Environmental management and the competitiveness of nature-based tourism destinations, *Environmental and Resource Economics*, 24(3): 213-233.
12. KRAUS S., RIBEIRO-SORIANO D., SCHÜSSLER M., 2018, Fuzzy-set qualitative comparative analysis (fsQCA) in entrepreneurship and innovation research - the rise of a method, *International Entrepreneurship and Management Journal*, 14: 15-33.
13. LI Y., XIAO H., BU N., LUO J., XIA H., KONG L., YU H., 2021, Configuration-based promotion: A new approach to destination image sustainability, *Sustainability*, 13(21), 12174.
14. LI Z. G., LI Y. K., LONG D., 2021, Research on the improvement of technical efficiency of China's property insurance industry: A fuzzy-set qualitative comparative analysis, *International Journal of Emerging Markets*, 16(6): 1077-1104.
15. LIAO Z., 2018, Content analysis of China's environmental policy instruments on promoting firms' environmental innovation, *Environmental Science and Policy*, 88: 46-51.
16. LIU Y., MEZEI J., KOSTAKOS V., LI H., 2017, Applying configurational analysis to IS behavioral research: A methodological alternative for modelling combinatorial complexities, *Information Systems Journal*, 27(1): 59-89.
17. PAPATHEODOROU A., PAPPAS N., 2017, Economic recession, job vulnerability, and tourism decision making: A qualitative comparative analysis, *Journal of Travel Research*, 56(5): 663-677.
18. QIN Y. J., YANG J., 2020, Influence of the configuration effect of environment and organization factors on the innovation of information technology enterprises – Qualitative comparative analysis based on fuzzy set, *Journal of Intelligent and Fuzzy Systems*, 38(6): 6765-6775.
19. SCOTT A., STORPER M., 2003, Regions, globalization, development, *Regional Studies*, 37(6-7): 579-593.
20. ŠEREMEŠIĆ S., DOLIJANOVIĆ Ž., SIMIN M., VOJNOV B., TRBIĆ D., 2021, The future we want: Sustainable development goals accomplishment with organic agriculture, *Problemy Ekorozwoju/ Problems of Sustainable Development*, 16(2): 171-180.
21. THOMANN E., MAGGETTI M., 2020, Designing research with qualitative comparative analysis (QCA): Approaches, challenges, and tools, *Sociological Methods and Research*, 49(2): 356-386.
22. TRACEY M., VONDEREMBSE M. A., LIM J.-S., 1999, Manufacturing technology and strategy formulation: Keys to enhancing competitiveness and improving performance, *Journal of Operations Management*, 17(4): 411-428.
23. VEIGA L. E., MAGRINI A., 2009, Eco-industrial park development in Rio de Janeiro, Brazil: a tool for sustainable development, *Journal of Cleaner Production*, 17: 653-661.
24. WU Y. N., XIAO X. L., SONG Z. Y., 2017, Competitiveness analysis of coal industry in China: A diamond model study, *Resources Policy*, 52: 39-53.
25. YANG T., LONG R., LI W., 2018, Suggestion on tax policy for promoting the PPP projects of charging infrastructure in China, *Journal of Cleaner Production*, 174: 133-138.
26. ZHANG Y. H., CHEN S., FAN J., 2020, Enterprise growth model: 'pollution' or 'environmental protection', *Environmental Engineering and Management Journal*, 19(9): 1605-1613.
27. ZHOU Y., XU G., MINSHALL T., LIU P., 2015, How do public demonstration projects promote green-manufacturing technologies? A case study from China, *Sustainable Development*, 23(4): 217-231.
28. ZHU N., BU Y., JIN M., MBROH N., 2020, Green financial behavior and green development strategy of Chinese power companies in the context of carbon tax, *Journal of Cleaner Production*, 245, 118908.

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