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Harnessing Artificial Intelligence for Socio-Economic Development

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ABSTRACT:
When covering issues on sustainable socioeconomic development such terms as 'artificial intelligence' (AI) and 'social economy' appear more and more often. At the same time, these terms are rarely used together within the same study. This article contributes to the gap filling through theoretical overview of social economy development in the context of economic and social effects of AI. For the purpose, the authors summarize theoretical insights on social and economic effects of AI; elaborate characteristics on how AI changes sociality; characterize development of social economy in the light of AI; provide examples of social innovations and AI in practice. Monographic method, methods of logical analysis and synthesis, and meta-analysis were applied. Social and economic effects that appear as a result of widespread application of AI and changes in sociality are accompanied with highly differentiated readiness to AI across countries. Given the changes above and expectations devoted to AI effects on economy, social economy may benefit from AI, particularly, through social innovations, and may reduce negative effects of AI, particularly, on overall wellbeing. For the mentioned benefits, changes in sociality that appear due to AI application have to be accompanied with timely adjustments in skills and competences. The research concludes that AI may intensify social economy development through its ability to support vulnerable groups, environmental protection and application of the newest technological solutions. In this way, AI in social economy not only contributes to efficiency and innovation in industry and the economy, but also plays a key role in promoting sustainability, social responsibility and inclusion.

Keywords: Social economy, Artificial intelligence, Social and economic effects, Sociality, Sustainable Socioeconomic Development

1. Introduction

In economics and sociology, drivers for development are factors that have important impact on social and economic processes. Such factors can include various elements such as technological changes, political decisions, demographic changes and others. This can change society and the economy by shaping trends and directions of development. Nowadays, more attention is devoted to the role of technologies in the formation of 'social economy' and 'artificial intelligence' (AI). Recently, the terms 'artificial intelligence' (AI) and 'social economy' appear more often, when covering the issue of sustainable socioeconomic development (e.g., Vinuesa et al., 2020; UN, 2023). At the same

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time, these terms together and, particularly, development of social economy in the light of AI, are studied rare (e.g., Social Good Accelerator, n/d).

According to the definition of the European Foundation for the Improvement of Living and Working Conditions (Eurofound, n/d): "… the AI systems that are deployed currently are narrow AI. Narrow AI uses machine learning and deep learning tools … to generate new value …; it has many fields of application." Nowadays, a use of AI for personal and professional purposes becomes widespread. In this regard, AI has social and economic effects. Application of AI foresees that human interacts with machine in social and economic areas what changes sociality – an environment, where society, and particularly, economic agents act.

One of the spheres, where social and economic issues meet and AI application may be widened is social economy. According to the European Commission (n/d b), social economy refers to "… the primacy of people as well as social and/or environmental purpose over profit. …" When designing AI's application, the European Union, the World Economic Forum and the United Nations highlight AI's contribution to sustainability (Francisco & Linnér, 2023).

Technological development provides considerable effects on society and stimulates development. In social and economic spheres, debates about AI include technological, practical, ethical, and academic concerns. Insufficient data and experience challenges prediction of desirable and undesirable effects of AI. Although, scientists and practitioners try to foresee changes provided by AI. There are a lot of efforts for making AI to work for good in society (e.g., European Commission, 2024).

After rapid AI expansion, in social aspect, adaptation to novel forms of work and lifestyle is needed (Paes et al., 2023). The mentioned changes have to be accompanied by non-discrimination policies, private data security, democratic values and control over autonomous systems (e.g., Paes et al., 2023) and improved decision-making and creativity (Ivcevic & Grandinetti, 2024). According to the World Economic Forum (2023), AI may work towards sustainable development goals what will benefit societies. Society expects that AI will contribute to improvements in overall well-being.

In economic aspect, AI may boost productivity, global growth and incomes (Georgieva, 2024). At the same time, positive effects may be accompanied with such negative effects as replacement of jobs and rising inequality (Georgieva, 2024). It is noteworthy that higher and lower developed countries may experience different effects.

Application of AI foresees interaction between economic agents and machines. Such interaction will change sociality. For example, scientists already consider possible scenarios, when AI may be as teammate not just a tool (Harris-Watson et al., 2023). Such changes need understanding on how sociality will reflect introduction of new participant and how it will mirror in economic sphere.

Application of AI may seriously contribute to development of social economy. In this regard, AI's contribution to innovation and, particularly, in fostering social innovation development is noteworthy. Overall, development of social economy in the light of AI is novel and needs understanding of AI's social and economic effects. Regardless certain conceptualization in relation to the study of social economy development, its development in the context of AI development has remained out of the scientists' field of vision and requires additional research, which is the subject of this article.

Within the framework of this article the authors envision to find answers to the following research questions: 1) What social and economic effects AI provides? 2) Which changes AI makes in sociality? 3) Which peculiarities are topical for social economy development in the light of AI? 4) How social innovations and AI are applied in practice?

For the purpose, the authors 1) summarize theoretical insights on social and economic effects of AI; 2) elaborate characteristics on how AI changes sociality; 3) characterize development of social economy in the light of AI; 4) provide examples of social innovations and AI in practice. The following methods were used in the course of this study: monographic method, methods of logical analysis and synthesis, meta-analysis.

2. Theoretical Background

2.1 2. Social and economic effects of Artificial Intelligence (AI)

According to the "Artificial Intelligence Index Report" (Stanford University Human-Centered Artificial Intelligence, 2021 a, b), many advanced economies worldwide intensively invest in development of AI, adapt to the use of AI, machines and robots in everyday life, and human-machine cooperation. The data indicate that AI private investments dominate in drug design and discovery (e.g., Stanford University Human-Centered Artificial Intelligence, 2021 a, b) and the use of AI specifically rise in the areas of healthcare and education. These development trends may contribute to social economy.

A variety of machines with elements of AI have an increasingly significant impact on various spheres of human life. This process is actively developing in healthcare, transportation, finance, defence, education, gaming industry. In healthcare, AI helps to analyse medical data, diagnose diseases, detect patterns and predict risks, allowing for more accurate and effective treatment of patients. In transportation, AI helps to optimize traffic and manage logistics in cities and AI-enabled cars with self-driving improve road safety. At financial markets, AI helps to analyse, predict trends and optimize investor portfolios. Defence and security applications include autonomous systems with AI elements for reconnaissance, drones, cybersecurity, and other areas. AI-enabled systems are used to personalize education and create individual education plans for students. In gaming, AI is being used to develop more complex and intelligent computer opponents, allowing for more interesting and challenging levels of difficulty in computer games. AI is also used to improve graphics and create realistic surrounding worlds. The examples mentioned demonstrate how widespread application of AI is in social and economic spheres.

Engagement of AI in the labour market may create new jobs to serve AI and at the same time to displace humans from some positions. Particularly, Industry 5.0, as well as the development of AI, significantly affects the labour market. For example, according to Brookings Institution (2019: 9), the following spheres are most at risk with regard to automation: Food preparation and service (81%), Production and operations (79%), Office and administrative support (69%), Farming, fishing and forestry (56%), Transportation and material moving (55%), Construction and extraction (50%), Installation, maintenance and repair (49%), Sales (43%), Healthcare support (40%), Legal (38%).

For education and medicine, AI brings new opportunities as new platforms for self-development and professional development. AI is being used to treat people.

Ecologization of economy may occur through application of AI. AI contributes to the development of green economy, optimization of production and consumption of resources. Application of AI supports sustainability and environmentally responsible practices in resource management and energy efficiency. AI helps in the efficient management of natural resources by predicting needs and optimizing their use to minimize waste. AI helps to analyse and optimize industrial energy consumption what reduces carbon footprint. AI contributes to innovatization of economies by automating processes and increasing efficiency. Automation and robotics as tools for process optimization in Industry 5.0 also use AI. A number of authors point to the human-oriented nature of industry 5.0 (Adel, 2022; Grabowska et al., 2022; Longo et al., 2020). Scientist Adel emphasizes that the key feature of Industry 5.0 is the cooperation between man and machine (Adel, 2022). Publications devoted to the impact of Industry 5.0 on the labour market, indicate threats and prospects for employees (Bednar & Welch, 2020; Raja Santhi & Muthuswamy, 2023). AI is helping to create smarter and more adaptable robots that can collaborate with humans and to improve the efficiency and safety of work processes. AI can analyse consumer data to create more personalized products that meet individual preferences and needs. In data analytics, AI can analyse large amounts of data to identify trends and needs in the social sphere, allowing for a better understanding of which solutions will be the most effective in addressing social problems. In predictive analytics, AI predicts social and economic trends what helps organizations and governments to plan and allocate resources more effectively. Finally, AI can promote inclusivity and accessibility of services. AI can help create more accessible and inclusive services for people with disabilities or those living in remote or underserved regions. All the above mentioned is topical for social economy activities as well. At the same time, experts foresee potential threats from inappropriate application of AI. Threats from autonomous systems, negative effects on health, equality, economic and social well-being may appear from application of AI.

According to the International Monetary Fund (Georgieva, 2024), economy will reflect AI introduction and possible effects may be both positive and negative. Expansion of AI in daily operations provides social and economic effects that have to be managed for avoiding materialization of risks for human well-being and economic stability. Understanding of possible social and economic effects is at the centre of scientific research (e.g., Lu, 2021; Hang & Chen, 2022; Paes et al., 2023; Bonaparte, 2024). Although, comprehensive picture on positive and negative influence is missing. The authors summarize and classify positive and negative effects in social and economic areas (see Table 1). This comprehensive overview presents overall possible socioeconomic challenges and benefits and highlights the new peculiarities.

Table 1: Expected social and economic effects of AI

Positive Effects	Negative Effects	New peculiarities
• Productivity improvements	• Lower labour demand leading to lower wages	• Effects on high-skilled jobs

• Increase in economic growth • Increase in income	• Reduced hiring • Some jobs may disappear	• Greater risks for advanced economies
• Improvements in management processes	• Rise of inequality • Structural inequality • Disproportionate increase in income of high-skilled workers	• Fewer immediate risks for developing economies
• Easy adaptation to changes at labour market of younger workers	• Weaker adaptation abilities to changes at labour market for older workers	• Not only stimulate innovative processes, but "has the potential to change the innovation process itself"
• Possibilities to lower carbon intensity of industries	• Effects on employee health and safety	• AI provides human and environmental costs
• New product discovery and development	• A lack of knowledge among SME for adopting AI	
• Potential to enable circular business model innovation	• AI may not improve household welfare in the long term	
• Upskilling, reskilling programs for employees	• Predictions at financial markets may be mistakable, because AI is trained on past data that may not reflect reality in an unprecedented situation	
	• Less social protection for employees	
	• De-skilling that can potentially diminish productivity levels	
	• Inequalities at labour market at basis of gender	
	• Exacerbate discrimination and exclusion in the workplace	

Source: elaborated by the authors using IMF 2024; Chen et al. 2024; Liu 2023; Hansen, Bogh 2021; Mariani, Dwivedi 2024; Daron, Gorska 2023; Hang, Chen 2022; Lu 2021; Jatoba et al. 2023; Ruiz Estrada et al. 2023; Bonaparte 2024; Desai 2023; OECD 2021; Jarota 2023; Grossi et al. 2024; United Nations 2023.

From positive point of view, introduction of AI is expected to boost economic processes in favor to more productive activities, improvements in economic growth, effective decision-making, innovations (e.g., IMF, 2024; Rousselière et al., 2024; Ruiz

Estrada et al., 2023). Special expectations are devoted to positive effects on sustainable development (World Economic Forum, 2023; Vinuesa et al., 2020). Particular contribution of AI is expected to environmental protection and lowering of carbon intensity. Changes at labor market will expand and improve skills of employees thus contributing to economy digitalization and human capital development. New approaches to economic activities would boost practicing of circular economy. Overall, correct and professional application of AI may benefit social and economic progress.

The analysis of scientific literature allows for knowledge that the most common general concerns arise about changes in labor market, worsening of well-being, increasing inequalities. Given possible risks, attempts for ensuring that AI works towards good in society are taken (European Commission, 2024; United Nations, 2023). Scientists suppose that at the moment, AI augments not automatizes the processes and that mostly qualitative not quantitative effects on labor market occur (Grossi et al., 2024). Moreover, it is still early to say about materialization of risks because AI adoption in business sector is relatively low, for example, in Europe (Grossi et al., 2024; Eurostat, 2024).

The United Nations call for research in terms of critical social effects of AI on labor, education and health services, peace and security, and geopolitical stability (United Nations, 2023). Another issue that needs attention is possible changes that may appear in sociality. When humans interact for social or economic reasons such phenomenon as sociality become topical for the analysis. Widespread use of AI in social and economic areas creates novel features of sociality, when interaction between human and AI occurs. Novel features of sociality may be evaluated according to several criteria – social relations, labor relations, education, communication, social roles. Novel features create necessity in adaptation for changes in sociality. The main changes before and after AI development are summarized within the Table 2.

Table 2: The effects of AI on sociality

Criteria	Sociality before wide AI application	Sociality after wide AI application
Social relations	• Interaction of human and society • Interaction of human and human	• Interaction of human and AI • Interaction of society and AI • Interaction of AI and AI
Labour relations	• Interaction of human and human • Interaction of human and machine	• Human-machine interaction performing certain types of AI work
Education	• Traditional forms of learning • Non-traditional forms of learning	• Learning on digital platforms, with the involvement of AI, without a "traditional teacher"
Communication	• Communication between humans • Emotional communication • Social behaviour	• Communication between human and AI

		• AI lacks emotion, empathy, and a deep understanding of complex social interactions • AI can mimic partial aspects of social behaviour
Social roles	• There are social inequalities and divisions in society	• AI can fulfil different roles and interact with people accordingly with these roles

Source: elaborated by the authors

Sociality is a basic characteristic of human life. Nevertheless, the forms of sociality are changing, which causes periodic changes in existing conceptions of the social. It seems that the modern sociological vision of the phenomenon of sociality requires comprehension of Niklas Luhmann's heritage in the field of systemic ideas about society and the role of communication in it. This allows to formulate definition of sociality in sociological aspect as the essence of agents' communication, autonomously functioning in a self-organizing network with autopoietic (i.e. self-regulating and self-reproducing) character (Menshikov, 2020).

Sociality that is an object for changes due to AI introduction, is important part of social and economic relations. The information given in Table 2 indicates the greater involvement of AI in social relations and communication. Communication is a key component of sociality because people interact with each other through communication regardless of the area of their activities. When people begin to communicate with each other, they can exhibit social behaviours and develop social skills such as understanding emotions, expressing empathy, and making an emotional connection. Communication occurs between people through different communication channels (online, live communication). AI can have the skills to communicate, generate natural speech and dialog, and can take into account the socio-cultural aspect of communication. AI can help machines become more adaptive and efficient in their communications. Machines can use algorithms and AI to analyse data and better understand the context of communication, allowing them to communicate with each other more effectively. AI is so far limited to predefined algorithms and trained data. It lacks emotion, empathy, and a deep understanding of complex social interactions. And while AI can mimic partial aspects of social behaviour, it does not possess the same level of social intelligence as humans do. The above mentioned discover both opportunities and hindering factors for application of AI in communication between business and consumers. Some scientists argue that introduction of AI already has created a new form of sociality, i.e., artificial sociality (Menshikov et al., 2024). At the same time, Hofstede et al. (2021) explain that "Artificial sociality is the study of sociality by means of computational modelling".

Changes in sociality after wide introduction of AI are accompanied with its relative newness, possible benefits, commercial interests, and lack of consensus. Sociality in the light of AI is a relatively new phenomenon, and understanding of its full potential and impact on society and the individual is at the beginning. The lack of sufficient data and studies hinder comprehensive understanding of all aspects of this process. Benefits

such as wide access to information, learning and communication opportunities, process automation, and more can divert attention from potential negative consequences and problems. Commercial interests to use AI for more targeted promotion of products and services may reduce attention to possible risks. There are still debates and disagreements among researchers, experts and the public about the future effects of impact of AI on sociality. There are different opinions on what risks exist and how to effectively manage them. Possible risks due to wide application of AI are loss of social interaction skills, negative impact on emotional intelligence of children and youth, digital violence and cyberbullying, psychological effects, health effects, digital divide, data privacy and security, algorithmic bias and discrimination.

The United Nations (2023) pay our attention on how we will work and socialize in a fully digital and networked world[1]. The analysis allows to see how AI would supplement and change social relations, labour relations, social roles, education. Within the mentioned spheres, AI appears as a new participant and society needs to accumulate knowledge and to develop skills for successful dealing with modern technological challenges. Scientists already try to forecast, which skills and competences will be necessary. For example, it is expected that AI application will expand a range of participants of social and economic relations by adding technology as a member of working teams (e.g., Harris-Watson et al., 2023). In such case and in overall, introduction of AI will require additional skills for personal and professional needs. For success in collaboration between individuals and AI, social perception, warmth, reflection, knowledge utilization, and psychology acceptance are of high importance (Harris-Watson et al., 2023).

According to the APA definition (American Psychological Association, 2018), sociality means "the tendency to live as part of a group with clear organization of social interactions and the ability to cooperate with and adapt to the demands of the group". In terms of social economy, ability to cooperate for collective interest is in its sense. As European Commission (n/d b) indicates, "collective interest", "general interest" are at the core of this economic form and ensured to be reached through entities like a cooperatives, mutual benefit societies, associations (including charities), and foundations.

The next section pays attention to peculiarities of development of social economy in the light of AI.

3. Peculiarities of development of social economy in the light of Artificial Intelligence (AI)

Given possible social and economic effects of AI, social economy, on the one side, may benefit from application of the newest technologies and, on the other side, may reduce consequences of AI's negative effects. It can be considered that the introduction of technologies based on AI elements and changes in sociality play an increasingly

[1] For example, Goldman Sachs (2023) forecasts noteworthy automation of jobs; Dooley (2023) informs about the fully autonomous restaurant where the entire staff will consist of robots, but at the same time human workers will assist consumers and control automation process; Dixon (2024) indicates that average daily social media usage significantly increased in the world since 2012 and maximal time spent on social media per day in 2024 was three hours and forty nine minutes.

important role in economy. Given the analysis in the previous section, AI can provide both positive and negative social and economic effects. In terms of negative effects, such processes as decrease in well-being, unemployment, deskilling, inequalities, gender gap, environmental costs become topical. Importantly that the mentioned issues can be addressed through social economy. At the same time, AI may foster development of social economy, similarly as for every economic activity.

European Commission (n/d c) highlights the following benefits of social economy – employment, social cohesion, regional and rural development, environmental protection, consumer protection, agriculture development, third countries development, and social security policies. Social economy as a business model is represented in different sectors of economic activity thus promoting such values as solidarity, participation, cooperation (European Commission, n/d c). The social economy stimulates socioeconomic cohesion (Matei & Dorobantu, 2015).

Social economy potential means the ability of a society or region to create favourable conditions for social development and improving the quality of life. It includes various social, educational, health and cultural resources, as well as measures aimed to promote social inclusion, citizen participation and equitable distribution of opportunities. As can be seen from the characterization of this term, the concept of a 'potential' in social sciences is used to refer to a set of opportunities, resources and abilities that a society, a group of people or an individual can use to achieve its goals and development. It has important advantages in comparison, for example, with such a term of characterization of the economy of society as 'total capital of society'. These advantages are universality, comprehensibility, flexibility and, most importantly, future-orientation, which facilitates both strategic thinking and long-term planning.

The concept of social economy encompasses economic activities that address social needs and create benefits for society. It includes cooperatives, non-profit organizations and social enterprises. Social economy emphasizes values, justice and citizen participation in governance processes. Torres and Augusto (2020) conclude that despite contribution of social entrepreneurship to well-being, it does not increase its level, but absence of social entrepreneurship leads to low level of well-being in a country. From business perspective, social enterprises indirectly affect enterprises in other sectors as well (Rousselière et al., 2024).

In terms of economic stimulus, social and/or environmental objectives are mentioned as the reason for commercial activities in social economy reinvesting the biggest share of profit back into social enterprise (European Commission, n/d b). Social economy business models are presented in many sectors of economic activity (European Commission, n/d b) thus expanding their effects on society and economy.

The practical realization of the concept of social economy may benefit from AI in several ways:

- The use of AI can improve the efficiency of social enterprises and non-profit organizations, for example, for better understanding of the needs of their audiences and improvement of services;
- Changes in sociality caused by AI can facilitate interactions between organizations and their constituents, providing a better understanding and response to social needs;

- Changes in sociality caused by AI can mean developing robots and automated systems that can interact with people in the work environment more harmoniously and safely.

AI has the potential to enhance the social responsibility and efficiency of both social and production organizations, which can contribute to the achievement of the goals and principles of the social economy.

The European Union works for ensuring positive effects of AI on society (European Commission, 2024). In this regard, the role of social enterprises is to participate in building appropriate models for their adjustment to AI and ensuring research activities (United Nations, 2023). The aim of digital transformation is to enhance digital competences, develop new digital business models, and employ wide range of technological solutions, including AI, for accelerating societal and ecological mission of social economy (e.g., European Commission, 2021).

According to the World Economic Forum (2024 b), social economy already forms seven percent of global GDP but using of generative AI can increase the share greatly. The main channel, which connects AI and social economy relates to social innovations. Social enterprises particularly address issues in healthcare, education, and environment. AI contribution to social innovations is expressed in the mentioned sectors, public and social sector, security and justice, equality and inclusion, information verification and validation, economic empowerment, technology (World Economic Forum 2024, b, c). Using of AI for social innovations increases healthcare availability, offers new solutions for climate change mitigation, enhances livelihoods in economically less developed countries (World Economic Forum, 2024 b, c). Application of AI for innovations by sectors differ between countries depending on their level of economic development. For example, economically higher developed countries focus on environmental concerns, while economically less developed countries on economic empowerment (Schwab Foundation for Social Entrepreneurship, EY, Microsoft, & World Economic Forum, 2024).

Experts see social economy as important factor for fair and inclusive digital transition (European Commission 2021). The development of digital technologies has a significant impact on material existence and, in general, on the activities of society in all spheres, on overall well-being. The process is called digitalization what according to Eurofound (n/d) means "integration of digital technologies and digitized data across the economy and society." AI is a one of concepts of digitalization (Eurofound, n/d; UNESCO, 2023).

In terms of development of AI and social economy, an important indicator is the Digital Economy and Society Index (DESI), which is a composite index that summarizes relevant indicators on the effectiveness of digital technologies in Europe and tracks the evolution of EU Member States in the field of digital competitiveness (European Commission, 2023). The DESI index covers five main areas: connectivity, human capital, internet usage, digital inclusion and digital public services. The DESI is published annually by the European Commission and measures the progress of EU Member States (European Commission, 2023 a) in achieving the objectives of the EU Digital Decade Policy Program 2030 (European Commission, n/d a).

"Europe's Digital Decade: digital targets for 2030" aims that more than 75% of EU companies adopt AI technologies by 2030 (European Commission, n/d a). The

current situation indicates on a progress in digital transformation in the most of Member States, but adoption of such key digital technologies by business as AI and big data remains low including the EU's advanced economies (European Commission, 2023 b).

The issue on digitalization and its social component gains attention within policy-making and academic research. Recently, more publications and normative documents have been published on the development of digitalization and its social component. For example, EU documents state that digitalization is not only about economic and technological development factors, but also about environmental, social and democratic aspects (European Commission. Directorate-General for Research and Innovation, n/d).

Social economy rests on social innovations, which according to Schwab Foundation for Social Entrepreneurship, EY, Microsoft, and World Economic Forum (2024) connect business, social relations, societal impact and technological innovation. Social innovators work in align with Sustainable Development Goals, where the top three among their activities are – Goal 3: Good Health and well-being, followed by Goal 8: Decent work and economic growth, and Goal 9: Industry, Innovation and Infrastructure. According to the data (Schwab Foundation for Social Entrepreneurship, EY, Microsoft, & World Economic Forum, 2024) social innovators widely address Sustainable Development Goals in their activities. The only exceptions were the following Sustainable Development Goals – Goal 1: No poverty, Goal 2: Zero hunger, Goal 5: Gender equality. Impact domains mostly addressed by social innovators in Europe are – environment, security and justice, healthcare.

AI contributes to social innovations. The data of Schwab Foundation for Social Entrepreneurship, EY, Microsoft, and World Economic Forum (2024) demonstrate that social innovators actively apply machine learning, then substantially less predictive analytics, machine learning and natural language processing. Trust, skills gap, gender gap, resources intensity, environmental footprint and data access are the issues that must be solved for reaching the best effects from AI to social good. Activities of social innovators are the driving force of realizing AI's potential for societal good, especially, for communities with specified needs, European Green Deal (Schwab Foundation for Social Entrepreneurship, EY, Microsoft, & World Economic Forum, 2024).

Despite widespread application of AI, countries are highly differentiated by their readiness to AI deployment according to the AI Readiness Index (McKinsey&Company, 2019). The European countries fall into four groups – Top 25% rank in AI Readiness Index, above average (next 25%), Below average (but not in bottom 25%), and bottom 25% (McKinsey&Company, 2019: 40). Given available statistical data it is possible to see that economically advanced countries are more ready to AI application. This may be explained by necessity to invest in AI technologies, education and competencies of employees, business sector.

Table 3: Grouping of the countries by AI readiness

AI Readiness	Countries
Top 25% rank in AI Readiness Index	• United States, United Kingdom, Sweden, Finland, Ireland

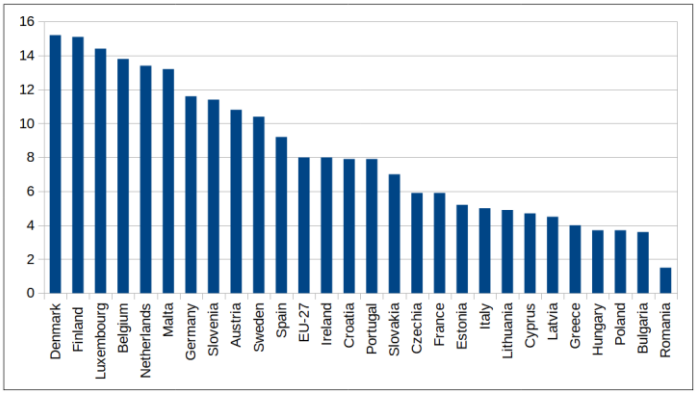
Above average (next 25%)	• Estonia, China, Netherlands, Denmark, Germany, Austria, France
Below average (but not in bottom 25%)	• Belgium, Spain, Lithuania, Czech Republic, Portugal, Italy, Latvia, Bulgaria
Bottom 25%	• Hungary, Croatia, Poland, Greece, Romania

Source: table elaborated by the authors using data from McKinsey&Company (2019: 40)

Improvements in AI readiness may be reached through targeted investments, development of appropriate institutional environment, improvements in knowledge, competences, skills, and increasing trust of potential users. In this regard, some countries elaborate detailed strategies with aims to ensure investments in AI for social good, while other countries do not prioritize such actions within special documents (e.g., Grossi et al., 2024).

In the European Union, according to the DESI (European Commission, 2023 a) a use of AI in business sector is low (8%) but results brightly vary across countries. Overall, a level of AI readiness affects activity of enterprises to apply AI but not in all cases. For example, Denmark, Portugal, and Finland demonstrate the highest share of enterprises that use AI in the European Union (European Commission, 2023 a). These countries has high (for Finland), above average (for Denmark), and even below average (for Portugal) AI readiness (McKinsey&Company 2019: 40). In parallel, countries that demonstrate AI readiness that is below average also have low share of AI use.

Figure 1: Percentage of enterprises (10 persons employed or more), which used at least one of the AI technologies in 2023



Source: figure elaborated by the authors using data from Eurostat (2023).

The biggest share of social economy entities are SMEs (European Commission, n/d c). For example, according to the Eurostat (2023) data, share of enterprises with 10 persons employed or more, which used AI in 2023, varied from 15.2% to 1.5%.

Application of AI differ not only by countries but also by sectors of economic activity. The highest share of enterprises, which use AI in their activities in 2021 were observed in information and communication sector and professional, scientific and technical service activities (Eurostat, 2024). Among different benefits, AI can improve automating, different workflows, decision-making process (Eurostat, 2024) what can increase effectiveness of social enterprises. According to the statistical data, in 2021, in the European Union, large enterprises significantly more used AI than small and medium enterprises (Eurostat, 2024).

Table 4: Main challenges for successful AI application in economy and possible solutions

Challenges	Possible solutions
Insufficient knowledge and skills	• Lifelong learning • Training
Technological gap	• Relevant policy elaboration
Ethical concerns	• Legislation • Regulation • Education
Acceptance level of end-users	• Education

Source: elaborated by the authors

Main challenges that may affect successful application of AI are insufficient knowledge and skills, technological gap, ethical concerns, acceptance level of end-users (see Table 4). Insufficient knowledge and skills differ across countries, sectors of economic activity, professions, and age groups. Possible solutions can be found through lifelong learning and training. Technological gap, especially between countries, seriously hinders possibilities to apply AI. Possible solution is elaboration of relevant policies – for innovation, education, and investments. Ethical concerns have to be solved through appropriate legislation and intensive education. Acceptance level of end-users may stimulate or hinder success of application of AI. Educational activities are recommended for solving this issue.

For the case of social economy, it has the potential to employ AI through the following channels – retraining of personnel of non-technological specialties, creation of a flexible labor market, digitalization in education and medicine, personalization of information, consumption and technologies, human-centeredness and mental health support based on the introduction of human-machine interaction, ecologization of social life (Kryvda et al., 2022), alignment with the sustainable development goals.

In their research Lukianenko and Simakhova (2023) indicate that social economy has multi-criteria format that includes social justice, responsibility and solidarity, social mentality and culture, social unity and optimism, social security, climate and comfort. Positive social and economic effects of AI and timely adjustments to changes in sociality can ensure that the mentioned values are supported and promoted through social innovations by application of the newest technologies including AI. Thus, the

development of AI will have a positive impact on social development and welfare of the population, creating conditions for human self-actualization, which is key in the social economy.

4. Social innovations and Artificial Intelligence (AI) in practice

Comprehensive analysis of theoretical materials on social economy and AI allows for conclusion about social and economic effects and changes in sociality. Obviously, that effects and changes occur during practices. As widespread applicable tools, AI and social innovations are quite novel what calls for risk minimizing actions and adjustments in business and public space. The common issues defined after the theoretical analysis relate to policy measures and strategies, data safety and ethics, sustainability goals, training, and employment. This section discusses the real-life examples on social innovations and AI that improve conditions for business making, education, health, sustainability, and strategic decision-making.

For example, European Social Fund Plus (n/d a, b) and Social Innovation Academy (2022) offer valuable case studies. At the same time, collaboration between social innovators and technology leaders ensures contribution of AI to social innovations worldwide (World Economic Forum, 2024 b). The aim of collaboration at the platform of the World Economic Forum is to involve technology leaders in solutions for social problems, training, and resource mobilization.

Undoubtedly, AI use has to be ethical and responsible. The White paper published by the World Economic Forum (2024 a) introduces PRISM framework on how to practice AI for social innovations in a responsible way. Experts advice to follow low-risk, low-cost approach and to evaluate technological readiness of the entity (World Economic Forum, 2024 a). In its sense, such approach encourages widespread application of AI and risk minimization. Additional in-depth guidance comes from the Presidio Framework by the World Economic Forum's AI Governance Alliance with focused approach on strategic aims and step by step solutions for business impact, operational readiness and investment strategy (World Economic Forum, 2024 a).

Ethical guidance for AI application offers general values and principles for avoiding bias in AI models, following transparency in decision-making, protecting data privacy, and incorporating ethical AI in business practices (World Economic Forum, 2024 a). For correct application of AI systems, they have to be built not only following ethical guidance but also using appropriate data given socioeconomic level of development of a country. Additionally, the World Economic Forum (2024 a) indicates, guidelines have to direct ethical behaviour of organizations but the practical solutions will differ depending on organizational aims and industrial specifics.

Besides ethical guidance, professional legislative framework is needed for correct application of AI for public and business issues. The work on legislative norms that guide and monitor application of AI are under intensive construction. The European Parliament agreed on the Artificial Intelligence Regulation (AI Act) for balance between society's safety and AI's industry development within the single market (Cancela-Outeda, 2024). At the same time, experimental standardization approach is emphasized as possibly useful when governing AI in the European Union (Prifti & Fosch-Villaronga, 2024). Overall,

Prifti and Fosch-Villaronga (2024) indicate that AI regulation is a great challenge that needs hybrid approach to governance. Scientists indicate that AI Policies are influenced by cultural values what is demonstrated through the case of Nordic countries (Robinson, 2020). The results demonstrate importance of such values as transparency, trust, and openness (Robinson, 2020).

In the European Union, social innovations contribute to improvements in social, economic and environmental well-being (European Social Fund Plus, n/d b). The case studies brightly demonstrate that it is possible and ensures solutions for urgent issues.

Unemployment is a critical indicator for societies' wellbeing. Social innovations demonstrate novel approaches for solutions. There are some examples.

In Finland, short-term jobs are offered through digital platform. Benefits are considered for both employers and employees – employers have easy possibility to offer jobs and be socially responsible and employees have possibility to overcome long-term unemployment through gig working (European Social Fund Plus, 2024, May 29).

Another social activity in Finland relates to wider effects including employment possibilities. Digital platform for young people brings together youth and professionals for systematic conversation thus addressing issues on wellbeing, education, and employment (European Social Fund Plus, 2024, March 12).

In Hungary, social enterprises provide jobs in agro-food, light industry and handicrafts for individuals who are excluded from the labour market thus addressing social inequalities (European Social Fund Plus, 2024, May 30).

The mentioned examples discover unusual and creative approaches to daily issues in labour market. In terms of AI, job creation mostly occur in service sector and younger firms (Damioli et al. 2024). Researchers also find that AI positively affects new job creation (Damioli et al. 2024). At the same time, job displacement threats remain topical but are compensated with job creation that needs advanced skills (Giwa & Ngepah, 2024). Additional threat comes from algorithmic decision-making in AI recruitment what calls for ensuring non-discrimination concerning vulnerable groups and private data safety (Rigotti & Fosch-Villaronga, 2024).

Social innovations may solve many issues but they need appropriate and supportive environment for development. The next examples demonstrate such activities. In Poland, at the basis of European Social Fund Plus, social innovation incubators were launched with several thematic focuses - employment, education, social inclusion, and accessibility for people with disabilities (European Social Fund Plus, 2024, May 28). The activity is realized at governmental level with the aim to support development and realization of innovative ideas (European Social Fund Plus, 2024, May 28). Another activity in Poland tries to solve issue on low realization of innovative ideas. The initiative aims to create social innovation ecosystem using networking as a tool for initiating, developing, disseminating and scaling up social innovations (European Social Fund Plus, 2024, March 11). Within the initiative, social innovation database was developed (European Social Fund Plus, 2024, March 11).

Sustainable development goals are addressed through social innovations and AI application. Active work is devoted to waste management and minimizing. For example, in Sweden, the project aims not only to minimize textile waste but also to reduce long-term unemployment and promote circular textile activities (European Social Fund Plus,

2024, March 27). Similarly, in Belgium, circular fashion is promoted through technologies that allow recycling original fabric materials (Social Innovation Academy, 2022). In Italy, app provides informative guidance for its users how to sort waste properly (Social Innovation Academy, 2022). One more example in Italy demonstrates improvements in biodiversity through application of Internet of Things and AI for monitoring of bee population (Social Innovation Academy, 2022). AI also is used for urban air pollution monitoring that addresses environmental and societal issues at the same time (Bainomugisha et al., 2024).

Health is one more area where social innovations and AI are of high importance for ensuring service accessibility and quality. Countries set development strategies for digital health development (Saheb & Saheb, 2024) and differ in terms of their vision of AI in healthcare (Castonguay et al. 2024). It is expected that AI will transform healthcare (Mafimisebi et al., 2024) but at the same time scientists worry about possible discrimination (Baumgartner et al., 2023). Social innovations help to target vulnerable groups. For example, in Germany, patient-centric app contributes to healthcare of chronic patients through medication prescription and monitoring what may reduce healthcare system issues (Social Innovation Academy, 2022). In Italy, mobile app helps patients to manage their pain interference through developing personalized care plans with help of AI (Social Innovation Academy, 2022).

Overall, application of AI for professional or personal needs in any area requires additional knowledge, skills, and competences. Almatrafi et al. (2024) indicate that changes in technological landscape calls for AI literacy. In this regard, scientists emphasize that individuals need to understand, critically evaluate, and ethically employ AI systems. Feltrero and Osuna-Acedo (2024) pay attention on social engagement that ensures future technology development and collection of datasets without discrimination. This is of high importance for educational texts also. Another new stream in education is Social Innovation Education what increases students' emotional, cognitive, behavioural, and agentic engagement (Kalemaki et al., 2021). Such education develops collaborative problem solving, design and systems thinking (World Economic Forum, 2024 d). Social innovations in education ensures technological education across different social groups, empower women who are interested to work in IT sector, empower youth with entrepreneurial competences, provide older population with interactive materials on culture (Smolonski, 2019).

The section aimed to demonstrate examples of practical application of social innovations and AI what emphasizes theoretically set linkages between technological and societal processes in real-life. It is noteworthy to indicate that the examples mentioned within this section are of interdisciplinary nature and calls for continuing development in the areas of technologies, legislation, competences.

5. Conclusions

This article contributes to the gap filling on understanding of social economy development in the light of artificial intelligence (AI). Particularly, the authors provide theoretical overview of social economy development in the context of economic and social effects of AI. The authors set three research questions – 1) What social and economic

effects AI provides? 2) Which changes AI makes in sociality? 3) Which peculiarities are topical for social economy development in the light of AI? 4) 4) How social innovations and AI are applied in practice?

For the answer to the first question, the authors provide comprehensive overview on social and economic effects of AI that previously were not summarized but were mentioned in scientific and policy-making documents. Changes that appear due to rapid AI expansion affect economic and social processes what raises interest to study social economy in the light of AI. Particularly, experts expect that AI will provide not only benefits in terms of enhanced productivity, decision-making and data processing but also shortcomings in terms of inequalities, unemployment and poverty. Given a sense of social economy, it may contribute to solutions of the above mentioned issues. At the same time, social economy may benefit from application of AI through improved decision-making, efficiency, and better understanding of the needs of its target audience.

For the answer to the second question, the authors provide characteristics on changes in sociality after widespread AI application. Social economy is based on ability to cooperate for collective interest. In this regard, AI's effects on sociality brings attention. Novel features of sociality appear due to necessary adjustments for interaction between human and AI in social relations, labour relations, education, communication, social roles. Social innovations connect technologies and social relations. In the context of social economy, the main actor in the process are social enterprises, which deploy AI for their activities and reduce negative effects of AI in economy and society. The main channel, which connects AI and social economy relates to social innovations. Social enterprises particularly address issues in healthcare, education, and environment.

For the answer to the third question, the authors provide peculiarities that are topical for development of social economy in the light of AI. Social and economic effects that appear as a result of widespread application of AI and changes in sociality are accompanied with highly differentiated readiness to AI across countries. Given the changes above and expectations devoted to AI's effects on economy, social economy may benefit from AI, particularly, through social innovations, and may reduce negative effects of AI, particularly, on overall wellbeing. For the mentioned benefits, changes in sociality that appear due to AI application have to be accompanied with timely adjustments in skills and competences. Experts see potential of AI for fair and inclusive digital transition and for sustainability support in social and economic spheres. For the spheres mentioned above, social economy may contribute through social innovations.

For the answer to the fourth question, the authors demonstrate real-life examples that emphasize theoretically set linkages between technological and societal processes. In practice, application of social innovations and AI provides novel solutions for urgent socioeconomic issues at interdisciplinary scale. The practices approved in different countries indicate wide possibilities to introduce scientific achievements into products and services that addresses needs of society as a whole and of vulnerable groups. The examples indicate that practicing of social innovations and AI provides basis for further technological and socioeconomic development in a sustainable manner addressing inequality, job displacement, environmental pollution and degradation.

Further studies, given theoretical background of possible interconnection channels between social economy and AI, have to focus on empirical testing. The current

research demonstrates that AI may intensify social economy development and expansion through its ability to support vulnerable groups and environmental protection and application of the newest technological solutions. In this way, AI in social economy not only contributes to efficiency and innovation in industry and the economy, but also plays a key role in promoting sustainability, social responsibility and inclusion. At the same time, possible negative socioeconomic effects of AI have to be addressed for gaining possible benefits. The novelty of the article lies in theoretical development of the interconnections between AI and social economy within comprehensive overview.

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