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Human-centrism as a driver of economic development in the era of Industry 5.0

Ihor Kobushko*

Doctor of Economics, Professor
Sumy State University
40007, 116 Kharkivska Str., Sumy, Ukraine
https://orcid.org/0000-0003-0821-4233

Iana Kobushko

PhD in Economics, Associate Professor
Sumy State University
40007, 116 Kharkivska Str., Sumy, Ukraine
https://orcid.org/0000-0002-2057-2300

Inna Balahurovska

Postgraduate Student
Sumy State University
40007, 116 Kharkivska Str., Sumy, Ukraine;
Silesian University of Technology
44-100, 2A Academic Str., Gliwice, Poland
https://orcid.org/0000-0003-3642-9506

Abstract. The study's relevance was determined by the necessity to comprehend economic development within the context of global digitalisation, automation, and the implementation of artificial intelligence, where the principal focus was not on technical efficiency but on the human being, their values, well-being, and social resilience. The article aimed to provide a scientific justification of the concept of human-centrism as a driver of economic development in the era of Industry 5.0 and examine the specific features of its implementation within organisational, production, and societal practices. The research methods included a systematic approach to analysing literature sources, comparative analysis of the evolution of economic models, logical-structural generalisation of Industry 5.0 principles, and analysis of human-centric innovation practices based on ethical technology use and human-machine partnership. A conceptual-analytical method was also employed to distinguish value-based differences between industrial paradigms, particularly between Industry 4.0 and Industry 5.0. The main findings demonstrated that human-centrism in the Industry 5.0 era was not merely a philosophical idea but a concrete managerial practice that established new interaction principles between innovative technologies and human potential. Within such an economic model, the human being was regarded not as an object of automation but as a creative partner in symbiotic human-machine systems. It was substantiated that the implementation of human-centric approaches positively impacted organisational productivity, innovativeness, and resilience, while also forming a foundation for the sustainable economic development of society. The study highlighted the necessity of integrating ethical norms, social responsibility, and a balance between efficiency and employee well-being during digital transformation. Particular attention was drawn to the challenges associated with the incomplete understanding of the human-centric concept at the organisational level, high implementation costs, and the need to continuously adapt human capital to shifting labour market conditions. The research findings may serve as a foundation for

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*Corresponding author

developing human-centric policy encompassing innovative technologies, support for inclusive and sustainable growth, labour market transformation, and governmental strategies under the conditions of Industry 5.0

Keywords: economy; innovation; model; sustainable development; technology; digitalisation

Introduction

The modern industrial era of Industry 5.0 signified a transition towards a human-centric economic model, which emphasised the empowerment of workers and the harmonisation of human-technology interaction. A shift in priorities from a technocratic to a humanistic approach opened new opportunities for socio-economic growth, grounded in ethics, inclusiveness, and sustainable development. The key drivers of contemporary economic development include innovation and technological advancement, human capital and education, institutions and effective public governance, infrastructural development, and environmental and social sustainability. These elements facilitated economic growth and its transformation under the conditions of globalisation, digitalisation, and sustainable development challenges. Human capital was recognised as a central component of national competitiveness. Education, innovativeness, entrepreneurial skills, and adaptability determined the level of preparedness for emerging challenges. Thus, the role of the human being as a key factor in economic development remained a matter requiring in-depth reflection in the context of historical transformations, philosophical concepts, societal value orientations, and the pressures of the modern global economy.

The current stage of economic development was accompanied by profound transformations caused by the introduction of cutting-edge technologies, the automation of production, and the digitalisation of processes. Within this context, the new industrial paradigm of Industry 5.0 continued the trajectory of previous technological revolutions. It shifted the focus from technological efficiency to prioritising human values, well-being, and sustainable development. The scientific problem concerned the definition of human-centrism as a key driver of economic growth under new conditions, in which technologies served humanity rather than dominating it. As the importance of human capital, creativity, emotional intelligence, and ethical approaches to management increased within the framework of Industry 5.0, the rethinking of traditional economic models became inevitable.

The philosophy of human-centrism within the system of contemporary values was considered essential in the context of a globalised information-digital world and the emergence of artificial intelligence, according to V.G. Kremen (2023). It was asserted by A. Sanchenko (2024) that, within the human-centric model of socio-economic development, each individual was regarded as the highest value for the economy, which, based on the ecological and socio-economic dimensions of sustainable development, functioned for the benefit of people. R. Samans (2023) emphasised the significance of human-centrism, which was being fundamentally reinterpreted in macroeconomic theory and policy, with growing attention directed towards social inclusion, environmental resilience, and human resilience, alongside the necessity of economic reform from a human-centric perspective.

Human-centricity is one of the three pillars of the "Industry 5.0" concept, aligning with the European Commission's priority of "An economy that works for people," in addition to the priorities of "A Europe fit for the digital age" and the EU's "Green Deal." In the research of the European Commission (2024), human-centrism was defined as a multidimensional framework that placed human needs, characteristics, motivation, and experience at the core of the design, development, and implementation of technological solutions and organisational practices. These were expected to meet functional requirements and enhance well-being, capabilities, skills, and working conditions.

A systemic vision of Industry 5.0 as a humanistically oriented concept was expressed through combining technological advancement with sustainability, inclusiveness, and ethical governance. The transition to Industry 5.0 appeared as a natural response to the challenges of previous industrial stages, in which the human being was often positioned merely as a passive element within production processes. This view was supported by the emerging vision of a new economic reality described by B. Saikia (2023), in which the focus shifted towards social responsibility, the empowerment of workers, and the rethinking of human engagement in digital transformations. L. Li & L. Duan (2025) emphasised that innovations within the Industry 5.0 framework acquired a human-centric character, reflecting collaboration between humans and technologies, the ethical deployment of artificial intelligence, the assurance of decent working conditions, and the integration of humanistic elements into technological innovation.

L. Li (2022) indicated that human-centric manufacturing, as an evolutionary step beyond the automated and digital solutions of Industry 4.0, entailed the design of work environments in which technologies supported rather than replaced the human, thereby enabling personalisation and improving quality of life. The modern vision of Industry 5.0 was also grounded in developing new competencies and strengthening civil society's role. The importance of educational initiatives, professional reskilling, and the implementation of socially oriented practices for the sustainable development of industries was emphasised by R. Kopp & A. Schröder (2024). As a result, a new system of knowledge and skills was

formed, incorporating interdisciplinary, emotional intelligence, and creativity as fundamental components of effective functioning in the world of Industry 5.0, as discussed by G.U. Ikenga & P. van der Sijde (2024).

A systematic analysis of technological development and managerial practices demonstrated a trend towards creating "smart manufacturing" oriented towards human needs. C. Zhang *et al.* (2023) highlighted the necessity of addressing ethical, legal, and social issues in implementing new solutions. Such approaches were reinforced by comparing the Industry 5.0 and Society 5.0 concepts in the study by S. Huang *et al*. (2022), illustrating their complementarity in building a harmonious society supported by digital tools that serve humans.

The shift in emphasis from automation to personalisation was also reflected in research underlining the importance of adapting organisational structures and production systems to new realities. In the work of M.C. Zizic *et al*. (2022), the involvement of employees in co-designing technologies, the development of corporate cultures based on mutual respect, collaboration, and sustainability were discussed.

Thus, human-centrism in the era of Industry 5.0 emerged as a foundation for economic growth grounded in the ethical use of technology, social inclusion, and innovative interaction between humans and machines. This approach transformed organisational and production processes and opened new horizons for shaping a more just and sustainable society. The aim of the article was to explore the concept of human-centrism in the context of economic transformation during the era of Industry 5.0, and to define its role and practical significance for developing an innovative, socially responsible economy.

Materials and Methods

A comprehensive approach was adopted for the study, incorporating several methodological tools. In particular, a systematic approach enabled a thorough analysis of literature concerning the development of economic models and the Industry 5.0 paradigm. A comparative analysis was applied to identify evolutionary changes between the industrial models of Industry 4.0 and Industry 5.0, emphasising the shift from automation to human-centrism.

Logical-structural generalisation was employed to systematise the principles of Industry 5.0, namely the principles of human-machine partnership and the ethical use of technology. A conceptual-analytical method was also used to distinguish value-based differences between industrial paradigms, based on analysing contemporary theoretical and practical approaches. Information was gathered by reviewing academic articles, analytical reports, and official documents issued by the European Commission. The primary resources utilised for data collection included databases such as Scopus, Web of Science, Google Scholar, and official reports from McKinsey & Company (Mayer *et al*., 2025), Deloitte, and the European Commission. Literature searches were conducted using the following keywords: "Industry 5.0", "human-centric innovation", "ethical technology", "workforce well-being", "technology and mental health", "future of work", "digital transformation and productivity", and "4-day work week". Particular attention was devoted to issues related to human-centrism in technological development, the impact of technology on employee well-being, and changes in the structure of labour within the context of economic digitalisation.

In the course of the study, the experience of several countries was analysed: (1) New Zealand, Iceland, the United States, and Japan in the context of implementing a four-day work week as a manifestation of the harmonisation between economic efficiency and employee well-being; (2) the United States, Denmark, Sweden, and China regarding the use of technologies to support workers' mental health, professional development, and overall well-being; (3) Japan and the United States concerning the deployment of digital technologies to enhance productivity and the efficiency of production processes. The study was carried out in the following stages:

1. A preliminary review of the literature based on the specified keywords.
2. A comparative analysis of industrial paradigms and identification of Industry 5.0 characteristics.
3. Examination of practical examples of human-centric innovation implemented in different countries.
4. Synthesis of the findings and identification of key trends in the contemporary economy.

The selection of research methods was determined by the need for a comprehensive analysis of the theoretical foundations and the practical implementation of Industry 5.0 principles. This approach enabled a holistic understanding of current strategies for integrating human-centrism into industrial development.

Results and Discussion

The philosophical foundations of human centrism provide the ideological basis for the industrial era and form the worldview framework for introducing and perceiving innovations. People have always been a key factor in economic development in different historical periods (Fig. 1). The philosophical foundations of the human-centred concept were formed during Renaissance humanism, when the human personality, dignity, free will and reason were considered the highest values. The foundations of the human-centred approach are reflected in social philosophy, existentialism and modern ethics. In the twentieth century, philosophical thought focused on values, including the uniqueness of human experience, creativity, responsibility and authenticity. These values are gaining new meaning in the context of digitalisation and the development of artificial intelligence. They are important in the context of preserving the human dimension in the technological world.

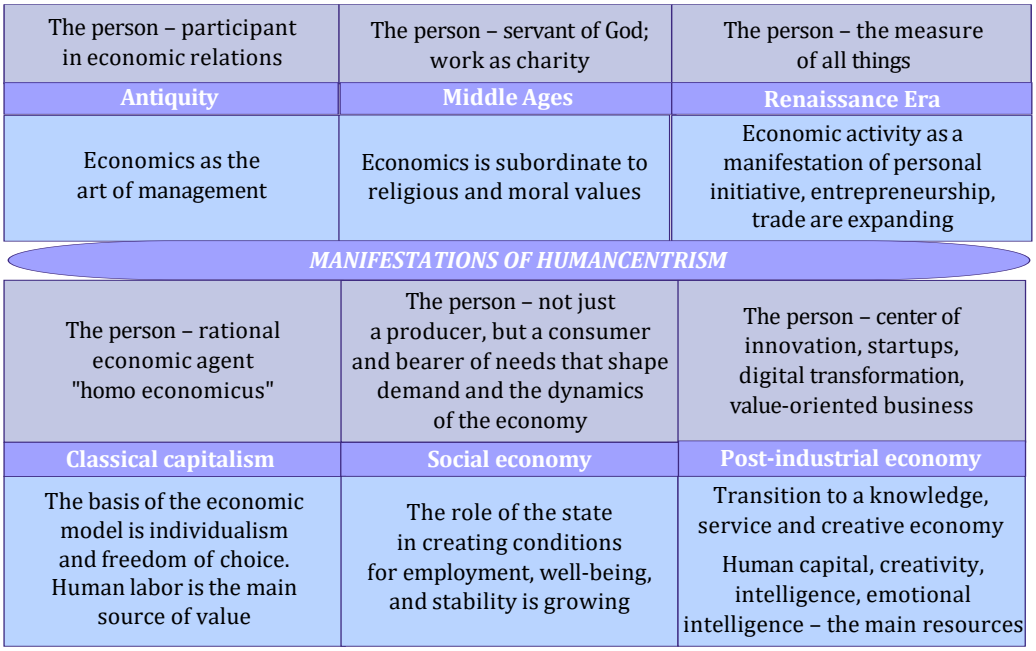

Figure 1. People as a key factor in economic development in different historical periods
Source: compiled by the authors

The philosophical foundations of human centrism are already being transformed in the Industry 5.0 paradigm into practical concepts that combine technological development with social justice, ethics and sustainable living (Table 1). A person is seen as an active subject of interaction with intellectual systems – a carrier of creative potential, moral guidelines and a driver of change. The 21st century is characterised by a wave of human centrism, where the economy is built around consumption and dignity, inclusion, psychological well-being, and sustainable development. Industry 5.0, as a new stage of industrial transformation, is changing the established technocratic approach to production, reorienting it towards human-centred values, sustainable development and ethical interaction between humans and technology. The concept of human-centredness in the context of Industry 5.0 is aimed at empowering people to collaborate with new technologies in the industrial context.

Table 1. Comparative table of Industry 4.0 and Industry 5.0

Industry 4.0	Criterion	Industry 5.0
Automation, efficiency, technology	**Center of attention**	Person, sustainability, values
Internet of Things, AI, Big Data, robotisation	**Key technologies**	Human-machine collaboration, ethical AI, green energy
Human as an operator/system supervisor	**The role of person**	The person – is a co-creator, a creative center
Scalable, standardised	**Production**	Scalable but personalised
Increasing productivity and profits	**Goal**	Balance between efficiency, human values and sustainable development
Not a priority	**Sustainable development**	One of the key priorities
Growth orientation	**Economic model**	Focus on sustainable well-being and value for society
A question of the future or secondary	**Ethics and responsibility**	Integrated part of the technological and business process
The person fades into the background	**Human-machine interaction**	Humans are at the center of interaction with intelligent systems

Source: compiled by the authors

In the context of Industry 5.0, special attention is paid to harmonising technological innovations with fundamental human values (Kemendi *et al.*, 2022; Alves *et al.*, 2023). Considering ethical issues, ensuring privacy, autonomy, and fairness is a necessary step in developing and implementing new technologies. In particular, in artificial intelligence, it is important to develop systems that consider ethical considerations and impartiality to avoid discrimination and ensure fair treatment of all users (Borenstein & Howard, 2021). In

addition, integrating technology into production processes should balance the needs of workers with ensuring safe working conditions.

Human centricity focuses on employee well-being, work-life balance, flexibility and mental health. That is why current trends include the introduction of a four-day working week, which is also an experiment in increasing labour productivity, economic efficiency and implementing the principles of social responsibility. In practice, several companies have implemented such ideas: Perpetual Guardian (New Zealand) in 2018; Buffer, Basecamp, Uncharted (USA) in 2019-2020; Microsoft (Japan) in 2019. In general, the results of such innovations were positive, with employees experiencing a stress reduction, improved work-life balance and increased job satisfaction (4-Day work week..., n.d); increased productivity, reduced burnout, and increased employee loyalty (What happened when..., 2021); a 40% increase in productivity and a reduction in electricity and paper costs (The Guardian, 2019). In addition, after these successful cases, according to the theory of diffusion of innovations, there was a tendency to scale up innovative practices, when companies focused on increasing productivity and social responsibility adopt the successful experience of implementing a four-day working week and receive support from the state (New Zealand, Iceland, USA), or vice versa (Japan).

For the four-day workweek experiment to have a sustainable effect, it is important to adapt the model to industry specifics, cultural norms and organisational maturity. Human-centricity is becoming not only a value paradigm but also a strategic advantage in the global competition. The use of technology should help support employees' mental health, professional development, and well-being (Peeters *et al*., 2021). The report by H. Mayer *et al.* (2025) examined examples of countries that apply this practice: the USA, Denmark, Sweden, and China. As artificial intelligence has the potential to automate routine processes, it allows employees to focus on more creative and strategic activities. To ensure the successful implementation of technology, employers provide adequate support through employee training and access to the necessary tools. At the same time, employees express a high level of trust in employers in the context of ethical AI adoption, which underlines the importance of transparency and responsibility in using new technologies in the workplace.

Along with ensuring ethical standards and accessibility, the impact of technology on society should be analysed. Digital transformation is an important change factor in the modern economy, affecting various aspects of social life and production processes. Digitalisation encompasses a wide range of technological solutions, such as automation, artificial intelligence, big data and cloud computing, which are changing how we do business, organise work and interact with people. The development of digital technologies contributes to increasing the competitiveness of enterprises, optimising resources, and creating new opportunities for economic growth (Schröder *et al*., 2024).

The main areas of impact of digital transformation on socio-economic development are: increased productivity, changes in labour market characteristics, and improved quality of life. The introduction of digital technologies helps to increase productivity and efficiency of production (Pluta-Zaremba & Szelągowska, 2021). Automation of routine processes and AI use help optimise business operations, reduce costs, and improve the quality of products and services. This trend creates new opportunities for innovation and stimulates the development of new business models and markets.

The introduction of digital technologies in production processes in Japan and the United States demonstrates significant potential for increasing productivity and efficiency in the context of economic development. For example, in Japan, the "Society 5.0" concept envisages the integration of advanced technologies, such as artificial intelligence, into various sectors of the economy to improve productivity and quality of life. In particular, Hitachi uses its Lumada platform for the digital transformation of production processes, which reduces the time for product inspection by 30-75% by using artificial intelligence to analyse large amounts of data (Sato *et al*., 2019).

In the US, companies are also actively implementing digital technologies to improve efficiency. For example, WestRock uses artificial intelligence and automation technologies to optimise production processes, particularly in the packaging industry. Such an approach reduces costs, improves product quality, and ensures sustainable development (Deloitte, 2024). The introduction of human-centred approaches in the modern economy aims to ensure the priority of human needs and values in technological development processes, which is an important component of strategic management in the face of rapid change. This approach focuses on the well-being of employees, social responsibility, and ethical aspects of technological innovations, and it is aimed not only at economic success but also at the overall development of society. However, despite the positive prospects, introducing human centricity is accompanied by several challenges and risks that require detailed analysis and consideration in the implementation process.

Firstly, one of the significant challenges is the risk of insufficient understanding and support for the concept of human centredness on the part of the leadership and staff of organisations (Adel, 2022). In many cases, the lack of a clear understanding of the benefits and mechanisms for implementing such approaches can lead to superficial implementation or even resistance to change. A people-centred approach requires a change in corporate culture and new approaches to employee engagement. Traditional

corporate culture, focused on efficiency and control, is transformed into one that supports employees' creativity, self-realisation and personal development. New approaches to employee engagement involve strengthening autonomy, creating conditions for personalised talent development, and actively involving people in decision-making processes (Rada, 2024). Therefore, management should be based on empathy, emotional intelligence, and the ability to form trusting relationships in teams that combine people and artificial intelligence (Goleman & Cherniss, 2024). In addition, in the context of Industry 5.0, organisations must build a corporate culture that ensures psychological safety and promotes continuous learning and value co-creation (Edmondson, 2018; Shumilova, 2024). Therefore, attention is paid to developing flexibility, creativity, and the ability to work across disciplines, which are critical competencies for the future. Integrating human-centric principles into corporate practice in the era of Industry 5.0 increases employee engagement and becomes the foundation for sustainable development of organisations in the new technological reality.

Secondly, implementing human-centred approaches requires significant financial and time resources (Longo *et al*., 2020). Rebuilding existing business processes, adapting organisational culture, integrating new technologies, and ensuring effective interaction between all levels of the organisation is a complex and expensive process. The costs of such transformation can be high, which can be a deterrent, especially for small and medium-sized enterprises. Therefore, it is important to strike a balance between investing in technology and preserving human values, and to implement changes in a phased manner.

Another significant challenge is the impact of rapid technological development and digitalisation on implementing human-centred approaches (Kalateh *et al*., 2022). Automation and the use of artificial intelligence can lead to job losses or changes in employee qualification requirements, requiring organisations to adapt their HR strategies flexibly. It is necessary to create conditions for the retraining of employees through the opportunity to learn new skills and adapt to new requirements arising from technological changes.

Successful implementation of human-centric approaches is only possible if the specifics of each organisation are taken into account, support is provided by all stakeholders and readiness to adapt in the face of constant change. It is important that organisations not only invest in technology, but also actively promote a favourable working environment where human values are prioritised at every stage of the organisation's development. The goals and impacts of human centredness at the individual, organisational and societal levels are summarised in the paper (Fig. 2). Thus, the transition to a human-centred economic model implies not just the technical modernisation of production but also a qualitative transformation of socio-economic relations with people, their knowledge, skills, values, and ability to self-realise at the centre. In contrast to the traditional approach, where human capital was considered mainly in education and healthcare costs, the modern vision covers a broader range of competences – cognitive, emotional, digital and entrepreneurial (Nahavandi, 2019; Lu, 2022). Human capital development includes not only formal education, but also continuous reskilling and upskilling, which corresponds to the dynamics of changes in the labour market. An inclusive economy involves all social groups in creating economic value and distributing growth results. Inclusiveness is not only an ethical requirement, but also a factor in increasing productivity, sustainability and trust in institutions (Burchardt & Vizard, 2011). Integrating inclusive practices into economic systems is becoming a prerequisite for creating a more just and stable society.

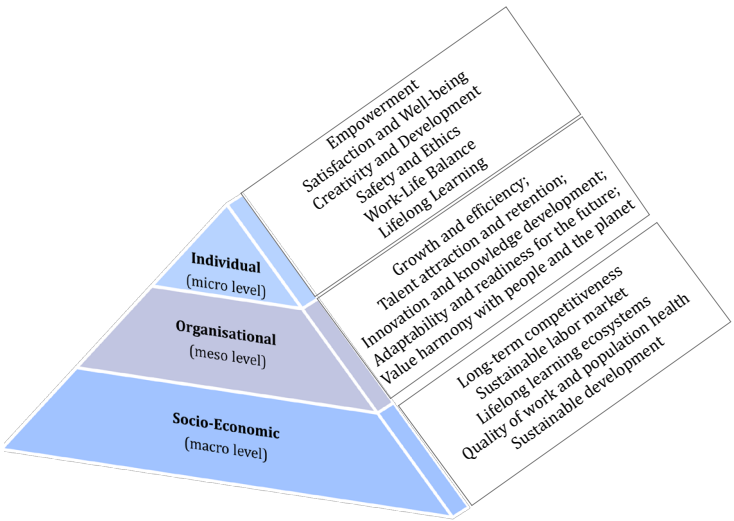

Figure 2. Human-centered goals and effects

Source: compiled by the authors

Industry 5.0 provides new tools for this:

▲ digital platforms provide access to employment, education and social services regardless of place of residence or social status;

▲ flexible work formats give women, people with disabilities, and older workers a chance to realise their labour potential;

▲ participation technologies (e-participation, civic tech) increase the involvement of citizens in policy-making and monitoring of their implementation.

According to M. Mazzucato (2018), the future of value-based economies lies in "co-creation", i.e., combining innovation, social needs and active citizen participation. Industry 5.0 does not propose replacing humans with machines, but rather a partnership in which technology enhances human qualities such as creativity, ethics, empathy, and entrepreneurship. Therefore, human capital is becoming not just a source but a key asset determining economic development trajectory. Supporting and developing human capital is an investment in the future of an inclusive, sustainable and competitive economy.

Conclusions

Integrating technology with human values and needs in the Industry 5.0 era requires a comprehensive approach to ensure ethical standards, accessibility, and consideration of the impact of technology on society. Such an approach will help improve society's quality of life and harmonious development. Industry 5.0 envisages the transformation of production and innovation processes based on human-centricity. This means reorienting industrial development from technocratic dominance to a humanistic paradigm, where human well-being, participation in decision-making, satisfaction of needs and professional fulfilment are prioritised. Industry 5.0 is not so much about automation or technological efficiency as it is about harmonising the interaction between humans and innovative technologies.

Human-centredness is a comprehensive socio-economic approach that combines ethical principles, inclusiveness, responsible use of innovations and a focus on improving human well-being. The transition to such an economic model requires not only the introduction of the latest technologies, but also a rethinking of economic relations, management practices and social policy. The determining factor was the realisation that human capital, its creative potential, emotional intelligence and ability to self-development are the drivers of innovative growth and social sustainability. In practice, human-centredness is being integrated into modern economic processes: the working environment is being modernised to meet the needs and well-being of people; sustainable business models are being developed that consider people's interests alongside technical or financial parameters.

Industry 5.0 creates new challenges for the labour market, education and corporate governance. This trend requires the adaptation of employee competencies, developing human-machine partnerships, introducing flexible employment formats, and institutional support for inclusive approaches to employment, education, and social inclusion. Ethical issues related to the use of artificial intelligence and automation are becoming an integral part of the design of organisational strategies and policies at the macro and micro levels.

A human-centric approach ensures not only economic efficiency but also a better quality of life, an inclusive social environment, and increased trust in economic and political institutions. This approach promotes sustainable development and the harmonious coexistence of technological innovations and ethical values within the new economic reality.

Further research should be directed at developing tools for assessing the degree of human centredness of economic systems, analysing mechanisms for supporting human capital in the context of Industry 5.0, and studying the relationship between human centredness, inclusiveness and sustainability of socio-economic development.

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Conflict of Interest

None.

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Людиноцентризм як рушій економічного розвитку в епоху Industry 5.0

Ігор Кобушко

Доктор економічних наук, професор
Сумський державний університет
40007, вул. Харківська, 116, м. Суми, Україна
https://orcid.org/0000-0003-0821-4233

Яна Кобушко

Кандидат економічних наук, доцент
Сумський державний університет
40007, вул. Харківська, 116, м. Суми, Україна
https://orcid.org/0000-0002-2057-2300

Інна Балагуровська

Аспірант
Сумський державний університет
40007, вул. Харківська, 116, м. Суми, Україна;
Сілезький технологічний університет
44-100, вул. Академічна, 2А, м. Глівіце, Польща
https://orcid.org/0000-0003-3642-9506

Анотація. Актуальність дослідження обумовлена необхідністю розуміння економічного розвитку в умовах глобальної цифровізації, автоматизації та впровадження штучного інтелекту, де основну роль відіграє не стільки технічна ефективність, скільки людина, її цінності, добробут та соціальна стійкість. Мета статті полягала у науковому обґрунтуванні концепції людиноцентризму як рушія економічного розвитку в епоху Industry 5.0, а також у дослідженні особливостей її впровадження в організаційних, виробничих та суспільних практиках. Методи дослідження включали системний підхід до аналізу літературних джерел, порівняльний аналіз еволюції економічних моделей, логіко-структурне узагальнення принципів Industry 5.0, аналіз практик людиноцентричних інновацій, що базуються на етичному використанні технологій та партнерстві людини й машини. Використано також концептуально-аналітичний метод для виокремлення ціннісних відмінностей між індустріальними парадигмами, зокрема Industry 4.0 та Industry 5.0. Основні результати дослідження продемонстрували, що людиноцентризм в епоху Industry 5.0 є не лише філософською ідеєю, а конкретною управлінською практикою, яка визначає нові принципи взаємодії між інноваційними технологіями та людським потенціалом. Людина у такій економічній моделі розглядається не як об'єкт автоматизації, а як креативний партнер у симбіотичних системах людино-машинної співпраці. В статті обґрунтувано, що впровадження людиноцентричних підходів позитивно впливає на продуктивність, інноваційність та стійкість організацій, а також створює підґрунтя для сталого економічного розвитку суспільства. Дослідження підкреслило необхідність інтеграції етичних норм, соціальної відповідальності та балансу між ефективністю та добробутом працівників у процесі цифрової трансформації. Зокрема, автори акцентували увагу на викликах, пов'язаних із неповним розумінням концепції людиноцентризму на рівні організацій, значними витратами на її впровадження та необхідністю постійної адаптації людського капіталу до змінних умов ринку праці. Результати дослідження можуть слугувати підґрунтям для формування людиноцентричної політики розвитку, що охоплює інноваційні технології, підтримку інклюзивного та сталого зростання, трансформацію ринку праці та державні стратегії в умовах Industry 5.0

Ключові слова: економіка; інновації; модель; сталий розвиток; технології; цифровізація