Editorial: Industry features of the economic policy of emerging economies in the age of intellectual machines

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1 Introduction

Emerging economies are a large group of economic systems, which are characterised by the most dynamic development of the institutes of the market economy, quick rate of economic growth, and highly innovative activity (Romero et al., 2023; Ząbek, 2022). The driver of emerging economies is the expanding BRICS group, which has very significant positions in the world markets. Emerging economies are located in all parts of the world, including Africa, the Asia-Pacific region (e.g., countries of Central Asia), South America, and Eastern Europe (Anthony-Orji et al., 2023).

The mentioned features of emerging economies require unique methodological approaches and applied solutions for their economic policy (Habibullah et al., 2023). Due to the Fourth Industrial Revolution, the modern world entered the age of intellectual machines. Its initial point could be considered the year 2020 when the programs of digital transformation of the economy were started by most countries of the world; many countries, including BRICS, reached good results in their implementation.

The problem is that the first countries (2010–2013) to join the Fourth Industrial Revolution were developed countries, e.g., Germany which adopted the strategic government initiative of industry development 'Industry 4.0' (Forschungsunion, Acatech, 2023) and the UK which adopted 'Eight great technologies' (UK Government, 2023). Developing countries took over this global initiative almost at once. For example, in 2017, Russia adopted the national programme 'Digital economy', authorised by the Decree of the government dated 28 July 2017 No. 1632-p (Ministry of Digital Development, Telecommunications and Mass Media of the Russian Federation, 2023).

However, the economic policy in emerging economies has been largely based – and is still guided – on the experience of developed countries. Insufficient attention to the specific features of emerging economies reduces the effectiveness of their economic policy and does not allow unlocking the potential of their high-tech growth in the age of intellectual machines. To solve this problem, a special issue of *IJEPEE* was organised; the special issue 'New challenges and economic policy for emerging economies in the age of intellectual machines' includes the best works as a result of the 14th National Scientific and Practical Conference 'A New Paradigm of Socio-Economic Development in the Age of Intellectual Machines 2020'.

The main idea of this special issue is that emerging economies are a heterogeneous group of countries, each of which has its specific features due to geographical, socioeconomic, institutional, and, under the conditions of the Fourth Industrial Revolution, technological features, and each sphere requires specific measures of economic policy because each sphere adapts to new conditions of the age of intellectual machines differently.

Based on the existing literature, the age of intellectual machines in this special issue is treated as a modern stage of evolution of the world economic system, at which, first, automatisation is performed with the help of smart technologies, which are based on artificial intelligence (AI) (Celetti, 2022). Second, the digital competitiveness of the economy and business are determined by the activity and effectiveness of the use of digital technologies (Popkova and Sergi, 2023a, 2023b; Sergi and Popkova, 2022).

Third, economic growth and sustainable development of economic systems and economic subjects are determined by their positions in the world's high-tech markets and technological sovereignties (Dohale et al., 2023). Fourth, intelligent machines –AI and AI-quipped robots, which communicate through the internet of things (IoT) – become new subjects of socio-economic relations and are among the main participants of economic processes (Alam and Dhamija, 2022).

The purpose of this special issue is to study the industry features of the development of emerging economies in the age of intellectual machines and to develop scientific and methodological recommendations for the highly-effective economic policy in view of their specifics. The special issue's originality and contribution to the literature consist in the rethinking of the development of the economy in the age of intellectual machines from the position of the unique experience of emerging economies and given the industry features of the Fourth Industrial Revolution.

2   Special issue overview

In the paper 'A new educational model for training digital personnel and intelligent machines: standardisation vs. flexibility', Bogoviz, Alekseev, Lobova, and Osipov reconsidered the essence of the processes of intellectual capital development in the Fourth Industrial Revolution. Using the econometric modelling of the international experience of emerging economies, the authors found the optimal ratio of standardisation and flexibility in a new model of education for training digital personnel and teaching intellectual machines in emerging economies. The authors made a new important conclusion that the adaptation of intellectual capital to the conditions of the Fourth Industrial Revolution takes place according to its own scenario, which requires the search

for unique solutions with the different significance of training digital personnel (through higher education) and teaching intellectual machines (through machine learning).

Morozova, Mizikovsky, Kornilova, Trifonova and Kuznetsova in the work 'Formation and development of digital marketing in a business environment', researched the leading trends in the development of digital marketing and assessed the readiness of various spheres (on the example of banking and financial services, insurance, and health insurance and retail) to its use from the position of required knowledge and skills with managers who are responsible for the technologies of digitalisation and intelligent machines.

The most important scientific result, obtained in the paper, was the concept of work continuum of man-machine, set in the basis of a new paradigm of the work with the analytics of platform business models, which specific feature is quick digitalisation of organisations with the comprehensive use of data transferred by devices from the IoT, digital platforms (DMP, DSP, SSP), and intellectual systems. By the criterion of approach to automatisation and the share of labour that is subject to it, an authors' classification of the organisation was proposed. According to it, the authors distinguished organisations of an open type (platform type, which includes experience, service, sound-box – which allow the consumer to become the creator of a new product) and organisations that are oriented towards the data (main attention is paid to the development of consumer goods and services).

In the research 'Financial strategy of human development management in emerging economies in the age of intellectual machines', Yankovskaya, Zaytseva, Petrovskaya and Kuzmina studied the experience of the top 10 emerging economies by the Human Development Index in 2020. Based on their experience, the authors performed a scenario analysis of prospects for optimisation of the influence of financial factors on human development in emerging economies in the age of intellectual machines and economic policy implications. As a result, a new approach to the strategic financial management of human capital development in emerging economies with a highly-effective combination of state regulation and the market mechanism in the market of higher education services was developed.

Vorozheykina, Tsvetkova, Pozharskaya, and Agunovich prepared the paper 'Financial measurement of emerging economies' effectiveness in the age of intellectual machines: scientific methodology and policy implications', in which they developed a new methodology for assessing the effectiveness of emerging economies in the age of intellectual machines. The proprietary methodology includes three measurements of effectiveness: effectiveness of business, budget effectiveness, and effectiveness of foreign trade. Based on them and the official international statistics, the authors assessed the financial effectiveness and compiled a set of evidence-based recommendations on the improvement of state regulation of digitalisation in emerging economies.

In the article 'Engineering enterprise cost management policy in a developing real economy', Mizikovsky, Lapaev, Kornilov, Yashin and Kuznetsov proposed a new vision of the distribution of commercial costs of a machine-building company based on the economic policy of managing the production and product promotion costs in emerging economies. For this, they described the key processes of promoting final products in emerging economies and compiled a context scheme of the functional system of assigning marketing costs to products' costs.

In the paper 'Digital personnel in labour market as the basis of creating highly efficient jobs in developing countries in the age of intellectual machines', Zakharov,

Sulimova, Konovalova and Mustafin used international statistics of labour efficiency to specify, scientifically substantiate, and systematise the factors of creation of highly-effective jobs for digital personnel in emerging economies in the age of intellectual machines. This allowed the authors to present a new, wider view of the economic policy of digital personnel management in the labour market, which is not limited by personnel training but takes into account their use in entrepreneurship as well.

Yashina, Garina, Romanovskaya, Andryashina, and Tsymbalov wrote the paper 'Budgetary stability of territories as a consequence of developing and developed economies of the regions of Russia', in which they offered a new criterion for detecting emerging economies in regions – budget stability, and classified the regions of the Russian Federation by this criterion. The authors suggested that the budget stability of regions be determined through the prism of the indicators of state financing of human capital and the structure of budget revenues, as well as the indicators of the region's business activity. Based on this, the authors developed a systemic approach, which allows analysing various aspects of assessing the budget's stability under the conditions of internal and external financial limitations.

In the work 'Models of economic growth of Russia's regions in the age of intellectual machines: technological breakthrough vs. stability and sustainability' by Abdulkadyrov, Abidov, Evdokimov, Kvasnitsky, and Khachaturian, a statistical overview of the digital growth of regions of Russia in 2020 was performed. Based on this, the authors identified the alternative models of economic growth of Russia's regions in the age of intellectual machines through the lens of the consequences of digitalisation. Thus, socially-oriented, externally-oriented, and technology-oriented models were distinguished.

In the paper 'Marketing model of distribution of intellectual machines as new subjects of socio-economic relations in emerging economies', Vasyakin, Mednikov, Karelina and Kharlanov analysed the level of market competition in groups of countries with emerging economies in 2020. Based on this, the authors substantiated the advantages of deregulation and the significant contribution of marketing to the dissemination of intellectual machines in emerging economies. The authors also described the prospects for the dissemination of intellectual machines as new subjects of socio-economic relations in emerging economies with the help of marketing.

In the paper 'Managing innovations and digitalisation in the age of intellectual machines: challenges for the economic policy in Russian regions', Buchaev, Abdulkadyrov, Abdulmanapov, Gadzhiev and Abdullaeva proved the necessity for the differentiation of innovations and digitalisation in a new classification of the sources of modernisation by the criterion of commercial effectiveness and the criterion of consequences for the region in the age of intellectual machines. This became the basis for the authors' new approach to the implementation of economic policy in the sphere of modernisation in modern regions by the example of Russia's regions.

In the work 'Labour mobility in emerging economies: a contribution to provision of employees' competitiveness in the age of intellectual machines', Khadzhalova, Muduev, Savzikhanova, Budzinskaya and Arslagereeva used international statistics to assess the mobility of the workforce and the competitiveness of employees in the age of intellectual machines in emerging economies in 2020. The authors substantiated the statistically significant influence of the level of digitalisation on the contribution of labour mobility to support the competitiveness of employees in the age of intellectual machines».

In connection with this, the authors offered new criteria of the competitiveness of employees and an alternative – digital – mechanism of labour mobility, which implies

online communications, virtual transfer of knowledge, experience, and information, and remote employment abroad. The scholars also elaborated on the prospects for ensuring the competitiveness of employees in the age of intellectual machines based on the management of the mobility of the workforce and proposed recommendations for economic policy.

Sozinova, Ilyina, Shabaltina, Velinov and Popova prepared the paper 'Hi-tech production based on intelligent machines in emerging economies in Industry 4.0: a source of new quality of economic growth or a path to socio-economic crisis', in which they studied the unique experience of emerging economies that suffered from the 2020 crisis and discovered a new factor that appeared during the crisis – the factor of entrepreneurial fear of failure, which, supposedly, influences the intensity of robotisation. The authors offered recommendations to take into account this new factor in the economic policy for the most effective management of the transition to a new quality of economic growth through the development of high-tech production based on intellectual machines in emerging economies in the conditions of Industry 4.0.

In the research 'Industry 4.0 as the vector of industrial development in emerging economies in the age of intellectual machines: a financial aspect', Osipov, Semenova, Adamova and Larina used the mathematical tools to study the experience of emerging economies and substantiate the specifics of the financial aspect of progress of Industry 4.0, which consists in its being a vector of industrial development in the age of intellectual machines. The scholars proved the financial advantages of the progress of Industry 4.0 and the priorities of economic policy in the management of this process.

Deberdeeva, Rogulenko, Bodiako, and Ponomareva prepared the article 'Innovative post-industrial development in the age of intellectual machines: experience and perspectives of financing in emerging economies', performing multi-factor modelling of the financial support of the innovative post-industrial development of emerging economies in the age of intellectual machines.

In this paper, Industry 4.0 was for the first time studied as a source and result of industrial innovations; the authors proved its significant contribution and potential in the sphere of generation of post-industrial innovations, which opened a new aspect of the research of innovative development in the age of intellectual machines. This allowed the authors to disclose the prospects and offer recommendations in the sphere of the economic policy of financial support for the innovative post-industrial development of emerging economies in the age of intellectual machines.

3   Conclusions

This special issue united the leading scientific studies on the international experience of emerging economies and thus systematised the practice of the development in the age of intellectual machines of various spheres, including industry, agro-industrial complex (AIC) and, in particular, agriculture, finance, education, and high technologies.

This special issue determined the main factors of the development of emerging economies in the age of intellectual machines, which are the most important objects of economic policy: HR support and HRM, marketing, financing, innovations, and globalisation. The special issue also described the most important consequences of the implementation of economic policy: for the labour market, including labour mobility, economic growth, budget stability, and development of territories (regions of countries).

The special issue's contribution to the literature consists in the development of the theory, methodology, and practice of economic policy in the new context of the age of intellectual machines given the industry and economic (with the focus on emerging economies) specifics of economic systems. The theoretical significance of the authors' fundamental conclusions, provided in the special issue, is that they formed a systemic vision of the specific features of implementing economic policy in emerging economies in the age of intellectual machines and determined the logic and order of the development and implementation of economic policy in view of these features. The innovative theoretical developments, which are reflected in this special issue, include the following:

- New measurement of the quality of economic growth in the age of intellectual machines through the lens of automatisation and high-tech character of economic processes and economic systems;

- New understanding of intellectual resources in the age of intellectual machines with the systemic character of digital personnel and smart technologies;

- New vision of the development of intellectual resources, which includes machine learning;

- New concept of technological breakthrough, rethought from the position of sustainability in the age of intellectual machines.

The practical significance of the set of applied recommendations, developed and presented in this special issue, lies in their allowing raising the effectiveness of economic policy in emerging economies in the age of intellectual machines. Due to evidence-based methodological and practical solutions, emerging economies will be able to better unlock their potential for economic development in the age of intellectual machines. In particular, they will be able to reach higher digital competitiveness, strengthen positions in the world's high-tech markets, and maximise the effectiveness of the automatisation of economic processes based on smart technologies.

Economic policy implications are connected with the fact that the authors' conclusions and scientific developments, provided in the special issue, will allow raising the flexibility of economic policy in emerging economies. The results of the special issue will allow developing and implementing highly-effective economic policy in each sector of the economy, adapting it to the age of intellectual machines.

However, the special issue's focus on economic policy is its limitation. The results obtained show that in the age of intellectual machines, deep changes take place not only in the economy but also in society. Intelligent machines were studied in this special issue as a technological innovation in the economy, but the conclusions made point to the fact that intelligent machines are also a new social construct. That is why, future scientific studies should pay attention to the in-depth research of the social essence of intellectual machines and the consequences of their dissemination for society and the prospects for social adaptation to this.

Acknowledgements

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