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ON ISSUE OF DIGITAL ECONOMIC EFFICIENCY

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Abstract

The paper deals with the issues related to the need to determine the digital economic efficiency. It identifies the main challenges and proposes the ways to address them. It underlines the necessity to assess the integral effect of measures related to the growth of the digital economy so as to incorporate all aspects of their implementation for proper reasoning and making policy decisions. The paper underpins methodological inputs to initiate the study of the digital economic efficiency and highlights strengths and gaps entailed by the use of project-based digital technologies at the regional level.

The management system for investment projects in the region based on the use of digitalization technologies should methodologically conform to theoretical and practical provisions of regional reproduction. In the region, investment management utilizing digitalization technology requires integrity that lies in the formation of one or more controllable regional project portfolios and provision of management. Such management will allow the preparation, development and implementation of investment management methodology, etc.In the whole range of various digitalization models of the regional economy, the following should be singled out: autonomous, coalition and regional (state) participation, and mixed models.The paper proposes introducing the concept of "digital potential of the economy" into scientific use, which signifies the ability of a socio-economic system to use digitalization technologies to ensure the transition to a new state. Conditions for enhancement of digital potential are determined.

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1. Introduction

The ever-growing digitalization of nearly all societal activities fundamentally changes both the role of information as such and information technologies in the socio-economic growth of the state, the region and economic entities.

The scope and quality of information technologies in various spheres determine the economic and social status of society, its integration into the world economic system. Therefore, it is particularly important to provide training for specialists to deal with global informatization environment, including the saturation of all spheres of the economy and society with increasing information flows, as well as their management.

Regional management and business progress are basically aimed at collecting, storing, searching, processing, transforming, distributing and using information. Currently, regional management and business are the most rapidly developing sectors that serve as an IT application, due to the fact that automation of information processing in the context of market development is a strategic tool for winning the competition.

In Russia the development of the information society and the digital economy raises unavoidable questions about the need to evaluate the efficiency of the implemented program and project activities and their impact on socio-economic indicators of an object (state, region, economic entity) as a whole.

2. Problem Statement

In Russia the development of information society and the digital economy raises unavoidable questions about the need to evaluate the effectiveness of the implemented program and project activities and their impact on socio-economic indicators of an object (state, region, economic entity) as a whole. In addition, there is a need for an objective comparison between the state of the regions and national economies, which are changing under the influence of digital technologies.

3. Research Questions

The subject of the study is to assess the efficiency of the digital economy at different levels: global, national and regional.

4. Purpose of the Study

The purpose of study is to raise the question concerning the need to assess the efficiency of the digital economy at different levels: global, national and regional, and to determine the ways to address this problem.

5. Research Methods

The study used the following methods: system and integrative approaches, macro- and microeconomic analysis, performance evaluation, sociological survey, analysis of socio-economic relations.

6. Findings

The methodological inputs to initiate the study of the digital economic efficiency are as follows:

– Service and informatization sector at the present stage of human development is a global instrument determining the state of civilization, making a significant contribution to the processes of social reproduction, promoting a new qualitative and structural economic certainty in the framework of the post-industrial vision;

- Besides technical and technological foundations, digitalization provides the related features of special socio-economic interactions with the meaningful genesis that is predetermined by the drivers of the modern society;

- Digital technologies have an impact on the resource-factor potential of the economy, assuming their adequate system and content modernization that bring about changes in the characteristics, properties and indicators of the previous structure, contributes to their embodiment and legitimization, subsequent reproduction and increasing transfer to the related economic areas;

- The concept of the digital economy substantiates the progress of society based on its innovation and information advancement, which implies an understanding of expected relationships between the costs invested by the society in the implementation of this process and the results achieved.

Digitalization intertwines the processes at the global, national, regional, and local levels. The unity of international language, labor market, basic laws for all states, information space, trade, etc. are viewed as the signs of globalization. This contributes to the interaction of people from different countries to overcome their national and ethnic isolation, increase the opportunities for self-realization and exchange (cultural, economic, etc.).

Digitalization, being an electronic form of communication and data processing, is one of the effective tools for globalization that minimizes time and space separating people. It introduces technological and organizational changes that allow the large-scale dissemination of ideas and products to all countries of the world, thus meeting different needs.

In the Strategy for the Development of the Information Society in the Russian Federation for 2017–2030, the digital economy is referred to as: "economic activity in which the key production factor is digital data that, unlike traditional forms of management, can significantly increase efficiency of various types of production, technology, equipment, storage, sale, delivery of goods and services" (Strategy, 2017).

The concept of the digital economy signifies that its application is potentially aimed at improving the efficiency of economic activities; however, the indicators and the expected value of this possible increase are not provided in the Strategy, which is considered acceptable for such documents, though.

To implement the initiatives of the Strategy, the program Digital Economy of the Russian Federation was later adopted, in which (Section VI) the indicators (Program, 2017) were specified. These include, for example: "the success of at least 10 leading companies (operators of ecosystems) that are globally competitive; the success of at least 500 small and medium enterprises creating digital technologies and platforms and providing digital services; the percentage of people with digital skills is 40%; the number of projects implemented in the digital economy (at least 100 million rubles) amounts to 30, etc. These indicators reflect the expected implementation outcomes of program activities without detailing the

estimated costs, which makes it impossible to evaluate their effectiveness both as a separate activity of the program implemented at the local level and at the macro level as well.

It should be borne in mind that the principle of economic rationalism implies the need to identify certain benefits, social and economically significant goods that will impact not only those involved in implementing program activities but the whole society as well (Ahinov, 2014). This calls for a comparison of the results obtained with the costs, or a determination of the performance efficiency (Economic efficiency).

The development and implementation of the program for the enhancement of the digital economy is not a phenomenon that is independent from the state and societal realities. On the contrary, it has a definite impact on the social sphere, labor market, structure and types of economic activity, and on the other hand, it is influenced by various environmental factors, which can significantly affect the implementation results, contributing to the growth of efficiency or reducing it. In addition, these programs ultimately affect the aggregate socio-economic indicators to streamline the functioning of the state or its individual entity (budget expenditures, number of jobs, amounts of taxes to the local budget, employment, etc.). The situation is complicated by the fact that the program, being a complex spatial-temporal phenomeno, includes structural and dynamic measures to use the resources and achieve the goals that should be predicted, monitored and measured. Efficiency assessment applied in different economic spheres is very similar; however, it is necessary to take into account differences in the content of efficiency, as well as its specific embodiments conditioned by the origin, time of occurrence, further use and influence on other elements of the economy (Guidelines, 2012).

In this regard, it is necessary to assess the integral effectiveness of measures related to the advancement of the digital economy seeking to address all aspects of their implementation for proper reasoning and making policy decisions.

Thus, the use of digitalization technology in project-based activities changes the algorithm and content of project cycle stages, the statement of policy decisions and actions at all development and implementation stages of investment projects, expanding the scope of strategic management (using strategic planning, SWOT analysis, etc.), ensuring a more complete compliance with the real needs of the region, increasing feasibility and sustainability.

The positive effects of digitalization technologies in the project-based approach at the regional level are as follows:

-   justification of objectives, costs and deliverables, which contributes to the increased efficiency and return on investment;
-   ability to predict, arrange and plan risks with a view to reducing their negative impact on the project (Baranov, 2010);
-   increased tolerance of economic entities to the environment through the implementation of relevant projects;
-   increased validity and transparency of doing business at different management levels – enterprises, regional;
-   regional priorities sought through the targeted update of the project portfolio;

- application of new methodologies, knowledge and technologies, subject to the development goals of the region;

- accumulation of experience and creation of a regional base of projects;

- a balanced impact on the spheres and entities of the region as to advantage the regional economy, depending on priorities, outcomes and benefits resulted from project implementations.

The negative effects caused by the project-based transfer into a digital format in the regional economy include complexity, time expenditures and high costs, since an accurate and painstaking design is required to digitize both projects and individual elements (e.g., resources). The use of digitalization technologies in the development and implementation of investment procedures in the region will demand the formation of an appropriate management system.

Investment management in the region refers to a specialized set of policy methods aimed at identifying needs, developing and implementing investment projects, justifying their goals, scope of work and resources (time, money, labor, materials, energy, space, etc.), detecting and managing risks, maintaining the quality of projects and their required efficiency to favour the socio-economic growth of the region.

Investment management mechanisms in the region introduced through the use of digitalization technologies allows defining special procedures for coordinating project objectives and results with the priorities and needs of the region, clarifying project planning, optimizing investments, mitigating project risks, improving project efficiency and their impact on the efficiency of the regional economy, increasing control over the performance and outcomes of the projects.

The system of regional investment management based on the use of digitalization technologies should methodologically comply with theoretical and practical provisions of regional reproduction policy, including the following positions:

1. Socio-economic regulation of regional development should ensure expanded reproduction. This requires the implementation stages of various investment projects to be bound and synchronized with each other. Likewise, they should be focused towards achieving an expanded reproduction outcome, which is fundamental in the competitive and sustainable socio-economic growth of the region (Barabanov, 2011).

2. Investment projects of the region, subject to their nature, should be organically "embedded" into the regional reproduction process as the tools (methods, technologies) of its implementation and as the integrators consolidating the elements and resources of the region. Therefore, investment projects have a dual nature: on the one hand, they are tools of social reproduction, and on the other hand, they integrate separate and local reproduction processes (at the enterprise level), scientifically enriching and developing them, creating enabling environment and expanding opportunities for the integral development of the region.

3. The totality of investment projects in the region in terms of its integrity and compliance with the statement of regional reproduction should be actively used in the production phase, thus ensuring the implementation of the remaining phases: distribution, exchange and consumption.

4. In a socio-economic system of the region there are various business entities. Investment projects make it possible to strengthen the interaction between them, uniting their interests and resources into a single reproduction process.

Digitalized investment management in the region requires integrity that consists in the formation of one or more controllable regional project portfolios, ensuring management. Such management will allow the preparation, development and implementation of investment management policies, the introduction of standards, necessary regulations, the integration of portfolios and projects based on the information system to be concentrated within a single approach. In addition, the design and implementation of investment projects in the region should be in line with the requirements for the optimized spatial distribution of production forces and their effective use. In this regard, three groups of requirements are taken into account when developing and implementing investment projects in the region.

The first group is composed of the following investment projects:

- providing the greatest possible entry of producers to the sources of raw materials, energy and labor, and in a number of areas – to end-consumers;
- contributing to regional concentration, for example, in the form of territorial facilities, groups of enterprises, clusters, etc., in accordance with their key specializations;
- modernizing the material and technical and production base of the economy, improving its performance, contributing to the production of innovative products competitive in the market;
- streamlining ties and cooperation between regional enterprises, reducing transaction costs, developing market infrastructure, etc.

The second group of investment projects involves a rational combination of ecology (natural environment) and economy. When making investments, the environmental impact of operations and the associated negative social consequences should be prevented.

The third group embraces investment projects that support businesses specializing in certain parts of the region to strengthen economic ties between them. These projects reach out to promote the optimal intraregional division of labor, the use of the most favorable conditions of certain parts of the region, the equalisation of their economic and social growth on the basis of optimal distribution and development of production forces.

In the whole range of various digitalization models of the regional economy, for example, projects designed for regional growth, the following should be identified: autonomous, coalition and regional (state) participation, as well as mixed models.

The autonomous model of digitalization of the regional economy assumes that the entire mix of measures for the development and implementation of digitalization technology is carried out directly by the enterprises themselves. Of course, it is possible for other organizations to participate on a contractual basis and to perform a number of works and services (at the stages of market research, business plan elaboration, information pick-up, etc.). In this model, all digitalization indicators, including its goals, functions, budget, deadlines, etc. are specified by the enterprise – the author of the project – on its own.

The coalition model of digitalization implies the engagement of one or more partners – co-authors of the project solution. To solve regional problems, a coalition can be created by regional and external

enterprises. The distribution of functions, the share of financial investments, the distribution of risks, etc. are determined by the concerned parties in a contractual manner.

When implementing, for example, large investment projects within the coalition model, it is acceptable to create structures with varying degrees of integration (in the form of a holding, pool, association, group of companies, etc.), issue securities, determine shares in future income and distribute risks and responsibility (generally, pro rata to a partner's respective share in the business). In a coalition model, project indicators including goals, functions, budget, deadlines, etc. are determined by the concerned parties.

The economic digitalization model with regional (state) participation is a kind of coalition model in which one of the parties is a region or a state. The nature of the region's participation in this model can greatly vary depending on its purpose in addressing socio-economic challenges of territorial development (Bablenkova, 2011). Thus, the involvement of regional authorities in the development and implementation of investment projects can range from the allocation of licenses, the provision of premises, land, etc. to the administration of guarantees or financial resources. The region can also attract strategic investors and act as a lobbying side of the project in state (federal) bodies.

 A promising form of interaction between private and regional interests within this digitalization model, for example, in developing and implementing investment projects, is the formation of a public-private partnership (PPP) for the period of their implementation (Badalov, 2008). As a rule, the leading party in this model is the region as such that determines priorities, methods of implementation, forms of support (its participation), etc. In the course of project implementation within this model, it is necessary to solve problems related to responsibility and risks, division of ownership, distribution of project outcomes, etc.

With a mixed model of digitalization of the regional economy, it is possible to use the three previous models together.

Economists, exploring socio-economic systems, identify different types of capacity: material, production, scientific and technical, innovative; information, natural resource, labor, economic, export, etc. In recent years, they have addressed the capacity attributed to integrated economic entities – clusters, groups of enterprises, etc. (Daurov, 2013). In general, the capacity is perceived as the totality of the means available and capabilities for their effective use (Krassovsky, 2006).

In view of increasing the importance and expanding the range of digital economic applicability, it seems necessary to introduce into scientific use the concept of "digital economic potential" that is deemed as the ability of a socio-economic system to use digitalization technology for ensuring the transition to a new state and progress to meet their needs.

The indicators of the digital economic potential can incorporate the following: the share of the digital economic sector in the total volume of production; development rates; investments in the digital economy; the share of R&D and the degree of return; software costs; the share of technological infrastructure in the digital economic sector; share of employment, etc

To make digital potential an effective tool, a number of conditions must be met:

1. The composition and complexity of management system and digital potential should be mutually consistent and compatible during operation. Otherwise, conflicts will inevitably arise between them, which will have a negative impact on the activities performed.

2. The set of methods for managing digital potential should be relatively independent, taking into account the characteristics of an object and possible actions in different situations in order to eliminate time loss and negative impacts.

3. The management system and digital potential should interact based on the principles of feedback, which is necessary to adjust actions while adapting potential elements to internal and external changes.

4. It is necessary to ensure a clear interaction between the management system and digital potential attributes. Management system is tasked to develop and transfer timely and reasonable policy decisions necessary in a given situation. Digital potential is tasked to provide their timely and accurate execution.

In order to determine the status and patterns of digital potential growth in the region, 60 enterprises were studied in compliance with all necessary representative conditions. The methodological basis for the study is an approach to the digital potential of an enterprise located in a volatile environment, along with its negative impacts, and forced to adapt its activities.

In a digital potential-cost coordinate system, it was revealed that the value of the potential depends on the amount of financial expenditures allocated for its improvement and growth. This is confirmed by a sufficiently large correlation coefficient that makes up 0.91 and shows a close relationship between costs and digital potential.

To simplify the calculations, the annual sales volume (that is easily determined based on submitted enterprise's reports), as well as the costs committed to projects, business plans and enterprise improvement measures were chosen as a key digital potential index.

The analysis of relevant sources showed a poorly-elaborated rationale to assess the economic efficiency of measures within the digital economy and the lack of appropriate integral methodology for its implementation, as compared to the methodological support of the former "analog economy". The assessment of digital economic efficiency was impeded by a number of circumstances.

Firstly, the system of indicators to assess enterprises operating in the digital economy and receiving the results by means of "digital data" (as per the definition of the digital economy in the Strategy) has not been developed.

Secondly, at present the entities of the digital economy mainly function in the "analog" environment, which hampers an unambiguous separation of their indicators from each other. This means that the results obtained through the implementation of digital economic measures can be obtained with a significant involvement of "former" economic factors.

Thirdly, the modern statistical accounting system of economic activity does not sufficiently reflect the digitalization indices and their impact on the final performance outcomes of business entities.

Fourthly, when developing and implementing digitalization measures, the following types of efficiency should be arranged in the wake of its localization levels: the efficiency of a program (project) measure, the efficiency of a program (project); enterprise efficiency, municipal (district) efficiency;

regional efficiency (of a state entity), state efficiency, social efficiency, integral efficiency. However, at present at all of these levels there are various digitalization instruments, as well as ways of their reflection in economic accounting data, which affects the reliability of economic calculations.

Developing and analyzing digitalization programs and projects one should distinguish between effectiveness and efficiency indicators, which by their content and value are included amongst the key performance indicators, KPI (Panov, 2013; Kaplan, 2008; Systems for business, 2010). In ISO 9000:2008, effectiveness is referred to as the implementation degree of planned performance and the achievement of planned results; efficiency is referred to as the relationship between the result achieved and the resources used" (Quality management, 2009). In view of these concepts, the Digital Economy Program mainly presents effectiveness indicators, such as: "the success of at least 500 small and medium enterprises creating digital technology and platforms and providing digital services". The criteria for successful operation, the costs of creating and supporting the performance of these enterprises, as well as financial and economic results of their activities are not specified, though. Thus, the approach proposed in the Digital Economy Program features local, "internal" effectiveness indicators, isolated from the impact on macroeconomic indicators of the entire economy and for this reason not allowing to determine efficiency at any economic level (micro, meso and macro).

In addition, there is a considerable time lag between investments used in the Program's activities and the final results obtained (in the maximum range 2018–2030), which requires the use of comparability methods and the need to calculate indicators based on the discounting method (estimating the value of the future cash flow given their unequal value at different times) (Pervushin, 2012). However, in the analyzed state program this circumstance is not taken into account, which distorts the cash flows and efficiency values. It is possible that, under certain circumstances, the effectiveness of the activities specified by the Digital Economy Program will be positive but ineffective.

An increase in the economic validity of investing in measures aimed to digitize the economy can be achieved through the following approaches.

Firstly, it is necessary to take into account the results and costs of the digital economy, which form the aggregate social product, ensuring its growth. Such an increase can be achieved through the development and use of relevant outputs (new products, technologies, materials, etc.), contributing to the growth of social labor productivity, saving of total working time and more efficient use of resources. The resulting increase in the social product created by the digitization of the economy compensates the costs incurred for its use and becomes an independent source of further generation of funds. Moreover, as the digital economy grows, this source of advancement of expenses should be used to a greater extent in the total amount of such advance payments.

Over time, the product obtained through the increased share of the digital economy can gradually become the main source of funds for simple reproduction.

The applied knowledge, in turn, continues to be: a) the source of compensation to society for previously advanced costs; b) the source of the future (in the next reproduction cycle) advancement of new funds for education and science (both applied and fundamental).

Secondly, the work of the remaining knowledge workers (fundamental and applied science for the industrial sectors of the economy), that is a part of a cumulative employee of the society, is not considered

in establishing the cost of a social product. It does not form any part of it that could serve as a refund for advanced payments and technical support invested.

To increase the rationale for the efficiency of economic digitalization measures, the following is proposed: to evaluate the efficiency of measures, projects and programs aimed at the digitalization of the economy; to develop a system of indicators characterizing the conditions of the digital economy; to develop methodology for calculating the economic efficiency of investments aimed at the implementation of measures and projects of economic digitalization.

7. Conclusion

The paper justifies the need to assess the integral efficiency of measures related to the digital economic growth so as to incorporate all aspects of their implementation for proper reasoning and making policy decisions.

In the whole range of various digitalization models of the regional economy, for example, projects designed for regional growth, the following should be singled out: autonomous, coalition and regional (state) participation, and mixed models.

In view of the increasing importance and ever-growing range of digital economic applicability, the paper proposes to introduce into scientific use the concept of "digital potential of the economy", which signifies the ability of a socio-economic system to use digitalization technology to ensure the transition to a new state and the growth to meet their needs.

To increase the rationale for the efficiency of economic digitalization measures, the following is proposed: to evaluate the efficiency of measures, projects and programs aimed at the digitalization of the economy; to develop a system of indicators characterizing the conditions of the digital economy; to develop methodology for calculating the economic efficiency of investments aimed at the implementation of measures and projects of economic digitalization.

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