

ISSN (Print) 2789-4320
ISSN (Online) 2789-4339

<https://doi.org/10.32523/2789-4320-2025-2>

ECONOMIC SERIES
OF THE BULLETIN
OF L.N. GUMILYOV ENU

ЭКОНОМИЧЕСКАЯ СЕРИЯ
ВЕСТНИКА ЕНУ
ИМЕНИ Л.Н. ГУМИЛЕВА

Л.Н. ГУМИЛЕВ АТЫНДАҒЫ ЕҰУ
ХАБАРШЫСЫНЫҢ
ЭКОНОМИКА СЕРИЯСЫ

№2•2025

2010 жылдан бастап шығады

Founded in 2010

Издается с 2010 года

Жылына 4 рет шығады

Published 4 times a year

Выходит 4 раза в год

Астана, 2025
Astana, 2025

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IRSTI 06.61.43

<https://doi.org/10.32523/2789-4320-2025-2-66-79>

Type of article: research article

Analysis of the digital representation of the activities of the special economic zones of the RK

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Abstract. Special economic zones are one of the important elements of the national innovation system. This article examines the activities of special economic zones and analyzes their representation in the digital space. The aim is to analyze the digital representation of special economic zones and develop proposals to improve the efficiency of their activities. The research used methods of deduction, induction, analysis, synthesis, and abstraction. During the study, the results showed that several SEZs are actively operating in the digital space, and information about their activities is available to all participants in the economy. SEZs have also been identified in which information about their activities is unavailable. Based on the results of the analysis, it was proposed to make proposals to improve their activities for the socio-economic development of the region. The practical value of this research can be useful to investors, consumers, businessmen, and government authorities. The theoretical value of this research lies in the fact that it can complement the theoretical studies of the development of the national innovation system of the Republic of Kazakhstan.

Keywords: free economic zone, enterprises, innovation, industry, investor, digitalization

Introduction

Special economic zones (SEZs) of the Republic of Kazakhstan play a key role in developing the national economy, attracting investments, and diversifying industries [1]. President of the Republic of Kazakhstan, Tokayev [2], in his 2024 address, noted that the development of industries and their diversification in producing finished products is the key to sustainable economic development. In this regard, the importance of special economic zones does not require proof. This production site provides preferential conditions for entrepreneurs and

Received 22.01.2025. Revised 12.05.2025. Accepted 14.06.2025. Available online 30.06.2025

investors, contributing to developing high-tech industries, transport and logistics systems, and industrial clusters [3,4]. Special economic zones are one of the main elements of the national innovation system, which can pave the way for successful innovative economic development. According to data from developed countries, the income of successful special economic zones ranks fifth in the country's GDP and accounts for about 40-60% of the country's gross exports, from 30% to 80%. Consequently, the effective functioning of the NIS elements can become an incentive for the diversification of industries and the development of production in the Republic of Kazakhstan.

However, in the context of the digital transformation of the economy, the digital representation of SEZ activities is significant. It is becoming a tool to increase their efficiency and an important factor in attracting new partners and investors. Consequently, one of the indicators of the effective functioning of special economic zones is the availability of information about them. Digital representation includes official websites, platforms for interaction with residents, integration into national and international information systems, and modern technologies to optimize management processes. Also, the available information is valuable for domestic manufacturers and helpful to investors, including increasing the interest of foreign investors. An active presence in the digital space not only increases the recognition of zones but also contributes to their competitiveness on a global level, improving communication with the target audience and simplifying access to necessary information. Also, digitalization enables you to track the effectiveness of the SEZ in real-time, the dynamics of work, and the activity of the SEZ's subjects. Thus, this article analyzes the representation of the activities of special economic zones. Therefore, this study aims to analyze and evaluate the activities of special economic zones based on the availability of information in the digital space of the Republic of Kazakhstan. Such an analysis enables the identification of strengths and weaknesses, as well as areas for further improvement, which is especially important in the context of the rapid growth of the digital economy since digital platforms and tools can enhance the efficiency of SEZ activities.

Literature review

Initially, special economic zones emerged in developed countries, which sought to enhance the efficiency of economic development to improve trade both within the country and with neighboring countries. In this case, it refers to special economic zones and free economic zones. The first Special Economic Zones (SEZs) emerged in Frankfurt and Hong Kong, where trade and tax relief regimes were introduced to stimulate trade. One of the first economists to substantiate the effectiveness of the Special Economic Zone (SEZ) was Bela Balassa [5], who demonstrated that special zones with specific conditions can enhance the effectiveness of export trade. The experiences of SEZs such as Shannon and Shenzhen played a key role in the development of SEZ theory. The work of Wang [6] and Ge [7] demonstrated that institutional improvements in SEZs can produce a synergistic effect on activities. This gave rise to the creation of an institutional theory of SEZs, which provides the basis for understanding that different SEZs experiment with various types of legal regulatory activities to achieve the best results.

Interest in the development of SEZ is growing among Russian scientists and their neighboring countries. Shchurina S. V. considers the SEZ a source of new industries and jobs, including in new territories of Russia [8]. Other authors consider its formation's importance and strategic

goal of creating a developed region [9]. Akhmetov D. & Kussainova A. (2024) consider the legal part of forming the SEZ's activities and the regulatory aspects of its partnership with other participants, such as investors, business entities, etc. [10]

Digitalization makes it possible to increase the efficiency of management and transparency of processes in the SEZ, improve access to information for potential investors and residents, and simplify administrative procedures. Tararyshkina, L. I., & Rudnitskaya, A.V. (2022). It is noted that digital development provides excellent opportunities for the development of special economic zones in general and for participating entities in this zone [11].

Kazakhstan is on the path to digital transformation of the economy. In this regard, the Digital Kazakhstan state program was launched, which aims to improve the use of information technology in all sectors of the economy. However, research shows that the level of digital maturity of Kazakhstan's SEZ varies significantly. For example, the Khorgos – Eastern Gate SEZ demonstrates a progressive approach, using digital platforms to manage logistics processes. At the same time, other zones, such as Ontustik, face limitations in the field of digital infrastructure and a lack of representation in the online space [12]. The literature review shows that the digital representation of SEZ activities is important in their successful functioning and development. Kazakhstan has all the prerequisites for creating modern digital zones integrated into global economic chains.

Methodology

This study took an integrated approach to analyzing the digital representation of special economic zones in the Republic of Kazakhstan, including several stages. The stages of the study are shown in Figure 1.

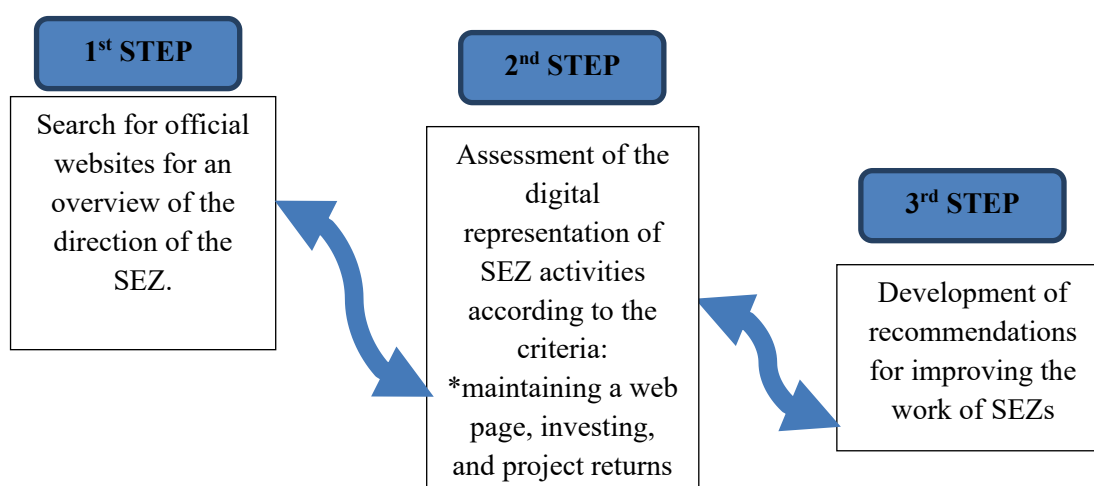


Figure 1 Stages of the study

Note: Compiled by the authors

The first stage of the study includes a review of documents on the creation of SEZs in Kazakhstan. At this stage, induction and deduction methods were used to consider the regulatory documents of the Republic of Kazakhstan. In the second stage, the method of analysis and synthesis was used, where the methods were used to identify areas of activity in the digital

space of the SEZ, and the availability of information on websites and the official website of the SEZ was also analyzed for the effectiveness of special zones. The database for data analysis was compiled from the official websites of domestic Special Economic Zones (SEZs). In the third stage, the abstraction method was used, which focuses on the weaknesses of development from the basics and offers practical recommendations for improving their activities. These methods enable the collection of comprehensive information and the systematization of data on the digital presence of domestic special economic zones.

Results and discussion

The first steps to create the Basics SEZ after the Independence of the Republic of Kazakhstan were required, as the development of the economy of Kazakhstan required attracting investments, including foreign ones. Next, the production and industry development in Kazakhstan required the creation of unique places where entrepreneurs could boost business development, and privileges were provided for them. Such zones were created in 2001 in Astana. The first SEZ is Astana – New City, which has become a pilot project to stimulate economic growth and develop the capital's infrastructure. From 2001 to 2011, several key zones were created, including Aktau Seaport, Park of Innovative Technologies, Ontustik, and others. For 2025, Kazakhstan will have several special economic zones, each focusing on developing specific sectors of the economy, such as petrochemicals, metallurgy, logistics, IT, and tourism (Figure 2).

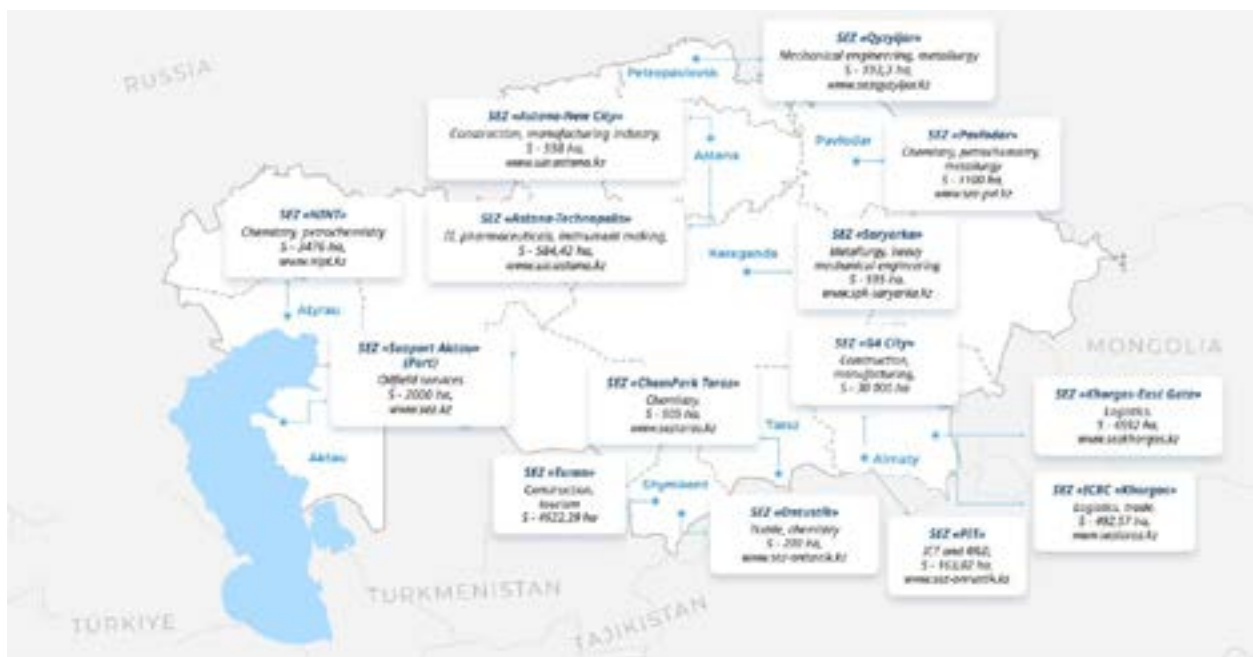


Figure 2 Atlas of SEZ in the Republic of Kazakhstan

Note: Special Economic Zones by National Company Kazakh Invest [13].

The data in the table shows the representation of SEZ activities in the digital space in the Republic of Kazakhstan. The availability of SEZ information directly affects the effectiveness of activities. The data show that some of the SEZs are actively operating, and at the same time,

information about their activities is available to investors, entrepreneurs, consumers, and researchers; such SEZs include the Seaport Aktau SEZ, the Khorgos - Eastern Gate SEZ, the Pavlodar SEZ, the National Industrial Petrochemical Technopark SEZ, the Turkestan SEZ" or the TURAN SEZ. However, data in the digital space shows that some active SEZs monitor their activities and show how much capacity this SEZ is operating at. For example, the SEZ "Park of Innovative Technologies" attracted 50.69 billion tenges of investments, taxes, and other payments paid to the budget for 34.7 billion tenge, products, and services were produced in the amount of 493.7 billion tenges, and exports amounted to 7.46 billion tenges. Projects have shown positive dynamics since the creation of SEZs more than ten years ago.

Table 1. Digital representation of SEZ activities in the Republic of Kazakhstan

Name of the SEZ	Official website	Services	General directions	Site description	Finance
SEZ "Astana – new city" (until 2027) SEZ "Astana – Technopolis" (2001 to 2042)	general information is available - https://nuris.nu.edu.kz/technopolis	tax benefits, access to infrastructure, and construction support.	construction, production of building materials, IT technologies.	General information is available - https://nuris.nu.edu.kz/technopolis . There is no information about manufactured products or enterprises.	Since the beginning of its formation, 2 trillion tenge has been spent. Produced for 4.52 trillion tenge, taxes paid - 137.9 billion tenge [14]
SEZ "Seaport Aktau" (2003)	www.sez.kz	benefits for logistics and transport.	logistics, transportation, oil refining.	The information on the site is available to both consumers and manufacturers. The site has been inactive for at least a year, the latest news was published in January 2024.	About 330 billion tenge has been invested, of which 170 billion tenge is foreign investment. We have produced products worth over 462 billion tenge. [15]
SEZ "Park of Innovative Technologies" (2003)	www.aitc.kz	support for IT startups, tax benefits, infrastructure.	IT technologies, electronics, renewable energy.	The information on the site is available to both consumers and manufacturers. The site has been inactive for at least a year.	50.69 billion tenge of investments were attracted, taxes and other payments were paid to the budget in the amount of 34.7 billion tenge, 16]

Ontustik SEZ (2005-2030)	https://openspk.kz/sez-ontustyk/ (The founder and shareholder of the Company is the Akimat of Shymkent)	tax benefits, infrastructure support.	textile industry, cotton processing.	General information is available - https://openspk.kz/sez-ontustyk/ . There is no information about manufactured products or enterprises.	98.48 billion tenge of investments were attracted, taxes and other payments were paid to the budget in the amount of 5.5 billion tenge[17]
SEZ Khorgos – Eastern Gate (2011)	www.sezkhorgos.kz	customs and tax benefits, logistical support.	logistics, warehousing, and trade.	The information on the site is available to both consumers, investors, and manufacturers. The site is active and the information is updated	In 2024, it was planned to invest 330 billion tenge in the city [18]

Note: Compiled by the authors based on the source.

The data presented in the table1 and 2 indicate the high digital activity of several special economic zones, including SEZ "Eastern Gate," SEZ "Pavlodar," SEZ "National Industrial Petrochemical Technopark," and SEZ "Turkestan" (Turan). This is reflected in the regular updating of official websites, the publication of relevant news, and the provision of information of interest to potential investors and other interested parties. At the same time, SEZs with insufficient digital activity have been recorded.: SEZ "Seaport Aktau," SEZ "Park of Innovative Technologies," and SEZ "Taraz Chemical Park." The official websites of these zones are either not updated or contain limited and outdated information, which reduces their attractiveness to investors and potential residents. There are also zones, such as SEZ "Saryarka" and SEZ "Ontus," which demonstrate a low level of digital representation, as there is no data available on products, residents, or other key parameters of their functioning. Thus, the analysis of the digital activity of the SEZ reveals a clear trend: the availability of timely, updated, and meaningful digital content helps to increase the investment attractiveness of the zone. On the contrary, limited access to up-to-date information can not only reduce investor interest but also contribute to an additional burden on the state budget in conditions of inefficient communication and low transparency of the zone's activities.

Table 2. Digital representation of SEZ activities in the Republic of Kazakhstan (Part 2)

SEZ "Saryarka" (2011-2036)	General information is available https://sez.qazindustry.gov.kz/ru/placemark/11	tax benefits, infrastructure for metallurgy.	metallurgy, mechanical engineering.	The site is incomplete	The volume of investments: 185.6 billion tenge. The volume of products produced: 218.7 billion tenge
SEZ "Pavlodar" (2011)	https://www.sezpv.com/	support for the chemical and metallurgical industries.	processing of raw materials, production of chemical products.	The information on the site is available to both consumers, investors, and manufacturers. The site is active and the information is updated	with a total investment of more than 80.6 billion tenge
Taraz Chemical Park SEZ (2012)	seztaraz.kz .	benefits for the chemical industry.	chemical industry, fertilizer production.	seztaraz.kz . not active	Missing information
SEZ "National Industrial Petrochemical Technopark" (2007-2032)	https://nipt.kz/	support for the petrochemical industry.	oil and gas refining.	The information on the site is available to both consumers, investors, and manufacturers. The site is active and the information is updated	Missing information
SEZ "Turkestan" or SEZ "Turan" (2018)	https://sez-turkistan.kz/	support for tourism and cultural projects.	tourism, construction, education.	The information on the site is available to both consumers, investors, and manufacturers. The site is active and the information is updated	Missing information

SEZ "Kaspiy" (2002)	https://www.sez.kz/	development of maritime navigation.	shipbuilding, oil refining	companies in the field of maritime transportation.	The volume of investments is 286.8 billion, production is 416.8 billion tenge. 36.8 tenge was raised for one budget tenge инвестиций
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Note: Compiled by the authors based on the source.

The most significant production volumes were shown by SEZ Astana – Technopolis: 4.52 trillion tenges, Park of Innovative Technologies: 493.7 billion tenges, and Kaspiy: 416.8 billion tenges. Kaspiy has a high level of return on investment: 36.8 range of products per 1 tenge of budget. Thus, the digital representation is uneven — some sites are not updated or contain limited data. Financial transparency also varies: not all FEZs disclose information about investments and results. Logistics and technopark zones demonstrate the most significant activity and investment attractiveness. Thus, a review of the SEZ's activities in the digital space shows that the availability of information is heterogeneous. Consequently, the activities of the SEZ require transformation, which can further enhance its effectiveness in the region's development.

Based on this, domestic special economic zones (SEZs) should be developed in the directions indicated in Figure 3. According to the figure, one of the important areas of development is the mandatory creation and maintenance of official SEZ websites. It is necessary to regulate a regulatory law that will monitor digital representation, as this can ensure demand for FEZ services.

Requirements for regular reporting. The introduction of mandatory reporting on the activities of the SEZ should be made publicly available (for example, through annual reports that include information on attracted investments, products produced, and jobs created). This measure will provide investor analysts with the opportunity to learn about risks and investment profitability, as well as business entities with the opportunity to expand their activities. Another important point is the involvement of independent experts. Independent analysts and auditors can participate in assessing the SEZ, which will increase confidence in the monitoring results. Strengthen control over how public funds allocated for infrastructure and support of the SEZ a respect.

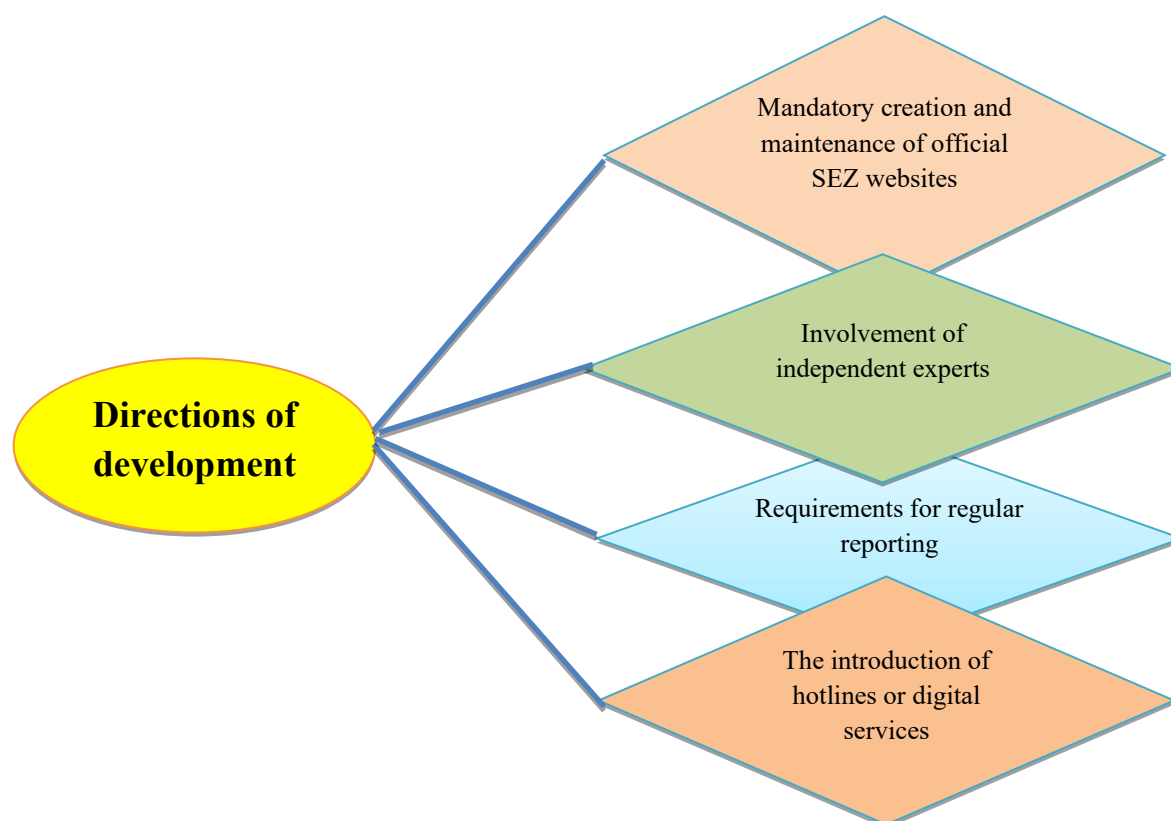


Figure 3 Directions of development of activities of SEZs of RK

Note: Compiled by the authors

Also, another area includes the introduction of hotlines or digital services to receive suggestions and complaints from citizens, investors, and entrepreneurs. Together, these areas can activate the activities of SEZs and thus provide an impetus for the development of innovative businesses in creating new products.

Another primary tool is popularizing the SEZ's activities, which can motivate the local population to create a business that can further cover imports. In this case, the SEZ's role will be important at the initial stage. Thus, the transformation of the activities of special economic zones can give a new impetus to production in the Republic of Kazakhstan, which can open up new industries and diversify production in Kazakhstan.

Conclusion

The development of special economic zones, which can promote production development with an emphasis on innovation, plays a unique role in developing the national innovation system. Also, the effective operation of SEZs will create conditions for business. However, its digital representation helps attract investment and create new projects that can reduce imports by introducing domestic goods. Consequently, the analysis shows that although the SEZ in the Republic of Kazakhstan has a positive activity trend, there are also SEZs where information is unavailable, which shows the ineffective introduction of its activities. Also, the analysis and

evaluation show that the payback period of investment funds is high, which is not attractive from the point of view of financing from outside. Thus, it is proposed that the mandatory creation and maintenance of official SEZ websites, the creation of a requirement for regular reporting, the involvement of independent experts in the assessment and audit of SEZ activities, and the introduction of hotlines or digital services receive suggestions and complaints from citizens, investors, and entrepreneurs.

Conflict of interest. The authors declare no conflict of interest.

Acknowledgement

This study is funded by the Committee on Science of the Ministry of Science and Higher Education of the Republic of Kazakhstan (IRN AP19680544 "Innovative infrastructure of Kazakhstan in the context of digitalization: assessment of the state and development of the atlas").

Authors contributions

Conceptualization and theory: DM and ZS; research design: DM; data collection: SI; analysis and interpretation: SI; writing draft preparation: ZS and SI; correction of article: DM; proofread and final approval of article: DM. All authors have read and agreed to the published version of the manuscript.

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ҚР арнайы экономикалық аймақтары қызметінің цифрлық көрінісін талдау

Андатпа. Арнайы экономикалық аймақтар ұлттық инновациялық жүйенің маңызды элементтерінің бірі болып табылады. Бұл мақалада арнайы экономикалық аймақтардың қызметі зерттеліп, олардың цифрлық кеңістіктегі өкілдігі талданады. Мақсаты-арнайы экономикалық аймақтардың цифрлық өкілдігін талдау және олардың қызметінің тиімділігін арттыру бойынша ұсыныстар әзірлеу. Зерттеуде дедукция, индукция, талдау, синтез және абстракция әдістері қолданылды. Зерттеу барысында нәтижелер Цифрлық кеңістікте Бірнеше арнайы экономикалық аймақ (АЭА) белсенді жұмыс істейтінін және олардың қызметі туралы ақпарат экономиканың барлық қатысушыларына қолжетімді екенін көрсетті. Сондай-ақ, олардың қызметі туралы қолжетімсіз ақпаратты АЭА анықталды. Талдау нәтижелері бойынша аймақтың әлеуметтік-экономикалық дамуы үшін олардың қызметін жетілдіру бойынша ұсыныстар енгізу ұсынылды. Бұл зерттеудің практикалық құндылығы инвесторларға, тұтынушыларға, кәсіпкерлерге және

мемлекеттік органдарға пайдалы болуы мүмкін. Бұл зерттеудің теориялық құндылығы оның ұлттық инновациялық жүйесін дамытудың теориялық зерттеулерін толықтыра алатындығында.

Түйін сөздер: арнайы экономикалық аймақ, кәсіпкер, инновация, өндіріс, инвестор, цифрландыру.

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Анализ цифровой представленности деятельности специальных экономических зон РК

Аннотация. Специальные экономические зоны (СЭЗ) являются одним из важных элементов национальной инновационной системы. В данной статье рассматривается деятельность особых экономических зон и анализируется их представленность в цифровом пространстве. Целью является анализ цифрового представления особых экономических зон и разработка предложений по повышению эффективности их деятельности. В исследовании использовались методы дедукции, индукции, анализа, синтеза и абстрагирования. В ходе исследования результаты показали, что несколько СЭЗ активно работают в цифровом пространстве, и информация об их деятельности доступна всем участникам экономики. Также были выявлены СЭЗ, информация о деятельности которых недоступна. На основании результатов анализа было предложено внести предложения по совершенствованию их деятельности для социально-экономического развития региона. Практическая ценность данного исследования может быть полезна инвесторам, потребителям, бизнесменам и органам государственной власти. Теоретическая ценность данного исследования заключается в том, что оно может дополнить теоретические исследования развития национальной инновационной системы Республики Казахстан.

Ключевые слова: специальные экономические зоны, предприятие, инновация, производство, инвестор, цифровизация.

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