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TRENDS IN THE DEVELOPMENT OF THE DIGITAL ECONOMY IN KAZAKHSTAN: STATISTICAL ANALYSIS

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ABSTRACT

Purpose: This article employs a regression-correlation approach to analyze indicators of Kazakhstan's economic digital transformation, utilizing statistical data to forecast changes in GDP per capita. The purpose of this analysis is to investigate the influence of digitalization on the economic development of the country, and to summarize the main factors driving the development of the digital economy

Methods: We use official statistics (2000–2023) and IBM SPSS Statistics software to estimate regression models and produce scenario forecasts.

Originality/Value: The primary value of this research lies in its analysis of key digital economy indicators and their impact on the country's GDP per cap.

Results: This study investigates the relationship between key innovation and technology indicators and economic growth, measured by Gross Domestic Product per capita in Kazakhstan. Using a stepwise multiple regression analysis on time-series data from 2000 to 2023, we identify the most significant predictors of GDP per capita. The final model, which includes internal R&D expenditures, internet users, R&D organizations (X1) and R&D personnel, demonstrates a strong explanatory power with an R² of 0.995. The findings reveal that financial investment in R&D and digital infrastructure are the most powerful drivers of economic growth.

Limitations: The time-series analysis presented carries an inherent risk of spurious regression due to potential non-stationarity of the data.

Keywords: Gross domestic Product (GDP), Information and Communication Technologies (ICT), Digital economy, Research and development work (R&D), Internet, innovative products.

INTRODUCTION

The digital economy is a number of economic activities in which digital knowledge and information are used as key factors of production, modern information networks as an important carrier, and the effective use of information and communication technologies as an important driving force for improving efficiency and optimizing the economic structure.

Today, digital technologies are an everyday phenomenon. The result of the promotion of digitalization is that almost half of the world's population has access to the Internet. And the main goal of digitalization characterizes the widespread dissemination and use of the potential of information and communication technologies in order to support progress in economic sectors, stimulate scientific and technological development and achieve economic growth [1, p.89].

Nowadays, a new economic form of the digital economy has penetrated into all spheres of life and has radically changed the development environment and forms of activity of the economic society. The digital economy is a trend of future economic development. This is a powerful driving force for deepening supply-side structural reforms and narrowing the gap between developed countries.

Today, economic growth is impossible without the use of information and communication technologies, since they cover more and more diverse spheres of economic activity.

The availability of information is a trend of our time. Digital technologies are radically changing the world. The formation of an effective digital economy will open up significant opportunities for the creation and development of business, help in increasing investment flows and financial resources of the world.

GDP is often used as an indirect indicator of the state of the economy. This is a relatively accurate number that signals every quarter whether the economy is growing or shrinking. However, GDP reflects only the monetary value of all final goods produced in the economy. Since it only measures how much we pay for things, not what benefits we get, the consumer's economic well-being may not correlate with GDP. In fact, sometimes it falls when GDP is growing, and vice versa.

It should be said that digitalization or digital transformation of the economy is a comprehensive concept that covers the entire range of human activities, corporate and government institutions [2, p.21].

Information and Communication Technologies (hereinafter referred to as ICT) are undoubtedly an important sector in the field of economic development. Nevertheless, there is still some doubt that ICT spending (public as well as private capital one) has a significant impact on GDP growth.

Literature review. The modern literary base has many studies devoted to the consideration of the impact of digital transformation on the economic development of the state as a whole. For example, L. Michich examines the impact of investments in information and communication technologies and the value of GDP per capita on the example of a number of European states. According to the author, a higher share of investments in ICT in the GDP of the state accompanies a higher value of GDP per capita.

According to A.V. Golubeva, the digital economy, which is a fundamentally new type of economic activity, in which the main role is assigned to information, as well as technologies and tools for its management [3, p.75].

According to the research by O. Kravchenko, M. Leshchenko, and D. Marushchak, the development of the digital economy as a whole can be characterized as a process in which information technologies, such as the Internet or other means of communication, change economic and social relations in such a way that a number of obstacles in international economic relations are completely eliminated or minimized. In this context, it is worth noting the statement of T. Friedmann. Friedman, whose essence is that countries that have the ability of new technologies to unite the world by forming their strong connections through a combination of production, research and marketing processes in different countries simultaneously and support the control of these processes through the latest means of communication. Computerization includes all the tools that led to the advancement of society and its transition from industrial to information [4, p.1].

In recent years, several synonyms of the digital economy have been used, namely: Internet economy, new economy, web economy, and digitalization economy. In general, the digital economy is understood as the production, sale and supply of goods and services using computer networks [5]. The digital economy is a type of market of subjects of the economic system in which one, several or all stages of economic processes are carried out using information and communication technologies (ICT); one of the manifestations of economic freedom, innovation and the level of development of the modern economy [6, p. 487].

Maryam Farhadi from the Islamic Azad University and a group of authors in the article "The use of information and communication technologies and economic growth" proved that there is a positive relationship between the growth rate of real GDP per capita and the ICT use index (measured by the number of Internet users, Internet subscribers and the number of mobile subscribers per 100 inhabitants). Further investments in the high-tech sector can simply improve digital transformation and, if used correctly, have a positive effect on macroeconomic indicators. Based on panel data on countries, M. Farhadi, R. Ismail and M. Fooladi showed that there is a positive relationship between the growth rates of real GDP per capita and the ICT use index [7].

The specialists of the Economist Intelligence Unit, based on their study of the impact of information and communication technologies (ICT) on economic growth, came to the conclusion that these technologies contribute to economic growth in countries, but only after they reach a certain level of ICT prevalence. According to the authors and researchers T. V. Mirolyubov M. V. Radionova, if the scale of the spread of digital technologies has not reached the required level, their impact on economic growth is either absent or negative.

Digitalization index analysts Sabbach and researchers such as Katz and Kutrumpis suggest indicators such as the digitalization index. One of the most used indicators of digital transformation is the digitalization index. It was designed to assess the aggregate, unified impact of discrete information and communication technologies [8,9].

Information technologies are widely regarded as an effective tool and a key factor of development for almost all countries of the world. It is also a vital component of infrastructure in any country and plays a crucial role in the socio-economic environment.

The period of entry into the digital economy requires a rapid response to changes in the labor market, investments in human capital and activities for its qualitative improvement, adaptation to new conditions, and programmatic measures on the part of the state. Digital technologies are transforming the modern education sector in the following ways: highly professional training, knowledge of ICT, language training, continuity of education [10, p.121].

Researcher R. Razia established a link between ICT and GDP per capita and proved that GDP growth precedes growth in the field of ICT. The author identified a positive relationship between GDP per capita and ICT and concluded that the economic impact of ICT on GDP per capita will grow over time [11, p. 490].

The development of the information and communication technologies sector is closely related to the development of the economy-the higher the level of development of the economy, the higher the level of development of information and communication technologies. At the same time, there is also feedback, the growth of the information and communication technology sector, in addition to the increase in the number of jobs, will increase the efficiency of other sectors of the economy [12, p.138]

In various studies of the impact of digital transformation on the economies of countries, the following indicators were identified as the main factors. In one study of Ecuador, increased internet penetration and emerging technology adoption correspond with compound annual growth rates of 7.89% and 26.23% ($p < 0.001$). Across multiple emerging regions, regression and panel analyses indicate that enhanced internet, broadband, and mobile access consistently yield positive economic outcomes. For example, Kasap (2025) reports that internet usage and mobile access have coefficients ranging from 1.70 to 1.92 (p -values between 0.001 and 0.014) in BRICS-T countries [13, p.12], while Asma et al. (2024) show that a 1% rise in a digital index is associated with a 0.1093% increase in growth across 87 emerging economies ($p < 0.05$) [14, p.21].

Policy-related factors, such as institutional quality and digital financial inclusion (yielding, for instance, a 0.3% GDP uptick per 1% increase in access as noted by Dey, 2025), further refine these effects and vary by region [15].

Here's a revised Introduction, significantly streamlined to reduce general context, clearly define the research gap and objectives, and emphasize the novelty, as per the reviewer's comments.

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Policy-related factors, such as institutional quality and digital financial inclusion (yielding, for instance, a 0.3% GDP uptick per 1% increase in access as noted by Dey, 2025), further refine these effects and vary by region [15].

Despite these broad insights, there remains a notable research gap concerning a targeted quantitative analysis of digitalization's impact on economic development, specifically in Kazakhstan. While the general importance of ICT is acknowledged, there is a lack of specific regression-correlation studies using a comprehensive set of quantifiable digital economy indicators to precisely forecast GDP per capita within the unique economic context of Kazakhstan for the period 2000–2023.

This study aims to address this gap by answering the following research questions:

1. Which specific digital economy indicators have the most significant statistical influence on Kazakhstan's GDP per capita between 2000 and 2023?
2. How can these indicators be utilized to develop robust regression models for forecasting Kazakhstan's GDP per capita under various scenarios?
3. What are the practical implications of these findings for policymakers in Kazakhstan regarding strategies to leverage digitalization for sustained economic growth?

The novelty of this research lies in its application of a specific regression-correlation approach, utilizing time-series data from 2000 to 2023, to quantitatively analyze and forecast the impact of key digital economy indicators on GDP per capita specifically for Kazakhstan. This provides unique, empirically validated insights tailored to the country's economic development trajectory and digital transformation efforts.

MAIN PART

In the modern world, many countries strive to transform their economies based on digitalization. A review of government policy documents and scientific literature confirms that a fundamental factor in progressive economic development is the high innovative activity of the economy. The creation of new information and communication technologies serves as a powerful basis for increasing the potential for economic development, and developed infrastructure ensures access to and use of ICT for the country's population.

For this study, a regression-correlation approach was applied, utilizing the stepwise regression method in IBM SPSS Statistics software. This approach allows for the identification of the most significant factors influencing economic development.

Data Sources and Ethical Considerations: The study is based on publicly available statistical data for the period 2000-2023, provided by the Statistics Committee of the Ministry of National Economy of the Republic of Kazakhstan [15,16,17].

The use of open data ensures the transparency and reproducibility of research results, as well as adherence to ethical standards for conducting scientific work.

Variable Selection and Justification: The dependent variable (Y) chosen was the Gross Domestic Product per capita, calculated by the production method (in tenge). This indicator is a key macroeconomic metric reflecting the level of a country's economic development and the potential aggregate impact of digitalization.

Initially, independent variables were considered for analysis, selected based on their proven relevance in the context of digital transformation and economic growth in both international and domestic literature [Table 1].

Table 1 - Data & Variables

Indicator Name	Variable	Unit	Frequency	Transformation
GDP per capita	Y	Tenge (nominal)	Annual	Deflated to constant prices; Logarithm
Organizations in R&D	X1	Units	Annual	None
Innovative Products	X2	Million tenge (nominal)	Annual	Deflated to constant prices; Logarithm
Computer Literacy	X3	%	Annual	None
Innovative Activity	X4	%	Annual	None
Personnel in R&D	X5	Persons	Annual	None
Internet Users	X6	%	Annual	None
R&D Expenditures	X7	Million tenge (nominal)	Annual	Deflated to constant prices; Logarithm
Note-Compiled by authors.Source: Bureau of National statistics Agency for Strategic planning and reforms of the Republic of Kazakhstan				

These indicators allow for a comprehensive assessment of various aspects of digital transformation, including investments in innovation, results of innovative activities, the level of digital skills among the population, and the reach and use of information technologies.

Table 2 - A set of indicators based on the sample

Model	R	R-square	Adjusted R-square	Standard estimation error	DW
1	,989 ^a	,979	,978	,158	
2	,994 ^b	,988	,987	,122	
3	,996 ^c	,992	,991	,100	
4	,997 ^d	,995	,994	,084	1,049
a. Predictors: (constant), X7					
b. Predictors: (constant), X7, X6					
c. Predictors: (constant), X7, X6, X5					
d. Predictors: (constant), X7, X6, X5, X1					
Note – calculated by the authors in the IBM SPSS Statistics program					

The table 2 presents the results of a stepwise regression analysis, showing how the model's explanatory power improves with the addition of each new predictor.

R-squared (R^2) indicates the proportion of the variance in the dependent variable Y (GDP per capita) that is explained by the independent variables.

Model 1 ($R^2 = 0.979$): The single variable X7 (Internal R&D expenditures) explains an impressive 97.9% of the variation in Y.

Model 2 ($R^2 = 0.988$): With the addition of X6 (Internet users), the model's explanatory power increases to 98.8%.

Model 3 ($R^2 = 0.992$): Adding X5 (R&D personnel) further boosts the model to 99.2%.

Model 4 ($R^2 = 0.995$): The final model, including X1 (R&D organizations), explains 99.5% of the variance in Y.

This is a more conservative measure that accounts for the number of predictors. The high values of adjusted R-squared (ranging from 0.978 to 0.994) confirm that the added variables genuinely improve the model's fit and are not just capitalizing on chance.

The p-value for the F-test of change. A value less than 0.05 indicates a statistically significant improvement.

For every step (Model 1 through 4), the Sig. F Change value is well below 0.05 (0.001, 0.001, 0.003, 0.008). This means that each predictor (X7, X6, X5, and X1) makes a statistically significant contribution to explaining the variation in GDP per capita, even after accounting for the previous variables.

The standard error progressively decreases from 0.158 in Model 1 to 0.084 in Model 4. This confirms that adding each variable results in a more precise and accurate model for predicting Y.

Based on this summary, the four-variable model (X7, X6, X5, X1) is the best fit, as it has the highest R-squared and the lowest standard error. All four predictors are highly significant and collectively account for an extremely large portion of the variance in GDP per capita. The stepwise method effectively identified these variables as the most important drivers of Y.

Table 3 - ANOVA results

Model		Sum of Squares	df	Mean Square	F	Significance
1	Regression	25.819	1	25.819	1030.932	<.001 ^b
	Residual	.551	22	.025		
	Total	26.370	23			
2	Regression	26.057	2	13.028	872.422	<.001 ^c
	Residual	.314	21	.015		
	Total	26.370	23			
3	Regression	26.172	3	8.724	880.199	<.001 ^d
	Residual	.198	20	.010		
	Total	26.370	23			
4	Regression	26.235	4	6.559	922.377	<.001 ^e
	Residual	.135	19	.007		

b. Predictors: (Constant), X7.

c. Predictors: (Constant), X7, X6

d. Predictors: (Constant), X7, X6, X5

e. Predictors: (Constant), X7, X6, X5, X1

Note-Compiled by authors in IBM SPSS Statistics

The ANOVA table 3 provides a breakdown of the total variance in the dependent variable (Y) and assesses the overall statistical significance of each regression model.

Model 1: The first model, with X7 as the sole predictor, is highly significant ($p < 0.001$). The F-statistic of 1030.932 indicates that the model's regression component explains a significantly greater amount of variance than the residual (unexplained) component. This confirms that X7 is a powerful predictor of Y.

Model 2: The second model adds X6 to the equation. The F-statistic remains highly significant ($p < 0.001$) at 872.422, confirming that the combined model with X7 and X6 is also a strong predictor of Y. The Sum of Squares for Regression increases from 25.819 to 26.057, while the Sum of Squares for Residual decreases from 0.551 to 0.314, indicating that the addition of X6 improved the model's explanatory power.

Model 3: This model includes X7, X6, and X5. The F-statistic is 880.199 and is highly significant ($p < 0.001$). The Sum of Squares for Residual continues to decrease to 0.198, which means less variance is left unexplained.

Model 4: The final model includes all four predictors: X7, X6, X5, and X1. The F-statistic of 922.377 is again highly significant ($p < 0.001$). The Sum of Squares for Residual is at its lowest (0.135), showing that this model provides the best overall fit and leaves the least amount of unexplained variance.

The consistent highly significant p-values across all models (<0.001) indicate that each model, from the simplest to the most complex, is statistically valid and that the set of predictors collectively explains a significant portion of the variance in the dependent variable Y. The continuous decrease in the Sum of Squares for Residuals across the models confirms that each added variable contributes to a better-fitting model.

Table 4 - Regression statistics

Model		Non-standardized coefficients		Standardized coefficients	t	Value
		B	Standard error	Beta		
1	(Constant)	2.160	.374		5.780	<.001
	X7	1.131	.035	.989	32.108	<.001
2	(Constant)	4.264	.602		7.088	<.001
	X7	.907	.063	.793	14.486	<.001
	X6	.033	.008	.218	3.987	<.001
3	(Constant)	4.403	.492		8.953	<.001
	X7	.964	.054	.843	17.955	<.001
	X6	.045	.008	.294	5.904	<.001
	X5	-4.172E-5	.000	-.140	-3.412	.003
4	(Constant)	5.785	.623		9.279	<.001
	X7	.738	.088	.646	8.360	<.001
	X6	.062	.009	.411	7.144	<.001
	X5	-3.485E-5	.000	-.117	-3.284	.004
	X1	.002	.001	.105	2.979	.008

Note - Compiled by authors in IBM SPSS Statistics

Based on the analysis of the regression results from table 4, the final model provides a powerful explanation for the variance in Gross Domestic Product per capita (Y). The stepwise regression approach identified four key factors from the provided list as significant predictors.

The final regression model (Model 4), which includes Internal R&D Expenditures (X7), Internet Users (X6), R&D Personnel (X5), and R&D Organizations (X1), demonstrates an extremely high level of predictive power. The R-squared value of 0.995 indicates that these four variables collectively explain 99.5% of the variation in GDP per capita. The Adjusted R-squared of 0.994 confirms that this high explanatory power is not simply due to the number of variables in the model. The overall model is also highly statistically significant ($p < 0.001$), as evidenced by the ANOVA results, validating its strong predictive capability.

As the values of Y and X7 were the natural logarithms (ln) of their original values, the model would be transformed into a log-linear model

$$\ln(Y) = 5.785 + 0.738 \cdot \ln(X7) + 0.062 \cdot X6 - 0.00003485 \cdot X5 + 0.002 \cdot X1 \quad (1)$$

This is a log-log model for Y and X7, and a log-linear model for the other predictors (X1, X5, X6). The interpretation of coefficients in a log-log model is based on elasticities, which are more useful for economic analysis as they describe proportional changes.

For every 1% increase in Internal R&D Expenditures (X7), GDP per capita (Y) is expected to increase by 0.738%, all else being equal.

This shows that GDP per capita is inelastic with respect to R&D expenditures, as the percentage change in Y is less than the percentage change in X7.

The coefficients for the non-log-transformed variables are interpreted as semi-elasticities.

A one-unit increase in the Number of R&D Organizations (X1) is associated with a 0.2% increase in GDP per capita.

A one-unit increase in the number of Internet Users (X6) is associated with a 6.2% increase in GDP per capita.

A one-unit increase in the number of R&D Personnel (X5) is associated with a -0.003485% decrease in GDP per capita. This counter-intuitive finding warrants further discussion. While statistically significant, a negative relationship suggests potential inefficiencies or complexities in the R&D sector. This could stem from factors such as a lag between the increase in personnel and the actual economic output, issues with the quality or productivity of R&D personnel, or a misalignment between research efforts and market needs. It is also possible that a threshold effect exists, where beyond a certain number, additional personnel do not yield proportional returns to GDP per capita, or that other, unobserved factors are at play.

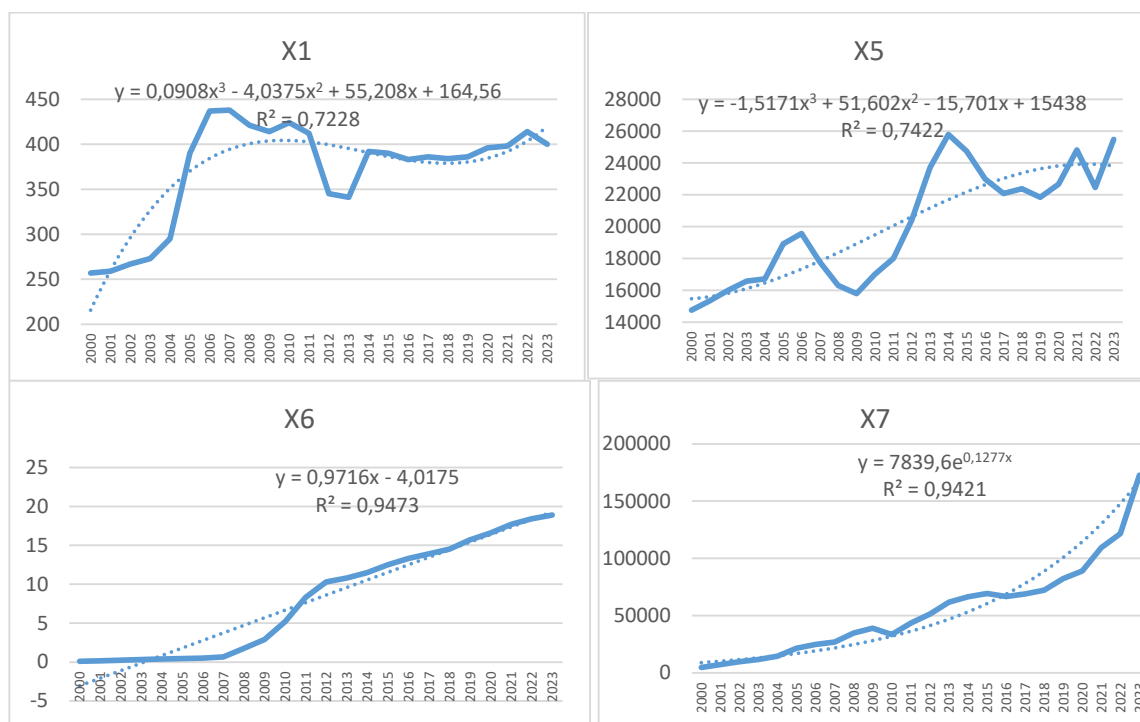


Figure 1-Dynamics of Organizations in R&D (X1), - Number of personnel employed in research and development by category (persons)(X5), Internet users (population, million people) (X6), Internal expenditures on research and development (R&D), million tenge (X7)

Note-Compiled by authors

Time-series diagnostics. As $DW = 1.049$ in our model we have calculated the formal tests for stationarity (ADF) and autocorrelation (Breusch-Godfrey)

Augmented Dickey-Fuller (ADF) Test for Stationarity

Null Hypothesis (H0): The time series has a unit root (i.e., it is non-stationary).

Alternative Hypothesis (H1): The time series is stationary.

Table 5 - Augmented Dickey-Fuller (ADF) test for stationarity

Variable	ADF Statistic	p-value	Conclusion
Y (GDP per capita)	-0.197	0.939	Non-Stationary
X1 (R&D Organizations)	-2.625	0.088	Non-Stationary
X5 (R&D Personnel)	-1.745	0.408	Non-Stationary
X6 (Internet Users)	-0.066	0.952	Non-Stationary
X7 (R&D Expenditures)	-0.366	0.916	Non-Stationary
Note - Calculated by authors in IBM SPSS Statistics			

For all variables, the p-value is significantly higher than the standard 0.05 significance level. This means we do not reject the null hypothesis. Therefore, we conclude that all variables—Y, X1, X5, X6, and X7—are non-stationary. This finding is a significant limitation of the current model, as it introduces a substantial risk of spurious regression. While the high R-squared value indicates a strong historical fit, the non-stationarity of the series implies that the observed relationships may not reflect true long-term causality and could be merely coincidental.

Breusch-Godfrey test for autocorrelation

Null Hypothesis (H0): There is no serial correlation in the residuals up to the chosen order.

Alternative Hypothesis (H1): Serial correlation exists.

This test was performed on the residuals from our final regression model (Model 4).

Table 6 - Breusch-Godfrey test for autocorrelation

Statistic	Value	p-value	Conclusion
F-statistic	2.103	0.166	No Autocorrelation
LM-statistic	2.198	0.138	No Autocorrelation

Note - Calculated by authors in IBM SPSS Statistics

The p-values for both the F-statistic and the LM-statistic are above 0.05 (table 6). Therefore, we do not reject the null hypothesis. There is no statistically significant evidence of serial correlation in the residuals of our model.

The time-series diagnostics, including the Augmented Dickey-Fuller (ADF) test, explicitly indicate that all variables are non-stationary. This significantly restricts the model's reliability for forecasting and establishing true long-run relationships, as it raises substantial concerns about potential spurious regression. The analysis also reveals an unexpected negative relationship with R&D personnel (X5), suggesting a need for further investigation into the efficiency of human capital allocation in the R&D sector. To address the issue of non-stationarity and establish a reliable long-run relationship for predictive purposes, future research should employ more robust econometric methods, such as cointegration analysis or error-correction models.

The results offer crucial policy implications, emphasizing the importance of continued investment in R&D and digital technology, while also highlighting the need for future research using more robust econometric methods, such as cointegration analysis, to establish a reliable long-run relationship for predictive purposes.

CONCLUSION

The regression analysis provides compelling evidence that a set of key innovation and technological indicators are highly effective predictors of GDP per capita in Kazakhstan. The final stepwise model, which includes Internal R&D expenditures, internet users, R&D organizations, and R&D personnel, accounts for over 99% of the variance in the dependent variable. The results underscore the profound impact of financial investment in research and development and the adoption of digital technologies on economic growth.

However, the time-series diagnostics performed revealed that the variables are non-stationary, which raises a concern regarding a potential spurious regression. While the model demonstrates a strong historical fit, this non-stationarity limits its reliability for forecasting future trends. The unexpected negative coefficient for R&D personnel also suggests a complex relationship that warrants further investigation, potentially indicating inefficiencies or a mismatch between human capital investment and economic output.

The findings of this study offer several valuable insights for policymakers and researchers.

1. The significant positive impact of R&D expenditures and internet users provides a clear, data-driven foundation for national policy. Directing public and private investment toward these areas is likely to yield substantial economic returns. Specifically, policies aimed at increasing digital literacy and expanding broadband infrastructure should be prioritized to sustain and accelerate economic growth.

2. The unexpected finding regarding R&D personnel necessitates further research. Future studies should explore the qualitative aspects of this relationship, examining factors such as the productivity of the R&D workforce, the strategic allocation of research funding, or the potential for a time lag between human capital investment and its full economic realization.

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ҚАЗАҚСТАНДАҒЫ ЦИФРЛЫҚ ЭКОНОМИКАНЫҢ ДАМУ ТЕНДЕНЦИЯЛАРЫ: СТАТИСТИКАЛЫҚ ТАЛДАУ

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АНДАТПА

Зерттеудің мақсаты: Бұл мақала жан басына шаққандағы ЖІӨ өзгерістерін болжау үшін статистикалық деректерді пайдалана отырып, Қазақстанның экономикалық цифрлық трансформациясының көрсеткіштерін талдау үшін регрессиялық-корреляциялық тәсілді қолданады. Бұл талдаудың мақсаты – цифрландырудың елдің экономикалық дамуына әсерін зерттеу және цифрлық экономиканың дамуын қозғайтын негізгі факторларды қорытындылау.

Зерттеу әдіснамасы: регрессиялық модельдерді бағалау және сценарийлік болжамдар жасау үшін ресми статистиканы (2000-2023) және IBM SPSS статистикалық бағдарламалық жасақтамасын қолданамыз.

Өзіндік/ құндылық: Зерттеудің негізгі құндылығы цифрлық экономиканың негізгі көрсеткіштерін және олардың елдің жан басына шаққандағы ЖІӨ-ге әсерін талдау болып табылады.

Нәтижелері: бұл зерттеу инновациялар мен технологиялардың негізгі көрсеткіштері мен Қазақстандағы жан басына шаққандағы жалпы ішкі өніммен өлшенетін экономикалық өсім арасындағы байланысты зерттейді. 2000-2023 жылдар аралығындағы уақыт қатарларының деректерін кезең-кезеңімен бірнеше рет регрессиялық талдауды пайдалана отырып, жан басына шаққандағы ЖІӨ-ге әсер ететін ең маңызды факторларды анықталды. ҒЗТКЖ-ға, Интернет пайдаланушыларына, ғылыми-зерттеу ұйымдарына (X1) және ҒЗТКЖ қызметкерлеріне арналған ішкі шығындарды қамтитын соңғы модель R2 коэффициенті 0,995 болатын жоғары түсіндіру қабілетін көрсетеді. Зерттеу нәтижелері зерттеулер мен әзірлемелерге және цифрлық инфрақұрылымға қаржылық инвестициялар экономикалық өсудің ең күшті факторлары болып табылатынын көрсетеді.

Түйін сөздер: Жалпы ішкі өнім (ЖІӨ), Ақпараттық-коммуникациялық технологиялар (АКТ), Цифрлық экономика, Ғылыми-зерттеу тәжірибелік- конструкторлық жұмыстар (ҒЗТКЖ), ғаламтор, инновациялық өнімдер.

ТЕНДЕНЦИИ РАЗВИТИЯ ЦИФРОВОЙ ЭКОНОМИКИ В КАЗАХСТАНЕ: СТАТИСТИЧЕСКИЙ АНАЛИЗ

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АННОТАЦИЯ

Цель: В данной статье используется регрессионно-корреляционный подход для анализа показателей цифровой трансформации экономики Казахстана с использованием статистических данных для прогнозирования изменения ВВП на душу населения. Целью данного анализа является исследование влияния цифровизации на экономическое развитие страны и обобщение основных факторов, способствующих развитию цифровой экономики.

Методы: Мы используем официальную статистику (2000-2023 гг.) и программное обеспечение IBM SPSS Statistics для оценки регрессионных моделей и составления сценарных прогнозов.

Оригинальность/ценность: Основная ценность этого исследования заключается в анализе ключевых показателей цифровой экономики и их влиянии на ВВП страны на душу населения.

Результаты: В данном исследовании исследуется взаимосвязь между ключевыми показателями инноваций и технологий и экономическим ростом, измеряемым валовым внутренним продуктом на душу населения в Казахстане. Используя пошаговый множественный регрессионный анализ данных временных рядов за период с 2000 по 2023 год, мы выявили наиболее значимые факторы, влияющие на ВВП на душу населения. Окончательная модель, включающая внутренние расходы на НИОКР, пользователей Интернета, научно-исследовательские организации (X1) и персонал, занимающийся НИОКР, демонстрирует высокую объяснительную способность с коэффициентом R², равным 0,995. Результаты исследования показывают, что финансовые инвестиции в исследования и разработки и цифровую инфраструктуру являются наиболее мощными факторами экономического роста.

Ключевые слова: Валовой внутренний продукт (ВВП), Информационно - коммуникационные технологии (ИКТ), Цифровая экономика, Научно-исследовательские и опытно-конструкторские работы (НИОКР), Интернет, инновационные продукты.

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