

The Impact of Economic Growth and Foreign Investment on the Advancement of E-commerce

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ABSTRACT: This study examines the interrelationship between economic growth, foreign investment, and e-commerce development in Kyrgyzstan from 2010 to 2022. Using correlation and regression analyses, the research reveals a strong positive relationship between foreign investment and GDP growth, with a 1% change in foreign investment corresponding to a 0.86% change in GDP. The study finds that increased investment and economic growth in key sectors such as information and communication, financial intermediation, and trade have significantly contributed to e-commerce expansion. This is evidenced by increases in Internet access points, mobile subscriptions, and bank card circulation. The research utilizes the UNCTAD B2C E-commerce Index to track Kyrgyzstan's progress in e-commerce readiness, showing improvements correlating with economic and investment growth. Practical implications for policymakers were created. It is recommended to prioritize policies that attract foreign investment, particularly in ICT, financial services, and trade sectors to stimulate e-commerce growth; develop targeted strategies to improve digital infrastructure and increase internet accessibility nationwide; implement regulations that facilitate secure online transactions and protect consumer rights in e-commerce; invest in digital literacy programs to increase e-commerce adoption among the population; create incentives for businesses to develop online platforms and integrate e-commerce into their operations; foster partnerships between foreign investors and local businesses to transfer knowledge and technology in e-commerce.

Keywords: gross domestic product, foreign capital, digital economy, financial investments, online trading.

I. INTRODUCTION

Economic development, investment, especially foreign investment, and e-commerce are intricately interconnected and have become increasingly crucial in modern economies. The proliferation of digital commerce has become a major driver for progress, allowing enterprises to surpass geographical limitations, connect with worldwide consumers, and enter new markets [1]. Digital platforms enable improved customer interaction and service refinement, motivating firms to innovate and enhance the quality of their products and services in response to increased online competition. This dynamic stimulates the development of new market initiatives that require astute investment. Efficient distribution and control of investments not only expedite economic expansion but also enhance overall sustainable national development.

In recent years, there has been considerable scholarly focus on the incorporation of e-commerce into conventional economic frameworks. Scholarly research has progressively acknowledged the significant influence of digital commerce on economic progress, emphasizing its capacity to stimulate economic expansion, encourage entrepreneurial activities, and advance inclusiveness in the worldwide market [2]. Evidence highlights the significance of foreign investment as a crucial catalyst for the growth of e-commerce, underlining the need to implement strategic investment measures to optimize developmental results [3]. Although there is increasing acknowledgement of the significance of e-commerce and foreign investment in economic development, there are still many deficiencies in our comprehension of their interconnectedness. An urgent necessity exists to further investigate the processes by which economic growth, investment, and e-commerce interact, and to ascertain the fundamental obstacles and possibilities inherent in this dynamic ecosystem. The

objective of this research is to fill the existing gaps in knowledge and offer significant insights that can guide policy making and strategic decision-making in both the public and private sectors.

The complex interplay between economic growth, investment, and e-commerce presents a myriad of challenges that warrant careful consideration [4]. These challenges may include regulatory barriers, infrastructural limitations, cybersecurity threats, and disparities in digital literacy and access. Moreover, the rapid pace of technological advancement and evolving consumer preferences further complicate the landscape, requiring adaptive strategies to navigate effectively [5].

The interrelationships among economic growth, investment, and e-commerce are complex and significantly influential on contemporary economies. The advent of e-commerce has become a paramount catalyst for economic advancement, facilitating enterprises to surpass geographical limitations, establish connections with consumers worldwide, and penetrate additional markets. The process of digital transformation improves customer interaction and service quality, which motivates companies to innovate and enhance their products or services to remain competitive in the online market [6]. These dynamics create the need for strategic investment to maximize growth results in new market initiatives. Strategic allocation and effective management of investments not only expedite economic growth but also enhance the overall sustainable development of a nation. The assimilation of e-commerce into conventional economic structures has been acknowledged for its ability to propel economic expansion, encourage entrepreneurial activities, and advance inclusiveness in the global marketplace. International investment, specifically, serves as a crucial driver for the expansion of electronic commerce by financing the construction of infrastructure and technological progress. Nevertheless, this interaction is not devoid of obstacles, including regulatory impediments, constraints in infrastructure, risks to cybersecurity, and inequalities in digital literacy and availability [7]. The swift rate of technological advancements and changing consumer tastes significantly complicate the situation, requiring flexible approaches to successfully navigate these intricacies. Policymakers and businesses need to comprehend these interrelationships and tackle the fundamental obstacles to fully exploit the potential of e-commerce and investment in stimulating economic growth.

Despite the existing scientific developments, analytical substantiation of the role and relationship between economic growth, investment, including foreign investment, and the development of e-commerce in the Republic of Kyrgyzstan is practically absent in the scientific literature. The research question for the study can be formulated as follows: "How do economic growth and foreign investment influence the development of e-commerce in Kyrgyzstan, and what are the key factors driving this relationship?". The hypotheses were formulated:

H1: There exists a statistically significant positive correlation between foreign direct investment (FDI) inflows and gross domestic product (GDP) growth in Kyrgyzstan.

H2: The development and expansion of e-commerce in Kyrgyzstan are significantly influenced by economic growth, as measured by GDP, and foreign direct investment (FDI) in critical sectors such as information and communication technology (ICT), financial services, and trade.

Therefore, the purpose of this study was to investigate the relationship between investment and economic growth, and their impact on the development of e-commerce in Kyrgyzstan based on the assessment of analytical and statistical data. The objectives of the article were as follows:

1. To investigate the reciprocal relationship between economic growth, foreign investment, and the development of e-commerce in Kyrgyzstan, exploring how each factor influences the others and identifying the extent of their impact on the country's economy.
2. To analyze the drivers of e-commerce development in Kyrgyzstan, particularly examining the contributions of economic growth and foreign investment to the expansion of online commerce platforms and digital entrepreneurship.
3. To assess the effectiveness of foreign investment in stimulating economic growth and fostering the growth of e-commerce in Kyrgyzstan, aiming to provide insights for policymakers on enhancing the investment climate and maximizing the positive impact on the country's digital economy.

This study is unique and innovative because it uses an integrated framework to comprehensively analyze the relationship between economic growth, foreign investment, and e-commerce development in Kyrgyzstan, a context that is often neglected in current literature. Utilizing longitudinal data over ten years and employing comprehensive indicators, the study presents a rigorous empirical analysis that provides a multi-dimensional perspective on the development of e-commerce. The incorporation of a regression model for predictive analysis, the integration of the UNCTAD B2C E-commerce Index for comparative evaluation, and the sector-specific analysis of key industries are novel elements that enrich the scope and comprehensiveness of the study.

The framework starts with foreign investment and economic growth, which are identified as the primary drivers of development. These factors serve as the foundation for the entire process. It is proposed that foreign investment and GDP growth lead to the development of key sectors such as: information and communication, financial intermediation, trade (wholesale and retail), development of e-commerce. As these key sectors develop, they collectively contribute to the growth of e-commerce. The framework posits that improvements in digital infrastructure, financial services, and trade directly support the expansion of e-commerce platforms and activities. This creates a positive feedback loop, reinforcing the initial drivers and accelerating overall development. The framework emphasizes the importance of tracking dynamic changes in economic indicators, such as the GDP, foreign investment, and specific e-commerce metrics (e.g., licensed software tools, Internet access points, mobile subscriptions). These indicators provide insights into the ongoing impact of economic factors on e-commerce development.

Furthermore, this study serves to connect academic research with practical implementation by offering policy suggestions that target the enhancement of the investment environment and the promotion of digital economic development. This interdisciplinary methodology, which combines principles from economics, finance, and information technology, effectively tackles significant deficiencies in knowledge and provides valuable perspectives for policymakers, corporate executives, and researchers in Kyrgyzstan and other regions (Figure 1).



FIGURE 1. Economic development, investment, and E-Commerce.

II. LITERATURE REVIEW

A.K. Tabyshova [1] concludes that despite fluctuations in global trade, the growth rate of e-commerce is impressive. The existing global trends are also relevant for the commodity markets of Central Asia (Kyrgyzstan, Kazakhstan, Uzbekistan). Small businesses in this region have many opportunities to promote their products through information technology. E-commerce in Kyrgyzstan is gaining popularity and is actively developing. It opens new opportunities for entrepreneurs and consumers, contributing to the country's economic development [2-3]. However, Kyrgyzstan has the potential for further, more intensive development in this area. According to A.J. Bektasheva [4], one of the key aspects of the development of this area is cooperation between the state and business, specifically in creating favourable conditions for attracting investment. However, according to S.B. Makeeva and A.S. Abarbekova [5], despite a number of particular measures taken to liberalise the economy, Kyrgyzstan, due to a combination of objective and subjective factors that create obstacles to attracting investment, is among the least competitive economies in the world and has very low investment to gross domestic product (GDP) ratios among neighbouring countries.

Studying the implementation and perception of Chinese investment in Kyrgyzstan, I. Jones [6] notes that there are various effects of foreign investment in the short and long term. Short-term benefits from foreign investment, quickly bringing jobs and tax revenues to local budgets. As noted by S. Furstenberg and K. Toktomushev [7], investment projects involve the implementation of training and professional development programmes, and in the long term, the development of infrastructure is ensured, which increases the efficiency of the logistics component of the business, simplifies the conditions for doing business and leads to stimulation

of the local economy through increased demand for hotel business, shops, restaurants, and small enterprises in places where there is an increase in labour force. This will also increase budget revenues through taxes.

The problems of taxation of e-commerce in Kyrgyzstan and assessment of international experience of taxation of e-commerce in developed countries are discussed in the study by G. Tashkulova et al. [8], where it is noted that the e-commerce market in Kyrgyzstan is developing rapidly, which leads to the development of tax administration-related issues in this area. Currently, the process of creating a regulatory framework for e-commerce is underway, which involves defining the basic principles of regulating the activities of e-commerce participants, the procedure for executing transactions and the principles of taxation. Notably, taxation in this area will affect the investment environment. According to M.J. Maadanbekova [9], the state of investment attractiveness of the Kyrgyz Republic is formed under the influence of the state administrative mechanism and requires the implementation of effective approaches to ensuring the principles of investor support. A clear policy on investment priorities and consistency of economic policy, as well as high accountability of the authorities, are essential for investors to make positive decisions about investing in the country's economy, especially foreign investors [10].

Song et al. [11] argue that while economic growth is important, other factors such as income distribution, access to education, healthcare, and environmental sustainability also play vital roles in determining overall quality of life and, by extension, the potential for e-commerce adoption. Azman-Saini et al. [12] demonstrate that foreign investment provides capital inflows, creates new jobs, and supplies modern technologies and equipment, thereby enhancing resource efficiency and creating a basis for sustainable development. The development of technological infrastructure is crucial for e-commerce growth. Timilsina et al. [13] note that economic growth and e-commerce development are often accompanied by investments in both physical and virtual technological infrastructure. This includes expanding internet access, improving communication speeds, and creating electronic payment systems.

Yu et al. [14] argue that economic growth primarily influences e-commerce through increased purchasing power. Similarly, Haji [15] concludes that as economies grow, populations have more opportunities for consumption, potentially leading to an increase in online shopping. This perspective is further supported by Vu et al. [16], who posit that information and computer technologies are not only drivers of the economy but fundamental factors of economic growth in the modern economy. The banking sector plays a pivotal role in e-commerce development. Vinoth et al. [17] substantiate that a developed system of banking services provided via the internet, including smartphone access and personal bank accounts with cards, is substantially related to the popularization of e-commerce.

The literature consistently emphasizes the need for supportive policies to attract and retain foreign investment. As noted by several researchers [14-20], this involves increasing transparency and accountability, reforming regulatory frameworks, strengthening property rights, enhancing financial stability, building institutional components, developing public-private partnerships, and implementing best international cooperation practices.

Significantly limited is the relevant prior research on the correlation between economic growth, foreign investment, and e-commerce development, especially in the setting of developing countries such as Kyrgyzstan. Although there exists a significant amount of literature on these subjects in industrialised economies, the distinct economic and political realities of Central Asian countries have been mostly disregarded. Current research often concentrates on discrete elements of economic growth, investment, or e-commerce without offering a comprehensive framework that analyses their interaction. Moreover, the empirical analysis in prior studies often depends on short-term data or limited sets of indicators, which may not fully encompass the intricacy of these connections. Additionally, the operational consequences of such research for policy and strategic decision-making are frequently insufficiently explored. To fill these gaps, this research intends to provide a thorough, long-term analysis that combines many aspects of e-commerce growth and offers practical insights for policymakers and stakeholders in Kyrgyzstan.

By systematically visualizing data and providing empirical support, this study aims to bridge the existing knowledge gaps and contribute to a more comprehensive understanding of the interconnections between economic growth, investment, and e-commerce in Kyrgyzstan.

III. METHOD

1. PROBLEM STATEMENT

This study investigates the relationship between economic growth, foreign investment, and the development of e-commerce in Kyrgyzstan. Specifically, it seeks to understand how economic growth and

foreign direct investment influence the expansion of e-commerce activities and digital infrastructure in the country, and to what extent these factors are interconnected.

2. RESEARCH DESIGN

The primary objectives of this study were to assess the relationship between economic growth and foreign investment in Kyrgyzstan, analyze the development of e-commerce, and examine the impact of economic factors on the e-commerce landscape. The study employed correlation and regression analyses to quantify the strength and form of the relationship between GDP and foreign investment. Data on GDP and foreign investment were obtained from the National Statistical Committee of the Kyrgyz Republic, and various indicators of e-commerce development were chosen to capture key aspects of digital commerce in Kyrgyzstan.

The choice of analytical methods was guided by the nature of the research questions and the type of data available. The Pearson correlation coefficient was selected for correlation analysis due to its ability to measure the strength and direction of the linear relationship between two variables, in this case, GDP and foreign investment. Linear regression was chosen to assess the relationship between GDP and foreign investment because it allows for the modeling of a linear relationship between the dependent and independent variables, facilitating predictions and understanding of the impact of one variable on the other.

The theoretical framework of this study aims to methodically examine the correlation between economic growth, foreign investment, and the development of e-commerce in Kyrgyzstan. The methodology commences by gathering longitudinal data on Gross Domestic Product (GDP), foreign investment, and important e-commerce indicators from authoritative sources like the National Statistical Committee of the Kyrgyz Republic. Following the processing of the data to guarantee precision and uniformity, a correlation analysis is conducted using the Pearson correlation coefficient to quantify the magnitude and direction of the association between GDP and foreign investment. Following this, a linear regression model is utilized to measure the influence of foreign investment on GDP, and the coefficient of determination (R^2) is employed to evaluate the correctness of the model. Furthermore, the framework incorporates a sector-specific examination of crucial industries such as information and communication, financial intermediation, and trade, to comprehend their role in the expansion of e-commerce. A comparative assessment of Kyrgyzstan's e-commerce growth is conducted by integrating the UNCTAD B2C E-commerce Index. The last stage entails analyzing the findings to extract policy implications and strategic directions for improving the investment climate and advancing digital economic growth in Kyrgyzstan.

The methodology utilized in this study, although thorough, has various constraints that need to be taken into account. Firstly, the dependence on aggregate data may obscure differences at the regional or sectoral levels, so oversimplifying the intricate dynamics of economic growth and the development of e-commerce. Secondly, the assumption of a linear correlation between GDP and foreign investment in the regression analysis may not comprehensively encompass the complex and possibly non-linear interconnections among these factors. Thirdly, the emphasis on specific measures of e-commerce growth may fail to consider other significant elements that impact digital commerce, such as regulatory frameworks, consumer dynamics, and technological progress. Fourthly, although correlation and regression analyses offer useful insights, they are unable to establish causality conclusively, underscoring the need for supplementary qualitative research to validate results. Fifthly, the study's exclusive examination of Kyrgyzstan may restrict the applicability of the findings to other situations, emphasizing the need to conduct comparative studies in various geographical areas and economic environments.

3. DATA COLLECTION

GDP and foreign investment data were obtained from official sources, specifically the National Statistical Committee of the Kyrgyz Republic. These data were processed to ensure accuracy and consistency, including adjusting GDP calculations to exclude the impact of price growth. No significant data preprocessing steps were undertaken beyond ensuring data integrity and reliability.

The study spans from 2010 to 2022, providing a comprehensive view of Kyrgyzstan's economic and e-commerce development over more than a decade. This timeframe was chosen to capture long-term trends and the effects of various economic policies and foreign investment initiatives. The sectors of information and communication, financial intermediation, and trade were selected due to their critical role in facilitating e-commerce:

Information and Communication: This sector provides the technological infrastructure necessary for e-commerce, including internet connectivity and digital platforms.

Financial Intermediation: The banking sector and financial services are crucial for enabling secure online transactions and providing electronic payment systems.

Trade (Wholesale and Retail): This sector represents the primary channel through which e-commerce operates, encompassing both B2B and B2C transactions.

To test H1, the study conducted correlation and regression analyses using data on GDP and foreign investment from 2010 to 2022. The Pearson correlation coefficient was calculated to measure the strength and direction of the relationship between these variables. To test H2, the study analyzed the relationship between GDP growth, FDI, and specific indicators of e-commerce development (e.g., number of Internet access points, mobile subscribers, bank cards in circulation); sector-specific investments and GDP contributions in areas related to e-commerce (ICT, financial intermediation, trade); Kyrgyzstan's ranking in the UNCTAD B2C E-commerce Index in relation to GDP and FDI trends.

4. PROPOSED MODEL

The selected indicators of e-commerce development were chosen based on their relevance to capturing key aspects of e-commerce activity in Kyrgyzstan. These indicators encompassed various dimensions of e-commerce, including the use of licensed software tools, Internet access points, website ownership by businesses, mobile Internet subscriptions, and bank card issuance. Together, these indicators provide insights into the technological infrastructure, digital adoption, and financial services supporting e-commerce growth in the country. Additionally, the inclusion of these indicators allowed for a comprehensive assessment of the e-commerce landscape and its relationship with economic growth and foreign investment (Figure 2).

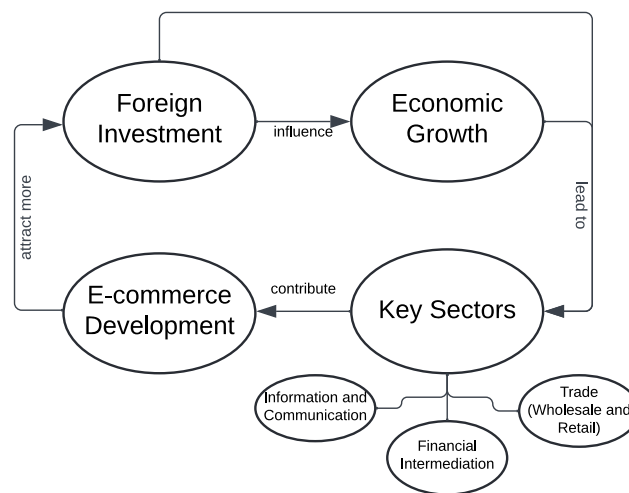


FIGURE 2. The relationship between E-commerce, economic growth and investment.

5. VARIABLES AND MEASURES

GDP is used as an indicator of economic growth. Moreover, the data used for Kyrgyzstan's GDP were calculated exclusively in the prices of the previous year to exclude the factor of price growth and its impact on the country's GDP. To assess the dynamic development of this indicator, the growth rate is used, which is calculated as the ratio of GDP in the reporting period to GDP in the previous (base) year. For the purposes of comparative analysis, the ratio between the volume of foreign investment and the GDP of Kyrgyzstan over the past 5 years, starting from 2018, was calculated. Extending the sample of statistical data to 13 years, starting from 2010, a correlation and regression analysis was conducted using the built-in tools of Microsoft Excel software to identify the strength and shape of the relationship between foreign investment in the Kyrgyz Republic and the country's GDP. The main key points of the method proposed in the article are:

The study investigates the reciprocal relationship between economic growth (measured by GDP) and foreign investment in Kyrgyzstan, creating a cycle of economic development and investment attraction.

The study utilizes Pearson correlation and linear regression analysis to quantify the strength and form of the relationship between GDP and foreign investment. It also measures the elasticity of GDP in response to changes in foreign investment, providing insights into how sensitive economic growth is to investment variations.

The method includes a dynamic analysis of GDP and foreign investment over a period of years, as well as a comparative analysis of the performance of key sectors in relation to e-commerce development.

The method identifies a feedback loop where economic growth and foreign investment contribute to e-commerce development, which in turn further stimulates economic growth and attracts additional foreign investment, creating a continuous cycle of enhancement.

The regression model developed in the study is used to predict changes in GDP based on variations in foreign investment, allowing for forecasting and planning in economic and investment strategies.

The correlation analysis was based on the calculation of the Pearson correlation coefficient. For the purposes of regression analysis, the country's GDP was taken as the variable (dependent on other factors), and the volume of foreign investment was taken as the independent parameter (i.e., the one that changes and affects the dependent variable). In addition, using the built-in functions of MS Excel, a linear regression model was built to predict changes in GDP depending on changes in foreign investment. To assess the adequacy and reliability of the results obtained, the coefficient of determination (R²) was calculated, which in the case of a pairwise regression is the value of Pearson's correlation coefficient (r) squared.

The built regression model was used to determine the level of elasticity of GDP with respect to changes in foreign investment, which provides an opportunity to determine how GDP changes with a 1% change in foreign investment. To summarize the results of the calculation, the average GDP and average investment over the period from 2010 to 2022 were calculated, and the data obtained were then fed into the formula (1):

$$E = ERPT = b \frac{\bar{x}}{\bar{y}} \quad (1)$$

where: b regression coefficient; \bar{x} average volume of foreign investment over the period under study; \bar{y} average GDP over the period under study.

The dataset used in this study includes gross domestic product (GDP), foreign investment, key sector indicators (information and communication, financial intermediation, trade), e-commerce development indicators including number of mobile Internet service subscribers, Kyrgyzstan's ranking in the UNCTAD B2C E-commerce Index over several years, correlation and regression analysis outputs. The dataset also includes the calculated Pearson correlation coefficients and regression model outputs that quantify the relationship between GDP, foreign investment, and the development of e-commerce.

To assess the relationship between economic growth and foreign investment and the development of e-commerce, the principal areas that play a significant role in the development and spread of e-commerce in Kyrgyzstan were investigated based on a series of dynamics and comparative analysis. Specifically, it analyses wholesale and retail trade, financial intermediation (including the banking sector), information and communications. The study compared the volume of foreign investment in the above-mentioned areas with the volume of GDP generated by them and analyzed specific indicators that characterize the development of e-commerce in the country. These indicators included the number of licensed software tools used by the business, the number of Internet access points, the availability of the business's own website, including one that renders online services, the number of active subscribers to mobile Internet services, and the number of issued bank plastic cards in turnover [18]. A generalized assessment of the development of e-commerce in Kyrgyzstan under the influence of economic growth and foreign investment was made based on a comparison of the dynamics of GDP, investment, and Kyrgyzstan's ranking in the UNCTAD B2C E-commerce Index [19]. The analytical research carried out in this study was based on the most relevant, published official statistics of the National Statistical Committee of the Kyrgyz Republic on national accounts, foreign investment, development of the financial sector, as well as the sphere of communication and information [20-24].

6. LIMITATIONS AND THEIR POTENTIAL IMPACT ON FINDINGS

Reliance on aggregate data: The study uses national-level data, which may mask regional disparities in e-commerce development within Kyrgyzstan. This could lead to an overestimation of e-commerce progress in less developed regions.

Linear regression model: The assumption of a linear relationship between GDP and foreign investment may oversimplify complex economic dynamics, potentially overlooking non-linear effects or threshold levels of investment. **Limited set of e-commerce indicators:** While the study uses several relevant indicators, it may not capture all aspects of e-commerce development, possibly leading to an incomplete picture of the sector's growth. **Correlation vs. causation:** The study establishes strong correlations but cannot definitively prove causation between economic growth, foreign investment, and e-commerce development. **External factors:** The study may not fully account for external factors such as global economic conditions or regional geopolitical events that could influence both foreign investment and e-commerce development.

These limitations suggest that while the study provides valuable insights, policymakers should consider additional qualitative research and sector-specific analyses when formulating comprehensive e-commerce development strategies.

IV. DATA ANALYSIS AND RESULTS

Digitalization is a phenomenon that inevitably affects the functioning of the economy. The virtual marketplace is an effective alternative for start-up entrepreneurs. The latest statistics show an accelerated growth in the pace of e-commerce development and adoption, which is creating new dynamic impulses for the market [25-27]. The results confirm the existence of a two-way causal relationship between entrepreneurship and e-commerce. Furthermore, from a more general business perspective, the study also shows that domestic entrepreneurship based on research and development of technological advance is the driving force behind e-commerce [28-29].

Investment activity in the modern economy is a key driving force that serves as a prerequisite for the development and expansion of international cooperation, as well as ensures economic growth and improves the country's goodwill [30-31]. Increased foreign investment is a catalyst for the development of various sectors of the economy, leading to an overall increase in business and economic activity. A vital task is to create the necessary conditions to make foreign investors interested in investing in the economy, as foreign investment, apart from capital, also involves the introduction of the latest technologies that ensure greater efficiency in the use of available resources. Foreign investment also uses modern developments in the use of electronics and information technology to sell goods and services, which underlies modern e-commerce [32-34].

Apart from computing the coefficient of determination (R²) to evaluate the reliability of the regression model, various other steps were implemented to guarantee the validity and strength of the findings. First, diagnostic tests for regression assumptions, such as multicollinearity, heteroscedasticity, and autocorrelation, were conducted to assess the integrity of the regression model. Sensitivity analyses were also performed to evaluate the stability of the results under different scenarios or variations in the data. Moreover, alternative analytical approaches, such as nonlinear regression models or time series analysis, were considered and compared to ensure the consistency and accuracy of the findings. By employing these methodological checks and comparisons, the study aimed to strengthen the validity of its conclusions and provide robust insights into the relationship between GDP and foreign investment.

The investigation of e-commerce directly aligns with the main research objectives by elucidating the interplay between economic growth, foreign investment, and the development of digital commerce in Kyrgyzstan. The specific areas chosen for analysis—wholesale/retail trade, financial intermediation, and information and communications were selected based on their pivotal roles in facilitating e-commerce activities and their significant contributions to overall economic growth. Wholesale/retail trade represents the backbone of e-commerce, serving as the primary channel through which goods are bought and sold online. Financial intermediation, including banking services and electronic payment systems, plays a crucial role in enabling secure and efficient online transactions, thus supporting the growth of e-commerce platforms. Information and communications infrastructure, including Internet access and mobile technology, form the technological backbone of e-commerce, providing the essential infrastructure for digital connectivity and commerce.

GDP is the main macroeconomic indicator that indicates the economic growth of any country. Moreover, to exclude the influence of inflationary processes, it is necessary to focus on GDP in prices of the previous period, as this indicator will indicate real growth or recession in the country's economy. The GDP of the Kyrgyz Republic (in prices of the previous period) generally demonstrates a positive trend in all types of economic activity (Table 1).

Table 1. GDP of the Kyrgyz republic by type of economic activity [20].

Indicators, billion KGS	2017	2018	2019	2020	2021	2022
Agriculture, forestry, and fishing	62.5	68.12	68.12	72.84	77.97	109.41
Mining and quarrying	4.84	4.97	7.10	9.52	8.57	23.4
Manufacturing industry	78.45	83.55	87.57	84.65	92.65	111.42
Provision (supply) of electricity, gas, steam, and air conditioning	9.8	14.02	15.24	14.07	20.17	11.61
Water supply, treatment, waste management and recycling	1.16	1.8	2.14	1.36	2.15	2.42

Construction	43.03	49.11	56.88	49.4	56.97	62.07
Wholesale and retail trade; repair of cars and motorcycles	91.27	99.95	108.04	92.83	114.51	139.1
Transport and storage of goods	19.93	21.25	22.3	17.11	22.18	31.46
Hotels and restaurants	9.22	9.58	10.15	5.55	7.88	11.91
Information and communication	13.83	16.25	14.82	15.8	18.34	22.21
Financial intermediation and insurance	2.53	3.16	3.49	3.62	5.73	5.81
Real estate transactions	12.42	13.36	14.82	17.82	16.08	18.55
Professional, scientific, and technological activities	7.08	7.89	9.95	8.33	7.75	10.01
Administrative and support activities	2.34	2.5	2.8	2.46	2.06	2.9
Public administration and defence, compulsory social security	25.95	30.38	33.26	37.12	42.66	49.41
Education	29.12	30.77	31.74	34.87	41.13	44.8
Healthcare and social services	13.11	13.66	14.5	14.98	16.83	20.49
Arts, entertainment, and recreation	2.23	2.38	2.76	2.81	2.69	3.13
Other service activities	4.63	5.75	5.62	6.58	4.76	6.44
Financial intermediation services measured indirectly	-13.11	-15.63	-18.57	-21.25	-20.8	-23.53
Net taxes on products	65.47	71.96	84.27	75.41	77.85	105.23
Total	498.91	550.41	595.58	567.11	638.94	791.77

The GDP growth rate showed positive dynamics in all the years analysed, except for 2020, when the economy of Kyrgyzstan, like many countries around the world, suffered from the COVID-19 pandemic. The pace of economic growth accelerated in 2022 (Figure 3).

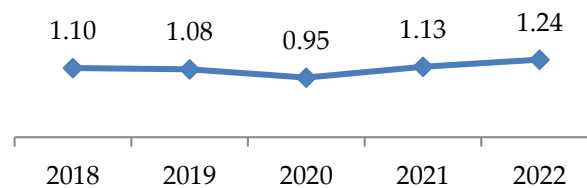


FIGURE 3. Dynamics of the GDP growth rate in Kyrgyzstan [20].

As for the volume of foreign investment, over the past 5 years, starting in 2018, foreign investors have invested more than USD 36.5 billion in the Kyrgyz economy (Figure 4).

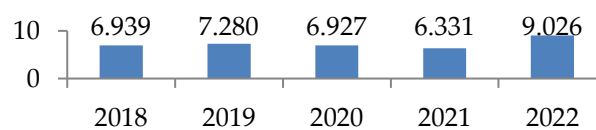


FIGURE 4. Dynamics of foreign investment in Kyrgyzstan, billion USD [21].

A comparison of Kyrgyzstan's GDP in US dollars and foreign investment reveals that the volume of investment relative to GDP has never been less than 68% in any of the last 5 years. In other words, foreign investors' investments in each of the years accounted for more than half of the country's total national product (Table 2).

Table 2. The ratio of foreign investment in the republic of Kyrgyzstan to the country's GDP [20-21].

Year	GDP, billion USD	Foreign investments, billion USD	Investment to GDP ratio in %
2018	8.276	6.939	83.85
2019	9.3698	7.28	77.70

2020	8.2754	6.927	83.7
2021	9.2536	6.331	68.42
2022	11.5462	9.026	78.17

By expanding the sample of statistical data, it is possible to build a linear regression model, based on which one can predict changes in economic growth depending on changes in foreign investment. For this, it is necessary to form a sample of data on GDP and foreign investment expressed in billions USD. The resultant indicator (y) is the country's GDP, and the factor influencing it (x) is the volume of foreign investment (Table 3).

Table 3. The volume of GDP and foreign investment in the republic of Kyrgyzstan in billions of us dollars, for 2010-2022 [20-21].

Year	GDP, billion USD, (y)	Foreign investments, billion USD, (x)
2010	4.78	3.57
2011	6.22	4.95
2012	6.6	4.34
2013	7.32	5.49
2014	7.43	5.42
2015	6.63	5.62
2016	6.86	5.34
2017	7.7	5.22
2018	8.28	6.94
2019	9.37	7.28
2020	8.28	6.93
2021	9.25	6.33
2022	11.55	9.03

Using MS Excel, based on the initial data from Table 3, it is possible to generate a corresponding graph, build a trend line and obtain a regression equation (model) for GDP and foreign investment (Figure 5).

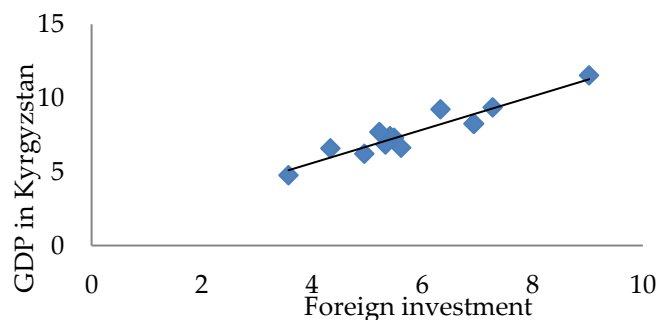


FIGURE 5. Graphical representation of the relationship between foreign investment and GDP in Kyrgyzstan.

The Pearson correlation coefficient, which demonstrates a linear relationship between two indicators (variables) for such a model, is 0.94 [35]. Such coefficient values indicate a very close, direct relationship between foreign investment and economic growth in Kyrgyzstan, expressed in terms of GDP. The coefficient of determination (R²) for this equation is 0.8876, which indicates that 88.76% of the variation in GDP depends on the variation in foreign investment flows into the Republic of Kyrgyzstan. Using such a model, it is possible to forecast the country's GDP according to the volume of investment in the Kyrgyz economy by foreign investors. This model can also be used to determine the level of elasticity of economic growth in relation to changes in the volume of foreign investment in the country based on the average values of these factors over the period under study. This can be calculated using formula (2):

$$E = 1.1312 \frac{5.88}{7.71} = 0.8627 \quad (2)$$

The result means that if the volume of foreign investment changes by 1%, the volume of GDP (economic growth) changes by 0.863%. These results support the hypothesis that there is a strong positive relationship between foreign investment and economic growth in Kyrgyzstan. The positive effect of investment on the economy is also reflected in the development of the digital economy, which is driven by the increase in the welfare of economic entities and individuals and the development of the information and telecommunications sector. However, economic growth and the development of e-commerce are undoubtedly interconnected and can mutually reinforce each other [36], contributing to a more innovative, accessible, and sustainable functioning of businesses using digital technologies [37-38]. The development of e-commerce can be assessed based on the volume of investment and economic growth in the areas most involved in this process. The basis of e-commerce is information technology [39]. According to the National Statistical Committee of Kyrgyzstan [20], foreign investment in this sector has amounted to almost USD 700 million over the past 5 years. The GDP generated in this area increased by 36% in 2022 compared to 2018. These findings support the hypothesis that the development of e-commerce in Kyrgyzstan is significantly driven by economic growth and foreign investment in key sectors (Figure 6).

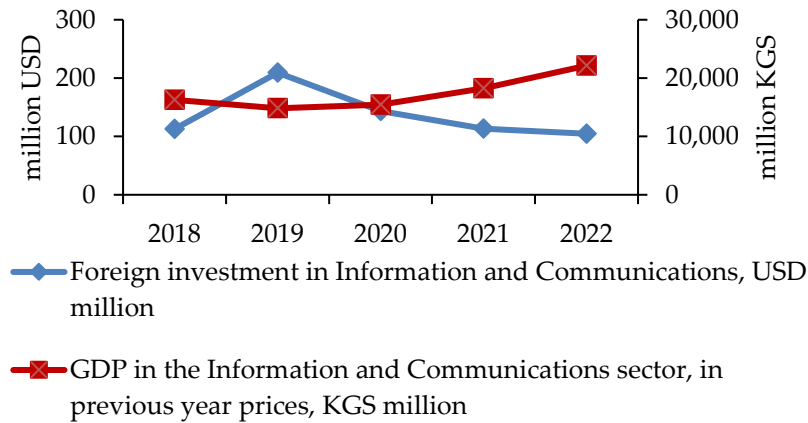


FIGURE 6. The Dynamics of foreign investment in information and communication and the GDP generated in this area in the republic of Kyrgyzstan [20-21].

Despite the declining dynamics of foreign investment inflows, their cumulative effect ensures further economic growth in this sector of the Kyrgyz economy. Investment and economic growth are driving an increase in the number of IT tools used by businesses to carry out their e-commerce activities (Table 4).

Table 4. Dynamics of development of selected indicators of information and telecommunication technologies of the republic of Kyrgyzstan [22].

Indicators	2017	2018	2019	2020	2021
Number of licensed standard software tools used by the business, units	16,087	21,313	21,474	22,492	24,170
Number of Internet access points, units	22,160	24,263	27,883	29,400	31,528
Businesses have their own website, units	1,717	1,915	2,041	1,910	2,057
including those providing online services, units	948	987	1,068	1,097	1,100
Number of active subscribers of mobile Internet services, thousand units	4,740.9	5,022.9	5,741.9	5,433	5,865.3

Another major area that directly contributes to the development of e-commerce is the banking sector. Banking institutions provide electronic payment systems and technologies that enable consumers and

businesses to conduct secure online transactions [40]. Financial institutions issue bank cards that are used to make online payments and purchases on the Internet. Banks provide their customers with the ability to manage accounts and conduct transactions via the Internet and mobile applications, which simplifies transactions and promotes the development and spread of e-commerce [41]. In Kyrgyzstan, in 2021, compared to 2017, the volume of foreign investment in the financial sector increased by almost 17%, GDP generated in the financial sector grew by 77%, and the number of bank cards issued almost doubled (Table 5).

Table 5. Some Indicators of the development of the financial sector of Kyrgyzstan [13-15].

Indicators	2017	2018	2019	2020	2021
Foreign investment in financial intermediation and insurance, mln USD	1,425,402.3	1,571,854.2	970,729.3	1,561,419.3	1,662,992.2
GDP generated in financial intermediation and insurance	15,639.2	18,783.9	22,057.8	23,895.1	27,709
Number of issued bank plastic cards in turnover, pcs.	1,984,163	2,432,590	2,980,559	3,388,310	3,757,083

Kyrgyzstan is one of five countries to receive investments under the project funded by the European Union and implemented by the International Trade Centre, totaling more than EUR 15 million. The Trade Readiness in Central Asia project aims to promote the overall sustainable and inclusive economic development of Central Asia by facilitating domestic, regional and international trade in the region, including through the use of digital economy tools. This project aims to develop a national e-commerce strategy by conducting a comprehensive analysis, providing policy recommendations and designing a tailored development strategy to build on Kyrgyzstan’s strengths while addressing the challenges that are barriers to the development and diffusion of e-commerce in the country. Kyrgyzstan, like the other project participants, namely Kazakhstan, Tajikistan, and Turkmenistan, receives funding in an equal share (20%) of the total amount of assistance. The project is designed to last until the end of 2023, with funding of USD 3.65 million, including more than USD 730 thousand for the Republic of Kyrgyzstan [42].

The Kyrgyz Republic has many opportunities to improve and develop e-commerce, including fast and accessible Internet, especially rapid development of mobile communications throughout the country, improvement of banking services and creation of mechanisms and systems for digital payments, and a growing number of digital technology users. However, despite the positive dynamics in recent years, many factors that contribute to the development and spread of e-commerce, including significant foreign investment and the country’s overall economic growth, Kyrgyzstan still ranks low in the UNCTAD B2C E-commerce Index, which is calculated by the United Nations (Table 6).

Table 6. Unctad b2c E-commerce index – republic of Kyrgyzstan [7].

Year	Kyrgyzstan’s ranking	Number of countries in the ranking
2016	137	137
2017	117	144
2018	114	151
2019	111	152
2020	97	152

The UNCTAD B2C E-commerce Index measures the readiness and ability of an economy to implement, support and develop online purchases. This composite indicator consists of several key indicators that are closely related to digital trade and are widely used within the country. These indicators include the percentage of people who own an account with a financial institution or market operator that provides electronic or mobile money services (defined as the percentage of the population over the age of 15), the percentage of people using the Internet in the country, and the postal reliability index (calculated by a special institution within the United Nations – the Universal Postal Union, which is a forum for international cooperation in the postal sector).

By comparing the rating data in the dynamics with the dynamics of foreign investment and GDP, one can trace the relationship between these indicators (Figure 7).

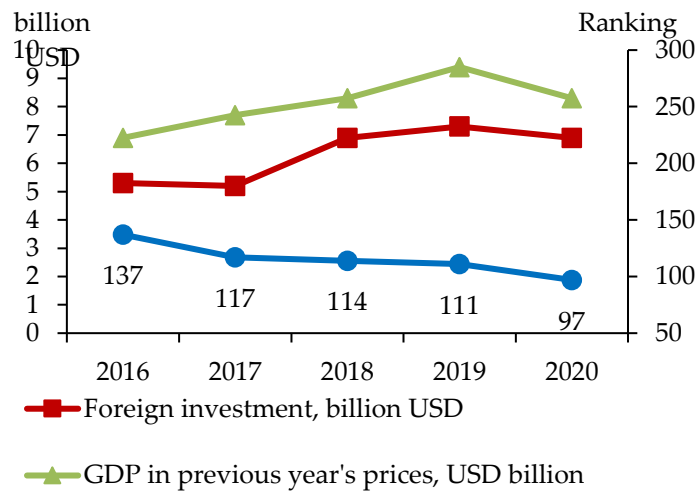


FIGURE 7. Dynamics of foreign investment, economic growth, and the ranking of the republic of Kyrgyzstan in the Unctad b2c e-commerce index [19-21].

Analyzing the data presented in Figure 5, a clear correlation can be observed between the indicators. With the increase in foreign investment, which contributes to economic growth (an increase in the country’s GDP), e-commerce is developing, i.e., the ranking positions are improving. The exception is 2020, when restrictions caused by the pandemic led to the intensification of online sales and purchases, despite the economic downturn and the volume of foreign investment in Kyrgyzstan.

Key findings and practical implications can be summarized as follows.

Economic Growth and Foreign Investment Relationship. A strong positive correlation (0.94) was found between foreign investment and GDP growth in Kyrgyzstan. The regression model showed that 88.76% of GDP variation can be explained by changes in foreign investment. This strong relationship underscores the importance of creating a favorable investment climate to drive economic growth. Policymakers should focus on strategies to attract and retain foreign investment as a key driver of economic development.

Investment Impact on E-commerce Infrastructure. Significant increases were observed in key e-commerce enablers: licensed software tools used by businesses increased by 50%; internet access points grew by 42.3%; businesses with websites increased by 20%; active mobile internet subscribers increased by 20%. Investments in digital infrastructure are directly contributing to e-commerce readiness. Businesses should capitalize on this improved infrastructure by developing their online presence and e-commerce capabilities.

Financial Sector Development. GDP generated in the financial sector grew by 77% from 2017 to 2021. The number of bank cards issued almost doubled in the same period. The rapid growth in financial services and electronic payment methods creates a more conducive environment for e-commerce. Businesses should integrate diverse payment options into their e-commerce strategies to cater to the growing number of digitally-enabled consumers.

Sector-Specific Growth. Information and communication sector GDP increased by 36% from 2018 to 2022. Wholesale and retail trade, and financial intermediation services showed significant growth. These sectors are key enablers of e-commerce. Businesses operating in or dependent on these sectors should be prepared for rapid changes and opportunities in the e-commerce landscape.

E-commerce Readiness. Kyrgyzstan's ranking in the UNCTAD B2C E-commerce Index improved from 137th in 2016 to 97th in 2020. While progress has been made, there's still significant room for improvement in Kyrgyzstan's e-commerce ecosystem. Businesses and policymakers should benchmark against higher-ranking countries to identify areas for development.

Investment-to-GDP Ratio. Foreign investment consistently accounted for more than 68% of Kyrgyzstan's GDP in the last five years. The economy is heavily dependent on foreign investment. Diversification strategies and policies to strengthen domestic investment could help create a more resilient economic environment for e-commerce growth.

V. DISCUSSION

Economic growth is characterized by a general expansion of the economy's production potential, including an increase in the output of goods and services. Gross domestic product is an indicator that can indicate economic growth. Notably, although economic growth generally underlies the functioning of a modern economy, it is not the only indicator of the well-being of society. Therefore, one can agree with C.Q. Song et al. [11] that other factors, such as income distribution, access to education, healthcare, and environmental sustainability, also play a vital role in determining the overall quality of life. Balancing economic growth with these broader factors is a key objective of the country's macroeconomic policy. The economy of Kyrgyzstan, according to the study, has grown substantially over the past 5 years (since 2018), by almost 44%. Moreover, this result was calculated using the net production growth parameter, i.e., in the prices of previous years, which excludes the inflation factor in the calculation of growth. Considerable economic growth was observed in 2022, with GDP calculated at the previous year's prices increasing by more than 24% in this period compared to 2021. The most significant growth was demonstrated by such sectors of the economy as information and communications, wholesale and retail trade, and financial intermediation services (primarily the banking sector).

One of the key factors in this development was investment, specifically foreign investment in the Republic of Kyrgyzstan. As proved in the study by W.N.W. Azman-Saini et al. [12], foreign investment plays a crucial role in stimulating economic growth, providing capital inflows, creating new jobs, and supplying modern technologies and equipment, which makes it possible to use available resources more efficiently and create the basis for sustainable development. However, it is important for recipient countries to effectively manage foreign investment to ensure that it is in line with their long-term economic goals and interests. Therefore, one can definitely agree with M.J. Maadanbekova [9] that to attract and retain foreign investment, countries such as Kyrgyzstan often need to improve the business environment, including the legal framework and governance mechanisms.

All of this involves increasing transparency and accountability, reforming the regulatory framework, strengthening property rights, enhancing financial stability, building the institutional component, developing public-private partnerships, and implementing the best international cooperation practices [43-44]. In recent years, the Republic of Kyrgyzstan has made substantial strides to improve the investment climate, which has had a corresponding impact on the volume of investment by foreign investors. Moreover, in 2022, this figure increased by more than 42%. At the same time, foreign investment decreased by 8.6% in 2021 compared to 2020. In total, the volume of foreign investors' investments in the Kyrgyz economy in 2022 amounted to about 25% of all investments over the past 6 years. The ratio of foreign investment to Kyrgyzstan's GDP shows that foreign investment on average over the period under review accounted for about 80% of the country's GDP. This suggests that the national economy of Kyrgyzstan is heavily dependent on foreign investment, and thus economic growth, i.e., an increase in gross domestic product, cannot be ensured without it. This is also confirmed by the results of the regression-correlation analysis, which shows a close relationship between the variation in foreign investment and the variation in the country's GDP. The elasticity of GDP from foreign investment is 0.86, which means that a 1% change in foreign investment results in a 0.86% change in Kyrgyzstan's GDP, i.e., it is extremely sensitive to this factor.

As G.R. Timilsina et al. [13] noted, economic growth and development of e-commerce is often accompanied by investments in physical and virtual, technological infrastructure. This includes expanding access to the Internet, improving communication speeds and creating electronic payment systems to develop and massively expand the popularity and accessibility of e-commerce activities. Improving and expanding the logistics infrastructure is also an important investment area that contributes to the development of e-commerce in Kyrgyzstan [45]. This is confirmed by the development director of one of the largest logistics operators Omniva, who notes that investing in the construction and development of a logistics centre in Kyrgyzstan has provided several benefits for the development and spread of e-commerce in Central Asia and Kyrgyzstan itself [46]. First of all, one of the key advantages is that it is the closest logistics centre to China, which means that it is possible to reduce the time for transporting goods to the region, which improves the quality and speed of service. Furthermore, thanks to the implementation of such an investment project in Kyrgyzstan, not only the operator benefits from its own activities, but also local businesses are supported, including those that sell products through the online sphere and are engaged in transport services, including the Kyrgyz Post. The largest areas of economic activity interconnected with e-commerce in Kyrgyzstan in which investments were made were financial intermediation (banking sector), retail and wholesale trade, information, and communications. Between 2017 and 2021, the number of licensed software used by businesses in Kyrgyzstan increased by more than 50%, and the number of Internet access points by 42.3%. The number of businesses with their own

websites increased by almost 20%, half of which operate online. The number of active users of mobile Internet services increased by more than 20%.

According to K. Vu et al. [16], information and computer technologies are not only a driver of the economy but are directly a fundamental factor of economic growth in the modern economy. The widespread adoption and effective use of modern telecommunications and information technologies has a transformational impact on businesses, industries, and society, stimulating innovation, productivity and economic growth, which has a direct impact on the development of e-commerce in the country. As Y. Yu et al. [14] noted, is implemented primarily through an increase in purchasing power. This is also noted by K. Haji [15], who concluded that with economic growth, the population has more opportunities for consumption. This may lead to an increase in the number of consumers who are ready and able to buy goods and services online. Another factor that is substantially related to the popularization of e-commerce is the developed system of banking services provided via the Internet, including via smartphones and, accordingly, the availability of a personal account with a bank card, as S. Vinoth et al. [17] have substantiated in detail in. That is why foreign investment in the financial sector of Kyrgyzstan in 2022 amounted to more than 31% of the total. The development of electronic financial intermediation makes it possible to conduct online transactions for the purchase and sale of goods and services via the Internet. One of the main tools for making payments in e-commerce is a bank card. The number of issued bank plastic cards in turnover increased by almost 90% between 2017 and 2021. Therewith, growth in 2021 was 11%.

Against the backdrop of increasing foreign investment and positive economic growth in the Kyrgyz Republic, e-commerce is growing rapidly in the country. In recent years, electronic payment systems and digital platforms based on mobile applications have undergone substantial development in Kyrgyzstan. There are now more online stores than there were a few years ago, and the range of commercial services offered online has expanded drastically. However, despite the latest technological advances, most Kyrgyzstan's residents still adhere to conservative standards, buying goods and ordering services in more familiar ways, especially the older generation. The main obstacle to the development of e-commerce in the country is the stereotype that goods purchased online may not be of the quality expected by the buyer, and that it is better to negotiate services in person. Consumers are also concerned about the lack of clear protections in case of a bad e-commerce experience. According to the National Commission for Information Technology and Communications, only 5% of the population is engaged in e-commerce. About 15% of the population uses Internet banking, and only about 40% have a bank account [47].

Overall, the results of the study show that economic growth and foreign investment have a positive impact on the development of e-commerce in the Republic of Kyrgyzstan. Kyrgyzstan's UNCTAD B2C E-commerce Index had better values in the years of GDP growth and foreign investment growth, which ensured the republic's higher position among other countries in terms of assessing the development of the digital economy.

The findings of this study underscore the intricate relationship between economic growth, foreign investment, and e-commerce development in Kyrgyzstan. The strong correlation between foreign investment and GDP growth (0.94) highlights the critical role of foreign capital in driving economic expansion. This relationship has significant implications for e-commerce development, as evidenced by the growth in key digital infrastructure indicators and financial services. Policy recommendations: implement a "one-stop-shop" system for foreign investors to streamline bureaucratic processes; develop targeted tax incentives for investments in e-commerce infrastructure and digital technologies; create special economic zones focused on digital economy and e-commerce businesses. Digital infrastructure development: allocate a specific percentage of GDP (e.g., 2-3%) annually for broadband infrastructure expansion, particularly in rural areas; implement a national digital literacy program to increase Internet adoption and e-commerce participation; encourage public-private partnerships for the development of secure data centers and cloud services.

E-commerce ecosystem enhancement: establish a regulatory sandbox for e-commerce startups to test innovative business models with reduced regulatory burden; develop a national e-commerce strategy with clear goals and metrics for digital economy growth; create an e-commerce ombudsman office to address consumer protection issues and build trust in online transactions. Financial sector modernization: incentivize banks to develop user-friendly mobile banking applications and increase digital payment options; implement policies to promote the adoption of international e-payment systems; develop a regulatory framework for fintech companies to encourage innovation in digital financial services.

Skills development and entrepreneurship: integrate e-commerce and digital skills training into national education curricula; establish incubators and accelerators specifically for e-commerce startups; create tax incentives for businesses investing in employee digital skills training. Cross-border e-commerce facilitation: simplify customs procedures for e-commerce shipments below a certain value threshold; negotiate e-commerce chapters in trade agreements with key trading partners; develop a national e-commerce export strategy to help

local businesses access global markets. These recommendations aim to capitalize on the positive cycle observed between economic growth, investment, and e-commerce development. However, it's crucial to note that Kyrgyzstan's heavy reliance on foreign investment (over 68% of GDP) poses potential risks. To mitigate these risks and create a more resilient economy, policies should also focus on:

- diversifying the economy beyond sectors traditionally attractive to foreign investors;
- strengthening domestic capital markets to reduce dependence on foreign capital;
- developing local tech talent to reduce reliance on imported skills and technology.

The improvement in Kyrgyzstan's UNCTAD B2C E-commerce Index ranking (from 137th to 97th) indicates progress but also highlights significant room for growth. Benchmarking against higher-ranking countries could provide valuable insights for further policy development.

The proposed method, while comprehensive, has some limitations that warrant consideration. One limitation is the reliance on aggregate data, which may mask variations at the regional or sectoral levels. Additionally, the analysis assumes a linear relationship between GDP and foreign investment, which may oversimplify the complex dynamics of economic growth. Furthermore, the study's focus on selected indicators of e-commerce development may overlook other important factors influencing digital trade. Finally, while correlation and regression analyses provide valuable insights, they cannot establish causality definitively, highlighting the need for complementary qualitative research to corroborate findings.

A multidisciplinary nexus of economics, finance, and information technology forms the theoretical foundation of this research. This approach is based on the concepts of endogenous growth theory, which suggests that economic growth is influenced by internal elements such as investment in human capital, innovation, and technology, rather than external factors. Moreover, it integrates the resource-based perspective of the organization, highlighting the strategic significance of distinctive resources and capabilities, such as digital infrastructure and e-commerce platforms, in attaining a competitive edge. Moreover, the framework incorporates the notion of network effects, whereby the worth of a product or service escalates with the adoption of more users, a particularly pertinent aspect for the expansion of e-commerce. Moreover, the concept of foreign direct investment (FDI) is used to elucidate the manner in which FDI can foster economic expansion and enable technological progress in the countries hosting such investments. This unified framework enables a thorough examination of the intricate relationship among economic growth, foreign investment, and e-commerce development, establishing a strong basis for the hypotheses and methodological approaches used in this study.

VI. CONCLUSION

Positive economic growth rates, reflected in the country's GDP increase, are driving the development and implementation of e-commerce, which creates new incentives for all market players to improve. The results confirm the existence of a two-way causal relationship between entrepreneurship, investment, and e-commerce. In other words, just as foreign investment and economic growth contribute to the development and spread of e-commerce, so e-commerce supports the development of the entire economy and helps attract foreign capital. In recent years, Kazakhstan's economy has been on a positive trend, with growth of more than 44% in 2022, driven by foreign investment. According to the results of the correlation and regression analysis, the closeness of the relationship between these indicators exceeds 90%, and the calculated elasticity of GDP depending on foreign investment, on average, for the period under study (2010-2022) is 0.86. This means that if the volume of foreign investment in Kyrgyzstan changes by 1%, the country's GDP will change by 0.86%.

The significant increase in foreign investment, in conjunction with economic growth, has also contributed to the development of e-commerce in the country. Specifically, investments in the wholesale and retail trade, financial intermediation (including the banking sector), as well as in the development of the information and telecommunications sector, in recent years have contributed to a 1.5-fold increase in trade operations in the wholesale and retail trade, the GDP generated in the financial sector has grown more than 2.3 times, and the number of bank cards issued to active users has increased 1.8 times. Furthermore, in 2017-2021, the number of licensed software used by businesses in Kyrgyzstan increased by more than 50%, and the number of Internet access points – by 42.3%. The number of businesses with their own websites has increased by almost 20%, and half of them operate online. The number of active users of mobile Internet services increased by more than 20%. The relationship between economic growth, foreign investment, and the development of e-commerce in Kyrgyzstan is confirmed by the dynamics of the country's GDP, foreign investment, and the values of the UNCTAD B2C E-commerce Index. Kyrgyzstan had the best months in the ranking when there was an increase in foreign investment and GDP growth.

This paper presents a comprehensive perspective on the interaction among economic growth, foreign investment, and e-commerce by incorporating concepts from economics, finance, and information technology. The use of this interdisciplinary approach is innovative within the specific setting of Kyrgyzstan and provides a more thorough comprehension of the active dynamics. The utilisation of longitudinal data spanning a decade enables a comprehensive and meticulous analysis of patterns and correlations that may be overlooked by shorter-term research. A long-term viewpoint is essential for comprehending the enduring influence of economic phenomena on the growth of e-commerce. The analysis examines important industries including information and communication, financial intermediation, and trade, offering a detailed perspective on the contributions of these sectors to the expansion of e-commerce. This sector-specific emphasis is exceptionally distinctive and provides practical and implementable knowledge for policymakers and businesses. By integrating the UNCTAD B2C E-commerce Index for comparative assessment, the analysis gains a unique global viewpoint, which is unprecedented in the specific setting of Kyrgyzstan. By emphasising these novel features, the study not only validates current paradigms but also offers distinctive perspectives and contributions to the discipline.

This study confirmed a strong positive relationship between economic growth, foreign investment, and e-commerce development in Kyrgyzstan. Key findings include: GDP growth of 44% in 2022, driven significantly by foreign investment; strong correlation (>90%) between foreign investment and GDP; GDP elasticity of 0.86 with respect to foreign investment; substantial increases in e-commerce indicators (e.g., 50% increase in business software use, 42.3% increase in internet access points);

improved UNCTAD B2C E-commerce Index rankings correlating with GDP and investment growth.

The implications of the study are multifaceted and have significant relevance for policymakers, business leaders, and researchers. For businesses, the study underscores the importance of aligning their strategies with the evolving digital landscape. The implications suggest that companies in sectors such as trade, finance, and technology should leverage the growth in e-commerce by investing in digital tools, enhancing online platforms, and expanding their digital footprint to capitalize on the increasing economic opportunities driven by foreign investment and GDP growth. The study's focus on Kyrgyzstan offers insights that could have broader implications for other Central Asian countries with similar economic structures and investment environments.

Further research should be aimed at developing practical recommendations aimed at improving the investment climate of Kyrgyzstan, which will ensure the inflow of foreign capital, economic growth and, accordingly, a positive impact on the development of e-commerce in the country. Future studies should conduct regional comparative studies to assess Kyrgyzstan's e-commerce development relative to other Central Asian countries, analyze the impact of specific government policies on foreign investment attraction and e-commerce growth and investigate the role of cybersecurity measures in fostering trust and growth in Kyrgyzstan's e-commerce sector. They may examine the effects of digital literacy programs on e-commerce adoption rates among different demographic groups, assess the environmental impact of increased e-commerce activity and explore sustainable practices for the sector, study the potential of blockchain technology in enhancing transparency and efficiency in Kyrgyzstan's e-commerce transactions and evaluate the effectiveness of public-private partnerships in developing e-commerce infrastructure.

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Author contribution

All authors made an equal contribution to the development and planning of the study.

Conflicts of Interest

The authors have no potential conflicts of interest or such divergences linked to this research study.

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