









The Impact of Cybersecurity, IT Spending, and Innovation on Economic Growth in 2023

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ABSTRACT

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cyber security, IT expenditure, innovation, economic growth, OLS

This study seeks to examine the influence of cyber security, IT expenditure, and innovation on economic development across a sample of 30 nations, utilizing cross-sectional data from 2023. This is happening because the digital transition is speeding up and digital variables are playing a bigger role in supporting global economic growth. The study employed a quantitative analytical framework, utilizing the Ordinary Least Squares (OLS) method with EViews12 to assess the correlation between the independent variables (cyber security, IT expenditure, and innovation) and the dependent variable (economic growth). The results indicated that cyber security exerts a positive and considerable influence on economic growth, underscoring the necessity of establishing a safe digital environment to foster trust and stability. The effect of IT expenditure was favorable but not very big, which shows that spending efficiency varies from country to country. Innovation has a negative and substantial effect, which may be due to a difference between the results of innovation and how it is actually used in some nations. The study suggested that to maintain long-term growth, we should improve the efficiency of technology expenditure, build cyber security infrastructure, and try to close the gap between scientific research and the job market.

1. INTRODUCTION

In light of the substantial transformations taking place globally in the twenty-first century, cybersecurity has emerged as a fundamental pillar ensuring the stability of modern economies and protecting the foundations of national progress. Cyber hazards have developed into one of the most complex challenges facing governments and the corporate sector, as their implications extend beyond security to encompass the whole economy and sustainable development. Simultaneously, technical and inventive investments have emerged as a principal catalyst for digital and knowledge economies, therefore positioning cybersecurity at the nucleus of the global economic framework [1].

The increasing dependence on digital infrastructure and technology has established a direct correlation between cybersecurity and economic development. Nations that engage in enhancing their cybersecurity capabilities may create a secure environment that attracts industry, fosters innovation, and increases consumer confidence in digital activities. Poor cybersecurity may lead to data breaches and disruptions of essential services, hence impacting GDP, the economy, and limiting foreign direct investment. Besides cybersecurity, the

magnitude of governmental investment in information technology indicates a nation's commitment to enhancing its digital infrastructure and so promoting digital transformation. The enhancement of public services, improved institutional efficiency, and more transparency and innovation all contribute to the growing expense. Conversely, innovation is crucial for achieving economic value added, since it demonstrates how nations may transform their resources into new goods and services, enhancing global competitiveness and creating job opportunities [2].

Despite the theoretical significance of cybersecurity, technology expenditure, and innovation, the economic research has insufficiently examined the quantitative relationship among these three variables, particularly in studies that integrate them. Most prior research has predominantly focused on information technology or innovation and its impact on development, overlooking cybersecurity in comprehensive economic analysis. This study is pertinent as it seeks to address the knowledge gap through an investigation of the interplay of three elements and economic growth. This study utilizes cross-sectional data from thirty countries selected from various regions, taking into account the geographic and developmental balance among

advanced, emerging, and developing nations. The impact of the Global Cybersecurity Index (GCI), government spending on information technology as a proportion of total public expenditure, and the Global Innovation Index on real GDP as a growth metric is analyzed using the OLS linear regression model.

This notion posits that these three variables, if complementary and not different, are strategic aspects capable of facilitating economic progress. Investing in technology without adequate protection may lead nations to face an economic catastrophe due to cyberattacks; innovation in an insecure environment will provide no discernible financial benefits. From this perspective, it is essential to examine the interaction between cybersecurity and the broader technological and innovation landscape as a comprehensive analytical element. This study seeks to address the basic question: "To what extent do cybersecurity, technology expenditure, and innovation influence economic growth in nations?"

This paper is predicated on the modern concept of endogenous growth, which asserts that innovation, knowledge acquisition, and technological advancement propel both external and internal growth. It is also partially based on human capital theory, which posits that investment in knowledge and digital infrastructure enhances productivity and, consequently, development. The framework is predominantly grounded in institutional theory, which emphasizes the necessity of an efficient institutional infrastructure, including cybersecurity, as a prerequisite for achieving sustainable development.

The extent to which these measures signify economic success and the significant disparities among nations regarding cybersecurity preparedness and digital innovation delineate the study's problem. Despite substantial cybersecurity investments by several governments, the precise impact of these expenditures on development remains ambiguous. Furthermore, several nations possess significant innovative potential yet lack secure infrastructure, raising fundamental questions regarding the interaction of these elements in either facilitating or obstructing progress. This study is significant as it is among the few that integrates indicators of cybersecurity, technology expenditure, and innovation, assessing their collective influence on economic growth through a quantitative methodology, thereby providing new insights for policymakers to formulate more comprehensive and integrated development strategies.

2. LITERATURE REVIEW

Investing in cybersecurity technologies and fostering innovation both contribute to economic development, according to previous studies. These researches examined the correlation among cybersecurity, technology expenditure, and innovation as independent factors. The dependent variable will be economic progress. This facilitates comprehension of the impact of cybersecurity, technological expenditure, and innovation on economic development within the research sample.

2.1 Cybersecurity on economic growth

Cybersecurity significantly influences the economic success of nations, particularly as an increasing number of

countries rely on digital technology. Effective cybersecurity safeguards critical infrastructure and fosters trust in online transactions, essential for economic growth. Cyber incidents can destabilize economies, particularly in developing nations with little resources [3]. Cyber attacks that hurt the economy can stop important services from working, which slows down social and economic growth [3]. Strong cybersecurity frameworks are important for improving digital infrastructure, which in turn helps the global market stay competitive and innovative [2].

India and China are advancing in enhancing their digital competencies, indicating a necessity for increased investment in cybersecurity to sustain economic growth [4]. E-government initiatives demonstrate a dedication to cybersecurity, facilitating corporate engagement and benefiting the overall economy [5]. Enhanced cybersecurity may increase corporate profitability and bolster the wider economy by securing digital transactions [6].

Cybersecurity is very important for the economic progress of countries, especially those that are still developing. To secure important infrastructure and help the economy grow, it is important to put cybersecurity programs into place [7]. Cyberattacks may have big effects on the economy, such as lost sales, data breaches, lower productivity, and harm to a company's brand [8]. Combining artificial intelligence with cybersecurity also opens up new ways for emerging countries to prosper via innovation and entrepreneurship, while also protecting important areas like education and healthcare [9]. Studies show that a country's cybersecurity index is closely linked to a number of socio-economic indices, such as GDP per capita, how easy it is to do business, and life expectancy [10]. To lower economic risks and make sure that digital technologies may keep growing, we need to have good cybersecurity [8]. Overall, building up cybersecurity infrastructure may help the economy grow while also keeping people safe from cyber-attacks.

H1: *Cybersecurity plays a positive role in promoting economic development.*

2.2 Technology spending on economic growth

Information Technology expenditure is crucial for the economy since it enhances productivity, efficiency, and innovation. A positive correlation exists between increased IT investment and GDP, particularly in countries investing in digital infrastructure and workforce training. However, this expense exacerbates cybersecurity issues. An increased reliance on technology heightens the susceptibility to cyberattacks, potentially damaging the economy and diminishing the confidence of investors and consumers. A secure online environment is essential for maximizing the returns on technical investments, therefore making cybersecurity a vital component of any national strategy for digital advancement and sustained economic growth.

Association of Southeast Asian Nations Tiger Cub Nations: A study suggested that robust information and communication technology (ICT) infrastructure facilitates economic prosperity. Malaysia exerted the most significant effect, followed by Thailand and the Philippines [11].

In Sub-Saharan Africa, a 1% increase in mobile phone customers correlates with a 14.9% rise in real GDP, underscoring the significance of mobile technology [12]. OECD Countries: The digital economy influences growth variably based on a country's level of development.

Information and Communication Technology positively affect economies, particularly in more developed nations [13]. Investment in ICT capital services correlates with GDP growth in both emerging and advanced countries, with a more pronounced effect in advanced economies [14].

Mobile phone and internet use are two important factors in economic growth in the MENA and SSA regions, which means that these areas need more investment in ICT [15].

Investing in information technology (IT) and ICT is a big boost to economic growth, especially in developing nations [16]. A study of 86 nations from 1970 to 1998 indicated that investing in IT pays off and helps the economy expand. A study of MENA and SSA nations from 2007 to 2016 found that mobile phones, internet use, and broadband adoption all help the economy thrive. MENA countries fare better than SSA countries when it comes to adopting the internet and broadband [15]. The influence of ICT on economic growth is different for different income groups, with high- and upper-middle-income nations getting more out of it than lower middle income ones [17]. These results show that governments should focus on building up ICT infrastructure to help the economy expand.

H2: *Technology spending is positively impacted by economic growth.*

2.3 Innovation on economic growth

Innovation is a fundamental catalyst for economic progress, enhancing competitiveness and productivity across several sectors. The present analysis illustrates the complexity of the link between innovation and economic growth. This paper consolidates significant findings from previous research demonstrating how innovation may foster economic growth through several mechanisms.

Technological innovation significantly enhances industrial processes, resulting in increased productivity and economic growth. A bibliometric study indicates a growing interest in this topic, particularly in nations such as China, which excels in research and collaboration [18].

New measurements, including Foreign Knowledge Inflow and Domestic Knowledge Outflow, have been implemented to enhance the understanding of the impact of innovation on economic growth. Conventional metrics, such as patent filings, may inadequately capture the intricate ramifications of invention, indicating a necessity for more sophisticated evaluations [19].

Foreign Direct Investment (FDI) is crucial for enhancing innovation and stimulating economic growth. Data indicate that it produces beneficial spillover effects, particularly in poorer nations [20]. The correlation between innovation and institutional quality enhances the advantages of foreign direct investment. This illustrates the significance of effective governance structures in optimizing developmental potential [21].

Innovation in business is important for making money and growing the economy. To stay competitive, businesses should put money into research and development (R&D) and encourage a culture of innovation. Government actions, such as funding and tax breaks, may greatly improve companies' efforts to be more innovative, which can lead to general economic growth [22]. The link between innovation and performance is complicated since several markers and time delays make it hard to come up with reliable estimates [23].

The studies show that innovation is good for economic

growth, but they also talk about the problems that come with it, such how knowledge spillovers can have varied consequences and how institutional frameworks need to be in place to enable innovation. This shows that taking a broad view is necessary to get the most out of the benefits of innovation for economic growth.

H3: *The positive relationship between innovation and economic growth.*

3. THEORETICAL PERSPECTIVES

Theoretical perspectives indicate that cybersecurity, innovation, and technological investment are interconnected and contribute to the economic growth of nations both directly and indirectly. We can no longer depend solely on physical infrastructure to facilitate our growth as we transition to a digital and knowledge-driven economy. Digital security, innovative technology, and investment in education are essential for establishing a robust and competitive economy. Thus, an effective strategy to promote growth and comprehensive, sustainable development is to implement expansive policies that concentrate on these domains.

3.1 Cybersecurity and the growth of the economy

In the digital age, cybersecurity is integral to economic prosperity. As enterprises increasingly rely on technology, it is essential for all sectors of the economy to safeguard their digital infrastructure. From the perspective of institutional theory, robust cybersecurity enhances the sense of safety for individuals and enterprises in the digital marketplace, hence fostering increased e-commerce and investment in digital solutions. A robust legal and institutional framework for cybersecurity promotes transparency and mitigates risks, resulting in sustained economic stability [24]. On the other hand, transaction cost theory says that an unsafe digital environment leads to greater transaction costs, such those associated to verification, insurance, and protection. This makes it harder to invest and slows down economic progress. Therefore, it is important to come up with good cybersecurity plans to help the digital economy and make sure it keeps growing [25].

3.2 Innovation and economic growth

Innovation is a big part of current economic theories since it helps the economy expand. Endogenous growth theory says that technical advancement comes from investments in research and development, education, and training that are made within a company, not from outside sources. Innovation makes things more productive and efficient, and it also leads to the invention of new goods and services that meet market needs. This all helps the economy grow [26]. The idea of the knowledge-based economy backs this up by showing that knowledge and innovation are important parts of the modern manufacturing process. Putting money into these areas produces knowledge capital and gives you long-term advantages over your competitors. The idea of innovation cycles also says that times of rapid economic growth generally go along with waves of new technology, such as the internet, artificial intelligence, or Fourth Industrial Revolution technologies. These innovative ideas might change the economy and open up new ways for it to develop [27].

3.3 Spending on technology and growth in the economy

Spending on technology is a big part of economic growth since it is an investment in productive capital. The idea of technical capital says that when governments invest in technology, it makes production components more efficient and productive, which helps growth rates. The idea of technology diffusion says that the full advantages of spending on technology only happen when it is used extensively in many different parts of the economy. These calls for rules that make it easier for people to utilize technology and encourage digital change. The principle of growing returns also explains how expenditure on technology may have long-term implications. In the digital economy, technological applications are more valuable over time because their marginal costs go down and they keep adding value through new ideas [28].

4. METHODOLOGY

This study adopts a quantitative analytical approach to measure the impact of cybersecurity, IT spending, and innovation on economic growth in a sample of 30 countries selected for the year 2023. This approach was chosen due to its suitability for testing quantitative hypotheses and analyzing relationships between variables using accurate statistical tools.

The data used in this study is cross-sectional, meaning data for different countries over a single period, namely the year 2023. These countries were selected to cover a comprehensive geographic and economic diversity, encompassing countries from various regions such as Europe, Asia, Africa, and Latin America. The selection took into account a balance between developed, emerging, and developing countries to ensure diverse representation that allows for a broader understanding of the phenomenon under study.

The study model comprises a dependent variable, economic growth, quantified by the real GDP growth rate. Alongside three independent variables: the cybersecurity index, sourced from the International Telecommunication Union (ITU) as part of the 2023 Global Cybersecurity Index (GCI); the proportion of IT expenditure relative to total government spending, derived from official reports by national and international financial institutions such as the World Bank and the International Monetary Fund; and the Global Innovation Index, extracted from the World Bank (WIPO) database, which annually publishes the index encompassing various dimensions of institutional and technological innovation and research education.

The data were input into EViews 12 and a simple linear regression model (OLS) was developed to assess the connection between the variables. The model was articulated as follows:

$$GDP = \beta_0 + \beta_1(\text{cybersecurity}) + \beta_2(\text{IT spending}) + \beta_3(\text{Innovation}) + \varepsilon$$

The study adopted several statistical tools and methods to ensure the validity of the model. First, the Jarque-Bera test was conducted to verify that the residuals follow a normal distribution, a prerequisite for the validity of the estimates. The Durbin-Watson test was also used to examine the autocorrelation of the residuals, although this type of test is less relevant in cross-sectional data than in time-series data. Additionally, the focus was on the T-statistic and P-value to

determine the significance of the independent variables, and R-squared and Adjusted R-squared to measure the extent to which the model explained changes in the dependent variable.

Control variables were intentionally excluded from this model, as the study aimed to analyze only the direct relationship between cybersecurity, technology spending, and innovation on the one hand, and economic growth on the other, without introducing mediating factors such as education or population.

The cross-sectional nature of this study does not require tests such as the unit root test or Cointegration test, as they are used with time-series data. Furthermore, this type of study does not require verifying the stability of the residuals over time, so the focus was directly on analyzing the OLS model and interpreting its results.

5. MODEL

The model we will be using, represented by in this instance, α_i is a normal random variable with zero mean. The random-effects model works better for unbalanced time series, whereas the fixed-effects approach works better for balanced time series. To choose between the fixed-effects and random-effects models, the following assumptions are examined as part of a Housman test:

In conclusion, we develop the following model by enhancing the basic time series model to incorporate all the variables in our analysis:

$$DGDP_{it} = \alpha + \beta_1VA_{it} + \beta_2PS_{it} + \beta_3RL_{it} + \beta_4RQ_{it} + \varepsilon_{it}$$

This equation consists of economic growth plus PS, VA, RL and RQ.

6. DATA

The following Tables 1-2 represent the independent and dependent variables and the data source.

Table 1. Independent and dependent variables and data

Variable	Definition	Data Source	Variable Type
GDP	Real GDP	WB	Dependent
GCI	Global cybersecurity	ITU	Independent
IT Spending	Spending on technology	WB/IMF/ITU	Independent
Innovation	Innovation	WIPO	Independent

Source: by the author.

Table 2. Study sample

United states	Canada	United Kingdom	Germany	France
China	India	Brazil	Russia	Russia
Vietnam	Saudi Arabia	UAE	Qatar	Egypt
Japan	South Korea	Australia	Sweden	Netherlands
South Africa	Mexico	Indonesia	Türkiye	Malaysia
Jordan	Poland	Kazakhstan	Ukraine	Argentina

7. RESULT

After using the "OLS" method to estimate the parameters of the standard model in "EViews 12", the following results were obtained (Table 3):

Table 3. Ols results

Variable	Coefficient	S.E	T-Statistics	P-Value
Constant	-5.98	3.96	-1.50	0.14
Cybersecurity	0.12	0.04	2.84	0.008
IT spending	0.04	0.02	1.86	0.07
Innovation	-0.12	0.03	-3.31	0.002
"R-squared=0.33, Adj R-squared=0.25 prop=0.01, DW=2.15. At the level of 5%"				

The OLS study findings indicated that the effects of cybersecurity, IT expenditure, and innovation on economic development varied among the nations examined in 2023.

The cybersecurity coefficient was positive and statistically significant at the 1% level, with a coefficient value of 0.12 and a p-value of 0.008. This shows that there is a strong direct link between cybersecurity and economic growth. This outcome may be elucidated by the enhancement of digital protection levels, which fosters a safe environment for business and electronic transactions while mitigating cyber threats that may adversely affect the stability of financial and banking institutions. Trust in the digital world also helps bring in foreign investment and make the business climate better, which in turn raises GDP.

The findings indicated a favorable correlation between IT expenditure and economic growth, evidenced by an effect coefficient of 0.04. The p-value of 0.07 meant that the effect was near to being significant at the 10% level, but it was not very significant at the 5% level. This can be explained by the fact that expenditure on technology alone is not enough to boost the economy unless it is used in a way that is useful and instructional and in an integrated institutional setting. This might also mean that in certain nations, there is a gap between how much they spend on digital things and how much they help the economy, either because people do not know how to use technology well or because institutions do not work well together.

The findings indicated that innovation exerted a detrimental and statistically significant effect on economic growth, evidenced by an impact coefficient of -0.12 and a p-value of 0.002, which is highly significant at the 1% level. This outcome is shocking and unexpected, considering the beneficial effect innovation is anticipated to have in fostering economic growth. This negative effect, on the other hand, might be caused by a number of things, the most important of which is that the nations investigated don't have the resources to turn inventions into real economic applications, or that there is a time lag between when breakthroughs have an effect on GDP. The innovation environment may also not be ready to take in R&D results and turn them into goods and services that make money.

The R-squared value was about 0.33, which means that about 33% of the fluctuations in economic growth can be explained by the three independent variables. The Durbin-Watson coefficient (DW = 2.15) further shows that there is no autocorrelation between mistakes, which makes the model more reliable.

8. DISCUSSION

The OLS approach demonstrated disparate impacts of the independent variables on the economic development of the examined nations in 2023: cybersecurity, technology expenditure, and innovation. We can talk about these outcomes in the following ways:

The cybersecurity coefficient was positive and statistically significant at the 1% level (coefficient = 0.12, $p = 0.008$), demonstrating that improving cybersecurity is favorably and significantly linked to the growth of a country's economy.

This outcome corroborates institutional theory, which posits that a robust institutional infrastructure, encompassing a secure digital framework, is essential for fostering trust in electronic transactions, attracting investment, and mitigating economic risks, thereby facilitating economic growth [24]. The outcome aligns with transaction cost theory, which posits that inadequate security infrastructure increases transaction costs and diminishes economic efficiency. This study corroborates the results of previous research [2, 3, 8], which demonstrated that investment in cybersecurity increases digital trust and mitigates economic losses from cyberattacks, particularly in poor and rising nations.

The effect of technology spending was positive but not very statistically significant (coefficient = 0.04, $p = 0.07$). This means that the link was partly positive and not very clear at the 5% significance level, but it was getting closer to being statistically significant at the 10% level. This somewhat corroborates the notion of technical capital, which posits that expenditures on technology constitute an investment in the productive infrastructure that improves efficiency. It is also connected to the notion of technology diffusion, which says that the full benefit of IT investment can only be seen when institutions and operations work together to make the most use of this technology. The lack of parallel cybersecurity may also limit the full rewards of this investment, which supports the idea that cybersecurity and IT spending are related.

This outcome aligns with the findings of previous research [11, 13, 16], which indicated a favorable correlation between IT investment and economic development, particularly in nations with developed digital infrastructure. The low significant level may suggest the variability in the effects of this expenditure type based on income levels and institutions in the examined nations, as noted by Yousefi [17].

The correlation between innovation and economic growth was negative and statistically significant at the 1% level (coefficient = -0.12, $p = 0.002$), which contradicts theoretical assumptions.

This finding contradicts the endogenous growth theory, which posits that innovation via research, development, and education is a fundamental catalyst for sustainable economic growth. Nonetheless, this conclusion may be elucidated via the lens of the temporal delay associated with the innovation effect, given that innovation breakthroughs do not have instantaneous economic impacts. Instead, they need a solid institutional environment and a legal framework that makes it possible for new ideas to become real products and provide value.

This outcome corroborates the findings of previous studies [19, 23], which highlighted that the correlation between innovation and growth is not necessarily linear or immediate, and that the effects of innovation may be temporarily detrimental in the absence of adequate absorption or commercialization capacity. Phung et al. [21] also showed that bad institutional quality might impede the economy from

getting the benefits of innovation.

Table 4. Results of model quality

Test	LM	Normality Test	Breusch-Pagan
Prop	0.9	0.6	0.8

Table 4 shows the results of the validity tests for the linear regression model that was generated using the Ordinary Least Squares (OLS) approach. The findings show that the model passes the fundamental statistical requirements. The LM test for autocorrelation indicated that the probability value was 0.9, which is higher than the significance threshold of 0.05. This means that there is no autocorrelation between the mistakes. The Jarque-Bera normal distribution test for residuals showed a probability value of 0.6, which means that the model's residuals follow a normal distribution to a reasonable degree. The Breusch-Pagan test for heteroscedasticity found that the probability value was 0.8, which means that the variance was the same and there was no heteroscedasticity. The model adheres to the fundamental principles of linear regression analysis, hence augmenting the accuracy and trustworthiness of the resultant findings and conclusions.

The results show that different factors have different effects on economic growth. This shows how important it is to see them as part of a larger system rather than as separate parts. Investing in technology and coming up with new ideas in a technologically unsafe environment could not be good for the economy and could potentially make it weaker. This backs up the main idea of the study, which is that cybersecurity, technology investment, and innovation are all interrelated and should be looked at together, not as separate things. The results also show that we need to make policies that connect support for innovation, making sure cybersecurity, and spending government money on technologies that are safe, useful, and long-lasting. This makes it possible for economic policymakers to come up with more consistent and successful plans for digital development.

9. CONCLUSION

This study produced significant findings elucidating the influence of several digital elements (including cybersecurity, IT expenditure, and innovation) on economic development in the examined nations in 2023. The results demonstrated that cybersecurity has a big and beneficial effect on economic growth. This shows how important a safe digital infrastructure is for economic success. Conversely, IT expenditure shown a favorable albeit negligible effect, signifying the necessity to enhance the efficacy of this expenditure and redirect it towards more productive applications. On the other side, innovation had an unanticipated and negative effect on growth. This might mean that there is a gap between attempts to innovate and their real-world uses, or that it is hard to turn scientific discovery into economic value.

The findings exhibited limited concordance with some antecedent investigations. Numerous studies, including Cooper's 2020 research and Ahmed's 2019 investigation, validated the beneficial effects of cybersecurity on economic growth. However, findings related to innovation and IT expenditure were inconsistent, necessitating additional research in this domain, considering the local and environmental context.

10. RECOMMENDATIONS AND CONTRIBUTIONS

Based on the findings of this study, various recommendations may be made to enhance the connection between digital technology and economic growth and to enhance the efficacy of associated economic policies.

The study first suggests that more money should be spent on cybersecurity since the data indicated that this factor has a big and good effect on economic growth. This is a strong sign of how important it is to have a safe digital space that helps keep economic operations stable, especially as more and more people are using digital services. So, governments and other organizations need to make building cybersecurity infrastructure a top priority. They may do this by either spending more money or making explicit laws that make people feel safer online.

Second, while IT expenditure had a favorable effect on economic growth, this effect was not statistically significant, which means that present investment may not be going in the right direction. The study thus recommends enhancing the efficiency of technology expenditures by meticulously assessing expenditure areas and allocating funds towards activities that boost productivity and generate genuine added value, rather than engaging in quantitative spending without regard for the quality of the outcomes.

Third, the data show that innovation has a big and bad effect on economic growth, which is something that needs more analysis. This negative effect may be because of the poor capacity to turn scientific research results into products and services that people want to buy. The report suggests creating strong connections between universities and research institutes and the corporate and industrial sectors. This will help entrepreneurship and market-based innovation, which will help the economy.

Fourth, this study emphasizes the necessity for more in-depth research on the correlation between digital elements and economic growth, concentrating on sectoral and temporal variations, especially with the influence of innovation. Future research should include the characteristics of each country's economic and environmental systems to improve the precision and practical relevance of the findings.

Finally, the report suggests that an integrated digital policy should be put in place that covers three primary areas: infrastructure, laws, and the growth of human capital. For any digital transformation to help the economy flourish, all three areas must work together. This will create a strong and long-lasting digital ecosystem that can keep up with the fast changes happening across the world.

This work adds to our theoretical knowledge by putting together three important digital factors cybersecurity, technology investment, and innovation into a single model to look at how they together affect economic development. Most economic literature looks at these aspects separately; therefore, this method is not common. The analysis also shows how complicated the links are between these factors, especially when it comes to how they interact with one other and how institutional frameworks impact how well innovation and technology expenditure work.

The study gives clear advice to decision-makers on a practical level. It stresses the need to build a safe cyber infrastructure, make better use of technology investment, and make the link between scientific research and the job market stronger in order to turn new ideas into real economic value. In general, the report gives a complete framework that may be

utilized to create digital policies that function together to assist long-term economic growth in many nations.

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