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The Role of Public Policy and Digital Connectivity in Driving GDP Growth: A Cross-Country Study of Emerging Economies

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ABSTRACT
Despite extensive research on the relationship between digitalization and economic development, existing studies have largely examined digital connectivity and public policy as separate determinants of economic performance. Moreover, comparative evidence from emerging economies remains limited. This study investigates the roles of digital connectivity and public policy performance in shaping economic outcomes across 21 emerging Asian economies during the period 2018–2023. Using secondary data from the World Development Indicators and DataReportal, the study employs a composite Government Policy Index and estimates a panel regression model using the Panel-Corrected Standard Errors (PCSE) approach. The results reveal that internet penetration, internet speed, and internet security are positively and significantly associated with GDP per capita. In contrast, cellular connectivity exhibits a significant negative relationship with GDP per capita, suggesting that basic mobile access alone may be insufficient to support higher-value economic activities. The findings further indicate that public policy performance has a substantial positive effect on economic outcomes, highlighting the importance of effective governance, public service provision, and infrastructure development in supporting growth. The estimated model explains a considerable proportion of cross-country variation in GDP per capita, demonstrating the relevance of both digital and institutional factors in emerging economies. This study contributes to the literature by integrating digital connectivity indicators and public policy performance within a unified analytical framework and providing comparative evidence from emerging Asian economies. The findings suggest that investments in high-quality digital infrastructure should be complemented by effective public policies to foster sustainable and inclusive economic development.

1. Introduction

In the era of rapid globalization and digitalization, connectivity and public policy have become central subjects of research, particularly in the context of emerging economies. Connectivity, encompassing both digital aspects, such as internet adoption rates and internet speed, and physical infrastructure, including access to clean water, sanitation, and electricity, plays an increasingly significant role in shaping a country's economic growth. Emerging economies face unique challenges in enhancing their connectivity, such as limited infrastructure and human resource constraints (Hendrawan et al., 2024). As Vidovic et al. (2021) note, individual well-being rises with the increase in connected communities, while improvements in infrastructure, regulation, and stakeholder coordination are vital for promoting growth. Investing in both physical and digital infrastructure is thus crucial, particularly for emerging economies in transition phases where the potential for rapid economic growth is significant, but comprehensive infrastructure is often lacking.

The innovation economics theory, which emphasizes the role of innovation in driving economic growth, is closely related to the role of connectivity and public policy. According to Apostu et al. (2022) and Pan et al. (2022), productivity growth is primarily driven by innovation and knowledge externalities, rather than by increased capital accumulation as claimed by neoclassical economists. This perspective is especially relevant in today's knowledge-based economy, where continuous growth relies heavily on innovative capacities fueled by digital connectivity. Connectivity, particularly digital, creates an environment conducive to innovation by facilitating the exchange of ideas, knowledge, and technology (Aksoy, 2023). Key variables of digital connectivity, such as internet adoption, internet speed, and internet security, play a crucial role in fostering economic growth and innovation. For example, internet adoption enables access to essential information and communication tools that drive productivity (Zhou & Wang, 2023), while faster internet speeds facilitate efficient business processes and real-time collaboration, increasing competitiveness (Ahmadova & Aslanov, 2020). Internet security is also critical, protecting digital transactions and fostering trust in digital platforms (Sharma, 2024). Public policy, through infrastructure investment, regulatory support, and economic incentives, plays an essential role in enabling and maintaining this connectivity (Perdana et al., 2023).

Beyond digital connectivity, public policy significantly impacts economic growth in emerging economies by fostering an environment that encourages investment, innovation, and economic stability. Public policy measures, such as government expenditure on education, healthcare, regulatory quality, and infrastructure development, are crucial for enhancing economic performance. Education improves human capital, promoting skills and knowledge that are essential for productivity and innovation (Olopade et al., 2023). Healthcare investment ensures a healthy workforce, reducing productivity losses due to illness and increasing economic output (Chang, 2024). Efficient regulatory frameworks attract foreign investment, promote fair competition, and reduce bureaucratic inefficiencies, creating a conducive business environment (Kalashnikova, 2021). Infrastructure development, including electricity, water supply, and sanitation, reduces operational costs, improves supply chain efficiency, and enhances the quality of life, making regions more attractive for business investments. These public policy interventions are critical for addressing the structural challenges of emerging economies while fostering long-term sustainable growth.

The impact of digital connectivity on economic growth is well-documented in the literature. Increased internet adoption rates, higher internet speeds, and strong internet security positively affect various sectors of society, creating economic opportunities, enhancing productivity, and reducing unemployment (Laitsou et al., 2020; Zhou & Wang, 2023). High internet speed is particularly important for increasing efficiency in business operations and maintaining competitiveness in the global market (Ahmadova & Aslanov, 2020). Ensuring robust internet security fosters trust in digital platforms, encouraging their widespread adoption and contributing to economic development (Sharma, 2024). Hjort & Tian (2025) show that internet usage has a long-term positive impact on economic growth, highlighting the role of successful public policies in enhancing digital connectivity for inclusive and sustainable growth.

Empirical studies support the critical role of public policies in driving economic growth. Studies show that well-designed policies reduce uncertainty, improve infrastructure, and promote human capital development, thereby fostering economic efficiency and stability (Adanma & Ogunbiyi, 2024). For example, policies that emphasize public investment in infrastructure can boost productivity, while those focused on education and healthcare contribute to a healthier and more

skilled workforce essential for economic development (Kokkinopoulou et al., 2026). Furthermore, proactive government policies have been instrumental in transforming emerging economies into advanced economies by addressing structural bottlenecks in investment, employment, and productivity (Arellano et al., 2020). Fiscal decentralization, when accompanied by strong institutional frameworks, can lead to more efficient public investment, driving economic growth (Arif & Chishti, 2022). These findings emphasize the importance of aligning public policies with the specific needs of countries to maximize their economic potential. While extensive research has established the positive influence of public policy interventions, such as investment in education, healthcare, infrastructure, and regulatory reforms, on economic growth, most studies have primarily focused on advanced or high-income countries, with limited comparative empirical analysis across emerging economies.

Existing studies have generally examined either digital connectivity variables (such as internet penetration and broadband infrastructure) or public policy indicators (such as governance quality and public expenditure) as separate determinants of economic growth. While both streams of literature consistently report positive effects on economic performance, limited empirical evidence has investigated how digital connectivity and public policy jointly influence economic growth, particularly across emerging economies. Furthermore, most cross-country studies focus on developed nations, leaving a lack of comparative evidence from developing countries where institutional capacity and digital readiness vary substantially. Therefore, this study addresses this gap by integrating digital connectivity and public policy dimensions into a unified analytical framework using panel data from 21 emerging economies during 2018–2023.

Analyzing public policy in emerging economies is essential because these countries stand at a critical juncture in their development trajectory, where strategic policy choices can yield substantial long-term economic gains. As highlighted in the literature, public policy interventions, particularly in education, healthcare, regulatory quality, and infrastructure, are foundational drivers of sustainable growth. These areas of expenditure not only build human capital and ensure a productive labor force but also enhance the business environment and reduce operational barriers, thereby stimulating investment and innovation. In contexts where structural constraints such as inequality, informality, and underdeveloped infrastructure persist, effective public policy becomes a decisive tool for unlocking economic potential and fostering inclusive development. Moreover, emerging countries often face institutional weaknesses that can hinder the efficient translation of public spending into development outcomes. The inclusion of variables such as government effectiveness and access to basic services, electricity, clean water, and sanitation, enables a nuanced assessment of how institutional capacity shapes the success of these policy interventions. These metrics are not merely indicators of state performance; they are vital enablers of economic activity and quality of life, both of which directly influence growth trajectories.

This analysis gains further relevance given the global emphasis on achieving the Sustainable Development Goals (SDGs), which require coordinated policy actions across sectors. Emerging economies, home to the majority of the world's population, are pivotal to the global success of this agenda. By examining cross-country data on public investment and service provision in these settings, researchers and policymakers can identify best practices, detect inefficiencies, and design context-specific reforms. In sum, studying emerging economies provides both theoretical insights and practical implications for how public policy can drive equitable, resilient, and sustained economic growth. This research, therefore, aims to explore the synergistic effects of digital connectivity and public policy on economic growth in 21 emerging economies including Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Iraq, Jordan, Kazakhstan, Kyrgyzstan, Lao, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor Leste, Turkmenistan, and Vietnam. By examining the roles of internet adoption, speed, security, and public policy interventions in areas such as education, healthcare, and infrastructure development, this study seeks to uncover how these factors collectively drive productivity, innovation, and economic outcomes. The implications of this research are broad, offering valuable insights for policymakers on how to prioritize investments in digital infrastructure and design effective policy frameworks that promote sustainable economic growth.

2. Research Method

This study utilizes secondary data sources from the World Development Indicators (WDI) and Data Reportal, both of which are pertinent sources for an analysis focused on connectivity, public policy,

and economic growth in developing countries. The World Development Indicators provide comprehensive data encompassing various crucial economic, social, and environmental indicators, such as GDP, infrastructure investment levels, access to basic services, and other indicators related to public policy and economic development. Meanwhile, Data Reportal offers specific data related to digitalization and connectivity, including internet adoption rates, internet speed, and digital penetration across different countries. The dataset includes 21 emerging countries in Asia, namely: Afghanistan, Bangladesh, Cambodia, China, India, Indonesia, Iraq, Jordan, Kazakhstan, Kyrgyzstan, Lao, Malaysia, Myanmar, Nepal, Pakistan, Philippines, Sri Lanka, Thailand, Timor Leste, Turkmenistan, and Vietnam. The analysis in this study covering period 2018-2023.

First, this study constructed the Government Policy Index using a composite index method to reflect the performance of public policy in each country. This method combines various distinct indicators into a single representative measure. For example, it merges dimensions such as government spending on basic services, government effectiveness, and public access to essential infrastructure like electricity, clean water, and sanitation. By doing so, it provides a comprehensive view of the quality and scope of government policies. The composite index method allows for the normalization and integration of data with different units and scales into a coherent index. This facilitates easier comparison and more in-depth analysis of how government spending on education and healthcare, policy implementation effectiveness, and public access to basic facilities impact societal well-being. Thus, the composite index offers a holistic insight into the successes and shortcomings of public policies, enabling more informed and data-driven decision-making. The dimensions and indicators constituting the index are outlined as follows:

Table 1. Dimensions and Indicators Compiling the Index of Public Policy Performance

No.	Indicator	Weight
Dimension of Government Expenditure for Basic Services (30%)		
1.1	Government spending on education	10%
1.2	Government spending on health	10%
1.3	Government subsidies and transfers	10%
Dimensions of Government Effectiveness (40%)		
2.1	Government effectiveness	40%
Dimension of Access to Basic Infrastructure (30%)		
3.1	Access to electricity	10%
3.2	Access to clean water	10%
3.3	Access to sanitation	10%
	Total Weight	**100%**

Next, this study employs the Panel Corrected Standard Error (PCSE) method to examine the determinants influencing growth in developing countries. The PCSE method adjusts for inherent correlation structures within panel data by providing robust standard errors. This adjustment is particularly crucial when errors exhibit correlation patterns within the same panel (across countries over time) or across different panels (between different countries). By correcting for these correlations, PCSE enhances the efficiency and reliability of regression parameter estimates compared to ordinary least squares (OLS) regression, which assumes independent and identically distributed errors. The PCSE method is particularly suitable for this study as it addresses potential issues of heteroskedasticity and serial correlation, which are common in socio-economic studies involving multiple regions and time periods, especially in developing countries. The research data and the equation is formulated as follows:

$$Growth_{it} = \alpha + \beta 1 Internet\_penetration_{it} + \beta 2 Mobile\_connection_{it} + \beta 3 Internet\_speed_{it} + \beta 4 Secure\_internet_{it} + \beta 5 Public\_policy\_performance_{it} + \epsilon_{it} \quad (1)$$

It is essential to clearly explain the research data and definitions to provide a solid foundation for understanding the study's methodology and results. Precise definitions of key variables, such

as digital connectivity indicators and public policy metrics, ensure consistency in data interpretation and result discussions. The elaboration is presented in Table 2.

Table 2. Research Datas and Definitions

Variable	Data	Definition	Source
Internet penetration	Internet penetration	Percentage of internet users to population	Data Reportal
Cellular connection	Cellular connection	Percentage of mobile connections to population	Data Reportal
Internet speed	Internet speed	Average mobile internet connection speed	Data Reportal
Internet security	Internet security	Number of secure internet servers (per 1 million people)	WDI
Public policy performance (Government Policy Index)	Government spending on education	Government expenditure on education, total (% GDP)	WDI
	Government spending on health	Total government expenditure on health (% GDP)	WDI
	Government subsidies and transfers	Subsidies and other transfers (% of government spending)	WDI
	Government Effectiveness	World Governance Indicator (WGI) is a measure of governance quality through government effectiveness.	WDI
	Access to electricity	Percentage of population that has access to electricity	WDI
	Access to clean water	Percentage of population that has access to clean water	WDI
	Access to sanitation	Percentage of population that has access to sanitation facilities	WDI
Economic growth	Per capita GDP	GDP per capita expressed in US$	WDI

3. Results

Assessing a country's public policy performance is essential for understanding how effectively government strategies achieve social, economic, and environmental goals. Public policy influences critical sectors like healthcare, education, and infrastructure, impacting overall societal well-being. By evaluating policy performance, stakeholders can identify successes and areas for improvement, enabling data-driven decisions that enhance transparency and accountability. This process allows governments to justify their actions and helps citizens hold their leaders responsible. Moreover, measuring policy effectiveness supports the efficient allocation of resources, ensuring that investments yield the greatest benefits, particularly in developing countries where resources are scarce. Importantly, strong public policy performance often correlates with sustained economic growth, as effective policies can stimulate development, reduce inequality, and improve the standard of living.

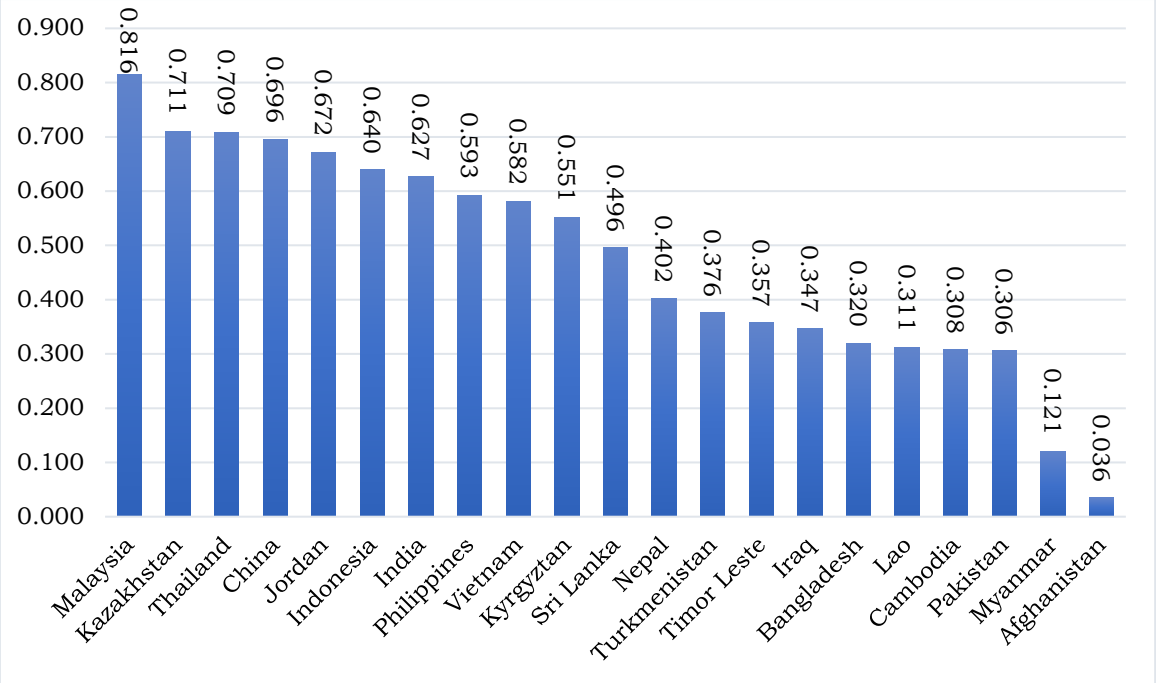

Figure 1. Public Policy Performance of Developing Countries 2018-2023
Source: Data Analysis (2024)

The figure illustrates the public policy performance of various developing countries between 2018 and 2023. The countries are ranked based on their performance scores, which appear to range from approximately 0.036 to 0.816. Malaysia tops the list with a score of 0.816, indicating a relatively high level of public policy performance, followed closely by Kazakhstan, Thailand, and China. Indonesia, positioned midway in the ranking with a score of 0.672, shows a moderate performance level. At the lower end of the spectrum, countries such as Pakistan, Myanmar, and Afghanistan exhibit significantly lower scores, with Afghanistan scoring the lowest at 0.036. This disparity suggests varying levels of effectiveness in public policy implementation across these nations, with some countries demonstrating more robust and successful policy frameworks while others struggle with significant challenges. The visualization emphasizes the need for targeted efforts to enhance public policy effectiveness, especially in countries with lower scores, to promote more equitable and sustainable development outcomes.

Table 3. Average Public Policy Performance Score According to Indicators 2018-2023

Countries	Education Spending	Health Spending	Subsidies and Transfers	Electricity	Clean Water	Sanitation	Government Effectiveness
Afghanistan	-0.033	0.007	-0.021	0.081	0.002	0.000	0.000
Bangladesh	0.006	0.000	0.034	0.082	0.092	0.008	0.098
Cambodia	0.020	0.030	0.019	0.050	0.000	0.038	0.152
China	0.040	0.055	-0.021	0.100	0.084	0.086	0.352
India	0.058	0.014	0.049	0.091	0.067	0.043	0.304
Indonesia	0.028	0.028	0.046	0.096	0.069	0.068	0.305
Iraq	-0.033	0.042	0.028	0.100	0.092	0.097	0.021
Jordan	0.032	0.052	0.021	0.100	0.096	0.095	0.275
Kazakhstan	0.045	0.036	0.087	0.100	0.081	0.097	0.265
Kyrgyztan	0.100	0.045	0.044	0.099	0.060	0.097	0.107
Lao	0.008	0.009	0.000	0.094	0.037	0.056	0.109
Malaysia	0.053	0.037	0.044	0.100	0.088	0.093	0.400
Myanmar	0.012	0.008	0.012	0.000	0.017	0.045	0.027
Nepal	0.047	0.021	0.100	0.070	0.061	0.050	0.054

Countries	Education Spending	Health Spending	Subsidies and Transfers	Electricity	Clean Water	Sanitation	Government Effectiveness
Pakistan	0.011	0.011	-0.021	0.081	0.060	0.031	0.133
Philippines	0.045	0.034	0.025	0.085	0.075	0.064	0.264
Sri Lanka	0.000	0.031	0.014	0.100	0.053	0.087	0.212
Thailand	0.030	0.056	0.029	0.100	0.100	0.099	0.295
Timor Leste	0.050	0.100	0.003	0.081	0.033	0.008	0.083
Turkmenistan	0.041	0.012	-0.021	0.100	0.100	0.100	0.044
Vietnam	0.032	0.033	-0.021	0.099	0.086	0.077	0.275

Source: Data Analysis (2024)

Table 3 presented contains detailed indicators contributing to the public policy performance assessment of various countries. These indicators include education spending, health spending, subsidies and transfers, electricity access, clean water, sanitation, and government effectiveness. The values range from negative to positive, indicating the relative performance of each country in these specific areas, with color coding that likely represents poor to strong performance (red to green). For instance, countries like Malaysia, Kazakhstan, and China generally score higher across multiple indicators, suggesting strong public policy performance. Malaysia, for example, shows high scores in education spending, health spending, and government effectiveness, with scores of 0.053, 0.037, and 0.400, respectively. This suggests a well-rounded and effective approach to public policy, contributing to its high overall performance as indicated in the earlier figure. On the other hand, countries like Afghanistan and Iraq display negative or low scores in several indicators, such as government effectiveness and education spending, which correlates with their lower overall performance. Afghanistan, for example, has negative scores in education spending and subsidies and transfers, reflecting significant challenges in these areas. The table highlights the varying levels of success in implementing public policies across different domains, emphasizing the importance of targeted interventions to address specific weaknesses, particularly in countries with lower overall performance scores. This granular data provides insights into where improvements are needed to enhance the overall quality of life and economic growth in these countries.

Table 4. Panel Data Estimation Result

Variables	Coef	Std.err	z	Prob	[95% conf.	interval]
Internet penetration	40.192	15.082	2.66	0.008***	10.631	69.754
Cellular connection	-24.162	5.550	-4.35	0.000***	-35.041	-13.282
Internet speed	111.654	30.009	3.72	0.000***	52.837	170.471
Internet security	0.615	0.056	10.93	0.000***	0.504	0.725
Public policy performance	4842.288	1317.362	3.68	0.000***	2260.376	7424.201
Constant	-432.202	460.990	-0.92	0.359	-1326.726	480.321
R-squared	0.7636					
Wald chi2	1342.62					
Prob>chi2	0.0000					

Source: Data Analysis (2024)

The panel data regression results indicate a strong relationship between several independent variables and per capita GDP in 21 developing countries from 2018 to 2023. The model explains 76.36% of the variation in per capita GDP, as indicated by the R-squared value. Significant positive effects on per capita GDP are observed for internet penetration, internet speed, and internet security, with coefficients of 40.192, 111.654, and 0.615, respectively, all significant at the 1% level. This suggests that increases in these variables are associated with substantial increases in per capita GDP. On the other hand, cellular connection shows a significant negative effect with a coefficient of -24.162, indicating that higher cellular connection rates might be associated with lower per capita GDP in this context. Public policy performance also has a highly significant positive impact, with a coefficient of 4842.288, suggesting that effective public policies substantially boost

economic growth. The overall model is statistically significant, as indicated by the Wald chi-square statistic of 1342.62 and a p-value of 0.0000, confirming the robustness of these relationships.

4. Discussion

The research underscores the critical importance of digital infrastructure, specifically internet penetration, speed, and security, in driving economic growth in developing countries. As these countries enhance their digital infrastructure, they experience increased productivity and innovation, which are vital for economic transformation. This is consistent with findings by Du & Wang (2024) and Feng & Qi (2024), who argue that digital infrastructure plays a pivotal role in bridging the economic development gap. Their research demonstrates that countries investing in robust digital networks can better integrate into the global economy, access new markets, and foster innovation across various sectors. As digital technology becomes increasingly central to economic activities, countries with advanced digital infrastructure are more likely to experience accelerated growth. This suggests that for developing nations, building and improving digital infrastructure should be a top priority, as it not only supports immediate economic activities but also lays the foundation for future growth and development.

The negative correlation between cellular connections and economic growth highlights the limitations of relying solely on mobile technology for driving economic development. While mobile networks provide essential connectivity, they often do not support the high-speed data transmission required for more complex and productive economic activities. Sarangi & Pradhan (2020) emphasize that advanced digital infrastructure, such as high-speed broadband, is crucial for enabling activities like remote work, online education, and e-commerce, which are increasingly important in the modern economy. These activities require reliable, high-speed internet that mobile networks alone cannot provide. Therefore, the findings suggest that while expanding mobile networks is important, developing countries should prioritize upgrading to more advanced digital infrastructure to fully capitalize on the economic opportunities provided by the digital economy. This shift is particularly important as the global economy becomes more digital, and countries that fail to keep pace with these technological advancements risk being left behind.

The significant positive impact of public policy performance on economic growth highlights the essential role of good governance in fostering a conducive environment for economic development. Effective public policies, characterized by transparency, accountability, and efficient public service delivery, are crucial for creating an environment where economic activities can thrive. Strong institutional frameworks are necessary for ensuring that public investments lead to tangible economic outcomes. In countries with effective governance, public investments are more likely to be allocated efficiently, leading to improvements in infrastructure, education, and healthcare, all of which are critical drivers of economic growth. Moreover, good governance can attract foreign direct investment (FDI), which brings additional capital, technology, and expertise into the economy, further stimulating growth (Raza et al., 2021; Ullah et al., 2024). The research suggests that developing countries should focus on strengthening their governance structures to fully harness the potential of their economies and attract the investments needed for sustained growth.

Synergy between digital infrastructure and effective public policies in driving economic growth in developing countries is found to be critical. The findings suggest that targeted investments in both areas can lead to significant economic advancements. As emphasized by recent literature, integrating technological advancements with sound public policies creates a robust foundation for sustained economic growth. For developing countries, this means that efforts to improve digital infrastructure must go hand in hand with governance reforms to maximize their impact. By doing so, these countries can better position themselves to compete in the global economy, attract investment, and improve the living standards of their populations. This holistic approach to development, where digital innovation and governance improvements are pursued together offers a promising path for developing countries to achieve long-term economic success.

5. Conclusion

This study highlights the critical role of digital infrastructure and public policy effectiveness in driving economic growth in developing countries. In an increasingly digitalized global economy, the ability of nations to harness the benefits of technology is contingent upon the quality and accessibility of their digital infrastructure. The findings reveal a strong positive impact of internet penetration, internet speed, and digital security on per capita GDP, underscoring that investment

in robust and secure digital networks is essential not only for improving productivity but also for enhancing competitiveness and fostering innovation across sectors. This demonstrates that digital connectivity is not merely a technological advancement but a strategic economic asset that can stimulate job creation, support digital entrepreneurship, and expand access to markets.

Conversely, the observed negative association between cellular connection and economic growth suggests that reliance on mobile connectivity alone may be inadequate for fostering significant economic advancement. This may be attributed to the limited functionality and lower productivity typically associated with basic mobile services, which do not offer the same economic opportunities as high-speed internet, particularly in knowledge-based and service-driven economies. Additionally, the study finds a significant and substantial effect of public policy performance on GDP per capita, reinforcing the argument that sound governance and effective policy implementation are indispensable for sustainable development. Efficient public policies, particularly those targeting education, healthcare, infrastructure, and regulatory quality, can create an enabling environment for investment and innovation. These findings collectively point to the necessity of integrated digital and governance strategies to drive long-term, inclusive economic growth in developing contexts.

This study underscores the importance of investing in high-speed internet and digital security to boost economic productivity in developing countries. While internet penetration, speed, and security are positively linked to GDP per capita, the limited contribution of basic cellular connectivity suggests that mobile networks alone are insufficient for driving growth. Policymakers should prioritize expanding broadband infrastructure, improving digital literacy, and fostering innovation in data-intensive digital services to fully realize the economic benefits of digital connectivity. In addition, the strong impact of public policy effectiveness on GDP highlights the need for good governance and strategic public investment. Governments should enhance institutional capacity, improve transparency, and align spending with key sectors such as education, health, and infrastructure. Strengthening regulatory frameworks and reducing bureaucratic inefficiencies will also support a more conducive environment for growth. Together, effective digital and governance strategies are essential for accelerating inclusive and sustainable economic development.

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