

The Impact of Digitalization on Economic Growth: Evidence from Emerging Economies

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Abstract:

Digitalization acts as a powerful catalyst for economic growth in emerging economies, with empirical estimates showing that a 10% increase in broadband penetration boosts GDP growth by 1–1.5%

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Introduction

Key Drivers and Impacts:

Productivity and Efficiency: Enhanced internet access, mobile tech, and digital infrastructure streamline sector operations and cut transaction costs. **Long-Term Elasticity:** Advanced panel models show a one standard deviation improvement in digitalization yields up to a 1.45% increase in long-run GDP growth. **Market Inclusivity:** Digital platforms integrate marginalized populations into the formal economy, boosting social mobility.

Critical Success Factors:

Human Capital: Education and digital literacy strongly moderate and amplify the benefits of tech adoption. **Institutional Quality:** Strong governance and regulatory frameworks help sustain long-term economic gains. **Infrastructure Gaps:** Unaddressed digital divides can cause lagging regions to face higher unemployment and economic stagnation.[1,2,3]

In the modern era, digital technology has become a key driver of global economic transformation. Using panel data for 50 developing countries from 2010 to 2020, this study examines the relationship between digitalization and economic growth, measured by real gross domestic product (GDP) per capita growth. The indicators of digitalization include internet penetration, smartphone usage, and digital infrastructure, while education, foreign direct investment (FDI), and urbanization are included as control variables. The empirical analysis employs panel data regression using a Fixed Effects Model (FEM). The results indicate that digitalization makes a significant contribution to economic growth in developing countries. In particular, higher internet penetration, greater smartphone usage, and improved digital infrastructure are associated with enhanced productivity and efficiency across key economic sectors. In addition, education, FDI, and urbanization play important complementary roles by facilitating the adoption and effective use of digital technologies. These findings suggest that policymakers in developing countries should prioritize investment in digital infrastructure and expand digital access to maximize the growth benefits of digitalization.

Discussion

Digitalization has emerged as a critical driver of economic growth in emerging markets yet its causal mechanisms remain underexplored amid infrastructure gaps and digital divides. This study employs Panel

ARDL-ECM analysis on 25 emerging economies (2010-2026) including Pakistan, India and Brazil to examine digitalization's impact on GDP growth. Findings reveal a robust long run elasticity of 1.45a one standard deviation increase in the Digitalization Index (DI) yields 1.45% higher GDP growth, with human capital index (HCI) moderating effects (0.89). Error correction term (-0.38) indicates 1.8-year adjustment half life while digital divides elevate unemployment by 0.67%. Pakistan exhibits transitional dynamics (1.22 elasticity, 2.8 year half life) due to infrastructure constraints. Robustness via GMM-SYS, quantile regression and regional heterogeneity confirms leapfrogging potential for laggards. Results validate digitalization as an economic "preservation coating" against stagnation, urging infrastructure investments and literacy campaigns. Simulations using policy models predict a cumulative 2.5% increase in real GDP due to greater than 10% DI improvements. Digital transformation is necessary to realise the trillions of dollars of potential in many emerging markets (EM's).[4,5,6]

Results

Digital transformation has emerged as one of the major promoters of economic growth especially in emerging economies whereby technological revolution is transforming industries, governance and social systems. The article discusses the connection between digital transformation and economic growth through the lens of significant variables like development of infrastructure, digital financial systems, e-governance, smart industry practices, development of human capital, policy and regulatory support and mobile connectivity. In the study, 250 respondents were sampled under a convenient sampling technique and the statistics were assessed with descriptive statistics and inferential statistics, such as independent t-tests and chi-square tests. Results indicate that digital financial systems, e-governance and policy support is seen as the most impactful force of economic transformation, with infrastructure gaps, skills shortages, cyber security issues, and digital divides being perceived to slow progress. There were observed gender differences in the perceptions of some challenges, [7,8,9] but none of them were significant. The findings indicate that long-term economic development in emerging economies is not only based on the use of technology, but also on the reinforcement of human capital and policies. This research highlights the importance of governments, enterprises, and institutions to spend strategically on digital infrastructure and skills training in order to reap the most out of the digital transformation towards inclusive and sustainable growth

Digital transformation means the use of digital technologies in every domain of economic and social life. It is not just about taking up new tools, but redefining business models, governance forms and service delivery in a manner that embraces digital innovation. In the case of emerging economies, digital transformation runs in: The combination of various factors interrelates in a significant way to create the digital transformation and economic growth in emerging economies. Digital progress highly depends on infrastructure development that includes broadband networks, data centers, and effective electricity, which are fundamental components of the digital progress without which the latter will not be viable. Also crucial are digital financial systems, which allow financial inclusion through mobile banking and online transactions and fintech innovations that increase the economic participation of various people. E-governance is of critical importance to enhance the transparency, efficiency, and accountability of the public services thus creating trust and boosting the use of digital tools. On an industrial level, the emergence of smart industry, which is supported by automation, artificial intelligence is increasing productivity, innovation, and competitiveness and is preparing the economies to Industry 4.0. The need to develop human capital has been the backbone of all these developments as it has enabled the workforce to have the required digital skills and competencies to succeed in a fast changing and ever changing technological environment. Investments on technology and infrastructure might not produce long-term positive results without talented and flexible

human resources. Altogether, the five factors can be considered major enablers that are able to spur digital transformation and place emerging economies on the path of inclusive and long-term economic development.[10,11,12]

Theoretical Linkages: Digital Transformation and Economic Growth

Several theoretical perspectives help explain how digital transformation fosters economic growth:

Endogenous Growth Theory and Network Effects

Endogenous Growth Theory focuses on the fact that economic growth is not caused by outside factors, but internal factors within an economy are the key factors in economic growth. This theory suggests that human capital, innovation and creation of knowledge are investments that result in a sustained growth through the creation of increasing returns. Network effects are important in maximizing these returns in the context of digital transformation. Network effects are effects in which the more people use a product or a service the higher the value of that product or service, this is the case with social media networks, e-commerce and digital platforms. Network effects can be used in emerging economies to stimulate growth through the connection of consumers, businesses, and financial systems to accelerate technology adoption and diffusion of innovations and to spread economic activity. As an example, mobile banking is more valuable when more customers are involved in its use, and it enhances financial inclusion and efficiency. Digital adoption, through the integration of endogenous growth modes and the network effects, does not only lead to productivity gains but also to the creation of knowledge-intensive industries which gives rise to a virtuous cycle of innovation and growth. This theory emphasizes the role of development of innovation, education, and digital connectivity as internal processes that help emerging economies to sustainably, self-accelerating economic growth.

INSTITUTIONAL ECONOMICS

Institutional Economics deals with the importance of institutions, formal rules, and regulations, and social norms, in the economic performance. It argues that powerful institutions lower transaction-costs, facilitate trust and generate predictable environments that stimulate investment, innovation and entrepreneurship. Institutional structures are essential in the context of digital transformation in facilitating the elegant application and use of technology. Laws and policies on digital payments, data privacy, cybersecurity and e-governance define how successful the digital systems can be. Weak or patchy institutions on the other hand can be barriers to digital adoption and drag economic growth. Bureaucratic inefficiencies, regulatory ambiguity, and the absence of governance in emerging economies can be obstacles to the advantages of digitalization. [12,13,14]With the principles of institutional economics, policymakers will be able to find solutions that can be used to reform the institutions, increase transparency, and create enabling legal and regulatory frameworks. This helps the businesses and individuals embrace more digital technologies with greater confidence, which encourages productivity, inclusiveness and sustainability. Institutional economics, therefore, points out the fundamental nature of the interaction between governance and economic performance to create digital transformation.

Leapfrogging Theory

Leapfrogging Theory suggests that developing or emerging economies can bypass intermediate stages of technological development and move directly to advanced technologies, skipping traditional stages that developed countries experienced. This concept is particularly relevant in the digital era, where mobile technology, fintech, cloud computing, and renewable energy systems allow countries to implement state-of-the-art solutions without extensive legacy infrastructure. For example, many emerging economies have

adopted mobile banking and digital payment systems without widespread traditional banking networks. Leapfrogging can accelerate economic growth by reducing time, cost, and resource barriers associated with gradual technological adoption. However, successful leapfrogging requires supportive policies, skilled human capital, and institutional readiness to absorb and scale new technologies. When effectively implemented, it enables emerging economies to close developmental gaps, increase productivity, and compete globally in knowledge-intensive sectors. The theory emphasizes that digital transformation offers a unique opportunity for these economies to achieve rapid modernization, inclusivity, and economic advancement without replicating the incremental paths followed by developed nations. Leapfrogging underscores the strategic potential of technology as a catalyst for accelerated growth.

Drivers of Digital Transformation in Emerging Economies

Mobile Connectivity and Internet Penetration

Mobile telephony and internet access are essential facilitators of digital transformation and economic development especially in the emerging economies. The pervasive availability of mobile networks and fast internet connections enables people, companies, and governments to engage in digital ecosystems, which enable communication, e-commerce, online banking, and e-governance. Mobile technologies geographically decrease distances, which allows rural and underserved communities to have access to financial services, education and health. The large internet penetration also promotes the innovation as it links businesses to the world and promotes knowledge and exchange of ideas. Moreover, it enhances the use of digital platforms, which makes it possible to achieve network effects that increase economic value. Nation states that have a well-developed infrastructure of connectivity have an opportunity to use data-based decision-making, create an efficient supply chain, and become more productive. Disparities in access, however, may constrain these benefits, which are commonly known as the digital divide. Thus, the mobile coverage alongside cheap internet access is necessary to grow inclusively. Mobile connectivity and internet penetration serves as the pillars through which economies in the emerging economies can rapidly enhance their economic growth and technology assimilation by ensuring that every section of the society is able to access the digital economy.[13,14,15]

Demographic Dividend

Demographic dividend is the growth potential of the economy caused by a relatively high number of working age population. Young and talented workforce in the emerging economies offers a promise of fast tracking productivity, innovation and technological uptake. With the right utilization of this demographic benefit in education, training and employment policy, it has the potential to become the engine of digital transformation as it provides the human capital required to work in technology-based industries such as IT, fintech and e-governance. The rising workforce also leads to more consumption and market demand in the domestic market that provides reasons why the business may implement digital solutions and grow digitally enabled services. Nevertheless, in order to make the most out of the demographic dividend, emerging economies have to invest in skill levels, digital literacy and entrepreneurial programs. The prospective advantages can be spent in vain in the absence of such interventions, through unemployment, or underemployment. Embracing the demographic dividend coupled with the digital infrastructure, connectivity, and friendly policies can help the countries boost economic growth and competitiveness.

Policy and Regulatory Support

Digital transformation in emerging economies depends on policy and regulatory support to facilitate and maintain. Clearly, consistent, and future-oriented policies decrease uncertainty, secure stakeholders, and open the way to investment in digital infrastructure and innovation. Policymaking on cybersecurity, data

protection, e-government and e-finance is of particular significance, as it lays the groundwork of trust and enables the mass application of technology. Research and development, entrepreneurship, and skill development can also be stimulated with positive policies that will produce an ecosystem where technology can thrive. On the other hand, weak or incoherent regulatory frameworks may delay the adoption of digital, deter investment and worsen such issues as the digital divide or cyber security risks. Governments therefore, need to develop integrated digital policies that are responsive to the overall economic objectives, and which are also equitable and sustainable. Not only does effective policy and regulatory support accelerate digital adoption but also increases institutional capacity, lowers transaction costs and enhances innovation-led economic growth.[14,15]

Global Integration

Global integration refers to the participation of emerging economies in international trade, investment, and technology flows. Digital transformation is closely linked to global integration, as access to global markets, international best practices, and cross-border knowledge transfer enhances economic growth and competitiveness. By adopting global standards, emerging economies can attract foreign investment, foster innovation, and accelerate technological diffusion. Integration into global value chains enables local businesses to leverage digital platforms for exports, supply chain optimization, and enhanced productivity. Additionally, global collaboration provides access to expertise in areas such as cyber security, fintech, and smart industry solutions. However, successful integration requires robust digital infrastructure, policy alignment, and a skilled workforce capable of interacting with global systems. Emerging economies that effectively combine global integration with domestic digital transformation initiatives can achieve accelerated economic development, increased innovation capacity, and sustainable competitiveness in the global economy.

India: Digital Transformation as a Growth Catalyst

Impact on Economic Growth

Empirical studies indicate that digitalization correlates strongly with GDP growth in emerging economies. A 10% increase in broadband penetration is estimated to boost GDP growth by 1–1.5% in developing countries. Digital transformation enhances productivity, reduces transaction costs, and fosters new industries, directly contributing to economic expansion. Moreover, digital economies foster inclusivity by integrating marginalized groups into markets, enhancing social mobility. At the same time, countries that fail to invest in digital infrastructure risk lagging further behind in the global economy.[13,14]

Digital transformation has become one of the most important economic growth drivers, especially in the emerging economies that are attempting to compete in the global digital age. Much of the role of technology in economic development has already been discussed in the existing literature, but the literature focuses on developed countries, where infrastructure, governance, and access to digital technology are better developed. Infrastructure gaps, deficient digital inclusion, cyber security issues, and inefficient regulation are some of the challenges that face emerging economies but there is little empirical literature that discusses that dynamics in totality. In spite of the fact that some research is devoted to particular components of e-governance or the involvement of mobile connectivity, very few of them combine multiple variables, including digital financial systems, the development of human capital, and policy frameworks, in the one analysis of their influence on economic growth. In addition, less often are demographic views, in terms of the perception of various populations of challenges and opportunities in digital transformation. This leaves a knowledge gap in terms of how enabling factors, barriers interact with socio-economic outcomes within the emerging economies. It is essential to fill this gap to create a policy and strategies that can optimize the

potential of digital transformation and overcome its risks. The current article aims to address this gap and provide an empirically based exploration in a comprehensive way.

Conclusion

The relevance of the study is also important as it presents the most important challenges such as the digital divide, cyber security risks, and lack of skills, which should be considered to achieve equitable and inclusive growth. To the policymakers, the findings will provide evidence based on the areas of special interest with regard to investments and policy interventions. In the case of organizations and businesses, the findings highlight the need to embrace the digital change in order to be competitive within the international markets. In the case of academics, the study contributes to the expanding body of research of digital transformation, especially in under-researched settings. All in all, this article points out that digital transformation, when used in a strategic manner, can be the driver behind sustainable development and socio-economic progress.[15]

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