


DIGITAL TRANSFORMATION AND ITS IMPACT IN EGYPT: A COMPREHENSIVE LITERATURE REVIEW

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ARTICLE INFO	ABSTRACT
<p>Article history:</p> <p>Received 15 May 2023</p> <p>Accepted 11 August 2023</p>	<p>Purpose: The purpose of this study is to review all studies that have analyzed the correlation between digitalization and economic growth. Additionally, this review analyses previous studies investigating the impact of digitalization on the labour market.</p>
<p>Keywords:</p> <p>Blockchain; Finance; Financial Services; Internet of Things; Supply Chain Management.</p>	<p>Theoretical framework: Several technological advances, including digitalization, intelligent automation, and software, have encouraged countries and industries to set up visions and plans that will lead to economic growth and strengthen their competitive position. This study will provide a holistic framework highlighting the current state and potential growth areas of digitalization in the economy.</p> <p>Design/Methodology/Approach: In this study, we examine and organize current research literature that explores the impact of digitalization on economic growth and the transformation in the labour market, quantitatively or qualitatively.</p>
	<p>Findings: The ability of Egypt to develop the digital transformation is related to readiness to obtain the framework of five pillars: legislation, technical and organizational capabilities, capacity building, and cooperation with other stakeholders. This imposes on the government the importance of continuing work to ensure the sustainability of strategies, measures, and adaptation to face the accelerated nature of cyber threats development according to the state of technical progress.</p> <p>Research, practical & social implication: This study will provide a holistic framework highlighting the current digitalisation state, the impact of digital transformation on economies, and the potential strategies to adopt digitalisation.</p> <p>Originality/Value: This study comprehensively reviews the correlation between digitalization and economic growth and the labour market's evolving requirements focusing on the Egyptian economy.</p> <p>Doi: https://doi.org/10.26668/businessreview/2023.v8i8.2755</p>

TRANSFORMAÇÃO DIGITAL E SEU IMPACTO NO EGITO: UMA REVISÃO ABRANGENTE DA LITERATURA

RESUMO

Objetivo: O objetivo deste estudo é rever todos os estudos que analisaram a correlação entre digitalização e crescimento econômico. Além disso, esta revisão analisa estudos anteriores que investigavam o impacto da digitalização no mercado de trabalho.

Estrutura Teórica: Vários avanços tecnológicos, incluindo a digitalização, a automação inteligente e o software, incentivaram os países e indústrias a criar visões e planos que levarão ao crescimento econômico e fortalecerão sua posição competitiva. Este estudo proporcionará um quadro holístico que realçará a situação atual e as áreas de crescimento potencial da digitalização na economia.

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Design/Methodologia/Abordagem: Neste estudo, examinamos e organizamos a literatura de pesquisa atual que explora o impacto da digitalização no crescimento econômico e na transformação do mercado de trabalho, quantitativa ou qualitativamente.

Constatações: A capacidade do Egito de desenvolver a transformação digital está relacionada com a prontidão para obter o quadro de cinco pilares: legislação, capacidades técnicas e organizacionais, reforço de capacidades e cooperação com outras partes interessadas. Isso impõe ao governo a importância de continuar a trabalhar para garantir a sustentabilidade de estratégias, medidas e adaptação para enfrentar a natureza acelerada do desenvolvimento de ameaças cibernéticas de acordo com o estado do progresso técnico.

Pesquisa, implicação prática & social: Este estudo proporcionará um quadro holístico que realçará o estado atual da digitalização, o impacto da transformação digital nas economias e as potenciais estratégias para adotar a digitalização.

Originalidade/Valor: Este estudo analisa de forma abrangente a correlação entre a digitalização e o crescimento econômico e as exigências em evolução do mercado de trabalho, com foco na economia egípcia.

Palavras-chave: Digitalização, Transformação Digital, Habilidades Digitais, Inovação Digital, Crescimento Econômico, Emprego.

LA TRANSFORMACIÓN DIGITAL Y SU IMPACTO EN EGIPTO: UNA REVISIÓN INTEGRAL DE LA LITERATURA

RESUMEN

Objetivo: El propósito de este estudio es revisar todos los estudios que han analizado la correlación entre la digitalización y el crecimiento económico. Adicionalmente, esta revisión analiza estudios previos que investigan el impacto de la digitalización en el mercado laboral.

Marco teórico: Varios avances tecnológicos, como la digitalización, la automatización inteligente y el software, han alentado a los países y a las industrias a establecer visiones y planes que conduzcan al crecimiento económico y fortalezcan su posición competitiva. Este estudio proporcionará un marco holístico que destacará el estado actual y las áreas de crecimiento potencial de la digitalización en la economía.

Diseño/Methodología/Enfoque: En este estudio, examinamos y organizamos la literatura de investigación actual que explora el impacto de la digitalización en el crecimiento económico y la transformación en el mercado laboral, cuantitativa o cualitativamente.

Hallazgos: La capacidad de Egipto para desarrollar la transformación digital está relacionada con la preparación para obtener el marco de cinco pilares: legislación, capacidades técnicas y organizativas, creación de capacidades y cooperación con otras partes interesadas. Esto impone al gobierno la importancia de continuar trabajando para asegurar la sostenibilidad de estrategias, medidas y adaptación para enfrentar la naturaleza acelerada del desarrollo de ciberamenazas de acuerdo al estado del progreso técnico.

Investigación, implicaciones prácticas y sociales: Este estudio proporcionará un marco holístico que resaltará el estado actual de la digitalización, el impacto de la transformación digital en las economías y las estrategias potenciales para adoptar la digitalización.

Originalidad/Valor: Este estudio revisa exhaustivamente la correlación entre la digitalización y el crecimiento económico y los requisitos cambiantes del mercado laboral centrándose en la economía egipcia.

Palabras clave: Digitalización, Transformación Digital, Habilidades Digitales, Innovación Digital, Crecimiento Económico, Empleo.

INTRODUCTION

In recent years, digitalization has increasingly become one of the most significant economic drivers facilitating job creation and accelerating economic growth. Digitization involves transforming analogue material into digital form for computer storage and use (Pearce-Moses, 2005). Moreover, digitalization refers to how consumers, businesses, and governments use these digital services (technology) to enhance corporate processes.

Digitalization is essential in helping policymakers stimulate economic growth and employment in a sluggish global economy (Sabbagh et al., 2013). Neoclassical economists hold that economic growth is determined by labour, technology, and a country's total capital stock (Solow, 1999). Therefore, it is imperative to determine how digitalization affects economic growth. Recent years have seen continued growth in the ICT sector in Africa. Numerous studies have indicated that ICTs are associated with economic growth in addition to growth theories (Niebel, 2018; Oliner & Sichel, 2000; Comin & Hobijn, 2004). Based on Stiroh's (2002) analysis, the coefficients of ICT capital in the production function regressions have a positive significance.

Similarly, to Stiroh's research, Dahl et al. (2011) used the European Union Capital, Labour, Energy, Materials, and Service (EU KLEMS) database to demonstrate that ICT enhanced growth in Europe after 1995. According to both studies, ICT-intensive sectors outperform other sectors in terms of labour productivity. Nevertheless, the impact of digitization may differ from one country to another. Digitalization affects developed and emerging economies differently due to their different economic structures (Sabbagh et al., 2013).

Since 2004, Egypt has recognized the importance of information technology (ICT) in economic and social development and has drafted the "Egyptian Information Society Initiative 2004". In order to support the transition to the digital information society, the "National ICT Strategy 2004-2006" was issued to address all sectors, including the economy (Kamel, Sherif, 2007, pp.845-847). The Egyptian Digital Transformation Plan was drafted in 2020 to build a digital economy. The plan comprises three pillars: digital transformation, skill, and innovation. The Government Plan 2018/ 2022 aims to expand the number of technology zones and science parks.

BACKGROUND OF THE STUDY

Several technological advances, including digitalization, intelligent automation, and software, have encouraged countries and industries to set up visions and plans that will lead to economic growth and strengthen their competitive position.

Across the globe, digital transformation is gaining increasing importance on the economic agenda. Using a mathematical model, Solow determined what increases output in a developed economy. As a result, it was determined that the most considerable contribution to growth came from something other than population growth, labour supply increases, or

expanding equipment inventories (Solow, R.,1945). Innovation in technology makes up the most significant portion of this contribution. The ability of a country to create, absorb, and utilize new technology leads to sustained growth (Solow, R., 1945). Based on differences in the growth rate of technology and human capital, the Solow growth model explains differences in per capita income levels (Gaertner, Manfred 2009). It is imperative that policies designed to promote economic growth focus on adopting state-of-the-art technology and developing human capital in education and training to employ the technology.

Justification

This study examines and organises current research literature that explores the impact of digitalization on economic growth and the transformation in the labour market, quantitatively or qualitatively.

The literature review consists of three parts; digital transformation, innovation, and skills. Section two introduces the effect of digital transformation on economic growth. Section three demonstrates digital transformation trends in Egypt, covering digital transformation, innovation, and skills.

Objectives

- Exploring the extent to which digital transformation impacts economic growth.
- Demonstrating the impact of digital skills on the labour market.
- Probing the future potential of digital innovations.

LITERATURE REVIEW

In evolving economic and social atmospheres, the significance of digitalisation and the economies' digital transformation impact is growing (Bieliyalov, T et al., 2023). Over the past few years, digitalization has been a crucial factor in promoting economic growth and creating job opportunities. It is essential in helping policymakers stimulate economic growth and employment in a sluggish global economy (Sabbagh et al., 2013).

Digital Transformation and Economic Growth

According to previous research, the digital economy is widely recognized as one of the principal drivers of economic growth and sustainable development in developed and developing countries. Typically exhibited by the Internet, big data, and artificial intelligence,

digitalization is accelerating the integration of industries, ushering in an era of a digital economy. In addition, digitalization has evolved into a vital part of inter-country cooperation. In conjunction with information and communication technology (ICT), the Internet, and other intelligent means, digitalization can further optimize industrial structure and create jobs, resulting in a significant increase in the economic development of a country. Recently, the digital economy has emerged as a new economic form after agricultural and industrial economies (Dahmani et al., 2021; Dahmani et al., 2022).

As part of their study on digitization and economic growth in 42 countries in sub-Saharan Africa, Tripathi and Inani (2016) utilized an autoregressive distributed lag (ARDL) model from 1998 to 2014. Results indicate that digitalization positively and significantly impacts long-term economic growth. Nevertheless, digitalization can negatively affect economic growth in the short term. Using panel data from eight developing countries from 1990-2013 and the Dumitrescu-Hurlin causality test, Rahimi and Rad (2017) examined the short- and long-term relationship between Internet use and economic growth. According to empirical results, digitalization contributes to economic growth. Economic growth, however, does not affect the digitization process. Pradhan et al. (2013) examined the relationship between digitization and economic growth between 1990 and 2010 in 34 OECD countries using panel cointegration and Granger causality. According to the team's cointegration analysis, digitization is intimately related to economic growth.

The Granger panel causality test also indicates that digitization and economic growth are bidirectional. From 1991 to 2003, Choi and Yi (2009) examined the impact of digitization on economic growth in 207 countries using pooled OLS, panel GMM, random effects, and fixed effects. According to all estimates, the digitalization of the economy has a positive and significant effect on economic growth. Choi and Yi (2017) examined the impact of digitization on economic growth in 105 countries from 1994 to 2014 using panel data analysis (pooled OLS, fixed effects, random effects, and GMM). According to empirical results, digitalization contributes to economic growth positively. In Saidi and Chebli's (2017) study, a panel dataset covering 1990 to 2015 examines the causal relationship between digitization and economic growth in high-income countries. The d-vector panel error correction model (PVECM) results indicate that digitization has a one-way relationship with economic growth.

Bakari (2021) examined the impact of innovation and digitalization on economic growth in 76 developed and developing countries between 1995 and 2016. Kalal et al. (2021) also

examined Tunisian time series data from 1997 to 2015. The study found that ICT had a positive long-term effect on economic growth but a negative short-term impact.

Digital Skills and Labor Market

Many businesses, governments, and other institutions provide services exclusively digitally. Across different industries, companies have begun to digitalize their operations and processes (Lund et al., 2021). Adopting digital technology increases productivity, enhanced quality, greater employee engagement, and lower corporate costs. Moreover, a company's digital transformation is vital to its survival and success (Frey, 2017). According to the World Economic Forum, 84% of companies digitize their work processes, including the possibility of relocating 44% of their personnel to work remotely. In order to streamline workflows and supply chains, businesses are utilizing artificial intelligence (Lund et al., 2021). Recent studies indicate that education policymakers should start focusing on preparing specialists for new jobs by developing and sustaining higher education services to include learning systems based on educational robots and artificial intelligence technology (Frey, 2017).

Organizations must update the skills of their workforce in order to remain competitive in the digital age (Sousa & Rocha, 2019a; van Laar et al., 2017). Micro-level studies have indicated that informal and proactive forms of work-related learning have gained importance (Dachner et al., 2021; Noe & Ellingson, 2017; Wong & Fieseler, 2018), primarily because employees are required to manage their careers more proactively than they have in the past (Ren and Chadee, 2017; Taber and Blankemeyer, 2015). According to Claes & Ruiz-Quintanilla, 1998, proactive skill development is the self-initiated, future-oriented, and change-focused acquisition of knowledge and skills that individuals will need to master future job tasks. Recently, management scholars have begun to pay attention to this concept, primarily focusing on its individual-level predictors (e.g., Clements and Kamau, 2018; Pajic et al., 2018; Ren & Chadee, 2017) and Strauss, Griffin, and Parker, 2012; Strauss & Parker, 2018; Taber & Blankemeyer, 2015).

With the advent of the information age, the requirements for employability are becoming more complex and require higher levels of education and training (Makundi et al., 2017). Computer-controlled machinery has rendered individuals obsolete in a wide range of daily activities. This provided new employment opportunities for individuals with non-routine cognitive abilities, such as creativity and social and emotional intelligence (Bialik & Fadel, 2018). In an analysis of employees' most valuable skills needed for employment, Peng et al.

(2018) identified information technology as the most important for up-skilling and reskilling employees. As the Centre for Economics and Business Research (2020) reported, 94% of business leaders expect workers to learn new skills on the job, 40% of them will require retraining within six months, and one out of 10 workers will be employed in an expanding field. One out of five will be employed in a declining field.

Technology and Economic Growth: Producer-Driven Innovation

Technology-growth relationships were traditionally framed in terms of quantitative growth, with an emphasis on firm size. As knowledge spread and innovation networks developed in the late 1990s, this relationship expanded, emphasizing the interaction between technology and societal elements (Nelson, R. & Winter, S. 1982; Lundvall, B. 2016; Eun, J.H. 2021).

The role of technology innovation in economic growth has been recognized since the early days of innovation research. According to Schumpeter, entrepreneurs play a crucial role in enabling economic growth by combining labour, land, and production resources. Meanwhile, key innovation actors have also changed. Entrepreneurs led the way early in innovation development (e.g., the early 1990s), but as time progressed, large companies with an R&D centre became the mainstay innovators (Schumpeter, J.A. 1934; Schumpeter, J.A. 1942).

Over the long term, innovation has driven economic development by disrupting existing industries or creating new ones. Thus, genuine economic development is the result of the change (innovation), and this change must take place on its own within the economic structure. Taking a traditional viewpoint, we can observe that the economy is centred on producers (Rosenberg, N. 1976; Rothwell, R. 1986). In the economic structure, producers played a crucial role in commercializing and selling technology innovations, such as interacting with consumers. However, consumers had limited roles, such as suggesting ideas for technology innovation by informing providers of any problems they encountered while using their products.

Economic Changes Caused by Digital Transformation

Digital transformation is the fundamental difference between the Fourth Industrial Revolution and its predecessors. In lexical terms, digital transformation refers to the application of information and communication technology (ICT), including the Internet of Things, clouds, big data, mobile devices, and artificial intelligence (ICBMA), across the spectrum of society to

innovate traditional social structures (TTA. 2021). Essentially, it refers to business activities that use ICT and non-technological elements to transform business models and change how organizations operate and provide services (Brozek, M. 2015; Agile Elephant. 2021). As discussed in the previous section, this section discusses the impact of digital transformation on economic growth.

Artificial intelligence and robots, in particular, will impact a significant portion of people's daily lives. Several business and communication functions will be embedded in the algorithm architecture to improve the relationship between information and efficiency (Smith, A.; Anderson, J. 2014; Surya, L. 2015).

Changes in businesses and individuals from a micro perspective

During digital transformation, knowledge and information play an essential role in enhancing business areas around digital platforms to create greater satisfaction and utility for consumers. Before the 1990s, manufacturers produced products sequentially, but digital transformation enabled them to integrate production activities such as product production, marketing, and sales. In this way, producers have been able to lower product prices by reducing costs and time. In addition, it enabled businesses to expand their reach by entering new fields of business or integrating with other sectors. Essentially, digital transformation has expanded the scope of profit-seeking activities.

Meanwhile, the role of the individual in the past has been limited to that of a consumer. Nowadays, polymerization is gaining ground due to the digital revolution, allowing individuals to serve simultaneously as consumers, producers, and distributors. Consumption behaviour is also shifting from owning to subscribing or sharing. Thus, digital transformation has expanded business areas through digital platforms and led to new consumer trends characterized as ownerless and personalized (Mi'ci'c, L. 2017; Park, S.W. 2013)

Industrial change from a macro perspective

In digital transformation, ICT changes existing practices and order beyond simply developing and using ICT. Specifically, cross-industry convergence is taking place rapidly, creating new markets in contrast to the traditional industrial structure. It is also important to note that the industry's value chain is changing from a vertically integrated industrial structure to an open and networked one. It is anticipated that this industrial change will have sweeping effects on the economy and society across all sectors (Yoo, I.H. & Yi, C.G. 2021; Shin, K.Y.,

Yeo, Y.J. & Lee, J.D. 2020; Berman, S.J. 2012; Agile Elephant. 2021; Seeger, G.; Bick, M. 2013; Lucas, H. et al. 2013).

As intelligent information technology advances, all areas will become hyperconnected and hyperintelligent, increasing reliance on networks. In addition, integrating daily life with the virtual world is expected to lead to the development of platform-based business models that will stimulate innovation across the economy and society. Consequently, the product-based economy will become service-based, expanding personalized production, blurring the lines between manufacturing and services, and intensifying convergence.

Digital Transformation Strategies in Egypt

The digital economy is a worldwide trend evolving due to technological advancements and the widespread adoption of internet-based communication tools (Shevchenko, I et al., 2023). Several technological advances, including digitalization, intelligent automation, and software, have encouraged countries and industries to set up visions and plans that will lead to economic growth and strengthen their competitive position. It is imperative that policies designed to promote economic growth focus on adopting state-of-the-art technology and developing human capital in education and training to employ the technology.

Therefore, many countries, including Egypt, have established national digital transformation strategies that recognize the importance of digital transformation in achieving inclusive and sustainable growth (OECD, 2017). A core component of Egypt's Sustainable Development Strategy (SDS), Egypt Vision 2030, is establishing a knowledge-based economy. In order to speed up the transformation process, short-term and medium-term plans and policies have been developed. In the medium plan for 2018/2019 to 2021/2022, LE 5.8 trillion is planned for investment.

Digital Egypt objectives

Digital Egypt has three fundamental objectives: digital transformation, skills and jobs, and innovation.

Digital transformation

The Digital Egypt platform offers a comprehensive range of e-government services, including food subsidy, notarization, court filing, driver's licenses, health, real estate, education, agricultural, and investment-related services. A pilot program was launched in July 2019 in

Port Said to digitize government services to expand the program to the remainder of Egyptian governorates and link the 33,000 facilities to fibre optics via a secure and unified platform by 2021. Over 35 government-to-consumer (G2C) services were implemented across Egypt in Q2/2021, and approximately 150,000 Egyptians have registered for digital identities to access those services. Moreover, 60 government-to-business (G2B) services are currently being introduced, including commercial registration.

It is currently possible to access these services through several electronic platforms, including the government services portal, which offers 75 online public services in English and Arabic and plans to add 25 more services shortly. In addition, more than 30 services can be accessed through mobile platforms (MCIT, 2021).

Digital skills and jobs

As part of the digital skills and job component of Digital Egypt, the government invested an initial amount of EGP 400 million (USD 26 million) towards upskilling, reskilling, and lifelong learning in various ICT specializations. The government has also launched several initiatives to support innovative and technology-enabled start-ups to enhance their competitiveness, including mentorship programs, boot camps, incubation, and acceleration programs. These initiatives target undergraduate and graduate students, entrepreneurs, and professionals, with youth and women programs aimed at meeting the growing demand in the local market, improving unemployment rates, and introducing different MSMEs to the new trends associated with the future of work and providing the opportunity to access and compete internationally due to the increased reach provided by the digital transformation process.

Thirteen thousand learners were trained during the Fiscal Year 2019/2020. The plan for FY2020/2021 was to train 115,000 learners; this demonstrates the acceleration of the reskilling and upskilling of human capital through multiple channels in the private and public sectors. Despite these efforts, the seamless integration of ICT and digital skills into education and lifelong learning at the level and pace that will enable them to achieve the transformation that can be expected through digitalization has yet to take place. Therefore, it is imperative to continue to invest in human capital across different segments of society.

Digital innovation

Egypt is building and nurturing an ecosystem that encourages and promotes entrepreneurship and innovation as part of its strategy to drive growth and support sustainable

development. The Technology Innovation and Entrepreneurship Center (TIEC), established in 2010, promotes entrepreneurship and innovation in various sectors. MCIT provides training, incubation, financial and in-kind support, and mentorship to young entrepreneurs, start-ups, and innovative MSMEs. Egypt is home to one of the fastest-growing start-up ecosystems in the Middle East and North Africa, according to MAGNiTT, a leading start-up platform. Egypt recorded the highest number of start-up funding and investment deals in MENA during Q1/2020, achieving 37 per cent of the total deals worth USD 277 million, 52 per cent of which attracted foreign investors.

In the first quarter of 2019, 142 investments totalling USD 95 million were made in the start-up ecosystem, an increase of 13 per cent over last year (MAGNiTT Report, 2020). Most of these start-ups are tech-enabled companies contributing to accelerating digital transformation (Oxford Business Group, 2020). A dynamic funding and support ecosystem has supported these developments, including several university-based accelerators and incubators, venture capitalists (VCs), and angel investor networks, including Flat-Labs, Algebra Ventures, Cairo Angels, Alex Angels, and AUC Angels, among others.

Digital Egypt: labor market and future skills

Based on the Egypt Country Risk Report (2020), there is a high supply of unskilled labour. Thus, firms face a labour shortage, which requires extensive training and the importation of expensive foreign personnel. Moreover, the report indicated that 60% of Egyptians are under 25. Most students still decide whether to pursue further education or meet the demands of the labour market. As a result, higher education will play a crucial role in Egypt's continued development in the future.

The Impact of Digitalization on Employment in Egypt

Every year, approximately 800,000 graduates enter the labour market in Egypt (World Bank, 2020a). Before the pandemic, the unemployment rate had declined to eight per cent, increased to 9.6 per cent in Q2/2020, and recently decreased to 7.4 per cent (CAPMAS, 2021). As of December 2019, youth unemployment stood at 31.05 per cent (OECD, 2021). The rate is estimated to be 29.96 per cent in 2020 (Statista, 2021), resulting from a mismatch between the skillsets and capacities provided by educational institutions and labour market requirements. Despite being a significant concern, women's unemployment impedes inclusive economic growth. Nevertheless, the tech start-up ecosystem, especially micro and small businesses, has

witnessed an increasing number of women taking the lead in Cairo and several other governorates, a promising development. Although the number of these enterprises needs to be bigger to make a significant difference, it is a step in the right direction and requires further investigation and follow-up.

To date, there has been no evidence in Egypt that the consequences of COVID-19 have caused major disruptions or significant job losses. Digital transformation is expected to lead to new jobs and the enhancement of existing ones. In contrast, some of the routine jobs that could be automated will be eliminated due to a lack of relevance and efficiency reasons. Approximately 75 million jobs are expected to be displaced by 2022 in around 20 leading economies globally, according to the World Economic Forum (WEF). Nevertheless, 133 million new jobs will be created, most of which will result from the growth of new products and services that will demand new skills where human capital should be able to deal better with machines (Schwab, 2018). Emerging economies are also expected to be affected, depending on their readiness and ability to adapt to a more technologically oriented and enabling environment (UN, 2019). The figures will likely change following the COVID-19 pandemic, given the rapid acceleration of digital transformation since Q1/2020. As opposed to skills that can be substituted by physical capital, the rewards for skills that create intangible capital will be significant and create more youth opportunities. Regarding the possibility of machines replacing humans, there are several things people will always be capable of doing that technology cannot, such as creativity, innovation, and emotional intelligence.

Employment and productivity levels are expected to increase as more Internet access and ICT adoption occur (Kolko, 2012). It will, however, depend on the industry. In the retail industry, for example, the projected growth in e-commerce is expected to lead to more jobs being created in new sales and delivery services. Studies indicate that e-commerce can adversely affect the geographic distribution of new jobs the industry creates. Downtown areas in cities may lose jobs, even though warehouses and distribution networks outside the cities they serve will create new jobs.

While digital transformation presents opportunities for economic growth and productivity, it also creates high levels of uncertainty due to the unprecedented rate of change and innovation (Brynjolfsson & McAfee, 2012). In terms of magnitude, the effects range from positive to damaging repercussions on the employment market, especially in light of the numerous opportunities related to the future of work. Consequently, the outcome of the current

wave of automation needs to be clarified. It will be determined by the policies and decisions made by individuals, enterprises, and governments (European Commission, 2019).

It is difficult to assess the impact of the digital economy on employment in Egypt, and it is unclear if it is ready for digitalization. The trend of embracing innovative digital platforms is likely to gain gradual momentum with the growing shift in consumer behaviour, further accelerated by the pandemic. As a result of digital platforms, businesses can increase their efficiency and provide increased opportunities for women, young graduates, and people with disabilities (ILO, 2021).

A distinctive feature of the digital economy has been the emergence of digital platforms. A digital platform would enable business owners and freelancers across various sectors to sell goods and provide various services. Due to the high number of informal and self-employed individuals, employment could also be affected by the gig economy and gig workers, including freelancers providing home repair services, care services, or seasonal agriculture. Due to the growing entrepreneurial space, these gig workers can source their businesses online, causing shifts in the established patterns of work (WEF, 2021) and opening up global markets through ICT-based platforms such as cloud computing (UNCTAD, 2021). By following the example of Uber drivers, they can benefit from the simple technology that apps and mobile connectivity can provide.

Access to the Internet, however, has been shown to increase employment and labour productivity in many research studies. However, it has been shown that if there are significant and advanced production bases, producers can leverage digital platforms to achieve economic growth due to a lack of technical education and knowledge (Jayakar & Park, 2013). Therefore, Egypt must continue to develop its human capital, including digital and ICT-related skills, promote innovation, strengthen financial inclusion, and deregulate the digital environment to establish a universal ICT infrastructure. In addition to striking a balance between digital access and digital equity, it is necessary to minimize the disparities between urban and rural areas that may be further exacerbated as digital transformation accelerates.

RESULTS AND DISCUSSION

Digital Transformation Impacts Egypt at a theoretical and pragmatic level. Digital transformation plays a significant role in pushing economic growth. It is related to digital skills and innovations, also known as the digital economy.

The ability of Egypt to develop the digital transformation is related to readiness to obtain the framework of five pillars: legislation, technical and organizational capabilities, capacity building, and cooperation with other stakeholders. This imposes on the government the importance of continuing work to ensure the sustainability of strategies, measures, and adaptation to face the accelerated nature of cyber threats development according to the state of technical progress.

On the other hand, digital development is related to the role of digital transformation in economic growth, skills, and innovation significance in economic development. Digitalization has increasingly become one of the most significant economic drivers facilitating job creation and accelerating economic growth.

FIRST, The strategic vision for becoming cyber resilient. Egypt's Constitution states in Article.31 "The security of cyberspace is an integral part of the economy and national security. The State shall take the necessary measures to preserve it as regulated by Law".

The Strategic priorities for supporting national cyber resilience capabilities require effective national and local leadership. It translated into some of the Strategies and Policies for cyber security, such as the objectives of the National Cyber Security Strategy 2017-2021, Egypt's Vision 2030, the Communications Information Technology Strategy 2030, Africa Agenda 2063, and Sustainable Development Goals (SDGs).

Egypt has invested in infrastructure development through the \$1.6bn made in the ICT and the power and energy sectors. Egypt's ICT sector is achieving a growth rate of 15.2%, and its contribution to GDP was about 4.4%.

SECOND, in 2009 Egypt launched Computer Emergency Readiness Team (EG-CERT); in 2014, it launched a Supreme Cyber Security Council. Its mission is to raise awareness and develop a strategy that counters cyber attacks through response, support, defence, and analysis. In November 2019, the Egyptian government formed the National Council for "AI" as a partnership between the government and others.

"Trend Micro" addressed 12.4 million email cyber-threats in Egypt in the first half (H1) of 2020. It also noticed a 16% increase in vulnerabilities detected in industrial control systems (daily news September 30, 2020).

THIRD, in April 2020, Egypt exerted significant effort in Education, Skills. Egypt launched initiatives like Basic Digital Skills Development, Social Media and Internet Safety, Youth Enablement for Freelancing, and Digital Egypt Builders Initiative (DEBI). It also

organized several training programs for government employees nationwide using e-learning applications.

FOURTH, Egypt and its partners are committed to advancing research and innovation and modernizing the educational curricula in schools and universities. Egypt launched initiatives for enhancing innovation like the Next Technology Leaders (NTL) Initiative, InnovEgypt, TIEC Innovation Ambassador, and Entrepreneurship Support Trainings. Egypt launched new colleges specializing in AI and adopting online exams, improving the quality of scientific research within research centres and encouraging creativity and innovation.

FIVE, Egypt achieved remarkable success in implementing the initiatives for promoting partnerships with all concerned parties regionally and internationally. Egypt organized the training and shared expertise between CERTs in the Arab world and African CERTs. It has also facilitated an enabling environment for building cyber resilience capabilities.

FINALLY, Egypt launched "Digital Egypt." including developing the infrastructure, promoting digital and financial inclusion, enhancing capacity building and innovation, fighting corruption, cyber security, and digitizing government services. Egypt started building a new administrative capital as a smart city with a resilience system. It is selected as an Arab digital capital for 2021, Egypt, which aims to move ministries and work intelligently, establishing advanced data centres and introducing them within smart cities.

CONCLUSION AND RECOMMENDATIONS

Theoretical and practical implications of digital transformation are evident in Egypt, where it is a robust driver of economic growth through the digital economy. The country needs to develop digital skills and innovations to achieve this growth by implementing the five pillars of legislation, technical and organizational capabilities, capacity building, and collaboration with other stakeholders.

The government must ensure that its strategies and measures are sustainable and adaptable to the evolving nature of cyber threats as technology advances. Moreover, the significance of digital transformation in economic development lies in its ability to create jobs and accelerate economic growth. As a result, digitalization has become a vital economic driver that should be leveraged to support Egypt's economic growth. Government can ensure adequate execution of digitalisation through the following:

- Adopting a comprehensive approach to cooperation between all sectors within the national economy, adopting a comprehensive vision of the digital environment as an integrated unit, and cooperation between the public and private sectors in data exchange.
- Consider the legislative frameworks at the national level and others that require regional and global cooperation.
- Paying attention to the workforce in the digital field, whether through building digital capabilities and skills or spreading a culture of cyber resilience.
- Should be handling the case of the weakness of national industries in the field of technology, whether at the level of software or the level of devices and equipment, which weakens the national ability to face cyber threats.
- Enhancing and fundraising the role of Research and Innovation and digitalization in economic and social development.

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