



The Applications of Digital Transformation Towards Achieving Sustainable Development Goals: Practical Case Studies in Different Countries of the World

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Abstract

Digital transformation is steadily changing states and organizations, and making them more cutthroat, as well as it offers a few valuable open doors for monetary development and success, as it empowers nations to including, more expanded instructive open doors, widespread admittance to the web and an exhaustive and supportive climate to the improvement interaction. The Communication and Information Technology industry's role in achieving sustainable development is highlighted in this paper, which focuses on the concept of sustainable development. hence, this paper audits the 17 SDGs (supportable advancement objectives) and makes sense of what data innovation has mean for every objective. In addition, we track progress toward the SDGs, existing e-governance initiatives, and big data initiatives in four distinct nations in the world. While in the next part, we significantly review the digital transformation in Egypt and its contribution in achieving sustainable development in Egypt.

Keywords: Digital transformation; Sustainable development in Egypt; Sustainable Development Goals; ICT in SDGs.

1. Introduction

In 2015, the Sustainable Development Goals (SDGs) were adopted, indicating that world leaders wanted to take a more sustainable approach to inclusive and equitable growth. The 17 SDGs, also known as Agenda 2030, consist of 169 targets and 304 indicators and cover a wide range of development-related topics. SDGs expand on different progressions put forth in feasible improvement attempts throughout the course of recent many years. SDGs expand on the Thousand years Advancement Objectives (MDGs), which were the first illustration of worldwide objectives and were functional from 2000 until 2015. In a similar manner, the Sustainable Development Goals (SDGs) continue and scale up the goals of Agenda 21 (A21), which were approved at the Earth Summit in 1992 in Rio de Janeiro; where senior government officials were aware that the majority of the issues affecting development and the environment stemmed from local activities. This led to their comprehension of the justification for including Chapter 28 of A21 (LA21) as a special mandate to describe the significant role that local authorities play in facing these challenges and supporting local authority action on sustainable development [1]. The universality of the 2030 Agenda is one of its most important features. The worldwide objectives expect to be of importance to all local area levels, from worldwide to nearby. Sustainable development has advanced globally as a result of localization of global objectives and sustainability efforts. This is on the grounds that it expects to connect with nearby partners in the cycles that influence neighbourhood, public and worldwide turn of events. Over the past few decades, technology and innovation have been playing an increasingly significant role in both the global efforts to achieve

sustainable development in general and the process of localizing these efforts in particular. Recently, the major databases are replacing oil; the new form of wealth that drives the digital economy and information age. While oil drives its worth from shortage, information carries its worth accessibility with the better capacity than manage and utilize. Countries ought to make investments in acquiring data in any and all conventional ways, as well as in any and all novel and creative ways. The Fourth Industrial Revolution is currently underway. The world is moving toward a new emerging paradigm of digital transformation, which presents a strategy-oriented change in modern societies' infrastructure and processes based on current information and communication technologies (ICT) [2]. This paradigm is being led by innovations in digital devices and information technology (IT). As a result, in order to present the complete picture of "Globalization 4.0," we anticipate that global economic sectors and systems will undergo complete transformation. Data that is collected in the form of algorithms does not, without a doubt, have a competitive advantage; skills are what turn the algorithms into useful tools and, as a result, give the data a competitive advantage. Countries, particularly developing nations, ought to be equipped with modern infrastructures, institutions, skills, and, most importantly, streamlined mentalities. Countries are able to take advantage of the new opportunities while avoiding disruptions thanks to this redesign [3]. This paper consists of four parts. The first part presents the introduction, while the second one presents the relationship between the Digital transformation and sustainable development. In addition, the third part talked about the contribution of digital transformation in achieving sustainable development goals.

2. Digital Transformation in Sustainable Development

The proper networking of all economic sectors during digital transformation requires actors to adapt to the new circumstances of the digital economy. digital transformation or Computerized change is characterized as "a method for remaking plans of action following the requirements of clients by utilizing new innovations" [4]. or, as stated by the European Commission [5], "new ways of working with stakeholders, building new frameworks of service delivery, and creating new forms of relationships." It likewise is characterized as "the significant change of business and hierarchical exercises, cycles, capabilities and models to completely use the progressions and chances of a blend of computerized innovations and their speeding up influence across society in a vital and focused on manner, in light of present and future movements" [6]. The previous definitions make it abundantly clear that the majority of digital transformation is associated with the utilization of novel technologies like; systems for automated decision-making, augmented reality (AR) and virtual reality (VR), additive manufacturing (AM), and deep learning To remain competitive in the age of the internet, robotics, big data, artificial intelligence (AI), and the Internet of Things (IoT) TWI 2050 [7]. According to TWI 2050, 2019, this indicates that digital transformation alters people's lives by reshaping work, behavior, leisure, education, and governance. It also has a positive impact on carbon productivity, energy, labor, resources, and access to services, lowers production costs, and dematerializes production. Likewise, it raise efficiency, grow access, further develop asset efficiencies and backing the roundabout economy.

According to DiPLo [8], these technologies are potent instruments for assisting transformation processes in all facets of society and the economy. as they are increasingly being used in planning processes, improving cognitive capacity to comprehend the implications of decisions in complex socio-ecological systems, and fostering better decision-making through multiple perspectives [9]. Additionally, artificial intelligence promises to produce a new generation of sustainable development solutions by processing enormous amounts of data UN, because it can direct manufacturing processes; financial flows and traffic, transform medical diagnostics and treatments, produce behavioral forecasts for groups and individuals, and alter a company's decision-making process. Provide decision documents to parliaments and governments TWI 2050, and it aims to strike a proper balance between people's privacy, human dignity, and technological advancement UN [10]. In this manner, computerized change turns into a vital main impetus in changing toward manageability, as mechanical change is fundamental for financial development and feasible turn of events UNCTAD [11]. Notwithstanding change the supportability worldview translation WBGU [12] and brings immense advantages for each of the 17 SDGs, which is considered as mid-highlights accomplishing manageable turn of events UNCTAD. Sustainable development is defined as "development that meets the needs of the present without compromising the ability of future generations to meet their own needs. Or, as Adamczyk, et al. [13] put it, "Sustainable development is a way for people to use resources without running out of them." It talks about the problems facing civilization as a result of the transformations in society and the economy. In addition, these definitions make it abundantly clear that sustainable development is founded on the three interdependent dimensions of; According to the United Nations and Silvestre & Tîrca [14], these social, environmental, and economic systems ought to be altered and connected to one another in order to guarantee societal health, human well-being, and a reduction in the impact on the environment. Education, the environment, health, security, peace, equality, and justice are all covered by the Sustainable Development Goals (SDGs) in the 2030 Agenda United Nations. So, achieving the SDGs requires transformations in six fundamental hubs; (i) Human well-being and capabilities, (ii) Sustainable and just economies, (iii) Sustainable food systems

and healthy nutrition patterns, (iv) Decarbonization and Energy, (v) Smart cities, (vi) Securing the global environmental commons. Where the stakeholders’ focus and collaborative action can accelerate the progress toward the Goals. As well as, the combinations between, collective and individual action, economy and finance, governance, and technology and science through these six fundamental hubs create integrative pathways to transformation and achieve the sustainable development. Additionally, a comprehensive science, technology, and innovation roadmap should be developed and implemented on a local and global scale in order to facilitate progress, accelerate implementation, and encourage widespread adoption of the SDGs. Therefore, technology must be sufficiently appealing and accessible. Consequently, in order to achieve genuine sustainable development and progress, every nation must have a robust ICT sector and build on ten pillars across the three dimensions of sustainable development. Ministry of Planning, Monitoring, and Administrative Reform [15] depicts these pillars (Table 1) as follows:

Table 1: The Main Sustainable Development Pillars

Dimension	Corresponding Pillars
Economic	Economic development
	Efficiency and transparency of government institutions
	Energy
	Innovation, knowledge and scientific research.
Social	Social justice
	Health
	Education and training
	Culture
Environmental	Environment
	Urban development

3. Digital transformation contributions to Sustainable Development Goals:

New advances focus to convey extraordinary advantages in accomplishing supportable improvement as they fundamentally impact the manner in which individuals live, work, cooperate, move and involvement with endless ways, by focusing on value, consideration, openness, global coordinated effort, human respect and maintainability in a complete and far-located way. So computerized change adds to the SDGs as indicated by Huawei [16] report, the ICT advancement and the advancement on the SDGs are reciprocal and there is high connection between them with (R2=0.86). through this segment we present the advanced change commitment to the SDGs ITU, 2018a [17]:



Figure 1: An overview on the UN Sustainable Development Goals (SDGs)

SDG 1: No poverty

End destitution all over the place, in the entirety of its structures. The quantity of people who don't have financial balances accomplished 2 billion from one side of the planet to the other. New advances give admittance to fund [18] and work with the monetary consideration that can assist in lifting with peopling out of neediness by empowering versatile admittance to computerized monetary administrations for those unbanked individuals [19].

SDG 2: Zero hunger

End hunger, further develop sustenance, accomplish food security and upgrade reasonable agribusiness. ICT-empowered arrangements, for example, satellite and remote detecting innovation make agrarian practices more information driven and proficient and assist ranchers with expanding their business efficiency by diminishing the utilization of energy, as well as, admittance to advertise updates and climate forecasts.

SDG 3: Good health and well-being

Advance prosperity and guarantee the sound live for all individuals at all ages. Advanced innovations grow the medical care scope, help to oversee pandemics and irresistible illness and reinforce the conveyance of the general medical care administration, by supporting the exhaustive admittance to the medical care offices. It can likewise foster models that are low-cost and high-volume to extend the admittance to drugs, symptomatic tests, antibodies, enhancements, and families arranging in the low-and center pay nations [20]. As, e-wellbeing applications, for example, Be Solid and Be Portable assist legislatures with giving medical care administrations to non-transferable sicknesses in their nations through cell phones, too as, the better network can improve telemedicine, wellbeing informatics and direct understanding collaborations. For instance; in Tanzania, Rwanda, and somewhere else, the innovation of robots is utilized to move lifesaving blood and prescriptions to distant regions. As well as, China utilizes computerized reasoning (man-made intelligence) innovation, large information, and different applications to recognize Coronavirus sickness, utilizes drone and reports to accomplish separation zones, and uses 5G innovation to interface specialists with patients to work with the finding system.

SDG 4: Quality education

Advancing long lasting learning open doors and guaranteeing impartial and comprehensive quality schooling for all. E-learning gives admittance to information to all individuals paying little mind to where they reside and the amount they acquire. It additionally Further develops the existence nature of crippled people and those in rustic regions.

SDG 5: Gender equality

Engage young ladies to accomplish orientation balance. There are 200 fifty million men more than ladies are on the web. ICTs are the fundamental pathway to close the computerized orientation hole and accomplish the orientation fairness and strengthening. There are number of orientation fairness drives to further develop the ladies' innovation access, construct applicable advanced and different abilities, as well as, advance female authority in the tech area.

SDG 6: Clean water and sanitation

Guarantee maintainable administration and accessibility of water and sterilization for all individuals. ICTs work with brilliant water the board frameworks, disinfection and cleanliness. As new advancements offer water reusing and refinement by utilizing gear that is more modest and more versatile [21].

SDG7: Affordable and clean energy

Guaranteeing the all-inclusive admittance to feasible, reasonable, and present-day energy. Utilizing brilliant lattices, green norms and innovation help in building more controllable and productive energy frameworks as well as diminishing fossil fuel byproducts.

SDG 8: Decent work and economic growth

Advance comprehensive and practical financial development, fair work and useful and full work for all. Advancing the computerized monetary, business, tech-SMEs, internet business and digital trust. As well as giving new acquiring prospects to individuals through internet-based work stages, gave they have sufficient availability and the right abilities.

SDG 9: Infrastructure, Industrialization, Innovation

Assemble versatile foundation, energize development and improve comprehensive and practical industrialization. The particular objective of this objective is to build data and correspondence innovation access, and reasonable and comprehensive web access at all created nations by 2020 [22]. ICTs are fundamental for the versatile framework of the 21st hundred years and for getting to administrations and applications, as they give comprehensive and reasonable admittance to the web.

SDG 10: Reduced inequalities

Decrease imbalance inside and among nations. Empowering the burdened fragments of society to get to advances and information help to limit the computerized partition, enable networks, and lessen disparity inside and between populaces, networks and nations [23].

SDG 11: Sustainable cities and communities

Make urban communities protected, comprehensive, practical and versatile. smart manageable urban areas, web of things, 5G and keen vehicle frameworks [24].

SDG 12: Responsible consumption and production

Guarantee the economical utilization and creation designs. ICTs can empower economical creation and utilization through distributed computing, savvy networks, and shrewd metering. As it guarantees less expensive and faster help conveyance.

SDG 13: Climate change action

Make a pressing move to battle the environmental change and its effects. ICTs and new advancements create better information supporting greener ways of life, conjecture, environment checking, and early admonition frameworks. Also, producing better information help to accomplishing SDG 14 and SDG 15.

SDG 14: Life below water

Ration the seas, oceans and marine assets and economically use them for supportable turn of events. Utilizing the range of radio recurrence and satellite circles permitting the satellite perceptions and observing that increment logical information on the seas.

SDG 15: Life on land

Secure and reestablish earthly environments, and advance the maintainable utilization of them. Utilizing radio-recurrence range and satellite circles permitting satellite perceptions and observing of earthly environments help to safeguard biodiversity.

SDG 16: Peace, justice and strong institutions

Advancing comprehensive and quiet social orders for supportable turn of events, building powerful, comprehensive and responsible foundations at all levels, and giving admittance to equity to all individuals. The open information increments straightforwardness, enables residents through their work on savvy manageable urban areas, drives financial development and key execution pointers that action social consideration, for example, citizen investment, and the quantity of electronic taxpayer supported organizations. Also, nations can foster ICT applications and convey broadband availability to work with the arrangement of minimal expense or free computerized admittance for schools, clinics and underserved populaces.

SDG 17: The power of partnerships

Reinforce the method for executing and renewing the Worldwide Association for feasible turn of events. ICT apparatuses work with and coordinate all SDGs through creative cooperation and increased limit building. Public-private associations are the way to carrying ICTs to all people groups, networks and countries. As these organizations are important to construct the actual foundation that is expected to convey the internet providers to at present impeded populaces and in difficult to-arrive at regions, as well as to work with advancement, consideration and speculation that is expected by the SDGs.

4. Case Studies

Colombia

Colombia has an elevated degree of decentralization. Colombia positions extremely high on the ADI record (#42) and has been decided to feature the significance of having strong neighborhood foundations for the limitation of SDGs. The nation has shown its obligation to the SDGs and the 2030 improvement plan by sending off its 2014-2018 Public Advancement Plan. This plan means to launch aggressive changes in three points of support: harmony, value and schooling by advancing hearty collaboration and coordination between all partners at the nearby level. This will assist the country with reinforcing nearby limit and organizations out in the open money the board to further develop administration conveyance and permit neighborhood districts to flourish. 57 % of the populace in Colombia have web access. The nation positions 55 with regards to innovative preparation Economist Intelligence Unit. The nation has gained notoriety for the utilization of huge information and computerized change to accomplish the SDGs. A huge part of families in Colombia depends vigorously on horticultural creation as a kind of revenue. In any case, in the midst of the scenery of an unnatural weather change, ranchers have been battling to go with schedule put together choices with respect to what and when to plant. A public area drive drove by The Global Community for Tropical Exploration (CIAT) as of late tried a creative device supporting Colombian rice ranchers utilizing enormous information. The method includes combining both reap and climate datasets to analyze the relationship between environment

factors and yield changeability, in this manner anticipating expected good and negative circumstances for editing in specific regions. This device gathers complex datasets and changes over them into open and significant data for ranchers on an Android application, empowering them to pursue information driven choices on rural creation. The procedure depends vigorously on AI like irregular woods and grouping methods to help investigation. This drive handles various different SDGs like SDG 13, related with combatting environmental change, notwithstanding SDGs 1 and 2 connected with destitution decrease and zero craving. This model likewise features how the presence of nearby specialists gives states an early advantage with regards to gathering large information. Activities at the nearby level aided tailor the item to the result of farming families.

Egypt

Egypt positions just with a score of 85. This exhibits that the nation isn't exceptionally decentralized. The 2014 Constitution frames the country's regulatory units (governorates, urban communities, and towns), and the

legitimate character that they appreciate. Every nearby unit is to choose a gathering to guarantee oversight over specialists. This committee has the ability to withdraw certainty from the authority of the neighborhood unit [25]. Notwithstanding, down to earth progress on decentralization has been slow.

The nation has exhibited its obligation to the 2030 Plan by sending off Egypt's Vision 2030, an arrangement to illustrating different SDG procedures and ways of carrying out them. Furthermore, the public authority has made the Service of Arranging, Observing and Regulatory Change liable for checking and writing about progress toward SDG targets UNDP Egypt [26]. Notwithstanding, regardless of government acknowledgment of the requirement for decentralization, strategies actually need coordination and related public incorporation and there is an absence of preparing and information at the civil level. Nearby administrations stay lacking, and neighborhood independence is thusly restricted. Additionally, defilement and issues with straightforwardness have frustrated nearby political cooperation [27]. In spite of the country's obligation to SDGs, the principal challenges they face connect with sexual wellbeing and schooling (SDGs 3 and 4), water shortage and agribusiness despite environmental change (SDGs 6 and 13), mechanical developments (SDG 9), orientation correspondence (SDG 5), and work precarity (SDG 8).

The nation positions low (#69) concerning mechanical availability. It likewise has a low web infiltration pace of 33 %. Egypt's EGDI was "medium" in 2016 after it was exited the "high-EGDI" gathering of nations. The authority government online gateway was sent off in 2004 and as of now centers around four primary areas: institutional turn of events, legislative administrations, undertaking asset arranging, and laying out and coordinating public datasets [28]. These projects expect to give complete, exact, and refreshed data to help dynamic cycles in general society and confidential area overall and encourage long haul arranging specifically. Through the Taxpayer driven organizations Advancement Program, the public authority endeavors to accelerate the course of administration conveyance through digitalization. The nation is mechanizing and accelerating countless its administration arrangement cycles, refreshing and extending public and confidential information, and bringing issues to light on the accessibility of fundamental assets and administrations by promoting nearby government supplier areas. The framework has incredibly further developed e-cooperation and resident commitment [29]. Nonetheless, information conveyed is for the most part public and individual, while limits connected with framework and information of nearby and local e-states are restricted. Virtual decentralization and IT limit working at neighborhood levels are crucial for push the nation forward. Information assortment and further developed examination and distribution stages ought to be upheld by additional collaboration with the confidential area and CSOs. This can help the public authority in executing its ICT projects in underserved regions (in the same place). The progress of current e-administration strategies in further developing individual cooperation shows a high potential to draw in with residents at a neighborhood level, lessen adverse consequences of political and financial emergencies (SDG 16), assist with distinguishing legitimate open positions (SDG 8), form entrust in and commitment with nearby government and common social orders foundations (SDG 17), diminish orientation disparities by creating confirmations (SDG 5) and backing schooling (SDG 4). More outcomes could be accomplished with limit building and counsels with neighborhood entertainers, particularly in the radiance of absence of confidence in the focal government.

United Arab Emirates

The United Arab Emirates has achieved a breakthrough in the field of technology. With their numerous social, cultural, and economic incarnations, digital technologies are now an essential component of daily life. The National Information Authority was established in 1989 with the goal to apply computers to government work. Modern integrated optical fiber services were then applied in 1988. The Internet was introduced to the Emirates in 1997, and the city of Dubai was established in 2002, marking the first instance of e-government in the region. These historical events culminated in the United Arab Emirates' digital transformation and in 2001 establishing the first electronic payment gateway (e-Dirham) and in 2003 establishing the Public Authority for Regulating the Telecommunications Sector and online-Govern in 2009 assigning the Telecommunications and Digital Government Regulatory Authority for supervising the digital transformation. [30] In 2010 the official portal of the UAE government was launched, after one year the Mohammed bin Rashid Smart Learning Program was launched, in 2013 the smart government (mobile) was launched at the federal level, and in 2015 the federal electronic network was launched (Fed Net) And in 2016, the digital identity was launched (Uaupes) and in 2018, the digital wallet (using the block chain) was launched. And the year 2021 is the year of the fifties and the launch into a new fifty. Emirati society is diverse, with people from all different backgrounds living there and interacting and conducting business via a variety of channels, the most significant of those being digital ones. The numbers show how much the Internet and other digital technologies have changed people's lives in the United Arab Emirates. 9.94 million people in total, 9.84 million active users of communication, 9.84 million internet users, and 17.06 million

smartphone users. \$18.50 billion payments for digital transactions 2021. 320 million pounds spent by UAE residents on smart applications 2021. 320 million hours spent by residents on smart applications 2021. 7.24 hours per day is the average time spent by an individual in the UAE on the Internet. The goal of the UAE Artificial Intelligence Initiative is to improve the efficiency of government, accelerate success, and create creative work environments by depending completely on artificial intelligence in data collection and analysis by 2031. Several important national areas are the focus of the plan, including those related to transportation, health, space exploration, renewable energy, water resources, education, the environment, and traffic. The United Arab Emirates government persists in its endeavors to shift to an economy based on knowledge by promoting creativity, research and development, fortifying the regulatory structure for key industries, and endorsing high-value sectors. These measures foster the business climate and augment the nation's appeal to investors.

Philippines

The Philippines is profoundly decentralized, with a position of 33 in the ADI positioning. It passages the best among each of the seven nation contextual analyses. The Philippines spearheaded the decentralization front in East Asia. Its nearby administration changes began before the more extensive flood of decentralization of the 90 s and the 2000s. Despite the fact that its decentralization endeavors were at first prodded by an emergency, these changes took time and were not arranged nor carried out rapidly. The Philippines has accomplished significant advancement in carrying out the SDGs. The new Willful Public Audit (VNR) report presented by the public authority in 2016 layouts illustrations gained from the MDGs like great administration and supported responsibility from all partners, and further developed ability to oversee and convey " funding plans. Under President Duterte, the public authority made the ten-point financial plan spreading out the significance of establishments, administration, rivalry and social security projects to advance comprehensive turn of events (in the same place). The public authority likewise sent off the Abacination 2040 vision which is a bunch of objectives that act as the nation's drawn-out vision and is firmly connected to the SDGs. The public authority empowers proprietorship and confinement of the 2030 Plan through various drives like the Open Streets drive, putting resources into protected and reasonable foundation for neighborhood networks, among others. For instance, the public authority is electively focusing on SDG 9 which looks to construct foundation projects that encourage advancement and industrialization, as well as SDG 11, which centers around creating economical and comprehensive urban areas through putting resources into protected and practical framework in the neighborhood networks through expanded activities (like lighting, transportation, and so on) 43.55 % of the populace in the Philippines have web access. The nation positions 55 regarding innovative status. The nation has seen numerous drives that feature the capability of huge information to accomplish the SDGs. The Open Roads drive joins publicly supported geo-coded video and picture information got from cell phones with street information trying to follow the condition of street organizations and public venture projects. Large information for this situation tends to various difficulties. In the first place, with confinement animating countless neighborhood projects, it becomes hard for policymakers to needs and supply functional street organizations. Moreover, some huge scope expressway networks will generally be wasteful in connecting networks together in light of the unfortunate condition of last-mile neighborhood streets, which make up 85 % of streets in the Philippines. The multi-media entry tracks public foundation extends that mean to foster last-mile street networks by utilizing the overflow of information on open framework (SDG 9) through publicly supporting. This happens by joining information from various organizations inside the Filipino government. This empowers all partners — remembering residents — to remark for all nearby street projects in all areas. It likewise permits them to follow the lifecycle of framework projects utilizing a versatile video application utilizing track-planning of photographs or recordings, which are then geo-handled into project data. This permit expanded coordinated effort across partners to track down inventive advancement arrangements.

5. Egypt's contributions to sustainable development through digital transformation:

In light of Egypt's pledge to achieve the Sustainable Development Goals of the UN, Egypt needs to establish itself as a safe rival nation that draws in investors from around the globe. This can be achieved by implementing an open market policy, building enormous construction projects, deregulating the currency, and lowering barriers and restrictions for foreign investors. Thus, "having a balanced, profitable, and diversified economy, reliant on technological advances and creativity, and founded on integration into society, justice, and participation" is Egypt's plan for achieving sustainable development. On top of that, it is characterized by an equal and diversified ecology, employing the location and humans' innovation in order to accomplish the goals of sustainable growth and increase the citizens' living quality". With regard to combating corruption, economic growth, competitiveness in the market, standard of living, and human development, this plan seeks to rank Egypt among the top 30 nations in the world. In addition, the plan

considers the fair and efficient use of resources, upholding the ideals of equal chances, protecting the rights of future generations, and closing some development gaps. Given that digital change plays a vital part in accomplishing SDGs and makes governmental provision of services simpler and more effective. The involvement, engagement, and engagement of youngsters is a critical component in Egypt's transition to the digital age and the creation of the digital labour force of the future. This is a unique and priceless opportunity for Egypt. Egypt must thus make investments in its human resources and impart technologies for communication and information know-how and skill sets to its citizens. In order to promote changes in sustainable development and the achievement of the SDGs, the Ministry of Information Technology and Communications is launching a number of initiatives and projects in partnership with other Ministries, governmental organizations, and other private partners. These projects and initiatives include seven major tracks: the e-Govern online education, electronic readiness, e-commerce, e-Culture, electronic health care, and ICT exporting initiative. Public-private partnerships, or PPPs, are also included into the reform processes of a number of economic sectors, including housing, government, education, security, health, and environmental challenges. In addition to helping to accomplish the SDGs, it aims to promote social inclusion by addressing both intra- and inter-digital barriers. In this regard, we have a chance because the digital initiative was started with the intention of forming partnerships between the public and commercial sectors and helping governmental organizations carry out digital transformation initiatives. which in turn improves the working environment, boosts productivity, and raises the standard of services offered to citizens at public institutions. In addition, the Planning, Monitoring, and Administrative Reform Ministry unveiled "Sharek," a smartphone application that serves as a digital platform for individuals to engage in the review process, particularly young people. Moreover, spread knowledge about sustainable growth. The author highlights the efforts and programmes of MCIT along with other partnerships that are helping Egypt fulfil the SDGs in the section that follows.

5.1. Education and Training

In keeping with Egypt's commitment to achieving the Sustainable Development Goals, the government has implemented an e-learning strategy for postsecondary and before college education that distinctly improves people's lives by changing them, irrespective of their age, socioeconomic status, or line of work. Therefore, with a \$500 million budget to support the reforming approach, the Egyptian Ministry of Higher education tends to change Egypt's educational system. With the use of technology like interactive whiteboards, virtual worlds, tablets, and digital libraries, this approach seeks to eventually replace textbooks with digital learning resources in the educational system. This change offers universal access to education, develops a high-quality and contemporary educational system in line with worldwide standards, enhances the learning process, and produces motivated and enthusiastic educators and students who absorb knowledge, think critically, and innovate. Over the course of five years (2019–2023), 1.5 million instructors and students will have access to digital learning resources thanks to this project. Furthermore, the government established a number of online learning environments, including a bank of Knowledge that provide a variety of digital resources and build an online community that mimics a classroom. While the bank of Knowledge offers an environment for scholars and undergraduates that includes various scientific materials like books and journals, in addition to higher education and pre-university education.

Additionally, the Egyptian government and the IT members of the World Economic Forum collaborated to develop the Education Initiative (EI) as part of the collaboration between the public and private sectors that is promoting Egypt's broader efforts to modernize education. The four main work tracks of this project—Higher Education, Prior to attending college Education, ICT Industry Development, and Lifelong Learning—as well as the fact that it unites students, educators, parents, local officials, business, international organizations, and government make it an inclusive model. Because they provide collaborative electronic publications, thinking in three dimensions, virtual lectures and laboratories, and drama-based learning, all of these initiatives improve e-learning. Additionally, with regard to the training process, MCIT is implementing several programmes and initiatives in conjunction with other Ministries for this very reason. These programmes are offered to citizens in an effort to enhance their expertise and abilities, increase the competitiveness of Egyptian standards, and empower young people to overcome labour shortages, find employment, meet local and global labour market demands, and advance gender equality.

5.2. FinTech

The realization of the digital economy depends heavily on financial technology, or FinTech. In addition to being quicker, less expensive, and more effective than traditional financial services, digital financial

services are also linked to faster GDP growth. In order to speed up the process of getting services, Egypt's government is attempting to expand its adoption of financial technology, or FinTech, as it leads to:

1. Encourage and accomplish monetary equality, which will lead to inclusive growth, by interacting with lower-income households and small- and medium-sized businesses (SMEs).
2. Boost the efficiency, speed, and ease of financial services.
3. Provide underserved SMEs and the unbanked people access to affordable financial services.
4. Decrease corruption and improve the openness, effectiveness, as well as the effectiveness of governmental operations that support social and humanitarian aid.
5. Cut down on the price and time spent on international transfers.
6. Offer solutions for a wide range of issues, including terrorist risks, large-scale economic inequality, undiversified economies, unbanked individuals, informal transfers and remittance markets, corruption, and a huge number of displaced people.
7. Permit current banks to create new business plans.
8. Make it possible for non-financial businesses to provide digital financial services, such as e-commerce platforms, big retailing groups, mobile network providers, and mobile transfer firms.

To address the many financial issues that Egyptian firms and people confront, a number of government and startup efforts, together with applications for various financial activities, have been introduced in the past two years. Additionally, startups are significant players in this space because they primarily target lower-class clientele and provide a variety of financing options and payment apps. Furthermore, they revolutionize both the human resources and payroll fields by means of several platforms offering financing alternatives and employee payment systems. As per the report by CBE, in 2022, there would be thirty-six banks with a total of Forty banks offering online banking services. Additionally, as table 2 illustrates, there was a significant increase in the quantity of fintech tools between 2019 and 2023:

Table 2: Number of fintech tools, Source: CBE, 2023

Fintech Tools	Dec 2023	Dec 2019
No. of Debit Cards	21,140,875	18,011,421
No. of Prepaid Cards	25,646,219	18,131,254
No. of Credit Cards	5,027,612	4,210,961
No. of ATM machines	17,812	14,201
No. of POS	180,023	90,153

Payment solutions, such as mobile and online banking facilities like mobile wallets that allow for deposits, withdrawals, transfers, and payments, are given top emphasis by CBE. As its customers exceeded a total of twenty million in 2022 and completed transactions totalling over EGP 100 billion yearly, they saw an annual increase of thirty times over 2022.

In order to unleash the potential of business owners and banking personnel in this domain, MCIT aims to provide a fresh slate of training, camps, and seminars covering all facets of the financial value chain. As a result, ITI launched a number of programmes in collaboration with the Egyptian Banking Institute, such as "Computer Networks Administration and Security," to train employees in the banking industry in the newest technologies in that domain, including data science, artificial intelligence, data analysis, and information security. The recent graduates of ICT specialization faculties are the target audience for these programmes. Additionally, work together to organize conferences and specialized competitions to share experiences and information about innovation.

5.3. Health

In order to advance the industry, MCIT is working alongside the Health Ministry to automate processes, construct networks that enhance and transfer communication, gather data, and increase capacity for medical and administration workers. In addition to closing the health gap in distant locations, it also helps to improve healthcare delivery there, increases physician knowledge and skills, uses ICT infrastructure to provide medical services, develops multi-partnership business models, and promotes e-Health culture. As a result, the health sector is implementing an integrated strategy that targets the entire community, including telemedicine for patients, tele awareness for the community, and tele education for physicians. In order to guarantee that residents can access healthcare services, enhance their scope, size, and quality, save patients' time and money, and ensure the financial viability of health coverage services, a number of digital initiatives are being implemented in the health sector. These initiatives include the Diagnostic Systems initiative, the National Network for Medical Therapies, the Universal Health Insurance program, and numerous mobile applications in the field of health that aid in the control and prevention of the spread of non-communicable diseases like diabetes, blood pressure, and hepatitis by sending patients brief messages.

5.4. Energy

Egypt is home to a wealth of highly deployable renewable energy resources, including biomass, solar, wind, and hydropower. In order to create a flexible, secure, and robust electrical grid, the Ministry of Energy and Renewable Energy has approved a new plan in partnership with a few Chinese businesses. This plan calls for the development of a smart electricity grid that utilises innovative technologies in communication as well as information technology fields. In addition, a number of hydropower plants are being built around Egypt starting in 2023. In addition, the ministry implemented a single digital system to collect power bills and digitise all public services. As a result, 415 payment collecting centres that are connected to the "Egyptian-Electricity-Holdings-Company" have been automated. Additionally, paying power bills will be possible at all bank locations, including ATMs, bank offices, and online banking. Additionally, a deal was reached between Siemens and the "Egyptian Electricity Transmission Company (EETC)" to deliver the first digital power transformer to the Egyptian market. In order to achieve power sustainability and security, boost energy efficiency, and begin the energy sector's digital transformation, new reform measures are also being implemented by the electrical sector. The private sector may now invest in innovative connections, clean power, improved governance, and sector transparency thanks to these regulations.

5.5. Innovation, Industries, and Construction

Egypt has achieved great strides in a number of infrastructure-related areas, including ports, green power, highways, and bridges. In order to accommodate the growing population, more wastewater and water supply projects are being undertaken. Since ICT infrastructure is a major driver of economic activity in every sector of the country, MCIT works to advance state-of-the-art infrastructure that can satisfy the expanding demands of businesses, governments, and individuals in the rapidly expanding global communications era. Additionally, as traffic increases, technology advances, and use shifts, MCIT keeps promoting new, cutting-edge technologies that support socioeconomic growth generally and works to upgrade and expand its telecommunications infrastructure. Additionally, the Egyptian manufacturing industry is greatly impacted by digital transformation, which uses suitable technology to boost efficiency and reshape business procedures. This boosts the competitiveness and overall performance of the companies by generating new revenue streams and enabling real-time quality control. Additionally, novel models for digital services, products, and solutions are created. Additionally, businesses may now better understand their production distribution, customers, consumption, and solutions, as well as identify their target markets and clientele, thanks to the availability of innovative data as well as systems. In this regard, three years ago the Ministry of Commerce and Industry began digitizing the industry sector. Through the Manufacturing Reconstruction Centre, it has launched the "Digital Revolution and Technological Support Programme Action Plan 2019-2023" to advance financial and technological advancement in businesses. Furthermore, the European Union funds the "Egypt Exports through Product Innovation" initiative, which is carried out by the Technical Export Council.

5.6. Sturdy institutions, justice, and peace

The five essential components of Peace, Justice, and Strong Institutions (SDG 16)—Inclusion, Effectiveness, Openness, Accountability, and Trustworthiness—are highlighted by both big data and e-government. In order to create an integrated system that would streamline processes, enhance and expedite citizen services, expedite the execution of rulings, and guarantee justice, MCIT frequently initiates numerous initiatives to streamline the legislative entities' services that are a part of the system. These projects include the following: automating the Ministry of Justice's legal departments, developing the Africa Constitutional Court Digital Portal, getting personal status documents, and automating family courts.

5.7. Conscientious production and consumption

A lot of new technology can lessen the trade-offs between production and the environment. Using cloud computing technologies, the enhancing productivity initiative not only reduces the need for specialised human resources but also offers innovative and cost-effective services, relieving the monetary cost of maintaining and operating data centres. Over one hundred fifty government organisations have benefited from a variety of services since the project's inception, including the supply of 18,250 email addresses and 1500 online portal accounts. This is on top of the 600 accounts that were offered in the integrated communication system, which makes video conferencing services easier.

5.8. Clean water

The Egyptian government is making great strides towards replacing antiquated methods of tracking the contamination of water on the Nile with cutting-edge technical alternatives. On the other hand, up to now, 21 stations have been set up to monitor the cleanliness of the Nile River naturally as well as the industrial effluent that is directly discharged into the river. By 2030, it is anticipated that there will be ninety-five monitoring sites.

6. Conclusion

Undoubtedly, digital transformation has an impact on society as a whole. It makes new technologies more approachable, informed, competitive, and nimble. It also facilitates improved decision-making, which helps to accelerate growth and the achievement of the SDGs. Since it facilitates efficient resource use, cost savings, time savings, and other benefits. Egypt is using ICT to achieve sustainable development as a result. Additionally, the public-private partnership (PPP), which is seen as the most crucial component in putting digital projects and efforts for development into action, is crucial to reaching the SDGs. As a result, Egypt's government has formed alliances with many organizations, both public and private, to introduce digital projects and initiatives that would improve the economy, society, and the environment. These programmes aim at cultivating human resources by giving them the necessary digital skill sets and opening up work prospects. After all, people are the primary players in all industries and bear the primary responsibility for the success of businesses. Furthermore, all sectors are covered by these endeavours, including business, legislation, energy, healthcare, education, and infrastructure. Furthermore, progress in one area might lead to progress in other areas as well. Despite all of Egypt's accomplishments in the area of digital transformation, the country is still in its infancy and has invested less in ICT that is targeted towards the SDGs. Furthermore, both internet connectivity quality and use rate remain below the worldwide average. Subsequent research endeavours may explore the obstacles and prospects associated with the integration of technological advances in this domain. Future research may also look at information technology's successful components.

Funding: “This research received no external funding”

Conflicts of Interest: “The authors declare no conflict of interest.”

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