THE JOURNEY TO EGYPT'S DIGITAL TRANSFORMATION

MOHAMED AZZAM
Federation of Egyptian Chambers of Commerce
Digital Economy and Technology General Division
4 El Falaki Square, Cairo, Egypt
Mo.Azzam@nu.edu.eg
NEZAR SAMI
Egyptian Banking Institute (EBI)
22A, Anwar Al Mofti Street, Nasr City, Cairo, Egypt
nsami@nu.edu.eg
TAREK KHALIL
Nile University
Sheikh Zayed, Giza, Egypt
tkhalil@nu.edu.eg

ABSTRACT

Purpose of the paper

The purpose of the paper is to provide a framework that can be used by Government of Egypt (GoE) to shape the future, create the desired abundance digital economy, and build a digitally competitive nation.

Related work

Mohamed Azzam, Nezar Sami and Tarek Khalil, 2017. TECHNOLOGY DISRUPTION FOR DEVELOPMENT AND PEACE. Vienna Austria, International Association for Management of Technology (IAMOT).

Mohamed Azzam, Nezar Sami and Tarek Khalil, 2016. UTILIZATION OF APPROPRIATE TECHNOLOGIES FOR A REAL "COMPETITIVE EGYPT". Orlando USA, International Association for Management of Technology (IAMOT).

Design/Methodology/Approach

The approach used in the paper is based on thorough analysis of the reports issued by international institutions and literature in the areas of future governments and digital transformation, desk research, and interviews with key personnel in the government, Business Representative Organizations (BROs), and private sector, in addition to youth, startups and entrepreneurs.

Findings

The paper outlines the major drivers that are shaping the future and their effects, the outlook of the future government and its function, and the role of Management of Technology (MOT) in this regards. This is towards developing a framework. A framework that aims at ensuring a sustainable economic growth in Egypt, which will be based on a public policy that anticipates the future, as well as understands how to handle the nature and the size of the ongoing change in a proper and innovative manner. A public policy that advances economic, technological innovation and trade systems. This is for matching the 21st century's challenges and opportunities, and on the other hand, helping the

nation to be capable to deal with such fluid environment and unprecedented disruptive models, towards prosperity and abundance digital economy.

Research limitations/implications

The study has the limitation that the empirical part is based on the international models in the domain of the digital transformation. More empirical research and studies should be conducted within the local context. This is for validating the findings and developing implementation programs for achieving the ultimate goal of building a competitive “Digital Egypt”.

Practical implications

The proposed framework will act as a guiding instrument for senior officials, policymakers, and business leaders for planning and executing effective and efficient digital transformation programs on both social and economic levels, while fostering innovation, attracting investment and creating jobs.

Originality/value of the paper

The paper provides a holistic outlook for senior officials, policymakers, and business leaders. This is for assisting them to have the big picture in mind, while developing and implementing the digital transformation programs that have a sound impact from the social and economic perspectives. Also, the paper can be used as a base for future research in specific issues related to the digital transformation of the nation.

Keywords

Management of Technology; Digital Transformation; Future Government; National Systems of Innovation; Digital Economy

INTRODUCTION

Back in the late 1990’s and early 2000’s, after the introduction of the internet, governments had started implementing strategies and initiatives for increasing access to technology on the government, enterprises and individuals levels. This was for growing businesses and improving the access and delivery of public sector’ services (Claps, 2017). During this era, Egypt has witnessed various initiatives in this regards, such as PC for Every Home (PC4EH) and e-Government. These initiatives, which had conducted collaboratively between the government, Business Representative Organizations (BROs) and private sector, aimed at increasing usage of new technologies, strengthening local electronics manufacturing, bridging the digital divide in Egypt, providing public services electronically, and establishing the base for digital society and economy.

However, the 21st Century has witnessed an unprecedented technological development coupled with disruptive models. Today’s exceptional technology advancement and the innovative usage models are not only disturbing the governments, but also disturbing the businesses, individuals and societies

largely. This exceptional disruption has initiated a massive transformation; a transformation that is behind the typical restraint of the governments. Moreover, this transformation is always powered by continuous innovation and significant evolution in the way people utilize technology. However, the structure of most governments is not swift enough to deal with such disruptions. Subsequently, governments are not fully taking advantage of such technological disruption to advance their nations on the socioeconomic levels (Mohamed Azzam et al., 2017).

On the other side, government officials, business leaders and policymakers are more aware of the value of the technology and its importance for the desired socioeconomic development in their countries. Though, the performance of the public governance has been always perceived negatively by the majority of the public. Most of the initiatives carried out by governments have failed, to a great extent, to improve the delivery of public services, and the mental image of the public sector at large. There are several issues labelling the public service delivery systems, especially in developing countries. This includes bureaucracy, ineffectiveness, corruption, rigidity, and lack of accountability and transparency (Noore Alam Siddiquee, 2016). Thus, leaders and policymakers should be ready to deal with such impulsive change on economic, societal, demographic and technological levels, and in a holistic approach. This is in order to be able to shape a better future for their nations and citizens.

Consequently, digital transformation becomes a mandate for governments to shape the future. However, digital transformation is a journey that needs a clear vision along with profound implementable strategies. It is a journey for transforming the government, people, process and policy (Zahir Irani, Muhammad Kamal, 2016). Furthermore, since 2014, Egypt is under large-scale economic and societal reform. A reform that aims at leveraging the country's competitiveness to be among the top 30 economics by 2030. Thus, Egyptian leaders and policymakers are in need for a base to understand the whole picture and get acquainted with the major drivers that are shaping the future. These drivers include economic, societal, demographic and technological drivers.

Based on that, the paper outlines the major drivers that are shaping the future and their effects, the outlook of the future government and its function, and the role of Management of Technology (MOT) in this regards. This is towards developing a framework. A framework that endeavors a sustainable economic growth in Egypt, which will be based on a public policy that anticipates the future, as well as understands how to handle the nature and the size of the ongoing change in a proper and innovative manner. A public policy that advances economic, technological innovation and trade systems. This is for matching the 21st century's challenges and opportunities, and on the other hand, helping the nation to be capable to deal with such fluid environment and unprecedented disruptive models, towards prosperity and abundance digital economy. Our framework will act as a catalyst that delineates what is possible for leaders and policymakers who are eager to support change and build a better future for Egypt and Egyptians. This will be elaborated in the following section.

DRIVERS SHAPING THE DIGITAL EVOLUTION

Before having an outlook on the drivers shaping the digital evolution, we need to understand the dynamics of the new wave of globalization.

For decades, the typical conception of globalization was defined as the flow of goods, services and capital between nations (James Manyika et al., 2016). Between 1989 (the fall of Berlin Wall) and 2007 (the Global Financial Crisis), capital flows grew from only 5% of the global GDP to 21%. Trade increased from 39% to 59% and the number of individuals living outside their countries of origin increased by almost 25% (Mallaby, 2016).

Today, the landscape is more complicated than ever. The flow of international capital has dropped and international trade has deteriorated. The only increase is the flow of individuals across borders (Mallaby, 2016). It seems that the typical flows have lost the momentum, but this does not implicate that globalization has entered a reverse cycle. As today, globalization has started a new era that is characterized by the unprecedented rising digital flows of data and information. Astonishingly, the digital flow, which was not existing approximately 15 years ago, has a greater impact on the growth of GDP than the traditional goods and services. The internet has managed to connect the global economy together. Almost 50% of the global traded services have been digitized. Moreover, approximately 12% of the global trade is conducted over e-Commerce platforms. 88% of SMEs that are using an e-Commerce platform, such as eBay, are exporters. Skype calls represents 46% of the international calls. Simply, digitization has opened new horizons and established various opportunities for conducting business globally (James Manyika et al., 2016).

Based on the above, there are four major drivers that direct nations' digital evolution. The drivers are: Supply Conditions, Demand Conditions, Institutional Environment, and Innovation and Change. Each driver has three main components. The digitization is the result of the multidimensional interaction of these four drivers and its related components and could not be an outcome of a single driver alone. It is also important to understand the nature of such drivers, in order to go beyond the static picture and nurture the required change across the whole system, for establishing more advanced economies and societies (Bhaskar Chakravorti and Ravi Shankar Chaturvedi, 2017). More elaboration on the four driver are in the following section:

Supply Conditions

This driver has three components that are: Access Infrastructure, Transaction Infrastructure and Fulfillment Infrastructure. Access Infrastructure includes communications sophistication and coverage, and security. Transaction Infrastructure includes access to financial institutions and electronic payment options. Fulfillment Infrastructure includes quality of transportation infrastructure and logistics performance. The driver is for measuring the quality of and

readiness of both digital and physical infrastructure needed to enable digital interactions and transactions in the country.

Demand Conditions

The three components of this driver are: Consumer Capacity to Engage, which includes consumer ability and willingness to spend and gender digital divide; Digital Payment Uptake, which includes degree of financial inclusion and use of digital money; and Digital Uptake that includes device prevalence and density, technology, internet, and mobile connection uptake and digital consumption. This driver is measuring the willingness and preparedness of consumers to involve in the digital ecosystem. Low demand score here does not mean navigate sign, as it could present a growth opportunity for innovators, businesses and investors in untapped markets.

Institutional Environment

The main components of institutional environment driver includes: Institutions and the Business Environment that comprises the legal environment including efficiency in settling disputes, IP and investor protections, and bureaucracy; Institutions and the Digital Ecosystem that includes government uptake and use of ICT and digital technology and telecom competition; and Institutional Effectiveness and Trust that includes transparency, rule of law and regulatory quality. The driver is concerned about the role of government in enabling or obstructing the business instrument that generates and distributes digital technologies, as well as the policies and regulations by government for flourishing the digital ecosystem.

Innovation and Change

The last but not least driver is innovation and change. This driver has three components that are: Inputs that has financing options and opportunity, start-up capacity, and ability to attract and retain talent; Process that has sophistication of business practices and R&D; and Output that has depth of mobile engagement, reach of innovation, and use of social networks and digital entertainment. This driver is the main instrument for establishing novel solutions to challenges facing economies and societies domestically and internationally. This driver is the principle vehicle to disrupt the status quo and open horizons for the digital ecosystem to flourish.

The four drivers shape the competitiveness of the countries' digital economy, and act as the base for calculating their Digital Evolution Index (DEI), as will be explained in the following section.

DIGITAL EVOLUTION INDEX (DEI)

The digital economy's competitiveness of any country is a function of two main factors. The first factor is its present status of digitization and its digitization's rate of growth over an eight-year period (2008-2015). Based on that the countries' DEI is classified in four main categories, as will be highlighted in the

following section (Bhaskar Chakravorti and Ravi Shankar Chaturvedi, 2017). The four main categories are:

Stand Out Countries

The countries that are both highly digitally advanced and demonstrate high momentum. These countries include Singapore, New Zeeland and United Arab Emirates.

Stall Out Countries

The countries that have a high status of digital progression while demonstrating slowing momentum. This includes Norway, Sweden, Switzerland, Denmark, USA and Finland.

Break Out Countries

The countries that are low-scoring in their current status of digitalization but are evolving rapidly. The Break Out countries include China, Malaysia, Saudi Arabia, Kenya and Russia.

Watch Out Countries

The countries that face considerable challenges, as they experience low status of digitalization coupled with low momentum. South Africa, Pakistan, Peru and Egypt are among the Watch Out countries.

The following chart illustrates DEI of 60 countries; the vertical axis is the status of digitization, and the horizontal axis is the digitization's rate of growth:

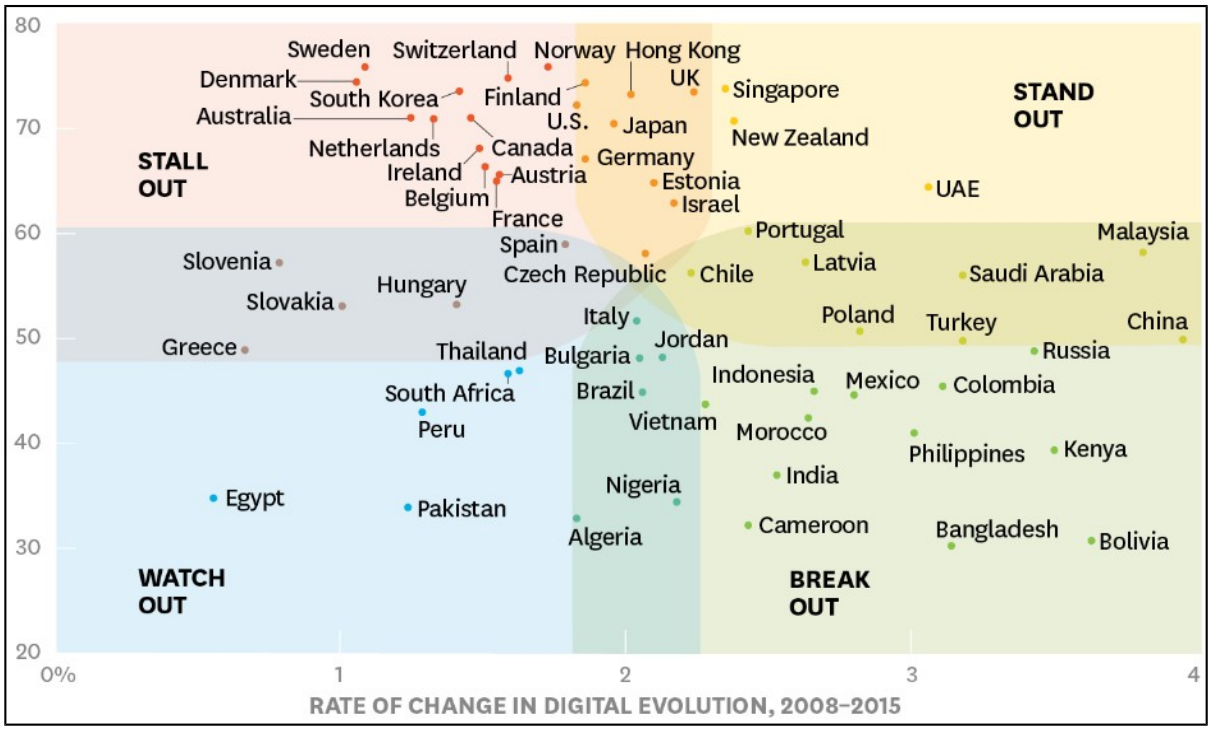

Figure 1: DEI 2017, Source: Digital Planet 2017, The Fletcher School, Tufts University

Furthermore, there is an important aspect that is the trust ecosystem. This trust ecosystem is provided by governments and businesses -the sponsors of trust- who deliver both experience and environment to the users -the givers of trust- who consequently behave within the digital system. Accordingly, the nations are categorized into four groups that are: (1) High Trust Equilibrium Nations, (2) Low

Trust Equilibrium Nations, (3) Trust Surplus Nations, and (4) Trust Deficit Nations. The following diagram demonstrates the trust index landscape.

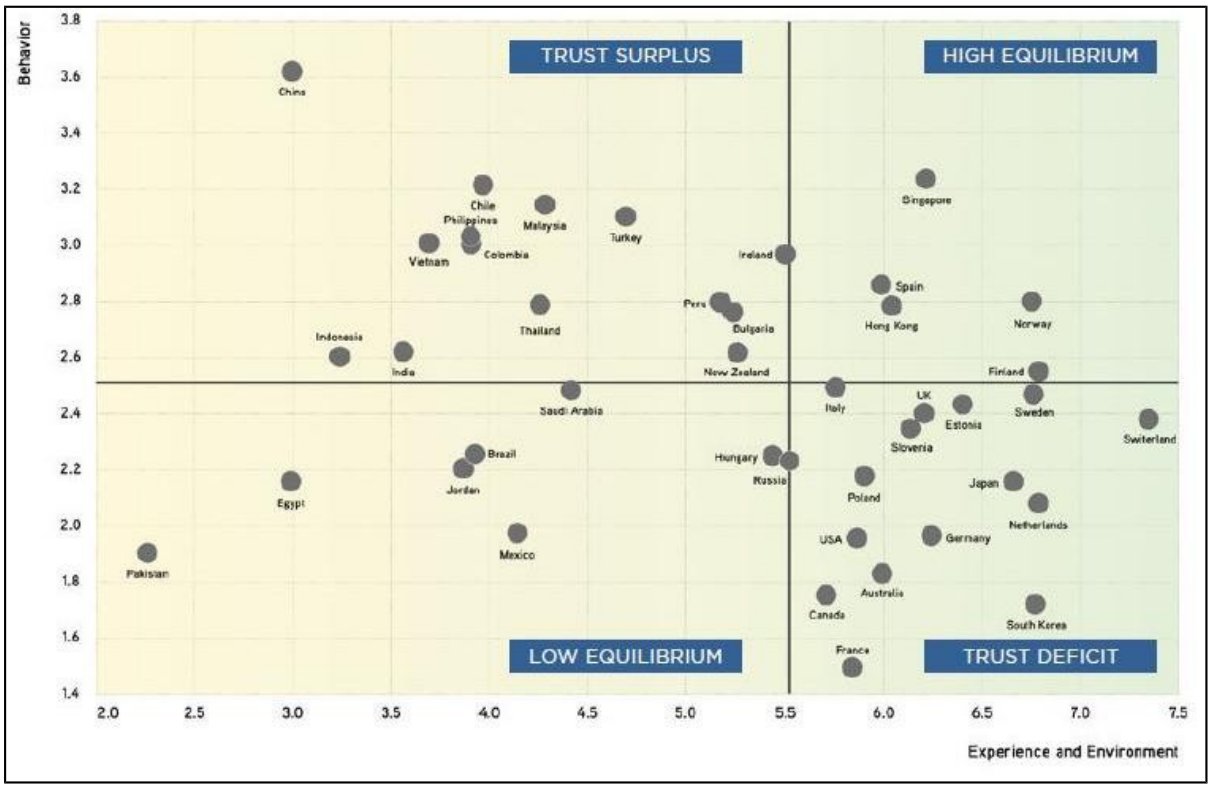

Figure 2: Trust Index Landscape, Source: Digital Planet 2017, The Fletcher School, Tufts University

More highlights on Egypt's digitization profile will be elaborated in the following section.

EGYPT'S DIGITIZATION PROFILE

There are two main perspectives for the outlook of Egypt's economy; the first perspective is the classical one that is mainly developed by World Economic Forum (WEF), and the second perspective is the digital perspective that is lately developed by The Fletcher School, Tufts University, as well as WEF. Both perspectives are complementing each other's. The outcome of WEF perspective is the Global Competitiveness Index (GCI) and the outcome of Fletcher School, Tufts University is the Digital Evolution Index (DEI).

Egypt's Competitiveness Profile

Egypt has witnessed a notable decline with respect to competitiveness since the Arab Spring in 2011. This was mainly due to the political and economic instability that Egypt has come across over the past few years (Mohamed Azzam et al., 2016). However, according to the latest report by WEF, Egypt's GCI has advanced 15 positions on the competitiveness ladder (World Economic Forum, 2017). The country's rank in 2017 is 100, while the rank was 115 in 2016. The

following diagram illustrates the current status of the country in relevance to the Middle East and North Africa (MENA).

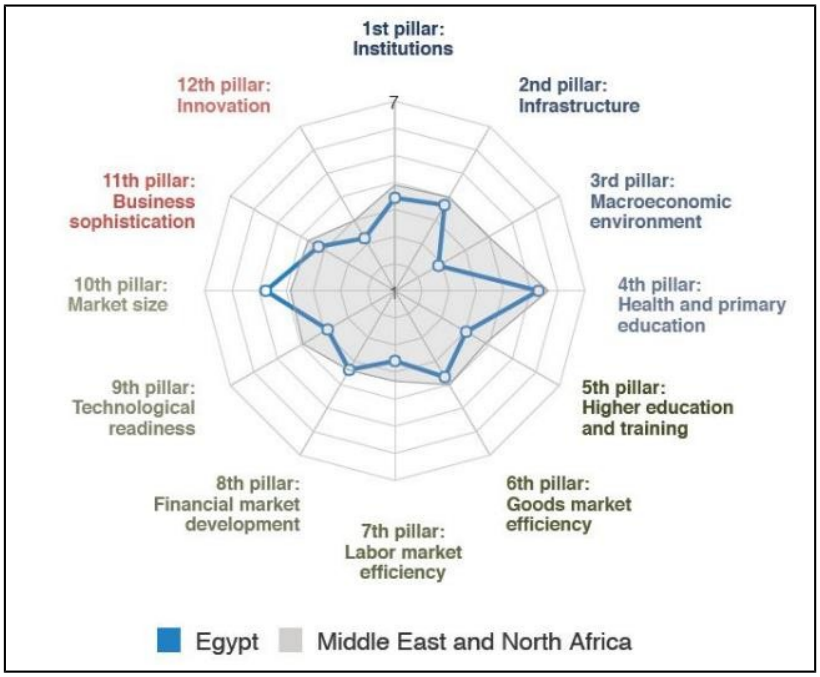

Figure 3: Egypt's GCI Outlook, Source: The Global Competitiveness Report 2017–2018, World Economic Forum

WEF report indicated that Egypt had excelled in several domains compared to the rest of the countries in MENA region. These domains include institutions, infrastructure, health and primary education, goods market efficiency, financial market development, and business sophistication. On the other hand, the countries is still behind the rest of MENA countries in other domains that are macroeconomic environment, higher education and training, labor market efficiency, technological readiness, and innovation.

Both technological readiness and innovation indices are the pillars for the 21st century economy, as will be discussed in the following section.

Egypt’s Digital Competitiveness Profile

Egypt possess a modest rank when it comes to DEI (Bhaskar Chakravorti and Ravi Shankar Chaturvedi, 2017). Egypt’s DEI score is 1.74 out of 4.0 and its rank is 54. Egypt is just before Nigeria, Pakistan, Algeria, Cameroon, Bolivia, and Bangladesh. Moreover, its momentum score is 0.56 and holds the last position, and the country’s digital trust environment score is 1.95 and in the 58th position, just before Pakistan and China.

Furthermore, Egypt occupies a humble rank with respect to Networked Readiness Index (NRI). The country’s rank is 96 out of 139 and its score is 3.7 out of 7. There are many pitfalls related to regulatory environment, infrastructure, business and innovation environment, individual, business and government technology usage, skills, economic and social impacts of technology (Silja Baller, Soumitra Dutta, and Bruno Lanvin, 2016).

Another report indicated that Egypt's rank is 105 out of 127 in the Global Innovation Index (GII) in 2017. The country score is 26 out of 100. The rank of the Institutions is 121, which include political, regulatory and business environments. The rank of Human capital & research is 82 that consists of education, tertiary education and research and development (R&D). Infrastructure's rank is 93. Market sophistication's rank is 107, while business sophistication's is 120. Knowledge & technology outputs' rank is 93 and the creative outputs' rank is 97 (Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent, 2017).

The outlook looks scary; however, it represents an opportunity for innovators and investors. It is still untapped market with remarkable growth potential.

It is a journey for the digital transformation in the country. This will be discussed in the following sections.

FUTURE GOVERNMENT AND ROLE OF MANAGEMENT OF TECHNOLOGY

As mentioned earlier, digital transformation is a journey. The fundamental objective of the journey, as stated by PricewaterhouseCoopers (PWC) is "creating the society of the future for the citizens of tomorrow by a trusted, sustainable and collaborating government" (Jan Sturesson et al., 2013). This journey should be led by "Digital Leaders". Leaders who recognize why digital technology is imperative and how to utilize it. When businesses and governments persuade "digital leadership" within the organization, the impact is clear. Businesses witness higher profitability and growth. As well, governments achieve higher efficiency and effectiveness, while realizing higher transparency and trust in the whole ecosystem (Harvard Business School, 2015).

Recognizing the new technologies and their potential is not the role of the CIOs within any organization any more, as the scope is getting broader. Leaders across governments and businesses should be aware of the emerging technology trends and their implications on the economic and social levels (Mohamed Azzam et al., 2017). This also doesn't mean that leaders should be aware of how the technology works on the technical side.

Therefore, a "digital" vision should be in place. This vision should be communicated across the organization for ensuring successful transformation. Developing such vision should be the role of the digital leaders within the organizations. Currently and in the future, businesses and governments should redesign their structure to be more responsive to such unprecedented pace of technological disruption. Businesses and governments should be to able to develop more agile and innovative policies and business models that cater people and process, rather than keeping the outdated current practices, in order to meet the evolving and novel challenges (KPMG, 2016).

There is a new role of Management of Technology (MOT) in this regards. The new role of MOT should be behind just forecasting the technology trends. The new role should be foreseeing these trends and their influence economically and socially, while developing and presenting innovative policies and business

models based on that to businesses and governments. This should be articulated by a board “Futuring Board” headed by Chief Technology Foreseeing Officer “CTFO”, who is reporting directly to the head of the organizations, or even to the head of the state on the national level (Mohamed Azzam et al., 2017).

Based on that there is an importance to develop a framework for “Digital Egypt”, as will be demonstrated in the following section.

FRAMEWORK FOR “DIGITAL EGYPT”

In order to formulate a framework for “Digital Egypt”, we need first to articulate a vision and a mission for “Digital Egypt” and identify the main pillars needed for such transformation. “Digital Egypt” should be a national initiative similar to “Digital India” initiative that was lunched on July 2015 by the Indian Prime Minister Narendra Modi. “Digital India” initiative comes with a motto “Power to Empower” and aims at transforming India into a “global digitized hub” by connecting citizens nationwide and improving their technological skills, towards making the whole country digitally empowered (GULATI, 2016) (Karamvir Sheokand and Neha Gupta, 2017).

The vision of “Digital Egypt” initiative should be “Digitally Competitive Nation”. The mission should be “Digitally Enabled Country coupled with Empowered Citizens and Businesses”.

To realize this vision and mission, GoE should consider digitization as the main vehicle for the development on both economic and social levels. Citizens and businesses should be connected electronically in both urban and rural areas. All public services should be available to citizens and businesses online, in order to eradicate bureaucracy and corruption. GoE should also equip citizens and businesses with innovative electronic payment means and proper digital literacy, while building robust infrastructure for supporting the whole new digitally enabled ecosystem. This is towards boosting the economy, attracting investments and creating new jobs.

For GoE to build the desired digitally enabled ecosystem, there are pillars to be considered within the proposed framework. The following figure illustrates these pillars and their relevance to DEI’s drivers.

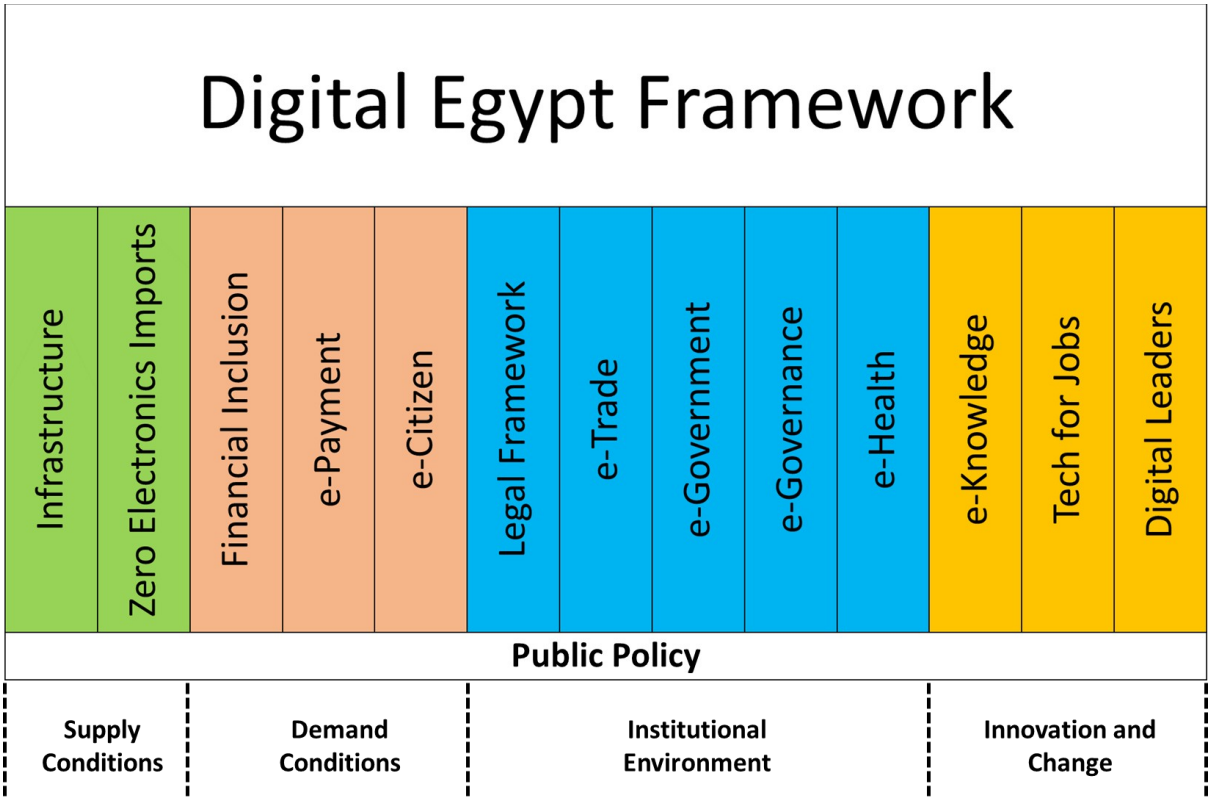

Figure 4: Proposed Framework and its Pillars of Digital Egypt and Relevance to DEI's Drivers

More highlights on the pillars will be elaborated in the following sections.

Digital Egypt' Supply Pillar

Infrastructure

To realize a digital nation, infrastructure should be robust enough for acting as the principal utility for the desired digital inclusion on the citizens, businesses and government levels (Deloitte, 2015). Infrastructure includes high speed broadband highways for connecting the cities, governmental agencies, schools, universities and R&D institutions together. Also, the proper coverage of 4G mobile network by the mobile operators is an important factor in this regards, as it represents a fast track for availing high speed connectivity to the different stakeholders within the newly developed digital ecosystem. Another important elements of infrastructure are data centers and technology parks. This sub pillar should be realized by the end of 2021.

Zero Electronics Imports

Egypt's imports of electronics was $19.2 billion and $16.8 billion in 2015 and 2016 respectively, while its annual exports of electronics was around $1.9 billion over the last two years (CAPMAS, 2017). GoE should adopt a medium-term strategy for reaching net zero electronics imports by 2022. As well, GoE should consider availing mobile connectivity to every citizen using mobile devices in an affordable way. This represents a multitude of opportunities for attracting Foreign

Direct Investment (FDI) and creating jobs and boosting innovation in the domain of electronics design and manufacturing.

Digital Egypt's Demand Pillar

Financial Inclusion

In spite that Egypt joined the Alliance for Financial Inclusion in 2013, the percentage of financial account ownership is still low, as it is only 14% among adults, who represents approximately 60% of the total population, and is only 9% among women (Robin Lewis, John Villasenor and Darrell M. West, 2017). However, GoE has started serious steps in this regards. In February 2017, National Payment Council (NCP) was established. This is to encourage digital payments and formal financial services. Moreover, in 2016 GoE released new regulations that are facilitating mobile payments using mobile wallets. As well, Central Bank of Egypt created a dedicated unit for financial inclusion in 2017. The role of this unit is to develop new services, while studying the market on the demand and supply side, and articulating the necessary regulations in this regards. Still, a national strategy is required for having innovative financial inclusion programs within the context of "Digital Egypt". Every Egyptian adult should have a sort of financial inclusion by 2022.

e-Payment

e-Payment levels in Egypt is still behind. One of the main reasons for that is the low penetration rate of credit/debit cards, as well as low mobile payment adoption. e-Commerce in Egypt reached $2.43 billion in 2016. Online buyers reached 17.7 million users last year. Purchases of mobile phones represents 61% of the total online purchases, while paying utilities and purchases of laptops represent 38% and 37% respectively. Cash on delivery, as a payment method, is on the top by 70%, while credit cards payment is in the second place by only 16%. 66.7% of online buyers believe that they might consider doing their online transactions without cash on delivery, as a payment method, if they are sure it is safe (PayFort, 2017). Trust in a creditable ecosystem is required to boost the e-payment services in Egypt. This also needs to have innovative programs to boost the e-payment within the context of "Digital Egypt". e-Payment should be the main instrument of payment by 2022, in coordination with the financial inclusion programs and efforts, as stated earlier.

e-Citizen

Turning citizens in Egypt into e-Citizens is a challenging aspect. In October 2017, GoE issued a decree for establishing National Council for Digital Society. The mission of the council is to nurture the digital transformation socially and economically. Equipping the citizens with right and convenient tools for dealing with peers, businesses and government in the digital era is the main challenge in this regards. Every citizen should have a single ID on a smart card or on a his/her smart phone, which caters all his/her information and data related to social security, subsidy, healthcare, education, banking, payment, as well as other

social security plans. This mandates GoE to build unified database for Egyptians, and activate, or even enforce, the e-Signature law that has been in place since 2004. This will assist in creating virtual citizens who can communicate and collaborate, as well as obtaining the required services in an effective and efficient manner. Furthermore, this will help in fostering and promoting inclusion and governance (Derven, 2016). e-Citizen programs should be concluded by 2021.

Digital Egypt's Institutional Environment Pillar

Legal Framework

Establishing an agile legal framework that is capable to deal with the unprecedented technological development is a cornerstone in the journey of transformation to "Digital Egypt". The legal frame in the digital era should be able to understand the nature of technology and its impact on the social, economic, security, geopolitical and competitiveness levels, both positivity and negatively. Both "*TechDevZone*", where the technological super trends have positive effects and need further development, and "TechChaosZone", where these super trends have negative effects and need innovative corrective actions to mitigate the associated risks, should be clear to policymakers and lawmakers (Mohamed Azzam et al., 2017). Articulating laws and regulations is not the function of typical lawyers and politicians anymore. Digital leaders should lead this process to ensure the developed laws and regulations are leveraging the whole environment within the desired digital ecosystem, and not the opposite. There will be a new "Uber" every day and we should be able to deal with it in an innovative manner. The novel legal framework should be ready within two years by the end of 2019.

e-Trade

Internal trade ecosystem in Egypt has been neglected for more than 50 years, in spite that this sector represents more than 19% of employment, which has resulted in creating a multitude of uncompetitive microenterprises that have unstructured format with low bargaining power. This is in addition to have informal sector that represents around 40% of the economy, which leads to not having an accurate data needed to develop a robust and modern internal trade ecosystem (Sara Elgazzar et al., 2017). This mandates GoE and BROs to establish and implement a strategy for modernizing the internal trade ecosystem by the end of 2023, and integrating such efforts with efforts conducted on financial inclusion and e-payment sub pillars. Furthermore, the modernization of the internal trade system should include real-time pricing and ordering system for commodities, goods and fresh produce. Also, it should include full logistics support system, starting from building and operating robust physical infrastructure to having end-to-end digital infrastructure serving the whole internal trade system in the country.

e-Government

The classical e-government is not sufficient in the digital era. Governments, especially in developing countries, are facing various challenges nowadays. Governments have increasing budget limitations, and citizens have higher expectations with respect to having better responsive public services, coupled with a growing demand for transparency and accountability. This is beside the lack of trust in governments regarding the ability to fulfil the promises (Hanna, 2017). This stipulates GoE to start an aggressive implementation plan to digitally transfer all its services in an integrated manner to citizens, businesses, investors, tourists, financial institutions, BROs, etc., by 2021. Moreover, GoE should consider ICT as a main tool to promote and foster internal proficiency and citizens' involvement in decision-making process. The activation of e-signature law that was issued in 2004 would act as a principle catalyst in this regards. Having an effective e-government is an important milestone in the journey for a competitive "Digital Egypt".

e-Governance

As discussed earlier, it is imperative to integrate services offered by the government to government (G2G), citizens (G2C), and businesses (G2B) through the usage of ICT in a one-stop-shop format. e-Government should act as the main tool for realizing effective governance. GoE should adopt Government Open Data (GOD) approach more progressively, by making data accessible and visible to citizens and businesses, by 2021. This will help improving the image of GoE, while reducing the ineffectiveness, bureaucracy and corruption, and increasing the accountability and transparency, as well as the involvement of citizens and businesses in articulating more flexible policies and regulations (Noore Alam Siddiquee, 2016). Digital empowerment of citizens and businesses is another major step towards a "Competitive Digital Egypt"

e-Health

The overall health services in the country is lacking sound quality, due to many reasons. Among these reasons is the scarcity of qualified doctors, nurses and medical facilities. Therefore, innovative solution should be in place. ICT could play a critical role in this regards (Shaik Shafiullah and Tvv Gopala Krishna, 2016). This includes providing online medical diagnosis and consultation, while utilizing GIS and mobile technologies for better service; establishing online medical records that are integrated with e-Citizen ID card; and having electronic platforms for patient information exchange and medication supply nationwide. e-Health system should be functioning and operational by the end of 2023.

Digital Egypt's Innovation and Change Pillar

e-Knowledge

All schools, universities and R&D facilities should be connected with high speed broadband by 2025. Free Wi-Fi connection should be available to students, educators and researchers within their institutions. World-class educational and knowledge content must be accessible online to students, educators and researchers. GoE has already introduced one of the largest e-knowledge banks in the world last year, under the name of "Egyptian Knowledge Bank (EKB)" (Egyptian Knowledge Bank, 2017). EKB has several portals; one for general readers, one for researchers, one for students and educators, and one for children. The general users' part contains a wide of resources serving different knowledge domains form local and international publishers. The researchers' portal includes specialized resources, databases, and scientific journals and books from top international publishers. The students and educators' portal has various educational books and resources, as well as cognitive educational resources from international publishers. The Children' section has interactive resources, educational toys supported by multimedia, and tools for parents for better engagement with their children. EKB is considered as the first milestone towards transforming the education system in Egypt by equipping the learners, educators and researchers with the right tools and knowledge set that match the 21st century requirements.

Tech for Jobs

The digital transformation in Egypt would open a vast range of novel job opportunities that require different and advanced skillsets that are not practically existing among the local workforce today. Therefore, equipping the local workforce with necessary knowledge and skills is another mandate for GoE. This requires GoE to develop and promote programs that aim at enhancing the digital literacy among the citizens and businesses in both public and private sectors, training the local workforce to be able to cater the needs of the newly developed job market, and preparing the employees in the public and private service providers to comprehend the nature of the digital era and conduct businesses and services while utilizing technology. These programs should be conducted in a sustainable manner and in parallel. This is to minimize the resistance to change and provide the services to the citizens and businesses in an effective way, which would result in creating more trust in the whole new ecosystem.

Digital Leaders

This sub pillar is the cornerstone for developing and sustaining the whole new digital ecosystem. This sub pillar is imperative to ensure ongoing momentum required for keeping the development of "Digital Egypt" not only on the right track, but also to boost the whole transformation to advanced levels. Building

digital leaders is also a journey and needs a clear implementation plan. Senior officials in government, businesses and BROs need to be “digitally” confident and incorporate digital thinking into their daily routine and management. As well, they need to inspire their staff members to develop their digital skills and literacy to become co-creators of value within the newly developed digital ecosystem. Both senior officials and their staff members should know how the technology works and its impact on the socioeconomic levels, as well as how to convert that into business programs of an impact. Furthermore, it is important to realize that technology is the principle tool for empowering people and accomplish strategic objectives, while understanding and applying the concept of using information and not just the technology (Sandra Sieber, Evgeny Káganer and Javier Zamora, 2013).

Recently in August 2017, GoE announced the inauguration of the National Academy for Youth Training and Development, following the concept of the French National Academy. The Egyptian Academy should consider having core tracks towards creating “digital leaders” for the nation.

From the above, it is clear that innovation and change pillar is of ongoing nature and should start immediately, while keeping into consideration having an agile mechanism for catering any changes concerning the requirements of the digital transformation, as well as the technological evolution in the future.

Also, this proposed framework is expected to face a multitude of challenges, during the implementation; yet each challenge is an opportunity. This will be discussed in the next section.

CHALLENGES CREATING OPPORTUNITIES

The proposed framework for “Digital Egypt” would properly come across many challenges during the journey of transformation; however each challenge represents a multitude of opportunities for innovators and investors. Among the challenges facing the digital transformation of developing countries are weak infrastructure, lack of trust in e-government programs, concerns about security and privacy, scarcity of financial resources and qualified staff members essential for running the digital transformation plans and programs, culture issues and resistance to change, lack of sponsorship by the senior officials, absence of governing policies and regulations, as well as strategic plans needed for progressing the digital transformation, and deficiency in the partnership and collaboration schemes between the different stakeholders within the ecosystem (Lloyd Waller and Aldrane Genius, 2015).

In this section, we will highlight some of key challenges and their related opportunities, such as the shortage of funds needed for infrastructure and the current low digital literacy among citizens.

The infrastructure and net zero electronics imports need massive capital investment that could be behind the capacity of GoE alone.

Thus, GoE should work on this challenge and identify the possible attraction points for local and foreign investors. GoE should design a full portfolio of

investment opportunities for attracting investors by employing the new investment law issued early 2017 and its incentives, while emphasizing on the size of the local market and its growth potential.

The investors in the domain of infrastructure include the four telecom operators working in Egypt that are Telecom Egypt, the national operator, Vodafone, Etisalat Egypt and Orange, as well as technology multinationals, especially those who are considered as the largest data centers providers, such as IBM, Dell-EMC, and Amazon. Business models, such as Public-Private-Partnership (PPP) and Build-Operate-Transfer (BOT), could be among the attractive business models for these giant enterprises towards having more investment in the country. At the same time, GoE should start establishing ties with leading innovation organizations, such Space-X to get the benefits of its undergoing project for providing free internet globally using low-orbit satellites.

For net zero electronics imports, the investors could be the leading Korean and Chinese manufacturers, such as Samsung, LG, HUAWEI and TECNO that are having a noticeable make share and presence in the country. Such investors realize the size of the local market and its growth.

GoE should give the local and foreign investors significant incentives for either building their own manufacturing facilities in the country, like Samsung and LG, or entering into partnership based on PPP model with these investors for establishing such facilities in the newly developed technology parks that are under progress in many areas nationwide. A knowledge-transfer program should be also developed to transfer the knowledge in this domain to the local expertise and engineers.

Another challenge is e-Readiness of citizens. e-Readiness is among the top challenges facing governments to make digital transformation a success (Saikat Ghosh Roy and Parijat Upadhyay, 2017). Egypt possess a humble rank concerning e-Readiness. The country’s rank is 96 out of 139 with a score of 3.7 out of 7. However, there are some bright indicators that could form a solid base for the desired digital transformation, such as mobile phone subscriptions per 100 population is 114.3 and mobile broadband subscriptions per 100 population is 43.5 (Silja Baller, Soumitra Dutta, and Bruno Lanvin, 2016). Therefore, for boosting the digital transformation, GoE should plan providing some of the major public services to citizens online exclusively within 2-3 years, while addressing the uncertainties of Egyptians regarding security and safety of having such services electronically. This bold step should be coupled by finishing the unified database project that is under progress and equip each citizen with a unique number that caters all his/her information and social security plans. This challenge could open a new horizon for investment and innovation, while increasing direct and indirect employment for providing such public services for citizens who cannot use the online services directly, due to many reasons, such as digital illiteracy.

CONCLUSION AND FURTHER WORK NEEDED

Having a competitive digital nation is not an option anymore. The only way for realizing such ultimate goal is taking digital transformation seriously.

Without having a clear vision for such transformation, it would be hard to keep abreast of the ongoing global change and consequently Egypt will stay within the Watch Out countries for a longer time.

Digital leaders within GoE, and public and private organizations should start developing such vision. GoE should be the main catalyst for realizing this vision on the ground to make Egypt a “Digitally Competitive Nation”, and moving the country to the quadrant of the Break Out countries and then to quadrant of the Stand Out countries. GoE should work closely with private sector and BROs to make the country digitally enabled, while empowering the citizens and businesses.

The proposed framework is just a milestone in the journey of digital transformation, which by the norm of the 21st century, is the main vehicle for the development on both economic and social levels.

Each pillar within the proposed framework needs further investigations and development.

Each pillar needs a detailed implementation plans. Plans that lead to more agile and innovative policies and business models, which cater people and process, rather than keeping the outdated current practices, in order to meet the evolving and novel challenges. However, each challenge is still an opportunity for innovators and investors.

Moreover, these plans must come with Key Performance Indicators (KPIs) to measure the progress and develop the necessary corrective actions when needed.

Identification of the digital leaders, who will lead the journey, is the starting point towards any possible success in the future.

REFERENCES

Bhaskar Chakravorti and Ravi Shankar Chaturvedi, 2017. *DIGITAL PLANET 2017: HOW COMPETITIVENESS AND TRUST IN DIGITAL ECONOMIES VARY ACROSS THE WORLD,* s.l.: The Fletcher School, Tufts University.

CAPMAS, 2017. *Egyptian Foreign Trade,* s.l.: Central Agency for Public Mobilization and Statistics (CAPMAS).

Claps, M., 2017. *The Role of Governments in Countries' Digital Transformation.* [Online]
Available at: https://idc-community.com/government/smart_government/the_role_of_governments_in_countries_digital_transformation
[Accessed 16 September 2017].

Deloitte, 2015. *Digital India: Unleashing Prosperity,* s.l.: Deloitte.

Derven, M., 2016. Four drivers to enhance global virtual teams. *Industrial and Commercial Training,* 48(1), pp. 1-8.

Egyptian Knowledge Bank, 2017. *Egyptian Knowledge Bank (EKB).* [Online]
Available at: http://www.ekb.eg/
[Accessed 24 October 2017].

GULATI, M., 2016. DIGITAL INDIA: CHALLENGES & OPPORTUNITIES. *International Journal of Management, Information Technology and Engineering,* 4(10), pp. 1-4.

Hanna, N., 2017. Transforming Government. In: *Mastering Digital Transformation.* s.l.:Emerald, pp. 77-110.

Harvard Business School, 2015. *DRIVING DIGITAL TRANSFORMATION: NEW SKILLS FOR LEADERS, NEW ROLE FOR THE CIO,* s.l.: Harvard Business School Publishing.

James Manyika et al., 2016. *Digital globalization: The new era of global flows,* s.l.: McKinsey Global Institute.

Jan Sturesson et al., 2013. *Future of Government,* s.l.: PricewaterhouseCoopers (PWC).

Karamvir Sheokand and Neha Gupta, 2017. Digital India program and impact of digitalization on Indian economy. *Indian Journal of Economics and Development,* 5(5).

KPMG, 2016. *Future State 2030: The global megatrends shaping governments,* s.l.: KPMG.

Lloyd Waller and Aldrane Genius, 2015. Barriers to transforming government in Jamaica: Challenges to implementing initiatives to enhance the efficiency,

effectiveness and service delivery of government. *Transforming Government: People, Process and Policy,* 9(4), pp. 480-497.

Mallaby, S., 2016. Globalization Resets. *IMF Finance & Development,* December . 53(4).

Mohamed Azzam et al., 2016. *UTILIZATION OF APPROPRIATE TECHNOLOGIES FOR A REAL "COMPETITIVE EGYPT".* Orlando USA, International Association for Management of Technology (IAMOT).

Mohamed Azzam et al., 2017. *TECHNOLOGY DISRUPTION FOR DEVELOPMENT AND PEACE.* Vienna Austria, International Association for Management of Technology (IAMOT).

Noore Alam Siddiquee, 2016. E-government and transformation of service delivery in developing. *Transforming Government: People, Process and,* 10(3), pp. 368-390.

PayFort, 2017. *State of Payments,* s.l.: PayFort.

Robin Lewis, John Villasenor and Darrell M. West, 2017. *THE 2017 BROOKINGS FINANCIAL AND DIGITAL INCLUSION PROJECT REPORT: Building a Secure and Inclusive Global Financial Ecosystem,* s.l.: Center for Technology Innovation at Brookings.

Saikat Ghosh Roy and Parijat Upadhyay, 2017. Does e-readiness of citizens ensure better adoption of government's digital initiatives?. *Journal of Enterprise Information Management,* 30(1), pp. 65-81.

Sandra Sieber, Evgeny Káganer and Javier Zamora, 2013. 5 Skills Every Leader Needs to Succeed in the Digital World. *IESE Insights.*

Sara Elgazzar et al., 2017. *Roadmap for Modernizing Internal Trade Ecosystem in Egypt,* s.l.: Federation of Egyptian Chambers of Commerce (FEDCOC).

Shaik Shafiullah and Tvv Gopala Krishna, 2016. DIGITAL INDIA THE FUTURE OF INDIA. *International Research Journal of Computer Science,* 3(12).

Silja Baller, Soumitra Dutta, and Bruno Lanvin, 2016. *The Global Information Technology Report 2016: Innovating in the Digital Economy,* s.l.: World Economic Forum and and INSEAD.

Soumitra Dutta, Bruno Lanvin, and Sacha Wunsch-Vincent, 2017. *The Global Innovation Index 2017,* s.l.: Cornell University, INSEAD, and the World Intellectual Property Organization (WIPO).

World Economic Forum, 2017. *The Global Competitiveness Report 2017–2018,* s.l.: World Economic Forum (WEF).

Zahir Irani, Muhammad Kamal, 2016. Transforming Government: People, Process, and Policy. *Transforming Government: People, Process, and Policy,* 10(2), pp. 190-195.