The American University in Cairo
School of Global Affairs and Public Policy
Department of Public Policy and Administration

Middle East Review of Public Policy and Administration (MERPPA)

Egypt's ICT Competitiveness: A Strategic Assessment Using Porter's Diamond Model and Lessons from Leading Emerging Economies

Karim Hamza

Adjunct Professor, School of Global Affairs and Public Policy, American University in Cairo

Received: December 2024
Revised: May 2025
Accepted: July 2025

Abstract

Egypt's information and communication technology (ICT) sector stands at a critical juncture, transitioning from a factor-driven to an efficiency-driven economy. This paper benchmarks Egypt's ICT competitiveness against three successful emerging economies—India, Vietnam, and the Philippines—using Porter's Diamond Model, the Global Competitiveness Index (GCI), and the Global Innovation Index (GII). The analysis reveals that while Egypt benefits from a large domestic market, expanding infrastructure, and a youthful workforce, it continues to lag in innovation capacity, digital readiness, and regulatory efficiency.

Drawing on comparative evidence and national competitiveness frameworks, the study identifies key areas requiring policy attention: research and development, industry-academia collaboration, talent development, and regulatory reform. Lessons from peer economies demonstrate how targeted interventions—such as FDI-friendly innovation policies and startup ecosystems—can help Egypt move beyond cost-based outsourcing toward a value-driven digital economy. The paper concludes with a set of actionable, stage-specific policy recommendations aligned with Egypt's Vision 2030, offering a roadmap for strengthening the country's ICT sector and enhancing its role in the global digital landscape.

Keywords: *Egypt, ICT sector, Porter's Diamond Model, Global Competitiveness Index, Global Innovation Index, policy recommendations, economic development*

1. Introduction

The global Information and Communications Technology (ICT) sector has become a pivotal driver of economic growth, innovation, and competitiveness in both developed and developing countries. As nations seek to position themselves in the global digital economy, the ability to foster a robust ICT sector is increasingly seen as a critical determinant of national competitiveness (Freeman, 2004; Porter, 1990; World Economic Forum, 2019). Egypt, with its strategic location, large population, and growing digital economy, has identified the ICT sector as a key area for economic development. However, the country's ICT sector is currently situated between the Factor-Driven and Investment-Driven stages of economic development, indicating significant opportunities for growth, as well as substantial challenges that must be addressed to enhance its global competitiveness (Dahshan, 2015; Gartner, 2010; OECD, 2020).

This study aims to provide a comprehensive analysis of Egypt's ICT industry clusters using Porter's Diamond Model and international benchmarks such as the Global Competitiveness Index (GCI) and the Global Innovation Index (GII) (Porter, 1990; WIPO, 2021; World Economic Forum, 2019). By comparing Egypt's ICT sector with those of rival economies, specifically India, Vietnam, and the Philippines, this research seeks to identify key areas for improvement and propose policy recommendations that can help Egypt transition towards a more Innovation-Driven or Efficiency-Driven economy (Hatzichronoglou, 1996; WIPO, 2020; OECD, 2020).

The study focuses on three key objectives:

1. Evaluating the current competitiveness of Egypt's ICT sector using established economic models and global indices.
2. Benchmarking Egypt's ICT sector against those of India, Vietnam, and the Philippines, identifying best practices and areas where Egypt can enhance its competitiveness.
3. Proposing a set of structured policy recommendations aimed at strengthening Egypt's ICT sector and positioning it as a leading regional hub for innovation and technology.

Through this analysis, the research will contribute to the broader discourse on national competitiveness and economic development in the context of the digital economy, providing actionable insights for policymakers, industry stakeholders, and academics (Berger, 2008; Liu & Nath, 2013; Huggins & Izushi, 2009).

2. Methodology

This study adopts a structured comparative benchmarking approach to assess Egypt's ICT sector. It integrates Porter's Diamond Model with global indices such as the Global Competitiveness Index (GCI) and the Global Innovation Index (GII) to evaluate Egypt's competitiveness across key dimensions including infrastructure, innovation, and workforce development.

Egypt is benchmarked against three peer countries—India, Vietnam, and the Philippines—selected for their successful ICT transformations and shared characteristics as emerging economies. The comparison focuses on identifying policy interventions, institutional reforms, and investment patterns that contributed to their advancement.

Data sources include policy documents, government reports, international development studies, and academic literature. The analysis combines qualitative insights with quantitative metrics to uncover structural gaps and transferable lessons.

Findings are used to formulate stage-specific policy recommendations, aligned with Porter's development stages, to support Egypt's transition from a factor-driven economy toward innovation-led ICT competitiveness.

3. Analyzing Egypt ICT Industry Cluster

In Egypt, the government acknowledges the critical role of the ICT industry in enhancing national competitiveness. The "ICT 2030 Strategy" outlines a comprehensive approach to strengthening the sector through seven key pillars: ICT infrastructure, digital content, electronics design and manufacturing, industry programs

and initiatives, and legislative and policy frameworks. Central to this strategy is the "Digital Egypt" program, which prioritizes Digital Transformation, Digital Skills and Jobs, and Digital Innovation. The government has allocated LE124.8 billion ($17 billion) for investments in cloud computing, broadband, and electronics design and manufacturing, with goals to double ICT GDP, create jobs, and boost exports (Oxford Business Group, 2022; Central Bank of Egypt, 2020; UNCTAD, 2022).

While these efforts have improved overall economic performance, the country continues to struggle in maintaining a leading global position. Economic clusters like ICT sector, have yet to fully realize their potential due to regulatory hurdles and a shortage of specialized skills.

3.1 Egypt ICT Industry Outlook:

Egypt is an emerging market economy, classified within the CIVETS and Next 11 groups, indicating high growth potential, a young population, and a strategic geographic location (International Monetary Fund, 2021). The ICT sector has expanded significantly, contributing 16.3% to GDP in 2021/2022, up from 15.2% in 2019/2020 (U.S. Department of Commerce, 2022). Industry value increased from EGP 80.1 billion (USD 4.5 billion) in 2017/2018 to EGP 107.7 billion (USD 6.8 billion) in 2019/2020, with ICT exports rising from USD 3.2 billion to USD 4.5 billion. Employment in the sector reached 281,000 in 2020 (ITIDA, 2022; MCIT, 2022).

Investment in ICT grew 35% in 2019/2020, reaching USD 3.5 billion, fueled by the “Digital Egypt” strategy, which promotes digital transformation, economic modernization, and workforce development (Oxford Business Group, 2022). The country has become a leading offshore outsourcing destination, offering cost advantages, a multilingual workforce, and a favorable investment climate. Software, IT services, and BPO exports have increased, while hardware and digital goods exports continue to expand (U.S. Department of Commerce, 2022; ITIDA, 2022).

Despite these advancements, key challenges persist. Skill shortages and talent mismatches hinder sector growth, as many IT graduates lack expertise in AI, cloud computing, and cybersecurity, limiting global competitiveness (WIPO, 2022; World Economic Forum, 2019). Regulatory complexities, including bureaucratic hurdles and inconsistent policies, create barriers for businesses and discourage foreign investment. Cybersecurity risks are also rising with increased digital transactions, making data protection laws and cyber resilience essential priorities (WIPO, 2022). Additionally, the digital divide remains a challenge, with rural areas still lacking reliable internet and digital infrastructure, limiting economic inclusion and nationwide digital transformation (World Economic Forum, 2019).

Government reforms have improved infrastructure, regulatory efficiency, and investment incentives, making Egypt more attractive for foreign investors (Forbes, 2023; OECD, 2020). The depreciation of the Egyptian pound has further boosted cost competitiveness, strengthening Egypt’s position as a regional ICT hub (ITIDA, 2022; Oxford Business Group, 2022).

Beyond outsourcing, Egypt is emerging as a key player in the Middle East and Africa’s venture capital landscape. Successful startups like Swvl and Fawry have attracted major investments, particularly in fintech and e-transport, highlighting Egypt’s growing innovation ecosystem (UNCTAD, 2019; OECD, 2020).

3.2 Egypt's ICT Economic Clusters Initiative:

Egypt's ICT industry is expanding rapidly, driven by strategic initiatives that enhance competitiveness and economic development. These efforts focus on policy reforms, infrastructure investment, and talent development to position Egypt as a key player in the global digital economy (U.S. Department of Commerce, 2022; ITIDA, 2022; MCIT, 2022).

Egypt's approach includes three main policy types. Facilitating policies improve the business environment by upgrading infrastructure, simplifying regulations, expanding financial access, and enhancing workforce skills. Traditional framework policies support SMEs, research, and regional development, leveraging ICT clusters to foster collaboration and innovation. Development policies strengthen ICT clusters by providing funding, attracting talent, and expanding market opportunities (Porter, 1996; Wolman & Hincapie, 2015; Benner, 2012).

To attract investment, Egypt has established dedicated IT hubs such as Smart Village and Maadi Technology Park, catering to multinational firms and local startups. The Export IT program offers cash rebates of up to 20% on value-added exports, encouraging global expansion. Additionally, the Software Engineering Competence Centre (SECC) fosters technological advancement, while InnovEgypt integrates entrepreneurship into university curricula (U.S. Department of Commerce, 2022; ITIDA, 2022; MCIT, 2022).

Egypt’s smart city vision is illustrated in the New Administrative Capital, designed with advanced cloud computing infrastructure. The expansion of tech parks, including Smart Village Egypt and TIEC, further supports job creation and digital transformation. Meanwhile, the Haya Karima (Decent Life) program enhances rural connectivity through fiber optic expansion and upgraded telecom services, ensuring digital inclusion nationwide (MCIT, 2022; MCIT, 2021).

3.3 Egypt's ICT Industry Stakeholder Ecosystem:

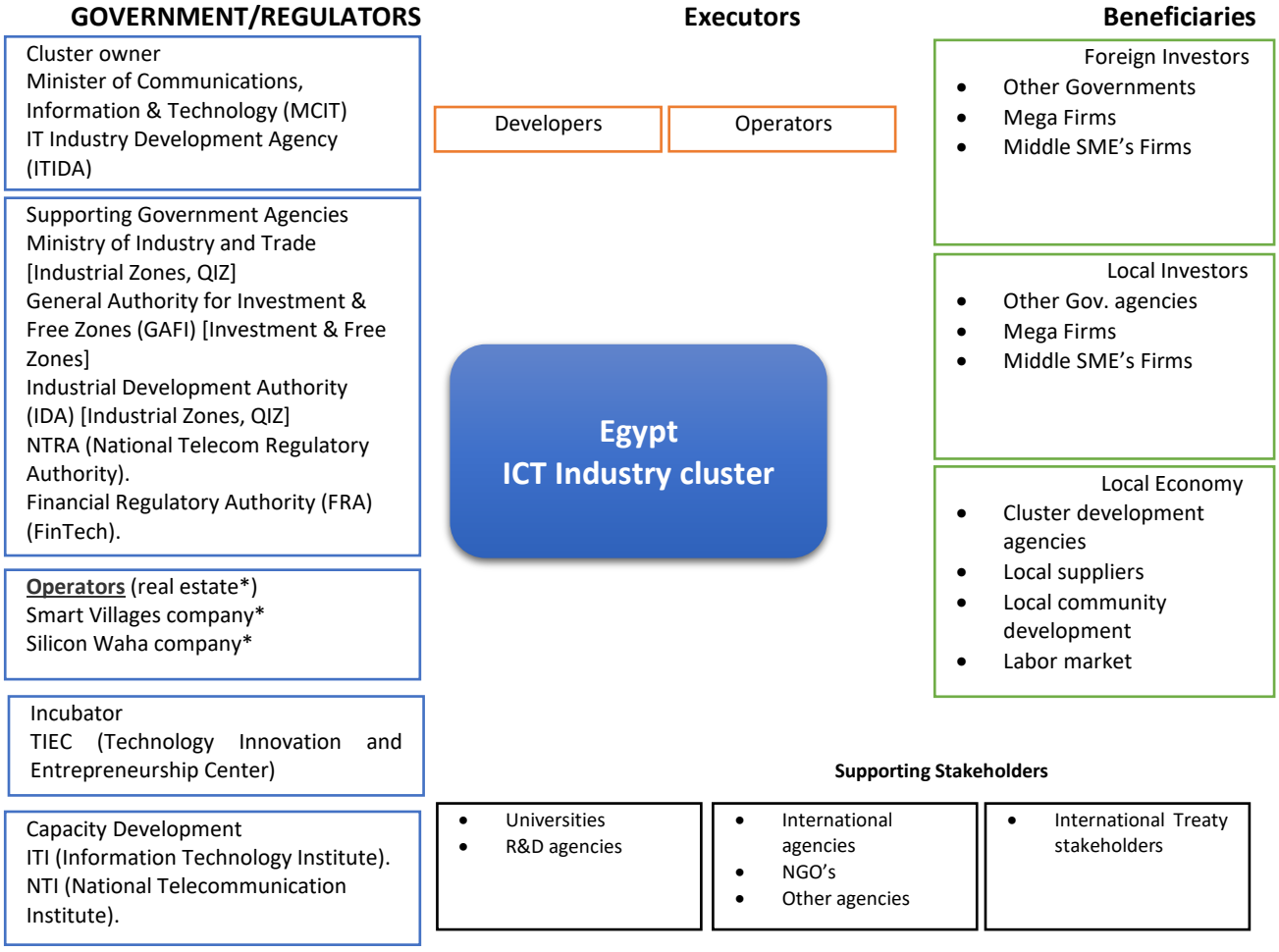
Egypt’s ICT sector is supported by government regulators, direct beneficiaries, and supporting organizations, each contributing to its growth and competitiveness (Ketels & Memedovic, 2008; Brun & Jolley, 2011).

- Government and Regulatory Stakeholders: The Egyptian government plays a central role in policy development, investment strategies, and regulatory oversight. Key entities include MCIT, ITIDA, the Industrial Development Authority, GAFI, NTRA, and FRA, ensuring a stable business environment and investment incentives (Egyptian General Authority for Investment and Free Zones, 2022). Infrastructure projects like Smart Village and Silicon Waha support technology firms, while institutions such as the Information Technology Institute (ITI) and TIEC focus on talent development and innovation (ITIDA, 2022; MCIT, 2022).
- Beneficiary Stakeholders: Egypt’s strategic location and skilled workforce have attracted global tech leaders like Microsoft, Oracle, IBM, and Google, alongside major telecom operators such as Telecom Egypt, Vodafone, Orange, and Etisalat Misr. Local firms like Raya, SEE, and Alkan Telecommunication primarily focus on IT services, with limited R&D investment. The fintech sector, led by Fawry and Paymob, is also expanding. The sector fuels job creation, local business

growth, and digital transformation, supporting Egypt's broader economic development.

- Supporting Stakeholders: Industry associations like EITESAL and CCIT advocate for business interests, while universities such as Cairo University and AUC supply skilled professionals and foster research partnerships. Financial institutions and venture capital firms provide funding for startups, while international organizations (World Bank, UNDP, EBRD) offer technical and financial assistance. NGOs and civil society groups promote digital inclusion and data privacy. Collectively, these stakeholders strengthen Egypt's digital economy and global competitiveness.

Figure 1: Egypt's ICT Industry Cluster Stakeholders Map



4. Benchmarking Egypt's ICT Industry Competitiveness

To assess Egypt's position in the global ICT landscape, this study benchmarks its performance against three emerging economies: India, Vietnam, and the Philippines. These countries have demonstrated effective strategies for leveraging ICT to drive national development and rank among the top performers in the Global Innovation Index (WIPO, 2021; WIPO, 2020). They were selected due to shared characteristics with Egypt—comparable population sizes, evolving digital economies, and similar macroeconomic structures. In contrast, Middle Eastern comparators were excluded due to structural and income-level differences that make direct benchmarking less relevant.

The analysis draws on Porter's Diamond Model (Porter, 1996), which assesses national competitiveness based on factor conditions, demand conditions, related and supporting industries, and firm strategy and rivalry. Complementing this model, the Global Competitiveness Index (World Economic Forum, 2019) and the Global Innovation Index (WIPO, 2022) provide internationally recognized metrics on infrastructure, education, innovation capacity, and institutional strength. These tools allow for a structured comparison of Egypt's ICT sector against its peers and help identify both internal weaknesses and external lessons. The Ease of Doing Business Index and the Competitive Industrial Performance Index were excluded from the analysis due to their limited relevance to ICT-specific performance.

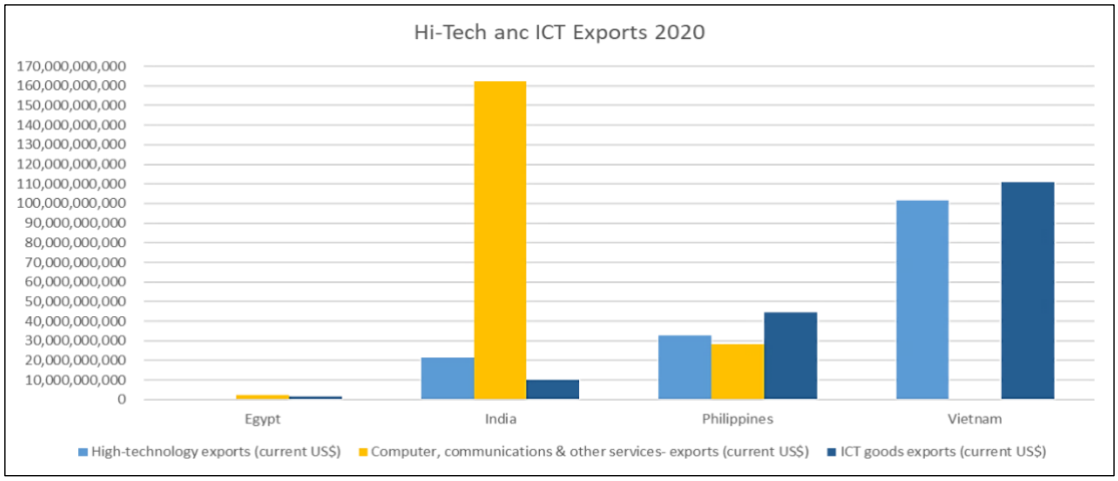
Figure 2- Metadata Comparative Analysis (Egypt, India, Vietnam, and the Philippines)

GDP	GDP per capita (current US$)	GDP (current US$)	Population, total	Land area (sq. km)
Egypt	3,569	365,252,651,279	102,334,403	995,450
Philippines	3,299	361,489,325,231	109,581,085	298,170
Vietnam	2,786	271,158,442,449	97,338,583	310,070
India	1,928	2,660,245,248,868	1,380,004,385	2,973,190

Source: Author data extracted from World Bank database - World Development Indicators (2023)

Compared to its peers, Egypt has a higher GDP per capita than India and Vietnam but operates within a smaller overall economic scale, which limits its capacity to influence global ICT trends. Nevertheless, Egypt benefits from a large domestic market exceeding 100 million people, which provides a substantial consumer base for digital services, fintech, and e-commerce (WIPO, 2021). Additionally, the government's commitment to digital transformation—reflected in initiatives such as "Digital Egypt"—and the growing number of ICT graduates position the country for significant innovation potential. Egypt's geographic advantage at the crossroads of Africa, the Middle East, and Europe, coupled with its multilingual and cost-competitive workforce, further enhances its appeal as an ICT outsourcing destination (Oxford Business Group, 2022; ITIDA, 2022).

Figure 3- ICT industry Exports Comparative Analysis (Egypt, India, Vietnam, and the Philippines)



Source: Author data extracted from World Bank database - World Development Indicators

Despite these strengths, Egypt faces persistent challenges that limit its ability to advance beyond a factor-driven growth model. Infrastructure gaps remain a major obstacle, especially in broadband access, rural connectivity, and cloud computing

infrastructure (WIPO, 2021; ITU, 2022). Digital readiness is also constrained by low cybersecurity awareness, limited adoption of advanced technologies such as artificial intelligence, and weak digital literacy outside urban centers (World Economic Forum, 2019). Furthermore, Egypt's innovation ecosystem is still underdeveloped, with insufficient research and development institutions, limited startup incubators, and modest venture capital activity (WIPO, 2020; UNCTAD, 2022). These deficiencies are compounded by a regulatory environment marked by bureaucratic inefficiencies, inconsistent enforcement, and limited protections for digital assets, which discourage private sector investment and startup formation (OECD, 2020).

Figure 4- Table comparing Competitiveness performance

Category	*Egypt*	*India*	*Vietnam*	*Philippines*
Competitiveness Strengths	• Large domestic market with over 100 million people, offering promising growth prospects. • Potential for innovation growth. • Large potential pool of ICT professionals.	• Global ICT leader with significant strides in infrastructure. • Vibrant innovation ecosystem with robust R&D institutions. • Large pool of skilled ICT professionals.	• Rapidly expanding market due to government support and foreign investment. • Emerging startup hubs with growing support systems. • Dynamic workforce, particularly in IT services.	• Steady growth supported by the BPO industry and government initiatives. • Emerging as a startup hub with growing support systems. • Dynamic workforce, particularly in BPO services.
Competitiveness Challenges	• Infrastructure quality and connectivity require further improvement. • Digital readiness needs assessment and enhancement. • Innovation ecosystem needs evaluation. • Regulatory framework requires scrutiny.	• High competition within a large market may challenge growth. • Complex regulatory environment.	• Infrastructure and digital readiness improvements are needed. • Emerging regulatory frameworks require further development.	• Regulatory environment requires ongoing improvements. • Digital readiness needs further enhancement.
Development Stage	• **First Stage**: Factor Driven. Egypt relies on basic factors of production, such as a large semi-skilled labour pool and natural resources.	• **Third Stage**: Innovation Driven. India has reached the ability to produce innovative products and services through advanced methods and technologies.	• **Second Stage**: Investment Driven. Vietnam is attracting foreign investments, necessitating improvements in infrastructure and regulatory frameworks.	• **Second Stage**: Investment Driven. The Philippines is attracting foreign investments, improving infrastructure, and regulatory frameworks.

Source: World Bank database (2024)

In contrast, India's advancement to an innovation-driven stage reflects the success of state-backed R&D investments, strong university-industry linkages, and a dynamic startup ecosystem in ICT and software services (WIPO, 2021). Vietnam, currently in the investment-driven stage, has improved its digital infrastructure and streamlined

investment regulations to attract high-tech foreign direct investment, while also nurturing homegrown startups in emerging digital sectors (WIPO, 2022). The Philippines offers a valuable model for service-oriented ICT growth, leveraging its English-speaking workforce, public-private training programs, and business process outsourcing (BPO) sector to achieve steady competitiveness gains (World Economic Forum, 2019).

Egypt's GDP per capita of $3,569 (World Bank, 2023) places it ahead of India ($1,928) and Vietnam ($2,786), though still below the Philippines ($3,299). However, in terms of innovation metrics, Egypt lags behind all three peers, particularly in business sophistication, creative outputs, and knowledge and technology production (WIPO, 2020). These gaps suggest that while Egypt has succeeded in building a foundation for digital participation, it has yet to develop the institutional depth and market conditions required for innovation-led growth.

Overall, the benchmarking exercise underscores the need for Egypt to invest in next-generation digital infrastructure, strengthen the enabling environment for innovation, and modernize its regulatory frameworks. By drawing lessons from the comparative experiences of India, Vietnam, and the Philippines, Egypt can formulate targeted reforms to transition from a cost-based outsourcing economy toward a more dynamic, innovation-driven ICT sector.

4.1 Global Competitiveness Index (GCI):

The Global Competitiveness Index (GCI) 2019 offers a comprehensive lens for assessing Egypt's economic positioning across twelve key pillars. When benchmarked against India, Vietnam, and the Philippines, Egypt shows relative strength in infrastructure and market size but continues to face significant challenges in ICT adoption, macroeconomic stability, and innovation capability (World Economic Forum, 2019).

Egypt's infrastructure receives a strong score of 73.05, reflecting substantial public investment in transport, telecommunications, and digital connectivity. Similarly, its market size score of 73.57 highlights the advantage of a large domestic consumer base that creates favorable conditions for scaling digital services, e-commerce, and fintech applications. The health pillar also performs relatively well, scoring 65.02, suggesting a comparatively robust healthcare system capable of supporting workforce productivity (World Economic Forum, 2019).

However, these strengths are offset by persistent weaknesses. Egypt's ICT adoption score remains low at 40.57, trailing both Vietnam (69.03) and the Philippines (49.69), indicating slow integration of advanced technologies across public and private sectors. This technological lag limits productivity gains and constrains digital transformation. Macroeconomic stability is another area of concern, with Egypt scoring 44.72, a figure notably lower than India (90.00) and the Philippines (89.95). Ongoing issues such as inflation, fiscal deficits, and exchange rate volatility undermine investor confidence and pose structural risks to long-term growth (World Economic Forum, 2019).

The innovation capability score, at 39.62, underscores Egypt's limited performance in research and development, startup dynamism, and private sector innovation. By comparison, India scores 50.94, reflecting stronger state-industry-academia collaboration and a more mature innovation ecosystem. Egypt's institutional quality,

measured at 51.33, is mid-range among the four countries—below India (56.75) but slightly above Vietnam (49.82) and the Philippines (49.98)—suggesting some progress in governance, though regulatory unpredictability remains an issue (World Economic Forum, 2019).

Overall, Egypt is currently situated in the second stage of development: Investment-Driven, as defined by Porter's framework. While it has moved beyond reliance on basic factor conditions, its advancement toward an innovation-driven economy is hindered by weak digital integration, macroeconomic volatility, and underdeveloped knowledge outputs. Addressing these barriers is critical for Egypt to unlock sustained ICT-led growth and enhance its global competitiveness.

Figure 5- Table comparing Competitiveness performance

Category	Egypt	India	Vietnam	Philippines
Competitiveness Strengths	• Large domestic market offering growth prospects. • Improving institutional quality and infrastructure. • Increasing focus on innovation capability.	• Strong institutional framework and well-developed infrastructure. • High ICT adoption and digital readiness. • Vibrant innovation ecosystem and skilled talent pool.	• Significant investments in infrastructure and ICT adoption. • Emerging as a startup hub with strong government support. • Stable macroeconomic conditions.	• Strong BPO industry and growing digital economy. • Improving infrastructure and ICT adoption. • Substantial English-speaking workforce.
Competitiveness Challenges	• ICT adoption is lagging. • Macroeconomic stability faces fluctuations. • Need for significant improvement in digital readiness and skill development.	• Bureaucratic inefficiencies persist. • Regulatory barriers in product markets and financial inclusion challenges. • Vulnerable to global economic shifts.	• Health services and rural infrastructure require further development. • Skill mismatches in the labor market. • Needs improvement in business dynamism and financial system.	• Challenges in regulatory environment and financial system development. • Need to enhance innovation capability and address informality in the labor market.
Development Stage	• **Second Stage: Investment Driven** Egypt is transitioning with ongoing reforms, focusing on improving infrastructure and digital readiness. While	• **Third Stage: Innovation Driven** India is a newly industrialized economy with a strong ICT sector and innovation ecosystem. Despite its	• **Second Stage: Investment Driven** Vietnam is a developing economy with rapid growth supported by government initiatives. It is transitioning to	• **Second Stage: Investment Driven** The Philippines is a developing economy with steady growth driven by sectors like BPO and a growing digital

	the country benefits from a large domestic market and growing innovation focus, challenges include lagging ICT adoption and macroeconomic fluctuations.	leading position, it faces regulatory inefficiencies and infrastructural challenges.	higher value-added industries, with strengths in ICT and infrastructure but needs improvements in health services and skill development.	economy. However, it needs advancements in innovation capability, digital readiness, and regulatory reforms.

Source: GCI 2019 data (World Economic Forum, 2019)

4.2 Egypt Global Innovation Index (2022):

The Global Innovation Index (GII), developed by WIPO in partnership with the OECD and other institutions, serves as a comprehensive framework for evaluating a country's innovation capacity. It measures both inputs—such as infrastructure, human capital, and institutions—and outputs, including knowledge creation, technology application, and creative production (WIPO, 2020; WIPO, 2021).

Egypt has made visible efforts to strengthen its innovation ecosystem through initiatives promoting R&D, entrepreneurship, and technology transfer. However, in comparative terms, it continues to lag behind peer countries such as India, Vietnam, and the Philippines in overall innovation performance (WIPO, 2021). While infrastructure and market sophistication have improved moderately, Egypt still struggles to build the institutional, educational, and financial systems required for sustained innovation.

India stands out as a regional leader, consistently ranking higher in the GII due to its robust ICT sector, large base of science and engineering talent, and a thriving startup environment supported by significant R&D investment and venture capital activity (WIPO, 2021). Vietnam, meanwhile, has rapidly improved its innovation indicators through coordinated government policy, foreign investment incentives, and support for high-tech exports and creative sectors. The Philippines, driven by its BPO industry, has also enhanced its creative outputs, digital infrastructure, and education systems to support innovation-led services (WIPO, 2021).

Figure 6- Egypt GII 2020 performance compared to rival countries

Row Labels	GII 2020	Institutions	Human capital & research	Infrastructure	Market sophistication	Business sophistication	Knowledge & technology outputs	Creative outputs
Viet Nam	37.02	58.82	28.09	38.20	57.25	30.75	29.39	33.44
India	36.39	64.38	34.07	36.83	55.55	29.21	34.45	23.08
Philippines	35.28	56.26	27.91	36.15	42.89	36.33	37.11	24.18
Egypt	25.09	49.33	21.76	33.54	40.90	18.05	19.38	15.55

Source: Author data extracted from GII 2020 (World Intellectual Property Organization, 2020).

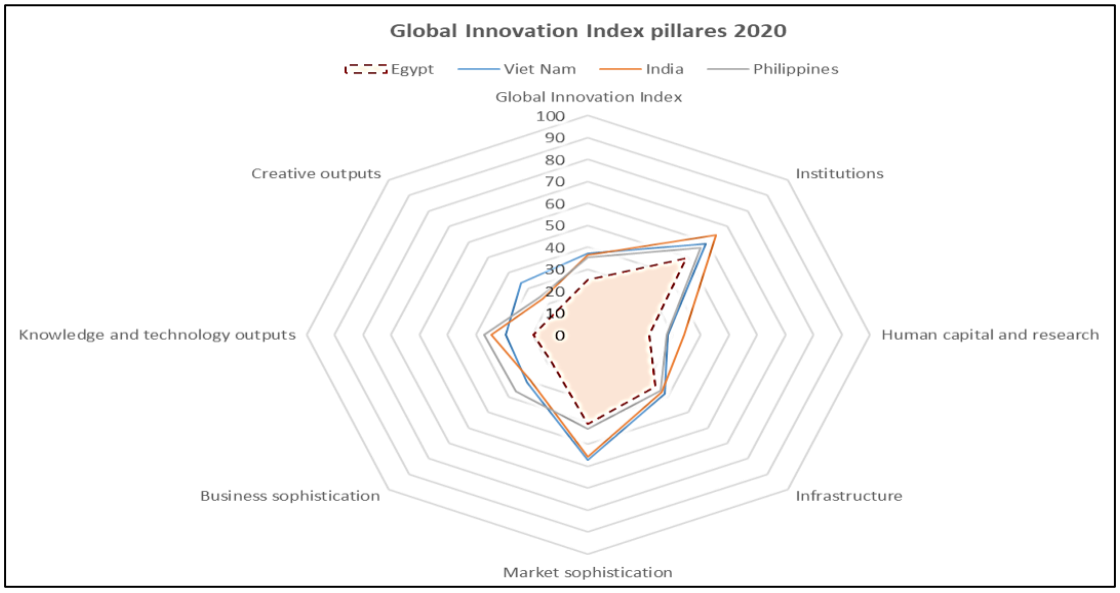
In comparison, Egypt's GII 2020 score of 25.09 is substantially lower than Vietnam (37.02), India (36.39), and the Philippines (35.28). Egypt scores particularly low in human capital and research (21.76), business sophistication (18.05), knowledge and technology outputs (19.38), and creative outputs (15.55) (WIPO, 2020). These figures

indicate limited university-industry collaboration, weak commercialization of R&D, and underutilized intellectual property potential.

Egypt's infrastructure score (33.54) and market sophistication (40.90) show moderate improvement, suggesting a foundation for growth. However, these gains have yet to translate into corresponding output scores. For example, in the tech industry domain, Egypt underperforms significantly in high-tech exports (2.06% of total trade) and mobile app creation, where it lags far behind regional peers (WIPO, 2020).

Workforce indicators also reveal structural weaknesses. Only 5.3% of Egyptian graduates are in science and engineering fields—well below India (64.89%) or the Philippines (55.13%)—and the share of research talent in businesses is just 7.59%, indicating minimal private-sector R&D absorption (WIPO, 2020). This gap reflects the disconnect between education output and market demand.

Figure 7- Comparison between the selected cases in GII Pillars



Source: Global Innovation Index, 2020

Despite these challenges, Egypt's venture capital landscape is showing signs of maturity. It exceeds Vietnam and the Philippines in venture capital deals per unit of GDP, although it remains behind India in both deal count and startup ecosystem density (WIPO, 2020; UNCTAD, 2022). This suggests a growing appetite for tech entrepreneurship, provided institutional reforms and capital access are further improved.

Figure 8- Sectoral Innovation Indicators (Egypt vs. Peers)

Category	Egypt	India	Vietnam	Philippines
High-tech exports (% of trade)	2.06	16.78	100.00	100.00
ICT services exports (% of trade)	10.58	100.00	2.09	45.82
Mobile app creation (per bn PPP GDP)	0.16	13.32	47.91	2.77
Research talent in business (%)	7.59	41.29	29.17	62.94
Science & Engineering Graduates (%)	5.30	64.89	37.86	55.13
Venture Capital Recipients (deals/bn PPP GDP)	6.20	23.42	7.99	2.95

Source: WIPO, 2020

To transition from an investment-driven to an innovation-driven economy, Egypt must address foundational weaknesses in business sophistication, creative production, and applied research. Improving university-industry linkages, protecting intellectual property, and incentivizing knowledge-based sectors are essential next steps. Without these reforms, Egypt risks stagnating in a mid-level development trap where infrastructure exists but innovation does not scale (WIPO, 2021; OECD, 2020).

In summary, Egypt's placement within the investment-driven stage reflects moderate progress in infrastructure and access to capital but continuing deficiencies in innovation outputs, talent pipelines, and ecosystem sophistication. The path forward requires Egypt to pivot from infrastructure-led growth toward policy-driven innovation development by strengthening institutions, investing in applied research, and enhancing private sector capabilities (WIPO, 2021; OECD, 2020).

4.3 National Competitiveness Using Porter's Diamond Model:

Porter's Diamond Model provides a systematic framework for assessing Egypt's ICT industry competitiveness by examining four key dimensions: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure, and rivalry (Porter, 1990; Porter, Ketels, & Delgado, 2007). This framework helps diagnose the country's current development stage and highlights the structural strengths and weaknesses that influence its trajectory from a factor-driven to an efficiency-driven economy.

Factor conditions represent Egypt's baseline inputs for production and innovation. The country benefits from a large and youthful workforce, with 46% of the population aged between 15 and 44 and a total labor force of 29.1 million (ITIDA, 2022). However, there remains a critical mismatch between academic output and industry needs. Egypt's Human Capital and Research score in the Global Innovation Index remains low at 20.3, reflecting gaps in advanced technical training, digital skills, and R&D capabilities (WIPO, 2020; WIPO, 2022). While government initiatives like ITIDA's capacity-building programs aim to bridge these gaps, broader and deeper engagement between academia and industry is required.

In terms of capital availability, Egypt has succeeded in attracting substantial ICT-related investment through incentives such as tax breaks, startup support programs, and initiatives like Export IT (Oxford Business Group, 2017). Nonetheless, the venture capital ecosystem remains limited, and regulatory restrictions on foreign direct investment present ongoing obstacles to scale and international participation (OECD, 2020). Although the country has made progress in infrastructure development, with investments in fiber optics, smart cities like the New Administrative Capital, and national data centers (ITU, 2022), connectivity is still uneven. Rural areas and underserved communities continue to face inadequate digital access, which constrains Egypt's ability to fully capitalize on ICT growth opportunities (MCIT, 2022).

Egypt's technological capabilities are expanding, with increasing policy attention to artificial intelligence, cloud computing, and digital skills training. However, R&D investment remains well below international benchmarks, and local innovation ecosystems—such as incubators and research centers—are underdeveloped. Strengthening these systems will be critical to enhancing Egypt's long-term global competitiveness (Oxford Business Group, 2022).

Demand conditions in Egypt are generally favorable. With a population exceeding 100 million, the country has a substantial and growing domestic market for ICT services, e-commerce, fintech, and digital platforms (WIPO, 2020). Government-led digital transformation initiatives, including cashless payment policies, e-government services, and smart infrastructure projects, are stimulating demand across public and private sectors (MCIT, 2022). The growing use of platforms such as Fawry, Instapay, and Paymob reflects early success in expanding fintech adoption. Yet despite these trends, Egypt's market sophistication remains constrained. Between 2019 and 2022, its Market Sophistication Index score declined, indicating continued barriers to investment, entrepreneurial growth, and regulatory clarity (WIPO, 2020; WIPO, 2022). Reforms to intellectual property laws, startup incentives, and business registration processes would improve the investment climate and encourage private sector innovation.

Related and supporting industries play a critical role in reinforcing the ICT ecosystem. Egypt has emerged as a leading regional outsourcing hub due to its cost-effective labor, multilingual talent pool, and favorable time zone (Oxford Business Group, 2017). Multinational firms such as IBM, Microsoft, and Oracle maintain a presence, while domestic firms like Raya and SEE serve regional clients (Gartner, 2017). The country's telecommunications sector is also relatively well-developed, with mobile penetration exceeding 100% and continued investment in 5G infrastructure and broadband services (ITU, 2022). However, service reliability and average internet speed remain below international standards, limiting efficiency and competitiveness (MCIT, 2022).

In financial services, Egypt's fintech sector has seen strong growth. Companies like Fawry and Paymob are improving financial inclusion and digital payment access. Yet, regulatory obstacles to technologies such as blockchain and cryptocurrencies continue to inhibit innovation in financial technology (World Economic Forum, 2019). More adaptive regulatory frameworks and stronger protections for digital assets will be essential to unlocking this sector's full potential.

The dimension of firm strategy, structure, and rivalry highlights both the promise and limits of Egypt's private sector in ICT. Egyptian firms are expanding into emerging fields such as AI, digital platforms, and cloud computing. The sector includes a mix of dynamic domestic players and global multinationals, creating healthy competitive pressure (MCIT, 2022). However, many local firms remain focused on service delivery rather than product innovation, and the innovation intensity of domestic firms is limited (Brun & Jolley, 2011; De Langen, 2006). Regulatory bottlenecks—such as complex taxation, inconsistent contract enforcement, and weak intellectual property protections—further suppress market entry and scale-up potential (WIPO, 2020).

Overall, Egypt remains in a transitional phase between the factor-driven and efficiency-driven stages of development. While progress in digital infrastructure, investment climate, and workforce expansion has laid the foundation for growth, the country risks stagnating in a middle-income trap unless structural reforms are accelerated. Egypt's innovation ecosystem lacks the critical mass of R&D institutions, scalable startups, and policy coordination necessary to move into a fully innovation-driven economy. Without significant policy shifts, Egypt will struggle to keep pace with countries like India and Vietnam that have successfully built knowledge-based, export-oriented technology sectors.

To avoid this outcome and strengthen its ICT competitiveness, Egypt must implement several strategic reforms. These include expanding broadband and cloud infrastructure, incentivizing public-private R&D partnerships, reforming regulatory frameworks, and aligning university curricula with emerging fields such as artificial intelligence, cybersecurity, and blockchain technologies. Empowering a new generation of digital entrepreneurs and strengthening institutional governance will also be essential for ensuring sustained ICT-led growth.

Egypt's future competitiveness will depend not only on infrastructure or market size, but on its ability to create value through knowledge, innovation, and resilient digital systems. Without urgent and coordinated reform, the country risks remaining a cost-based outsourcing hub while others transition to higher-value, innovation-led digital economies.

Figure 9- Egypt's National Competitiveness Porter's Diamond Analysis

	Factor Conditions	Measurement		Demand Conditions	Measurement
+	Young population	Age 15-44 (46% of population)	+	GCI 10th pillar: Market size	GCI 73.57
+	Strong Labor force	29.1 million	+	Global and Regional demand for Egypt's products and services	Raw materials, labor, agricultural
+	Strong Higher Education	41 Universities (23 Public, and 18 Private)			
+	Strong growing GDP	31st global, 3rd Middle east, 2nd Africa			
+	Geographic Advantages	Heart of EMEA, GMT +2, 1.1 M sqm land, 2seas and Nile River, moderate weather			
+	Ease of Access	26 airports, 15 ports, 65k roads			
+	GCI 2nd pillar: Infrastructure	GCI 73.05			
+	GCI 5th pillar: Health	GCI 65.02			
-	GCI 3rd pillar: ICT adoption	GCI 40.57	-	GCI 4th pillar: Macroeconomic stability	GCI 44.72
-	GCI 8th pillar: Labor market	GCI 49.50	-	GII Market sophistication	GII 40.9
-	GII Human capital & research	GII 21.8	-	GII Business sophistication	GII 18
-	GII Infrastructure	33.5*			
	Firm Structure & Rivalry			Related & Supporting Industries	
+	Government Support	Investment law and FDI support regulations	+	Strong Banking and Financial Institutes	Egyptian Central Bank control
			+	Diversity of industries and services	
-	GCI 1st pillar: Institutions	GCI 51.33	-	Spread of the Informal economy across different sectors	
-	GII Institutions	GII 49.33	-	GCI 12th pillar: Innovation capability	GCI 39.62

			-	GII Knowledge &technology outputs	GII 19.4
			-	GII Creative outputs	GII 15.5

Source: Author data extracted from Global Competitiveness Index 2019, Global Innovation Index 2021, Ease of doing business 2020 Reports (Note: + positive, - negative)

Figure 10- Egypt's National Competitiveness Development Stage as per Porter's four stages

First Stage Factor Driven Nation depends on the basic factors of production, such as natural resources, and inexpensive semi-skilled labor pool		Second Stage Investment Driven Nation attracts foreign investments, which requires heavy investment in efficient infrastructure, business friendly government administrations, strong investment incentives, and better access to capital		Third Stage Innovation Driven Nation reaches the ability to produce innovative products and services, through advanced methods and improved technologies	
Monetary and fiscal, political, and legal stability	Egypt face challenges in currency devaluation, high inflation rate, barrier in foreign funds, lack of finance and funding source Demand Conditions GCI 4th pillar: Macroeconomic stability Related & Supporting Industries +Strong Banking and Financial Institutes +Diversity of industries and services	Increasing local rivalry	Still not achieving a suitable rivalry Demand Conditions GII Business sophistication Firm Structure &Rivalry +Government Support GCI 1st pillar: Institutions GII Institutions Related & Supporting Industries Spread of the Informal economy across different sectors	Building advanced skills	Egypt suffers high skilled resource depletion Factor Conditions GCI 8th pillar: Labor market GII Human capital & research
Market opening	Private sector faces many challenges in different sectors, due to the monopoly of companies owned by the government Factor Conditions +Geographic Advantages + Ease of Access + Strong growing GDP Demand Conditions + GCI 10th pillar: Market size	Creating advanced infrastructure	Still working on basic infrastructure Factor Conditions GCI 3rd pillar: ICT adoption	Creating world class scientific and technological institutions	There is not enough investment in R&D Related & Supporting Industries GCI 12th pillar: Innovation capability GII Knowledge &technology outputs GII Creative outputs
Improving basic human capital	High skilled capital are immigrating for other countries in the region, due currencies difference Factor Conditions + Young population + Strong Labor force + GCI 5th pillar: Health	Setting incentives and rules encouraging productivity	Not started Demand Conditions EDB Trading across borders	Setting incentives and rules encouraging innovation	Not enough incentives for innovation
Efficient basic infrastructure	Relatively good Factor Conditions + GCI 2nd pillar: Infrastructure	Cluster formation and activation	Still organic clusters are the dominate in egypt Demand Conditions GII Market sophistication	Cluster upgrading	Not started yet
Lowering the regulatory	Still challenges appearing, due to increasing more taxes				

costs of doing business	and increasing complexity of work Firm Structure &Rivalry +Ease of Starting a business +Ease of dealing with construction permits +Ease of getting electricity				
Observation	Egypt almost finished the 1st stage factor driven with need to focus on Macroeconomic stability	Observation	Egypt had started the 2nd stage investment driven, but a lot of effort is required	Observation	Egypt have not started the 3rd stage innovation driven, and not applicable to go for 4th stage wealth driven

Source: Author data extracted from Global Competitiveness Index 2019, Global Innovation Index 2021, Ease of doing business 2020 Report

5. Conclusion

Egypt's ICT sector stands at a strategic inflection point, navigating the transition from a factor-driven to an efficiency-driven stage of economic development. The country possesses several foundational strengths—most notably a large and youthful population, strategic geographic location, expanding digital infrastructure, and rising demand for technology-enabled services. These factors have positioned Egypt as a competitive outsourcing hub and a potential regional player in the digital economy.

However, benchmarking against peer countries such as India, Vietnam, and the Philippines reveals that Egypt continues to lag in key enablers of innovation-led growth. Its low scores in ICT adoption, knowledge and technology outputs, and creative capacity highlight structural challenges in digital readiness and innovation capability. Weak research and development ecosystems, skill mismatches, limited venture capital penetration, and regulatory unpredictability remain critical obstacles to progress. Unlike its peers, Egypt has not yet translated infrastructure gains into scalable innovation or globally competitive digital products.

Porter's Diamond Model analysis reinforces these findings. Egypt's factor conditions—including labor force size and recent infrastructure investments—are moderately strong, yet advanced capabilities such as R&D intensity, institutional quality, and business sophistication remain underdeveloped. While demand conditions are improving due to digital transformation initiatives and fintech growth, inefficiencies in market sophistication and startup regulation constrain private-sector dynamism. The ICT sector's competitive potential is further weakened by fragmented support industries and regulatory bottlenecks that discourage innovation and investment.

To avoid stagnation in a middle-income trap, Egypt must act decisively to shift from cost-driven service exports to value-driven innovation. This requires a multi-pronged strategy focused on scaling R&D investment, fostering deeper industry-academia collaboration, incentivizing product-based tech entrepreneurship, and modernizing regulatory frameworks. Egypt should also expand broadband access, strengthen IP protection, and cultivate a venture capital ecosystem aligned with national innovation goals.

By drawing strategic lessons from Vietnam's FDI-driven tech growth, India's startup-led innovation engine, and the Philippines' services-based digital economy, Egypt can shape a tailored pathway toward global ICT competitiveness. With coordinated policy

action and institutional commitment, Egypt has the potential to transform its ICT sector into a catalyst for broader economic modernization, job creation, and regional digital leadership.

References

Anttiroiko, A. (2004). Global competition of high-tech centres. *International journal of technology management*, 28(3-6), 286-323.

Anttiroiko, A. (2004). Science cities: Their characteristics and future challenges. *International Journal of Technology Management*, 28(3), 395-418.

Balkyte, A., & Tvaronavičiene, M. (2010). Perception of competitiveness in the context of sustainable development: facets of "sustainable competitiveness". *Journal of business economics and management*, 11(2), 341-365. doi: https://doi.org/10.3846/jbem.2010.17

Benner, M. (2012). Cluster policy as a development strategy: Case studies from the Middle East and North Africa (No. 255). *Working Paper Series in Economics*. Lüneburg: Leuphana Universität.

Berger, T. (2008). Concepts of national competitiveness. *Journal of international Business and Economy*, 9(1), 91-111.

Berger, T., & Bristow, G. (2009). Competitiveness and the Benchmarking of Nations – A Critical Reflection. *International Advances in Economic Research*, 15(4), 378–392. doi:10.1007/s11294-009-9231-x

Brun, L., & Jolley, G. (2011). Increasing stakeholder participation in industry cluster identification. *Economic Development Quarterly*, 25(3), 211-220.

Carneiro, A. (2000). How does knowledge management influence innovation and competitiveness? *Journal of knowledge management*.

Central Bank of Egypt. (2020). *EGYPT ECONOMIC REVIEW*. Vol. 60 No. 2 2019/2020. Cairo: CENTRAL BANK OF EGYPT.

Central Bank of Egypt. (2021). External Position of the Egyptian Economy July/March 2020/2021 Volume No. (73).

Chesbrough, H. (2003). Open innovation: The new imperative for creating and profiting from technology. Harvard Business Press.

Cho, D., & Moon, H. (2005). National Competitiveness: Implications for Different Groups and Strategies. *International Journal of Global Business and Competitiveness*, 1(1), 1–11.

Cho, D., MOON, H., & Kim, M. (2006). Competitive strategy to enhance national competitiveness. *Academy of international business 2006 annual meeting*. Beijing.

Christensen, T., Lämmer-Gamp, T., & Meier zu Kö, G. (2012). Let's make a perfect cluster policy and cluster programme smart recommendations for policy makers. Berlin/Copenhagen: Danish Ministry of Science .

Dahshan, M. (2015). The Egyptian Economy (Vol. 55). Adelphi Series.

De Langen, P. (2006). Stakeholders, conflicting interests and governance in port clusters. Research in Transportation Economics, 17, 457-477.

Economist Intelligence Unit (EIU). (2010, July 26). Beyond the BRICs. Retrieved from Global Forecasting Service: http://gfs.eiu.com/Article.aspx?articleType=wif&articleId=242

Egyptian General Authority for Investment and Free Zones. (2022, April 19). ABOUT General Authority for Investment and Free Zones (Egypt). Retrieved from GAFI: https://www.gafi.gov.eg/English/AboutUs/Pages/default.aspx

Egyptian Industrial Development Authority. (2022, April 19). About Industrial Development Authority (Egypt). Retrieved from Industrial Development Authority:

http://www.ida.gov.eg/webcenter/portal/oracle/webcenter/page/scopedMD/s83d58991_1ad6_4dce_99ea_30c57d0e8097/Pagecb089a5d_952c_494a_93be_18b98e912a5e.jspx

EIU. (2021, September 9). Egypt - Fact Sheet. Retrieved from Economist Intelligence Unit: http://country.eiu.com/article.aspx?articleid=751456258&Country=Egypt&topic=Summary&subtopic=Fact+sheet

EUROMONITOR . (2008, april 2). The Next 11 Emerging Economies. Retrieved from *EUROMONITOR International* : https://www.euromonitor.com/article/the-next-11-emerging-economies

European Commission. (2022, April 22). Egypt Trade Relationship with European Union. Retrieved from European Union Trade Relationships: https://policy.trade.ec.europa.eu/eu-trade-relationships-country-and-region/countries-and-regions/egypt_en

Forbes. (2023, APril 17). Top 30 Fintech Companies 2023. Retrieved from Forbes Middle East: https://www.forbesmiddleeast.com/lists/top-30-fintech-companies-2023/

Freeman, C. (2004). Technological infrastructure and international competitiveness. Industrial and Corporate Change, 13(3), 541-569.

Freeman, R., & McVea, J. (2001). A stakeholder approach to strategic management. In The Blackwell handbook of strategic management (pp. 189-207).

Gartner. (2010). Analysis of Egypt as an Offshore Services Location. Gartner Research.

Gartner. (2017). Evaluate Offshore/Nearshore Countries for Outsourcing, Shared Services and Captives in EMEA. Gartner Research.

General Authority for Investment and Free Zones. (2021, October 9). EGYPT Fact sheet. Retrieved from Invest in Egypt: https://www.gafi.gov.eg/English/whyegypt/Pages/About-Egypt.aspx

Gerasymchuk, V., & Sakalosh, T. (2007). Competitiveness and knowledge-based economy: information and communication technology impact evaluation. Business: Theory and Practice, 8(4), 195-203.

Hatzichronoglou, T. (1996). Globalisation and competitiveness: relevant indicators. Paris: ORGANISATION FOR ECONOMIC CO-OPERATION AND DEVELOPMENT (OECD). Retrieved from https://dx.doi.org/10.1787/885511061376

Huggins, R., & Izushi, H. (2009). Regional Benchmarking in a Global Context: Knowledge, Competitiveness, and Economic Development. *Economic Development Quarterly*, 23(4), 275–293. doi:10.1177/0891242409347896

Innova, E., & Inno, P. (2008). The concept of clusters and cluster policies and their role for competitiveness and innovation: main statistical results and lessons learned. Luxembourg: European Commission.

International Monetary Fund. (2018). Arab Republic of Egypt 2017 Article IV Consultation, Second Review Under the Extended Arrangement under the Extended Fund Facility. International Monetary Fund.

International Monetary Fund. (2021, July 14). Egypt: Overcoming the COVID Shock and Maintaining Growth. Retrieved from https://www.imf.org/en/News/Articles/2021/07/14/na070621-egypt-overcoming-the-covid-shock-and-maintaining-growth

International Monetary Fund. (2021, April 14). The future of emerging markets. Retrieved from International Monetry Fund: https://www.imf.org/external/pubs/ft/fandd/2021/06/the-future-of-emerging-markets-duttagupta-and-pazarbasioglu.htm

ITIDA. (2022, December 1). Egypt ICT Industry Outlook. Retrieved from Information Technology Industry Development Agency - Egypt: https://itida.gov.eg/English/Programs/Industry-Outlook/Pages/default.aspx#:~:text=It%20is%20creating%20280K%20jobs,%244.9%20billion%20in%202021%2F2022.

ITU. (2022, August 1). Digital Development Dashboard - Egypt. Retrieved from International Telecommunication Union (ITU) - statistics: https://www.itu.int/en/ITU-D/Statistics/Dashboards/Pages/Digital-Development.aspx

Ketels, C., & Memedovic, O. (2008). From clusters to cluster-based economic development. International journal of technological learning, innovation and development, 1(3), 375-392.

Koh, F., Koh, W., & Tschang, F. (2005). An analytical framework for science parks and technology districts with an application to Singapore. *Journal of Business Venturing*, 20(2), 217-239.

Laur, I., Klofsten, M., Bienkowska, D., Wincent, J., & Ylinenpää, H. (2019). Development of European cluster initiatives: stakeholders' contribution and enrolment. *Global Business and Economics Review*, 21(6), 685-711.

Liu, L., & Nath, H. (2013). Information and communications technology and trade in emerging market economies. Emerging Markets Finance and Trade, 49(6), 67-87.

Magnitt. (2020, Feburary 1). 2019 MENA Venture Investment Report. Retrieved from https://magnitt.com/: https://magnitt.com/research/2019-mena-venture-investment-report-50680

MCIT. (2020, November 11). Digital Egypt Strategy. Retrieved from Ministry of Communications, and Information Technology: https://mcit.gov.eg/en/Digital_Egypt

MCIT. (2021, February 7). ICT Minister Delivers Talk at Parliament - Main Economic Indicators 2018-2020. Retrieved from Minister of Communications and Information Technology: https://mcit.gov.eg/en/Media_Center/Press_Room/Press_Releases/57168

MCIT. (2022, July 01). Egypt's ICT 2030 Strategy. Retrieved from Egypt Ministry of Communications and Information Technology: https://mcit.gov.eg/en/ICT_Strategy

Miehe, L., & Roll, S. (2019). Three Scenarios for the Development of the Sisi Regime in Egypt. London: German Institute for International and Security Affairs (SWP).

OECD . (2020). Investment Policy Reviews: Egypt 2020. Paris: OECD Publishing. doi: https://doi.org/10.1787/9f9c589a-en

OECD. (2007). Competitive Regional Clusters: National Policy Approaches. Paris: OECD Publishing. doi: https://doi.org/10.1787/9789264031838-en

OECD. (2020). OECD Review of Foreign Direct Investment Statistics: Egypt. Retrieved from http://www.oecd.org/investment/OECD-Review-of-Foreign-Direct-Investment-Statistics-Egypt.pdf

OXFORD BUSINESS GROUP. (2017, jan 1). Egypt looks to special economic zones to attract investment shore up industry. Retrieved April 11, 2022, from OXFORD BUSINESS GROUP: https://oxfordbusinessgroup.com/analysis/one-stop-shop-egypt-looks-special-economic-zones-attract-investment-and-shore-industry

Oxford Business Group. (2022, May 1). Egypt's ICT industry expected to drive economic growth. Retrieved from Oxford Business Group: https://oxfordbusinessgroup.com/overview/turning-plans-reality-nation%E2%80%99s-talent-and-technical-capacity-have-made-it-key-outsourcing-partner

Pellegrin, J., Spinoglio, M., Wintjes, R., Hausemer, P., & Amichetti, C. (2020). Smart Guide to cluster policy monitoring and evaluation. Luxembourg: European Union. doi:10.2826/519400

Phillimore, J., & Joseph, R. (2003). Science parks: a triumph of hype over experience? In The international handbook on innovation (pp. 750-757). Pergamon.

Pine, B., & Gilmore, J. (1998). Welcome to the experience economy. Harvard business review, 76, 97-105.

Porter, M. (1990). The Competitive Advantage of Nations. 68(2). *Harvard Business Review*, 68(2), 73-93.

Porter, M. (1996). Competitive advantage, agglomeration economies, and regional policy. *International regional science review*, 19(2), 85-90.

Porter, M. (2003). The economic performance of regions. Regional studies, 37(7), 549-578.

Porter, M., Ketels, C., & Delgado, M. (2007). The microeconomic foundations of prosperity: findings from the business competitiveness index. The global competitiveness report, 2008.

Quintas, P., Wield, D., & Massey, D. (1992). Academic-industry links and innovation: questioning the science park model. Technovation, 12(3), 161-175.

Rudra, N. (2008). Globalization and the Race to the Bottom in Developing Countries: Who Really Gets Hurt? Cambridge: Cambridge University Press.

Schuller, B., & Lidbom, M. (2009). Competitiveness of Nations in the Global Economy. Is Europe Internationally Competitive?. *Economics & Management*, 934–939.

Schwab, K. (2009). The global competitiveness report 2009-2010. Geneva: World Economic Forum. Retrieved from http://www3.weforum.org/docs/WEF_GlobalCompetitivenessReport_2009-10.pdf

Seoudi, I., & Mahmoud, S. (2016). Public Policy for Venture Capital: A Comparative Study of Emirates, Saudi Arabia and Egypt. *Review of Business & Finance Studies*, 7(1), 19-42.

SIS. (2022, October 10). Egypt ranks 1st in Africa for fixed broadband internet speed. Retrieved from Egypt State Information Service: https://www.sis.gov.eg/Story/171974/Egypt-ranks-1st-in-Africa-for-fixed-broadband-internet-speed?lang=en-us#:~:text=Egypt%20ranked%20first%20among%20African,Amr%20Talaat%20announced%20on%20Monday.

SolAbility Sustainable Intelligence. (2019). The Sustainable Competitiveness Report, 8th edition. Zurich, Seoul: SolAbility Sustainable Intelligence.

Sum, N., & Jessop, B. (2013). Competitiveness, the knowledge-based economy and higher education. *Journal of the Knowledge Economy* (4), 24-44.

U.S. Department of Commerce. (2022, May 1). Egypt - Information and Communications Technology; and Digital Economy. Retrieved from International Trade Administration: https://www.trade.gov/country-commercial-guides/egypt-information-and-communications-technology-and-digital-economy

UK Foreign & Commonwealth Office. (2020, December 1). Continuing the United Kingdom's trade relationship with Egypt. Retrieved April 22, 2022, from UK Government Trade and Investment: https://assets.publishing.service.gov.uk/government/uploads/system/uploads/attachment_data/file/1010861/uk-egypt-trade-relationship-parliamentary-report-print.pdf

UNCTAD. (2019). World Investment Report 2019. Geneva: UNCTAD Publishing,. Retrieved from https://unctad.org/en/PublicationsLibrary/wir2019_en.pdf

UNCTAD. (2022, december 1). UNCATD Stat-DIGITAL ECONOMY. Retrieved from United Nations Conference on Trade and Development: http://unctadstat.unctad.org/EN/BulkDownload.html

Uyarra, E., & Ramlogan, R. (2016). The impact of cluster policy on innovation. In Handbook of innovation policy impact. Edward Elgar Publishing.

Vadra, R. (2018). After BRICS, CIVETS as emerging markets. *Journal of International Economics*, 9(2), 2-12.

Wasim, M. (2014). Factor for Science Park Planning. World Technopolis Review (WTR), 3(2), 97-108.

Wei, X. (2000). Acquisition of Technological Capability through Special Economic Zones (SEZs): The Case of Shenzhen SEZs. Industry and Innovation, 7(2), 199–221.

Wessner, C. (2009). Understanding research, science and technology parks: Global best practices: Report of a symposium. National Academies Press.

White, J. (2011). Fostering innovation in developing economies through SEZs. Special economic zones. World Bank.

WIPO. (2020). Global Innovation Index 2020 – Egypt. World Intellectual Property Organization (WIPO). Retrieved from https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020/eg.pdf

WIPO. (2020, October 1). Global Innovation Index 2020 - EGYPT. Retrieved from World Intellectual Property Organization: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020/eg.pdf

WIPO. (2020, October 1). Global Innovation Index 2020 - EGYPT. Retrieved from World Intellectual Property Organization: https://www.wipo.int/edocs/pubdocs/en/wipo_pub_gii_2020/eg.pdf

WIPO. (2021, SEP 23). Retrieved from Global Innovation Index (GII): https://www.globalinnovationindex.org/about-gii#history

WIPO. (2021, SEP 23). Global Innovation Index (GII). Retrieved from World Intellectual Property Organization: https://www.globalinnovationindex.org/about-gii#history

WIPO. (2022, 8 1). Global Innovation Index 2022. Retrieved from World Intellectual Property Organization: https://www.wipo.int/global_innovation_index/en/2022/

Wolman, H., & Hincapie, D. (2015). Clusters and cluster-based development policy. *Economic Development Quarterly*, 29(2), 135-149.

World Bank. (2020, october 1). Doing Businesses 2020. Retrieved from Business Enabling Environment (BEE)*: https://www.doingbusiness.org/en/reports/global-reports/doing-business-2020

World Bank. (2020). Egypt Economic Monitor, November 2020: From Crisis to Economic Transformation-Unlocking Egypt's Productivity and Job-Creation Potential. World Bank.

World Bank. (2022, September 19). ICT service exports - Egypt. Retrieved from World Development Indicators: https://databank.worldbank.org/source/world-development-indicators

World Bank. (2024, August 1). Country Profile. Retrieved from World Bank Data: https://data.worldbank.org/country/egypt-arab-rep?view=chart

World Economic Forum. (2014). The global competitiveness report 2014-2015. Insight Report.

World Economic Forum. (2015). The Global Competitiveness Report 2014-2015: Full Data Edition. Geneva: World Economic Forum.

World Economic Forum. (2019). Global Competitiveness Index. World Economic Forum. Retrieved from https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

World Economic Forum. (2019, December 1). Global Competitiveness Report 2019. Retrieved from World Economic Forum: https://www3.weforum.org/docs/WEF_TheGlobalCompetitivenessReport2019.pdf

WorldData. (2021, October 9). The 10 biggest airports in Egypt. Retrieved from Egypt: https://www.worlddata.info/africa/egypt/airports.php