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Views on the Crisis

Drivers of Change Series

Egypt's "Future of Work": Coping with Global Trends (Country Experiences: China, Turkey and the UAE)

General Introduction

ECES initiated a set of studies to analyze the implications of the Corona crisis on the various variables and sectors. Now it is time to move to the second stage, which is to put forth the strategic pillars for the post-corona phase in the Egyptian economy, taking into account the new global economic situation imposed by the crisis.

This series of new reports provides a detailed discussion of a set of drivers of change, i.e., issues that, if properly addressed, are expected to cause major developmental strides for the Egyptian economy. These issues may have been dealt with previously, but were not adopted in the required manner and therefore need revisiting, or they may be issues that were not addressed in the first place despite their importance.

This series of reports follows a descriptive and quantitative analysis approach according to the nature of the topic.

Each report focuses on an issue through three main aspects, clarification of the importance of focusing on this issue and the rationale behind it, followed by a quick description of the current situation, a detailed discussion of the proposed change mechanism and timeframe, and any immediate / medium-term / long-term changes. Finally, it identifies the parties responsible for implementation, preconditions for success and the most important expected results.

"The future of work is now. Digitalization and globalization have sparked radical shifts in how we live and work. The coronavirus (COVID-19) crisis has accelerated these beyond anything we could have imagined.

These changes raise essential questions about the precarity of our jobs, the support available if we are unable to work or retire, the skills we need for current and future jobs, the quality of those jobs, and what voice we have in shaping these outcomes."

Organization of Economic Cooperation and Development (OECD)

Introduction

This report addresses new global trends in the labor market or what is known as the "Future of Work". It becomes increasingly important for the labor market structure to adjust to as a new norm, and to be well prepared to face with the speed and efficiency required, especially, in light of the current critical period workers are witnessing in terms of job and income losses, and more generally in the post Covid-19 era. This shift in global trends of the labor market is not nascent, but rather imposed by new patterns of jobs since the 1990s. The global communication revolution, communication networks and the Internet moved the system of "work" to the era of e-business. However, what is new in the current wave of global changes is the different level of dynamism of functional tasks, which started with the entry of the world into the

Fourth Industrial Revolution and has grown rapidly with the accelerating pace of innovations and digital transformation. This, in turn, changed the approaches of dealing with “work,” introduced new important considerations that greatly affect its future, created a new labor market not only in developed countries, but also all over the world, and has been accelerated due to the Covid-19 crisis.

The report covers six sections that begin with clarifying what is meant by the term “Future of work” in the first section. Section 2 provides an explanation of the most important reasons for its classification as a main driver of change. Section 3 reviews the most important global “Mega Trends,” which contributed to the world transformation towards certain patterns of work. While Section 4 deals with the new global patterns of the labor market. Examples of how countries dealt with recent changes in the labor market, such as China as a leading country, Turkey as a competitor, and finally the United Arab Emirates as a neighboring country, are presented in Section 5. The report then extracts the most important elements of success from the three experiences. In the final section, the report provides a detailed analysis to answer the question «**Where does Egypt stand in terms of coping with the new reality of the labor market**», through a quick overview on the Egyptian labor market, analyzing Egypt’s position with respect to the elements of success, and what are the needed requirements for the labor market to become a strong driver for change. It should be noticed that ECES had previously presented a detailed analytical study of the Egyptian labor market, addressed all its aspects, and analyzed it at the sectoral level through a set of sectoral studies on the repercussions of the Covid-19 crisis on the Egyptian economy.[1]

[1] Sectoral studies on the repercussions of Covid-19 on the Egyptian economy.

I. What is Meant by the Future of Work?

The term "Future of work" refers to major economic and social changes that were directly reflected on the supply and demand sides of the labor market and completely changed its features, not only in terms of technological transformation but also in terms of how to prepare for and respond to these changes. This transformation is described through several mega-trends or phenomena, which acted as a main engine directing global labor markets towards certain patterns. Most importantly, the information revolution and its impact on re-arranging the priorities of countries worldwide, globalization and technological booms, the Fourth Industrial Revolution and how it contributed to shifts in the balance of global economic power, and finally the demographic development.[2] These mega trends combined have reshaped the features of the labor society as we know it. Added to this is the emergence of the Covid-19 pandemic over the past year, which came to confirm and even accelerate the impact of all of the above on “work” patterns.

[2] https://www.mckinsey.com/featured-insights/innovation-and-growth/navigating-a-world-of-disruption

II. Why developing the entire system of work at this stage is considered one of the main drivers of change for countries?

In general, there is a vital role employment and labor market activation play in any country being the primary source of production, and a major source of income at the individual level. This is in addition to the following:

2-1. Acceleration in the pace of global mega trends, such as leaps in emerging technologies and the demographic shift mainly in developed countries, which is a major source of change in the features of the labor market.

2-2. Noticeable difference in terms of the scope of change this time and the accompanying pattern, which imposed further preconditions compared to the previous industrial and technological revolutions. For example, what the labor market witnessed during the transition from the agricultural to the industrial revolution, such as movement of workers from agricultural work to assembly lines in industrial production, is described as an easy transition as it included limited training and did not require a high level of skills. However, the current wave of changes differs in terms of the educational background and skills required. Therefore, the transition

process has become much more difficult and thus requires a different level of readiness.

2-3. Chronic structural and institutional deficiencies facing the Egyptian labor market, and the recent huge increases in unemployment rates, which weakened Egypt's position further compared to the rest of countries. Hence, raising Egypt's readiness in the face of these accelerating developments requires more effort in grasping new global concepts and dealing with the evolution of the labor market.

III. Major global trends behind the changing features of the labor market

Global mega trends are a major driver of shifting global patterns of employment and disrupting the labor markets worldwide. There is a strong interrelationship between these trends, evident in the sequence with which they began to affect the dynamics of labor markets. The **information and data revolution** comes at the fore, which changed the way of thinking and the major goals of global economies, and began over time to move to other countries, resulting in a parallel revolution in **digital technology** and a new stage of **globalization**. These, in turn, were transformed into highly advanced technologies that formed a unique **fourth industrial revolution**. Adding to these three trends are, the

demographic transition that is threatening advanced economies, and the new normal imposed by the Covid-19 pandemic. It is quite clear that all of them witnessed previous influential waves, but the current wave has a new imprint that doubled its impact, with the exception of the Covid-19 pandemic, which is unique in both nature and repercussions. This section reviews the details of each of the previous trends separately.

3-1. The Information Revolution: "data and information" constituted the new norm for the capital of economies and the most important elements of the modern global system, known as the "machine knowledge capital" phenomenon. The real value of gigantic companies such as Google, Facebook and Amazon, whose market value ranges between 200 to 400 billion dollars, lies in the value of the data they own,[3] and their wealth of intellectual property and patents. This tightened their control over global markets, and largely caused the difference this time in terms of the speed of change and the absolute spread of technology in our lives. While the old inventions of the telephone and radio began to spread after many years, ranging between 38-50 years, Facebook was able to attract 6 million users in its first year, this figure

[3] ECES, On the Threshold of Change: Trade and Development in the Information Age, Distinguished Lecture Series, 2019.

increased 100 times during the following five years, which encouraged these companies to accelerate the pace of innovation even more.[4] Hence, competition between companies around the world took a new form, such as how to acquire intellectual property rights and adopt the power of information in the face of rapid developments. Acceptance of technology and adjusting to it is no longer optional in light of the acceleration of its transfer and the replacement of human beings by artificial intelligence. The trading volume of the artificial intelligence market is expected to grow by 2025 around the world to reach $59 billion, compared to only $1.8 billion in 2016.[5] Hence, countries' real capital form has shifted from labor force, equipment and machinery, or even natural resources, to the pace of innovation.

[4] https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-four-global-forces-breaking-all-the-trends

[5] THE FUTURE OF WORK? WORK OF THE FUTURE! On how artificial intelligence, robotics and automation are transforming jobs and the economy in Europe, A report by Michel Servoz, European Commission, 2019.

3-2. Globalization and the Technological Revolution: Globalization is an old term that goes back 20 years, but the current wave is very different compared to the previous waves in the early 1990s. This is attributed to the exceptional pattern we observed during the past few years, which characterized the modern **technological revolution** with faster transformation rates and more continuous fluctuations than its predecessors did. This created, and continues to create, new types of jobs to replace the old ones, especially with the increasing productivity witnessed by global economies recently.[6] Rather than the simple routes that connected the major trading centers of Europe and North America to one another, the global trade system expanded into a number of complicated, intertwined and extended networks. Within just 10 years, global financial and trade flows witnessed an extraordinary leap, with Asia becoming the largest trading region in the world, the share of trade flows among emerging markets in global trade doubled, and the volume of trade between China and Africa increased more than 23 times between 2000 and 2012. Global capital flows increased 25 times between 1980 and 2007.[7] In

[6] https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/

[7] https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-four-global-forces-breaking-all-the-trends

addition to the short-term challenges that faced the labor market as a result of replacing labor with machines, and the consequent need to upgrade skills and competencies, there are fundamental differences compared to previous technological revolutions, the most important of which lies in the speed of transformation and the scope of impact.

This accelerating transformation is the result of speeding up the pace of innovations and the discovery of new capabilities for machines. This has led to an almost complete layoff of labor as a result of the development of technologies such as artificial intelligence that adopt advanced methods of research or what is known as “deep learning” - which has gone beyond mere programming skills, to allow the possibility of machines to develop their own software.[8] Therefore, the readiness of countries to face this transformation should see further improvements, i.e. upgrading training and skilling to a new level that adopts user-friendly technologies and not reinvent them.

As for the scope of the impact, these booms affect the service sector extensively to the point it was called “globalization of services”. Thanks to the increasing electronic interconnectedness

[8] https://www.weforum.org/agenda/archive/fourth-industrial-revolution

of nations, the service sector is the fastest growing economic sector of all—from business services, health care to leisure services. It has become indispensable for managing complex and advanced industrial economies, whether logistics, financial, information or other services. According to the latest data, the service sector contributes more than two-thirds of the economic output, attracts more than two-thirds of foreign direct investment worldwide, and provides nearly two-thirds of jobs in developing countries. This percentage rises to 4/5 in the case of developed countries.[9]

3-3. The urban revolution and the fourth industrial revolution, the latter being very different from the previous industrial revolutions that shared one goal, which is to develop production using different technologies such as hydro and steam energy, electricity, or electronics and information technology. This time, the industrial revolution is characterized by more precision and a faster pace, with lines blurred between the physical, biological and digital worlds. This was through the launch of highly advanced technologies such as artificial intelligence, cloud computing, robotics, 3D and 4D printing, the Internet of Things, advanced

[9] https://www.wto.org/english/res_e/booksp_e/02_wtr19_1_e.pdf

wireless technologies[10] and other economic and social disruptions that have overturned the balances of labor and production markets, such impact on labor markets will be discussed later on. Contributing to this was the parallel urban revolution taking place in emerging economies, which is represented in the qualitative shift of the global economic activity hubs to emerging economies markets such as China. More specifically to urban cities within those markets, and how the pivot points of the global economy have shifted to the east and south at an unprecedented pace. Nearly half of the global GDP growth between 2010 and 2025 came from 440 cities in emerging markets, 95% of which are small and medium-sized cities like Tianjin whose total output is almost comparable to entire countries like Sweden. Moreover, more than half of the world's largest companies—with revenues of $1 billion or more—are expected to be located in emerging markets by 2025.[11]

[10] https://www.weforum.org/agenda/2016/01/the-fourth-industrial-revolution-what-it-means-and-how-to-respond/
[11] https://www.mckinsey.com/business-functions/strategy-and-corporate-finance/our-insights/the-four-global-forces-breaking-all-the-trends

3-4. The demographic transition in developed countries: The decline in working-age population represents a real problem that troubles advanced economies in particular and creates great pressures on their social security schemes. The latest statistics indicate that in 2020 there were an estimated 727 million people aged 65 years or more, worldwide. This figure is expected to double by 2050 to reach more than 1.5 billion people, and the proportion of older people will increase in the world population from 9.3% in 2020 to 16.0% by 2050. Once again, what is new this time is the precarious result of this evolution in demographic trends in developed countries in terms of raising the costs of pensions and health care services, [12] in addition to the relatively limited capabilities of these age groups to use recent technologies. While the same situation is not applicable to developing countries due to their demographic dividend and the high number of young people in working age. In fact, they have an opportunity to benefit from this unfavorable situation faced by developed countries, but their surplus of young people is not well equipped with the necessary skills and capabilities that cope with the digital revolutions and contemporary technology, which we will discuss in detail later.

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12 https://www.un.org/development/desa/pd/sites/www.un.org.development.desa.pd/files/files/documents/2020/Sep/un_pop_2020_pf_ageing_10_key_messages.pdf

3-5. The COVID-19 crisis: The COVID-19 pandemic has resulted in a further acceleration of the forced digital transformation, which is evident with the almost complete shift to remote work and the sudden wider spread of e-commerce. This has led to the reconfiguration of the features of the labor market anew to include mainly different mechanisms for the practice of job tasks remotely. At the same time, this represented a critical challenge to the workers' ability to continue living under these conditions, as it was difficult to adapt to the new nature of work during such a short period of time. This showed the differences between countries in terms of their readiness to respond to the new reality imposed by the pandemic, which is largely related to the ability to keep pace with the changes previously presented. Countries that were able to cope with previous global changes—albeit at a slower pace now—were not negatively affected by the pandemic as much as countries that are late in responding to similar changes (distance learning, e-commerce, comprehensive digital transformation, information infrastructure, trained labor, etc.).

In the wake of the COVID-19 pandemic, the labor market was automatically classified into three categories: one that includes "essential workers" such as delivery workers, health workers, food store workers, agricultural workers and medical factory workers. A

second category includes "remote workers" who have been able to work remotely and are likely to keep their jobs. The last category is "displaced workers" who are likely to be replaced in the future; who work mostly in the sectors that were hit hardest by the crisis—such as the travel and tourism sectors, retail trade, and service work. These three categories are facing a comprehensive transformation in terms of the nature of the practice of their jobs, and hence the labor market is facing a new model of skills and qualifications that requires a new category of training and qualification.[13]

4. The new global patterns of labor market

There are three patterns that reflect global changes in labor market trends, and it is clear that they automatically caused each other to emerge. The first pattern is the recently discovered technologies that are getting more and more complex day after day, which in turn led to the loss of a great number of jobs, and the emergence of other new jobs representing the second pattern. The final pattern is the new structure of skills necessary to practice these new jobs. This is the most important thing that distinguishes the effect of global changes this time compared to last time, where the

[13] World Economic Forum, The Future of Jobs Report, 2020

gap, represented in preparations and expertise required to match the new jobs, was not that much that it could be overcome with more training and compensating workers for losing their jobs due to technological progress. This section discusses these three patterns and their impact on labor markets.

4-1. Newly Emerging Technologies[14]

The past two years have witnessed a clear acceleration in the adoption of certain technologies by international companies. Technologies related to digital transformation such as cloud computing, big data analysis and e-commerce are at the top of the companies' priorities in terms of technologies adopted, in addition to a significant interest in adopting encryption technologies. Countries have also made a big jump in the number of companies expected to adopt more advanced technologies, such as non-humanoid robots and artificial intelligence, which are slowly beginning to dominate the nature of jobs at the level of all industries. There are some other less complex technologies such as augmented and virtual reality, biotechnology, in addition to 4D printing and modeling techniques.

[14] Ibid.

Technological adoption patterns differ according to the sector, as artificial intelligence is more concentrated in digital information, communications, education, financial services and transportation sectors, and biotechnologies in the health care sector; while big data analysis, internet services, and non-human robots are strongly embraced in the mining and metals sector. Government and public business sectors support encryption techniques.

4-2. New employment pattern

While the main objective of designing these innovative technologies is stimulating both the productive growth of industries, and the demand for new job tasks and their diversity of skills, this positive impact may be discouraged because of the disruption of these technologies to the workforce. Technological adoption will negatively affect workers by displacing some of the tasks performed by human power and replacing them with machines. The degree of impact of these disruptors on workers varies according to the nature of the profession and the level of skills, as well as the companies' response to this development by adjusting their employment structure.

Most international forecasts indicate that such transformations inside companies have already begun in many fields, and are continuing to increase. The results of recent studies predict that by 2025, job tasks that have been eliminated by modern technology will increasingly

decline from 15.4% of the workforce to 9% (a decline of 6.4%), and that emerging occupations will grow by 7.8% to 13.5% (i.e., a growth of 5.7%) of the total workforce.[15] This type of substitution, which is called "job disruption," is offset by the creation of new job opportunities in new fields known as "Jobs of Tomorrow," which are expected over the next decade to constitute a significant proportion in completely new professional fields, or existing professions but are subject to a major shift in terms of their job content and appropriate skills.[16] It is estimated that 85 million jobs may be replaced by machines by 2025, while 97 million new jobs may emerge that are more adapted to the new division of jobs between humans, machines and algorithms.[17]

The following table (1) shows the 20 most prominent job tasks in terms of high or low demand at the level of industries. This classification reflects a great development in the dynamics of the labor market, and a clear threat to those on right side of the ranking, which shows the jobs that are witnessing lower demand. First, there is a clear difference between the type of jobs with lower demand and the corresponding jobs in the new fields. The first is mostly

[15] World Economic Forum, The Future of Jobs Report, 2020
[16] For the first time, the World Economic Forum's Jobs of Tomorrow report, in partnership with data scientists at LinkedIn and Coursera, presented a simplified methodology to measure and track the emergence of a range of new jobs in the economy using real-world labor market data that helped identify 99 jobs in ever-increasing demand in 20 economies. These jobs were then organized into distinct occupational groups according to the similarity among their skills.
[17] https://blogs.imf.org/2021/01/07/the-jobs-of-tomorrow/

characterized by providing services, whether through workers only or workers operating electronic devices, while a more precise dimension in terms of scientific specializations characterizes the newly created jobs, even if they are in the service sector, occupying the position of “fin-tech engineer”. The difference is also clear in the level of jobs, as the lowest-demanded jobs range from factory workers and construction workers—at the bottom of the list—to managers, but the highly demanded jobs include only specialists and managers. This reflects the precarity of the situation for blue-collar workers versus white-collar workers. Second, it is clear that the mobility between the two groups of jobs entails an additional cost such as the type of new skills to be learned and adopted. Although some old skills may still be needed, they may require further rebuilding and training in line with the new operating model. For example, job mobility between occupations dealing with people, or in the fields of engineering is somewhat smooth as skill levels converge between jobs. While the situation is different for other fields, such as content development skills (in teaching for example) or specialized skills in precise fields such as data science or robotics engineering where the difference in skill level is relatively large. Among the most important fields that involve wide gaps in terms of skill level, are the disciplines of data analysis and artificial intelligence, as the specialized jobs in these technologies are

associated with large disparities compared to the original jobs, which are witnessing declining demand.

Table 1. The 20 most prominent job tasks in terms of high and low demand

↙	Jobs with declining demand	↖	Jobs with growing demand
1	Data entry Clerks	1	Data Analysts and scientists
2	Administrative and executive secretaries	2	Artificial Intelligence (AI) and machine learning specialists
3	Accounting, book-keeping and payroll clerks	3	Big data specialists
4	Accountants and auditors	4	Digital marketing and strategy specialists
5	Assembly and factory workers	5	Process automation specialists
6	Business services and administration managers	6	Business development professionals
7	Client information and customer service workers	7	Digital transformation specialists
8	General and operations Managers	8	Information Security analyst
9	Mechanics and machinery repairers	9	Software and applications developers
10	Material recording and stock keeping clerks	10	Internet of things specialists
11	Financial Analysts	11	Project managers
12	Postal service Clerks	12	Business services and administration managers
13	Sales Rep	13	Database and network professionals
14	Relationship Manager	14	Robotics engineers
15	Bank tellers and related clerks	15	Strategic advisor
16	Door to door sales, news and street vendors	16	Management and organization analyst
17	Electronics and telecoms installers and repairers	17	Fintech Engineers
18	Human Resources specialists	18	Mechanics and machinery repairers
19	Training and development specialists	19	Organizational development specialists
20	Construction Laborers	20	Risk Management Specialists

Source: World Economic Forum, Future of Work 2020 Report.

It is worth noting that development of the job structure stems from development of the sector itself and then extends to the intertwined and surrounding sectors, as the nature of these new or created job tasks is related to the industry operating thereof. For example, the profession of materials engineers appears in the automotive sectors, and the profession of e-commerce and social media specialists relates to the consumer sectors. Renewable energy engineers in the energy sector, while fin-tech engineering is a profession that emerged as a result of the development of the financial service sector.[18]

4-3. New skill requirements

The fluctuations in job patterns resulted in a similar shift in the demand side for skills, as requirements emerged for new skills. The type of training required varies according to the field and the employment situation. It is noticed that there is a high demand for training courses related to self-skills development or personal development, as well as that training programs for health workers. There are also disparities between the employed and the unemployed, as the employed persons focus more on managerial skills training programs, personal development and human development, which increased by a large percentage of 88%. The

[18] World Economic Forum, The Future of Jobs Report, 2020.

unemployed, however, were more interested in learning technical skills such as digital skills including data analysis, computer science and information technology.[19]

To measure the skills gap resulting from moving to work in emerging jobs or other more complex jobs (Table 2), the difference between the skill requirements needed to perform original jobs and new jobs over the past five years was monitored in a study of future employment trends issued by the World Economic Forum. This was done using an index ranging from zero to one, with the gap widening the closer we get to zero and decreasing the closer we get to one. It is clear from the table that the skills related to marketing and management (Product Marketing, Digital Marketing) do not suffer from a lack of required skill level, which did not record gaps (1: there is no gap), compared to the precise technical skills that require a huge additional effort to be able to perform the new jobs, such as data science skills, natural language processing, cloud computing, and signal processing, which represented about a third of the skills and recorded huge differences (0.10-0.27) in the level of required skills, and an almost complete gap in Artificial Intelligence capabilities.

[19] Ibid .

Table 2. The skill gap resulting from the shift from original to new jobs

Skill	Skills gap as a result of job shift (0=full gap, 1=no gap)
Data Science	0.19
Data Storage Technologies	0.41
Artificial Intelligence	0.10
Development Tools	0.73
Computer Networking	0.78
Management consulting	0.86
Scientific computing	0.41
Product marketing	1
Natural language Processing	0.11
Digital Marketing	1
Advertising	1
Cloud Computing	0.27
Customer Experience	1
Signal Processing	0.16
Information Management	0.93
Software Development Life Cycle (SDLC)	1

Source: World Economic Forum, Future of Work 2020 Report.

Hence, the final impact of the dominance of new technologies on the labor market depends on several factors, the most important of

which are: the type of new technologies and their degree of suitability to existing industries, the ability of sectors to localize technology and generate job opportunities that offset job losses resulting from automation, the level of skills, which determines the gap resulting from the shift from original jobs to new ones, in addition to the relative distribution of workers between white and blue collar jobs.

5. Examples of how countries dealt with recent changes in the labor market and the most important elements of success

The readiness of countries for the previously presented developments in the labor markets varied. Some countries quickly realized these transformations and took steps to confront the technological disruption of jobs, while others recently realized the need to raise readiness in the face of these transformations to reduce job losses, which has been accelerated by the spread of the Covid-19 pandemic. Another set of countries is still looking at how to compensate for the losses. The next section of the report deals with the experiences of three countries that have made progress to varying degrees, namely China as a model for a leading country, Turkey as an example of a competitor country with Egypt, and the United Arab Emirates as a neighboring country to Egypt. The evaluation addresses three pillars of the system for

adjusting to technological changes in the labor market directly and other aspects of economic activity indirectly. These sections are as follows: 1) institutional framework, 2) information framework, and 3) a third framework related to the monitoring and evaluation system to keep pace with technological development and ensure its sustainability.

These three pillars represented the vertices of the triangle upon which the strategies of the countries that have achieved tangible success in this regard were based. It is striking that these countries did not focus on developing their labor markets as much as they focused their efforts mainly on developing the mother system, which is based on developing the education system, the updated technological infrastructure serving it, and complementing all of this with smart technology cities. This resulted in an automatic generation of suitable job opportunities and a gradual adaptation of the labor market to the new normal. Hence, the success of countries came as a direct result of the comprehensive and intelligent view of the transformation system.

5-1. China's experience[20]

At the beginning of the twenty-first century, China adopted a number of policies aimed at developing the education system and achieving a level of equality in educational opportunities between urban and rural areas. The aim was to be able to completely shift from dependence on the agricultural sector, which was the largest employer of labor, especially those with low skills, to industrialization, which needs a higher level of skills compared to rural ones. Accordingly, it began to take gradual serious steps towards transforming the entire education system into a technological system based on modern methods at the time, and took it as a base for building any new technological developments that might emerge. The following are some of the steps China had taken to raise the level of Chinese graduates and employment.

5-1-1. Information framework (inclusion of the technological component in the education and training system)

In 1994, China's most famous universities, including Tsinghua and Peking Universities, were established. The first educational

[20] This section is mainly based on the following two references unless otherwise stated:
Zhu, Y. (2019). New national initiatives of modernizing education in China. *ECNU Review of Education*, *2*(3), 353-362.
Fuyin, X., & Jianli, J. (2010). Programmes of educational technology in China: Looking backward, thinking forward. *British Journal of Educational Technology*, *41*(4), 560-566.

network using the Transmission Control Protocol/Internet Protocol "Chinese Education and Research Network" (CERNET), initially connected five major cities to the Internet. In the following decades, CERNET developed rapidly. By 2008, the number of universities, primary and secondary schools and scientific research institutes connected to the network had reached more than 2,000, with nearly 30 million users. CERNET came to own more than 30 international and regional communication channels in 2010, ensuring high-speed and secure exchange of information between educational institutions at home and abroad.

Thanks to this network (CERNET), Chinese colleges and universities have moved into a whole new era of "e-campus" that will lead the way for all Chinese universities. The term "e-campus" here means an enterprise based on the campus network and integration of digital resources, such as the establishment of an e-learning platform, distance learning, multimedia broadband network, campus management information system, etc., with the aim of forming an ideal digital environment for expanding the application of IT gradually across the campus.

The e-campus program was based on four pillars:

- ✓ Digital storage of resources
- ✓ Transferring information over electronic networks
- ✓ Automation of management or transition to digital management
- ✓ Personalization of Communication

In 1999, the Ministry of Education also gradually approved the establishment of online colleges for 67 full-time higher education institutions, as the basis for building electronic campuses in Chinese universities. By 2010, there were 299 majors, over 20,000 online programs and 2 million students.

By 2010, universities and colleges in China had already completed the construction of ICT infrastructure and began to focus on the application and integration of various management information systems. To some extent, Chinese universities have achieved infrastructure similar to those of developed Western countries.

Besides the in-depth development of the e-campus, ICT has become a vital tool for university teachers in their daily work, as professors in increasing numbers began to use various modern educational technologies in their classrooms.

The special academic and cultural environment that was adopted in colleges and universities, such as the development of new measures and mechanisms in higher education institutions for graduates of colleges of education, was reflected in the acceleration of the spread and development of information and communication technology applied in school management.

5-1-2. Institutional framework for the technological development process

- The central government issues general regulations; while governmental units responsible for educational administration innovate methods for specific applications, and through the appropriate executive mechanism, these procedures are implemented from top to bottom all the way to the schools, where each applies the methods according to its own conditions. Thus, the objectives of the national plan are achieved quickly and effectively in a shorter time and on a larger scale.
- The overall vision and general direction are provided by the Chinese government, and then region-specific policies, according to the economic and cultural differences between local regions. For example, the central government has allocated 10 billion yuan to ensure that the education system is developed equally between the backward rural areas in the West and the

relatively developed regions, and has distributed teachers and equipment to implement the "modern distance education" project in rural primary and secondary schools to be completed within 3 Years. This has led to a significant improvement in the quality of distance education in rural schools, and has enabled them to share educational resources with developed regions.

- The central government manages educational activities in a unified manner while leaving room for the participation of various parties such as local agencies to implement according to local conditions. For example, educational administration entities, especially schools, under the direction of national policy, finance and purchase ICT equipment, and conduct teacher training and experiments that greatly improve the educational process.
- Civil organizations also play an important role in facilitating the dissemination of ICT in education. The Chinese government considers educational technology NGOs to be complementary to government agencies. The entities established by the Ministry of Education to implement the technological development plan include:
    - The Advisory Committee for Educational Technology Programs in the Ministry of Education, whose main responsibility is to direct specialized training in the use of educational technologies.

- The Chinese Committee for e-Learning Technology Standards in the Ministry of Education, which is mainly responsible for building standards related to educational technology.
- The Education Administration Information Center of the Ministry of Education and the China National Educational Research Institute, which are responsible for conducting research on educational technology in related business fields.

- The development plan in itself includes a strategic view targeting China's long-term technological future, and a guarantee to achieve a unified and clearly defined operational plan in terms of specific roles, responsibilities, time frame, indicators for follow-up and performance evaluation, in addition to flexibility in adapting plans according to developments and surrounding changes.

5-1-3. Monitoring and Evaluation Framework: Keeping Up with Technological Development (Shenzhen as a Model for Smart Cities)

Based on the strong technological base from which the Chinese experience was launched, it came to have an updated and comprehensive technological infrastructure that started on a small

scale and then shortly after covered most of the Chinese cities. This contributed significantly to raising China's ability to cope with every new technology, whether digitally or industrially, or its reflection in the education and training system as a prerequisite for the sustainability of this process. This is clearly demonstrated in the remarkable progress that China has made in the field of smart cities and the extent of its competition with leading countries in this regard. Shenzhen, as we will see below about smart China, is an example of a successful experience among eight Chinese smart cities, in order to identify the most important elements of its success as an experiment worth studying.

The city of Shenzhen competes with major industrial cities and countries that are at the top of the global ranking of indicators in technological development, such as Tokyo and Singapore. In 1920, the gross domestic product of Shenzhen was about 2.7 trillion Chinese yuan (equivalent to about US$ 390.6 billion),[21] compared to about US$372 billion for Singapore for the same year,[22] making it the third largest economy at the level of Chinese cities, after Shanghai and Beijing. Shenzhen's GDP growth

[21] https://www.statista.com/statistics/1025207/china-gdp-of-shenzhen/
[22] World Development Indicators https://datatopics.worldbank.org/world-development-indicators/

between 2017 and 2018 exceeded 7.5%, compared to only 3.4% in Singapore and 2.8% in Hong Kong.[23]

In the Global Financial Centers Progress Index 2021, Shenzhen was ranked as the ninth most competitive and largest financial center in the world and sixth in the entire Asia Pacific (after Shanghai, Hong Kong, Singapore, Beijing, and Tokyo). The Shenzhen Stock Exchange (SZSE) is the eighth largest in the world. The World Economic Forum has included it among the most important ten cities in 2035 in the world, along with large cities such as New York, Tokyo, Los Angeles, Paris and London (with Shanghai and Guangzhou in China).[24] According to the 2021 Hurun Global Rich List, Shenzhen is the fourth city with most billionaires (after Beijing, Shanghai and New York).[25]

In just four decades, China has successfully transformed Shenzhen from a primitive fishing village into an international urban metropolis, now dubbed "China's Silicon Valley". Quite simply, the adaptation of AI and big data has changed the way Shenzhen residents interact with government, with tech giants

23 https://www.globaltimes.cn/content/1140560.shtml
24 https://www.weforum.org/agenda/2019/10/cities-in-2035/
25 https://www.hurun.net/en-US/Info/Detail?num=LWAS8B997XUP

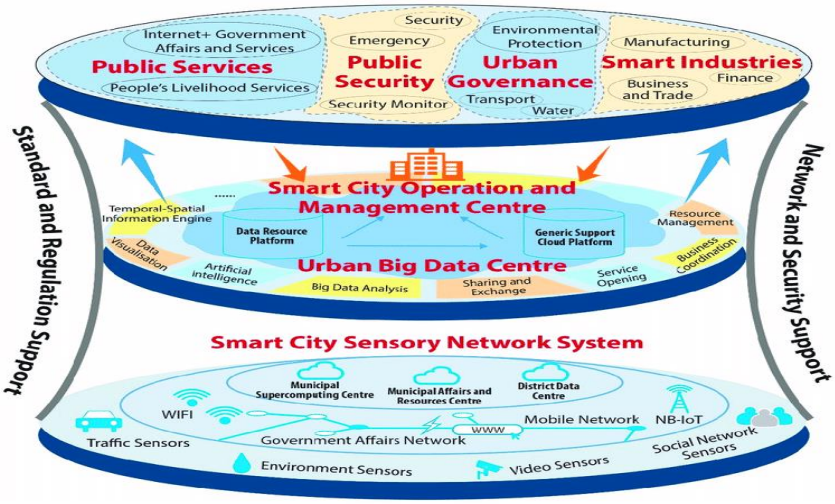
such as Alibaba, Tencent and Ping An Smart City leading the city's innovation engines. Shenzhen now has a "digital brain" and a "central nervous system" that integrates the flow of big data across all government agencies and businesses.[26]

Shenzhen has successfully digitized most government administration in recent years. The i-Shenzhen mobile app, for example, can handle more than 8,000 local government services, from paying utility bills and traffic fines to managing housing benefits and even purchasing Central bank digital currency lottery. The AI-powered food regulator, Ping An, is limiting the approval period for a restaurant license to no more than an hour, compared to several weeks if the order is processed outside the network. As for the traffic system, it changes traffic lights according to traffic conditions in real time, which helps reduce emissions during waiting periods and the regularity of business in emergencies.[27] Figure 1 below reflects the administrative and executive structure of the city, which shows the importance of the institutional and organizational framework, and the mechanism for supporting the interlocking relationships between the three layers, the foremost of

[26] Hu, R. (2019). The state of smart cities in China: The case of Shenzhen. *Energies*, *12*(22), 4375.
[27] https://news.cgtn.com/news/2021-04-06/Tides-of-change-Shenzhen-powers-China-s-smart-city-drive-ZeYdvZA94k/index.html

which are government, public services and smart industries side by side.

Figure 1. The Administrative and Executive structure of the Smart City "Shenzhen" in China



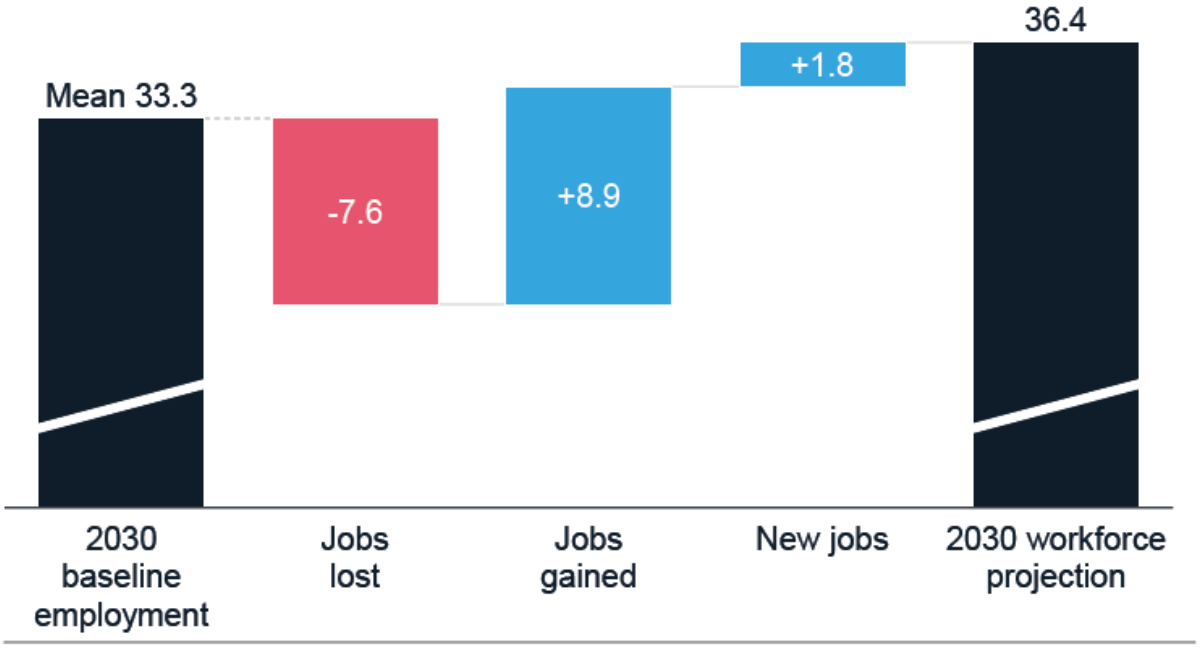
Source: (Hu, R. 2019) [28]

5-2. Turkey's experience

The number of essential workers in Turkey for 2030 is estimated at 33.3 million. It is possible to lose 7.6 million jobs due to the impact of automation and digital technologies, and it is estimated that 8.9 million new jobs can be created by 2030 to achieve a net gain of 1.3 million jobs,[29] as shown in the following Figure (2).

[28] Hu, R. (2019). The state of smart cities in China: The case of Shenzhen. *Energies*, *12*(22), 4375.
[29] Mckinsey & Company, Future of Work: Turkey's Talent Transformation in the Digital Era

Figure 2. Change in expected demand for labor in Turkey as a result of job automation*, for the period 2018-2030



Source: Mckinsey & Company, Future of Work: Turkey's Talent Transformation in the Digital Era
* automation level 20-25%.

In response to these changes, Turkey launched a national plan[30] aimed at developing the educational process and matching the skills of the workforce with the new requirements of the labor market. The most important pillars of the plan are based on education inputs from teachers, learning mechanisms and methods, educational content, and finally, the monitoring and evaluation system. The following are some important objectives of the plan.

[30] Turkey's Education Vision 2023.

5-2-1. Information framework (inclusion of the technological component within the education and training system)

Improving the quality of the teacher

- Raising the level of the education certificate that must be obtained by those wishing to join the Pedagogical and Teaching Colleges through a program specialized in the teaching profession at the postgraduate level within the framework of professional development.
- Linking these programs, in cooperation with higher education institutions, to the urgent fields needed by the labor market and providing teachers with the skills of the twenty-first century.

Educational capabilities

- Adopting digital methods and interactive mechanisms in teaching, through applied simulation experiments that are difficult to conduct in the normal environment, and animations to visualize abstract concepts and others in line with the scientific material. The use of this content is intended to help students to access information, skills, and develop their thinking abilities.
- Conducting assessments through daily life experiences during the learning process as in developed countries instead of relying on traditional assessment tests. These educational

methods aim to extend the learning process beyond the walls of the classroom.

Educational content

- Integrating programming skills, three-dimensional design, electronic design and production skills related to information technology within the educational curricula and applying them through activities that bring together students, teachers, and representatives of the government and the private sector, whether for school or university students in teaching disciplines.
- Introducing topics related to online communication techniques such as safe internet, cyber security, cyber bullying, and data security within primary education programs and courses.
- Developing curricula according to the new competencies required by the industry, and in line with the approaches to digital transformation.
- Strengthening cooperation between schools, scientific centers, culture and arts centers, and universities.
- Qualifying technical workers by creating opportunities for them abroad to meet the needs of Turkey's foreign trade sector.

- Developing curricula and courses to measure new generation digital skills and advanced meta-cognitive skills to help students achieve the desired results in international tests, such as the Program for International Student Assessment (PISA). Such a program for OECD countries aims to enhance students' mental abilities and international educational systems in an unconventional way to test the consistency of the educational process outcomes with the ability to make decisions and manage career life.[31]
- Creating Design-Skill Labs to help students explore and acquire life skills consistent with their interests, talents, and personalities.
- Organizing face-to-face training workshops for faculty in various fields, especially in topics such as the development of multidisciplinary projects, 3D design and smart devices.

5-2-2. Monitoring and evaluation framework: A coherent and comprehensive database

- Establishing an electronic portfolio at all educational levels including files for students starting from childhood, with data related to each child, so that children's development from early

[31] Visit the following link for more details on how the program works and its objectives: https://www.oecd.org/pisa/publications/pisa-2018-results.htm

childhood to higher education can be monitored and evaluated in all fields.

- Designing training programs for parents about their role in the process of measuring the child's progress and evaluating his level electronically.
- Establishing special units for measurement and evaluation in all governorates to monitor and evaluate the social and educational skills of children.
- Conducting a questionnaire aimed at following up on students' achievements, through which the progress of the new system is evaluated, and based on the students' academic outcomes without using any student grades.

5-3. The United Arab Emirates' Experience[32]

The United Arab Emirates has launched a National Employment Strategy 2031, which includes special programs to develop future skills. The most important are programs to enhance and localize skills of artificial intelligence, innovation and e-learning. The following is a brief summary of each.

[32] https://u.ae/en/about-the-uae/strategies-initiatives-and-awards/federal-governments-strategies-and-plans/the-national-employment-strategy-2031

5-3-1. The information framework (the technological component of the education and training system)

The Bachelor of Artificial Intelligence program was launched by the British University in Dubai in partnership with British universities to grant dual degrees, with the aim of providing the education sector with new skills and competencies to meet the challenges of the labor market and the knowledge economy.

The National Program for Artificial Intelligence (BRAIN) includes a set of cooperation and partnership initiatives in the field of artificial intelligence. These initiatives include:

The Emirates Artificial Intelligence Training Program for a period of one year for UAE government employees;

The Emirates Artificial Intelligence Camp for high school and university students, in partnership with the public and private sectors, which aims to provide the necessary support to enable the next generation to develop solutions to various future challenges;

The "Innovate" (Ibtakr) platform is an interactive electronic platform that is the first of its kind in the Arabic language for government innovation, and aims to build a generation of Arab innovators. The platform aims to reach 30 million participants

globally, includes a huge number of online courses and programs, available to all Arabic speakers for free, and grants students accredited certificates.

The National Program for Field Training and Summer Work "Wajehni" was launched by the Ministry of Human Resources and Emiratization, in partnership with the Ministry of Education and universities, with the aim of educating young people about the importance of working in the private sector, guiding them professionally and employing them according to the needs of the labor market.

5-3-2. Institutional framework for the technological development process

The institutional framework of the UAE government for the development process brings together a number of national centers and programs, an independent ministry of artificial intelligence and a number of foreign partnerships to localize technology, raise the level of youth skills and link them to the labor market in terms of skills or educational level. It also manages some development programs by the youth themselves. The most important forms of institutional management in the UAE experience are the following programs:

- The National Training Portal was launched to qualify 18,000 citizens for the labor market during the next three years through a package of specialized training programs offered by the portal to enable young people to obtain jobs and improve their practical skills. This is especially in targeted strategic economic sectors that include customer service, sales and retail, real estate and property management and technical programs in mechanical and electrical engineering, aircraft maintenance and others.

  The duration of the offered programs ranges between 3-6 months, through which the trainee obtains a training certificate issued by the approved training centers in the Ministry. The portal also targets non-employed job seekers or those wishing to change their jobs, and there is no academic requirement or previous experience required to register in the training programs offered.

- Emirates Youth Vocational School (EYPS) - a crowdsourcing model that aims to bridge the gap between the academic experience of young people and the practical needs of the labor market, which is witnessing rapid changes in light of the development of professional sectors, and emerging jobs that require practical qualification. This school is based on a

crowdsourcing model for teachers, using a group of experts, specialists and professionals to provide a practical education experience for young people.

This system is managed entirely by youth under the umbrella of the Federal Youth Foundation. The vocational school focuses on young people in the 15-35 age group, and invests their time in continuing education, and preparing them for the labor market through advanced career paths in various sectors.

- Dissemination of the UAE school model in the academic year 2017-2018, as the UAE unified educational systems, policies and paths among public schools all over the country. The UAE School targets a new innovation-based phase for the education all over the country. In addition, it supports creativity, and upgrading the students' skills, as well as providing students with programming and modeling skills, and creating interrelationships between technical, scientific and technological skills.

- UAE Hackathon. The UAE government organizes an annual event under the title "UAE Hackathon" to encourage data analysis, which is an integral part of current and future skills.

- Development Fund for Communication and Information Technology Sector, which aims to achieve rapid and tangible developments in the information and communication technology sector in the country, and to promote innovation in the areas of smart research and incubation of start-ups. The Fund offers scholarships to outstanding students to encourage studies in scientific and technical fields.

- UAE Skills is an initiative of the Abu Dhabi Center for Technical and Vocational Education and Training. It aims to raise awareness of professions that depend on technical education and vocational training among young people. The activities focus on organizing competitions, training programs and professional technical activities at the regional and international levels. The National Skills Competition is also organized annually aiming to raise efficiency standards in the industrial, technical and vocational sectors in the UAE towards professional excellence. This is through improving competitiveness among UAE youth and benchmarking performance and skill competency with global standards.

  The initiative also aims to enhance skill inclusion by attracting different age groups, such as competitions for young people,

which allow participation for young citizens in the 9-15 years age group, in addition to new societal segments such as special competitions for people with disabilities.

5-4. Elements of success based on the previous experiences

- An Executive plan under the direction of the central government, engaging civil organizations and educational departments in the implementation process.
- Involving youth in the institutional management of the technological development process.
- Starting to include new skills in higher education institutions first, especially in the majors of teaching and pedagogy, then the basic levels of education.
- Foreign partnerships with more than one country to localize new technologies and skills.
- Upgrading the level of technical education to international levels in accordance with foreign trade requirements.
- A strong, comprehensive and unified database at all educational levels since childhood.

- Monitoring and Evaluation units to follow up on the system as a whole on a regular basis.
- Achieving an equal level of opportunities between different educational administrations.

Table 3. Key elements of success and their importance based on previous experiences

Elements of Success	Importance
Design a coherent institutional framework	• Tasks are gradually arranged from top to bottom within a central, unified and comprehensive institutional framework. • The executive plan is drawn up under the guidance of the central government, as well as policies for each region. • Necessary funding is directed in accordance with the development plan. The plan is implemented through educational departments with the engagement of civil organizations. • The development plan does not change with the change of responsible officials. • Establishing specific entities to be responsible for development, similar to the Ministry of Artificial Intelligence in the United Arab Emirates.
Localization of new technological skills	• Foreign partnerships with more than one country, towards creating a strong base to build on in the future, and for the country not to always depend on other countries and thus standing behind.

	• Upgrading the level of technical education to international levels in consistence with foreign trade requirements.
Giving priority to teaching departments in higher education	• Starting to include new skills in higher education institutions first, especially in teaching and pedagogical departments, then moving to basic levels of education to improve teacher's abilities first so that he/she can transfer skills to students.

Educational content development	• Integrating new information technology skills required by the labor market within the educational curricula,
	• Applying these new skills in a comprehensive framework that brings government, private sector and teachers together to:
	  ○ Involve the employers with the teacher in the development process
	  ○ Match between labor supply and demand,
	  ○ Match between education outcomes and labor market requirements.
	• Conducting assessments through daily life experiences during the learning process, as in developed countries, instead of relying on traditional tests, to help students improve their (mental) abilities, explore, and acquire life skills in line with their interests, talents and personalities. These teaching methods aim to extend the learning process beyond the walls of the classroom.

Building a comprehensive monitoring and evaluation system	• A strong, comprehensive and unified electronic database at all educational levels starting from childhood.

	• Monitoring and Evaluation units to follow up on the system as a whole on a regular basis.
Unifying educational system	Creating an equal level of opportunities among regions at the country level.

6. Where does Egypt stand in coping with the new normal of the labor market?

It is clear from the previous experiences presented that the state's readiness is based mainly on the status of the education and labor systems, how consistent the relationship between them is, and the degree of flexibility and dynamism that allows for rapid engagement with the new changes. This is mainly related to three pillars, namely: The institutional framework, the information framework, and the technological base. The following is a quick overview on the Egyptian labor market as well as an analysis of Egypt's position regarding the elements of success previously presented.

6-1. Quick overview on the Egyptian labor market

The Egyptian labor market is characterized by a number of structural deficiencies that make it fragile facing crises and very rigid while coping with global changes. As a result, desired

transformation becomes very difficult process that requires an excessive effort. Over the past three decades, previous periods witnessed clear weaknesses in the dynamics of the labor market, most importantly:

a. Excess demand and supply at the same time, which reflects the severe structural weakness of the labor market, and the inconsistency between educational outcomes and its requirements. Such weakness is burdening the labor market with annual work force beyond its capacity.
b. Weak institutional and legislative frameworks governing the Egyptian labor market, and their failure to respond to structural challenges it faced due to different local, regional and global changes over the last decades.

This is clearly reflected in the characteristics of the Egyptian labor market, as follows:

- Unemployment is higher among the educated, especially university graduates, reaching more than double among those with intermediate technical education, while it is much lower among the illiterate. It is also higher among the youth, reaching about 20% or 5 times the unemployment rate in the 40-49 age group. As for females, the unemployment gap between males

and females is about 10%, which is nearly 2.25 times among females compared to males.[33]

- The position of women in the Egyptian labor market is remarkably low in terms of equal opportunities. In addition to the high unemployment rate among women, their contribution to the labor market is significantly lower, and they suffer from a noticeable wage difference compared to males despite the equal average working hours among them in many economic activities. In addition, the largest percentage of women work in the informal sector (53.2% of the total women workers in Egypt in 2018). The role of women is limited in general in the decision-making process or occupying administrative positions.[34]
- Unemployment rates in urban areas are about two and a half times higher than those prevailing in rural areas, despite the concentration of industrial activities in urban areas.[35]

These indicators represent a reversing of the normal conditions in which educated young people get better job opportunities in

[33]The Central Agency for Public Mobilization and Statistics, Annual Labor Force Survey Bulletin, 2020.
[34] For more details on the situation of Egyptian women in the labor market, see the “Views on the Crisis” report on Egyptian Women, No. 21.
[35] Central Agency for Public Mobilization and Statistics, Annual Labor Force Survey Bulletin 2020.

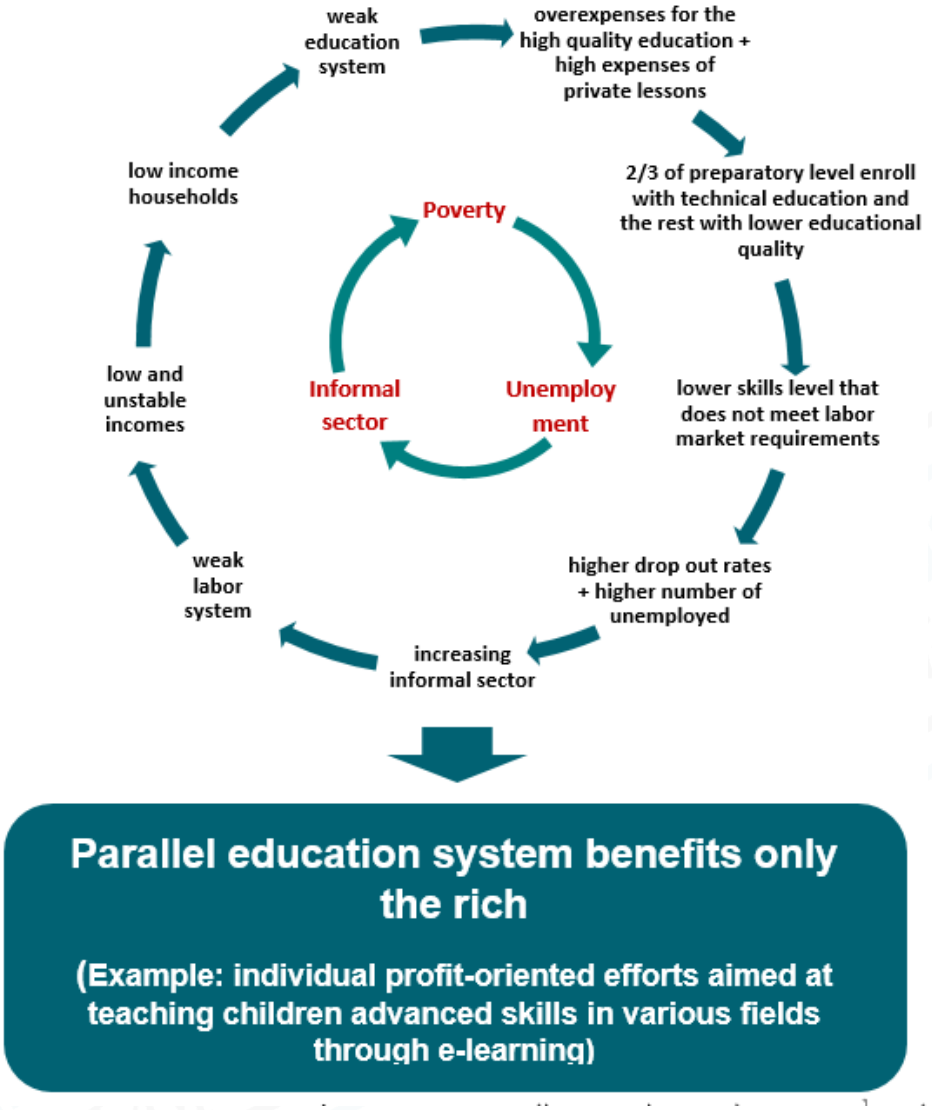
urban areas compared to rural areas, with a noticeably high gender gap.[36]

The negative impact of the weak education and labor systems on Egypt's future opportunities over the coming generations is evident, as it reflects the nature of the vicious circle around which students and graduates, especially in public schools, revolve.[37] This is illustrated by Figure (3):

[36] For more details on the dynamics of the Egyptian labor market and analysis of the structural distortions it suffers from, see the "Views on the Crisis" report on the Impact of the Covid-19 Pandemic on the Egyptian Labor Market, prepared by the Egyptian Center for Economic Studies as part of facing the supply and demand shocks due to the repercussions of the Covid-19.

[37] El Baradei, Mona 2003. The Private Rate of Return to Education, Educational Inequalities and Poverty in Egypt. Research Papers Series. Economics Department, Faculty of Economics and Political Science. Cairo University. June.

Figure 3. Vicious circle resulting from weak education and labor systems



Source: Prepared by the Egyptian Center for Economic Studies.

6-2. The Egyptian system versus the elements of success

In order to take a deeper look at the ability of Egyptian labor market to cope with the global changes and new patterns of employment. The following table (4) shows where Egypt stands regarding the success factors of previous experiences in terms of the three

pillars: the institutional framework, the information framework and the monitoring and evaluation framework, and what is required to cope with the new normal.[38]

Table 4. Egypt's position in terms of the elements of success, and requirements to cope with the new normal of the labor market

Elements of Success	Egypt's Position	Requirement
Dimension1: Coherent and Effective Institutional Framework		
1. Proper design ensuring good governance of development plans	• Fragmented affiliation between many bodies and authorities with different specializations for the same file, including Ministry of Education and Technical Education, Ministry of Higher Education and Scientific Research, Ministry of Manpower. As well as Ministry of Planning and Economic Development and Ministry of Finance, as they determine together the education funding	• Integrated institutional framework for the system as a whole (education, labor and technological development), which are no longer separated as before, a fact that was realized by countries that were able to adapt to new developments and achieve integration between them as mentioned in the

[38] In a recent report - unpublished (July 2020) - entitled "The Fourth Industrial Revolution, Artificial Intelligence and the Future of Work in Egypt", the International Labor Organization in cooperation with the American University in Cairo - Advancing the Decent Work Program in North Africa ADWA - analyzed the response of the Egyptian labor market to the COVID-19 pandemic and its ability to automate at the sectoral level.

	allocations. Adding the Ministry of Trade and Industry that are concerned with vocational training. In addition, there is a huge number of councils, bodies and projects that lack coordination, and some of them are not addressed by the relevant legislation. • Each ministry develops its own sectoral strategy, and thus we end up with a number of conflicting development strategies from several ministries. The same is true for sectoral socioeconomic medium-term plans that are not binding. In the sense that they may change with the change of the responsible minister, despite their presence in the five-year national socioeconomic development plan. • Development initiatives are associated with separate committees	country experiences previously presented. • Promote the proper institutional framework in terms of the flow of the strategic view through more centralized thinking while having decentralized implementation. This way development directions emanate from a unified vision at the national level (top bottom approach), and do not change with the change of the relevant minister. • Coordination between various responsible authorities, defining clear specializations and roles. The responsibility of the

	that do not meet periodically and are centered inside the ministries. Furthermore, there are no specific rules or standards for development. For example, in higher education, there is no unified scheme for development at the university level, but the decision is left to each university (and sometimes to each college). • The institutional framework is generally outdated and not updated with the new qualifications and expertise required.	entire sector should be assigned to one authority to avoid conflicting, fragmented and unsustainable development plans. This also ensures consistency between different policies targeting the same objective.[39] • An updated qualified institutional framework to deal with the new background, away from old structures and expertise, which are no longer compatible with global developments.
2. A unified and comprehensive implementation plan in its objectives and diverse in time frame	• The variety, multiplicity and inconsistency of time and technical frames of relevant ministries plans and strategies, such as education, labor, communications and	• A Consistent timeframe based on roles and priorities, through developing a diversified staged framework to cope with global changes (immediate – medium

[39] For example, imposing a tax of up to 14% on e-commerce operations contradicts the main objective of promoting digital transformation.

	information technology, which result in overlapping and unclear priorities. Each of them formulates their own development strategy timeframe without coordinating among each other. Therefore, the sectoral dimension of the plans is absent, and they do not take into account the differences between sectors, and the skills required for each of them.	term – long term) according to the degree of necessity of each sector separately, and each activity within each sector. This means giving priority to immediate changes required in the short term to compensate for job losses. Then gradual progression of the action plan according to the nature of the sector, its complexity, and expected impact. For example, starting immediate steps to reform education and training system in order to achieve adaptation in the long term. Though giving the same importance to all staged actions of the plan.
3. Consistent and sustainable financial plans	• The final decision in determining the allocations for financing the education development plan is in	• A higher decision at the level of the Republic to allocate a certain percentage in line with the unified

	the hands of the two Ministries, Planning and Economic Development, and Finance not the Ministry of Education or Higher Education. If the ministry needs more funding for development, it relies on other resources. • The education budget, in general, represents a very small percentage of the gross domestic product, not exceeding 2.7%, and less than the percentage stipulated in the Egyptian constitution. Therefore, it does not fulfil the desired development. Furthermore, most of the budget is directed to wages and not development (about 74% of it is allocated to wages and salaries (that are essentially low)).	development vision and in coordination with relevant ministries. China has successfully done this to ensure sustainability of the implementation plan in the short and long terms, with a clear time dimension for the financing plans in consistence with the varied timeframes of the action plans.
4. Comprehensive system for	• The teacher development system is weak, and not taken into account when choosing	• Developing higher education curricula in teaching departments (Faculties of

teacher development	new educational systems for development. • The educational curricula in faculties of education are outdated and do not conform to the new requirements of the educational system, whether in terms of content or teaching mechanisms. • The inferior view to the faculties of education and lack of interest in them due to placing them among the bottom specialization faculties. This is also reflected in the social status (in terms of salary and career advancement) of the teacher after graduation, compared to other professions of less importance that receive higher salaries (inverted wage pyramid), without having a higher level of education, experience, culture or any other wage determinants.	Education) and incorporating modern technology skills into them, in line with the educational system requirements for the new generations. • Raising the social level of the teacher, in terms of wages and privileges, to comparable levels with other professions that enjoy higher wages; similar to developed countries which honor the teacher and offer them competitive wages in recognition of their role in educating new generations. For example, in Germany teachers are paid comparably to other professionals and those who taught them. • Benefiting from the Turkish experience

		with regard to the dynamics of the development system, teaching students and teachers together when learning new skills that emerged.
Dimension2: Information Framework		
1. Sustainable localization of new skills	• There are some successful projects that are concerned with localizing skills, such as the Mubarak Kohl initiative. However, such projects lack sustainability due to the following: 1. Weak funding, as it depends on donor funding and not government funding with specific percentages within the development plan. 2. Not generalized, as they are applied to certain groups in some schools and not at the national level. 3. Not addressed by the legislation related to the	• Localizing new skills through sustainable partnerships established by the central government with developed countries in a way that ensures sustainability. • Expanding the scope of benefiting from these partnerships via (Training Of Trainers), to ensure the sustainability of the process so that they are employed in subsequent projects on a larger scale, and so on. • Involving the private sector in the process of development, training methods and

	educational process like other educational tracks. 4. Not binding to the private sector, as in successful developed countries.	performance evaluation, especially in technical education tracks. This can be done through the application of industrial parks that combine factory, technical school or technological college and the market in one place. • Upgrading the technical education system by creating a path equal to general secondary education, and opening opportunities for them abroad.
2. Comprehensive and up-to-date development of educational content	• Weak educational curricula in the basic levels and their lack of an electronic component, especially in public schools. • The ineffectiveness of the academic performance evaluation system for students, whether during the basic levels (albeit undergoing	• Equipping basic education curricula with the fundamentals of e-learning, the internet, and learning new skills. • Revising assessment methods for students in different educational levels, using international tests that depend on

	some development now), or after the secondary level to enroll into universities, on which the future of students in the labor market depends. This is evident in the high unemployment among the educated mainly, especially among higher education graduates.	the mental abilities of the student. • Priorities of the private sector skills requirements can be included in the assignments and applied projects of practical colleges such as engineering, computer science and others.
3. Unified educational system	• Huge differences, whether between regions or the types of education itself. This is clearly reflected in the high unemployment rates and the spread of the informal sector in the labor market. • The quality of education varies between urban and rural areas in terms of quantity and quality, so that the latter (most of which suffers from a high poverty rate) face severe weakness in capabilities. Starting from the availability of schools, educational tools and	• Gradually unifying the educational system at the national level to ensure equal opportunities between urban and rural areas and a uniform level of graduates. • Unifying educational curricula, and learning-paths, and

	equipment, Internet and others, to the quality of teachers, availability of textbooks, means of transportation and others. • There are great disparities in education systems between government, private and international schemes, in terms of the quality of education, which creates educational layers in the labor market after graduation, and a parallel system of education that benefits only the rich, and weakens the quality of government education, that embraces the largest number of young people.	integrating parallel education systems into the official government education so that all students receive the same educational service.
Dimension3: Monitoring and Evaluation system		
1. A unified and comprehensive database for the educational levels, linking it	• There is no unified, comprehensive and updated database for the educational levels or the labor market.	• Building a strong, unified, comprehensive and updated database to be used in student assessment and evaluation of the

to labor market data		education system performance as a whole even after joining the labor market. It can also be used in matching labor supply and demand.
2. Comprehensive system for monitoring and evaluation at the National level	• There is no system for follow-up and evaluation of the development plans objectives on the ministerial level. Rather, development projects and proposals are implemented by relevant ministers without any follow-up, which leads to the emergence of weaknesses in late stages of implementation.	• Establishing special monitoring and evaluation units that end up into a unified system at the National level on a regular basis, so that adjustments can be made according to the evaluation results and quickly identify any technical problems during implementation. The aim is to reduce costs and ensure the sustainability of development plans. This should be done electronically so that it is linked to the M&E database, similar to the Turkish experience.

3. An objective evaluation mechanism to achieve good governance	• The responsible ministry evaluates its own performance through performance indicators set at the beginning of the planning process.	• The recipient of the educational service (the private sector and parents) does the evaluation and not the provider. The Turkish experience can be useful in this regard, as it has integrated the parents within the evaluation system and allowed them to enter the database and communicate with the service provider with the possibility of teaching them how to do so if necessary. • Develop a clear performance - measurement timely consistent indicators and implementation framework, so that the evaluation process is staged and carried out periodically and within a measurable achievement range. (For example, exceeding targeted, exactly targeted and

		below targeted). The aim is to allow for accountability and adjustment throughout the implementation phase.