

**Arab Republic of Egypt
Institute of National Planning**



2022

Planning and Development Issues Series No: (335)

**Executive
Summary**

**Analyzing the Workforce Structure in the Egyptian
Economy: The Fourth Industrial Revolution**

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Introduction

The incompatibility between the educational process's outcomes and the labor market's needs has become a general phenomenon that is expanding severely, especially with the economic changes that the national economy is going through. This has led to structural changes in the Egyptian economy, like the use of technology-intensive heads. In addition, it led to a structural imbalance that manifested in structural unemployment among the youth and the educated.

Egypt suffers from a high rate of structural unemployment, which is linked to the mismatch between the outputs of the educational and training systems and the skills required in the labor market. Unemployment rates in Egypt are found primarily among university graduates and those with above-average qualifications. As a result of the growing gap between the outputs of education and training and the needs of the labor market, new issues were raised concerning the quality of graduates of the educational system. A plan was set to develop the skills of the workforce to meet the requirements of the labor market, especially in light of international changes, scientific and technological developments, trade liberalization, the openness of markets, and the increasing intensity of global competition which caused a problem. Unemployment is more complex and the management of labor markets has taken on new dimensions. From this logic, the importance of forecasting the demand and supply of labor in the Egyptian labor market flourishes, that is one of the means through which compatibility between the needs of the labor market and the outputs of education and training can be achieved.

Keeping up-to-date with developments and changes that occur in the Egyptian labor market and the educational process, through forecasting, policies or measures can reduce the expected gap. It is worth noting that the process of forecasting the labor market for the demand and supply sides is not easy, especially in developing countries. Data quality, financing, and the regularity or periodicity of anticipating represent some of the problems that impede the process of anticipating the skills required in the labor market.

The relationship of the research with the fourth industrial revolution is very clear, as the fourth industrial revolution brought many changes and resulted in inequality. Mechanization replaces employment in all aspects of the economy, and the net exit of workers by machines may exacerbate the gap between capital returns and returns on work. Under the umbrella of the fourth industrial revolution, ordinary labor will not be the most valuable, but it will be those people who can generate new ideas and innovations. Hence, the phenomenon of structural unemployment is expected to increase, and the gap between available and required skilled labor is increasing.

Objectives

- Determining the general changes that will occur to several workers, whether at the level of economic activity or professions, and the numbers in the labor force are also determined. Identifying the development that occurs on the demand and supply levels is very important. It is possible to formulate a set of educational and training policies and a strategic plan for all the problems that are expected to occur. This will help reduce the costs of adjustment that appear as a result of the mismatch between supply and demand in the market.
- Determining the components, nature, and gap between demand and supply. Then this needs to look at the requirements of the labor market and predict the transition from one profession to another or from one activity to another and then determine the quality of transformative education and training. If it is expected that there will be a surplus supply in a particular activity or profession, which will result in a decrease in wages in this profession or activity, then individuals will search for another activity or profession in which it is expected that there will be an excess of demand. It is worth mentioning that wages are expected to rise when the worker begins to take courses and training programs to move to this profession.
- Research appears to be of particular importance in the era of rapid technological development, information exchange, extensive use of knowledge, and the tendency of the state in Egypt to deepen local industrializations. Thus, it is important to identify whether the labor force in the future will be prepared for the needs of the labor market in Egypt. The main question of the study revolves around the number of employed people, the labor force, and the qualities expected in 2030.

In addition to the main questions, there are some sub-questions such as

- What is the current situation of the Egyptian labor market, and what are the policies that contributed to the high unemployment rates and low employment rates?
- What are the different planning methods for the labor market?
- What economic activities and professions are expected to occupy a large proportion of workers in 2030?
- What are the expected numbers of the labor force during the period from 2020 to 2030?
- What are the policies that can be recommended to improve the demand and supply sides of the labor market in Egypt during the coming period?

Methodology

The study follows more than a scientific approach to deal with the phenomenon in question, depending on the nature of the research problem and its objectives. The solutions represented in the recommendations and proposals marketed by researchers to address the research problem. The study also follows the analytical method, which helps in achieving more accurate results through fragmentation, division, and

evaluation of the problem. It clarifies that the foundations of the analytical method complement the procedures of the descriptive method or other scientific methods used in the study.

The study follows the quantitative approach which depends on one of the measurement methods that are used in research, which is to test hypotheses, and then apply the acquired theories and concepts to the research problem because the research is scientific. The quantitative approach refers to the systematic research of the phenomenon in question through statistical and standard methods. The quantitative research in the study aims to develop and employ standard economic models, theories, and/or hypotheses related to unemployment to arrive at scientific proposals to resolve the problem of the study.

Findings

- 1- The future of labor in light of the technological developments imposed by the fourth industrial revolution is not clear and there is a great deal of uncertainty surrounding the future of employment. The impact varies between job losses; as a result of mechanization; the creation and emergence of new jobs and tasks and new products that will be produced and consumed as a result of innovation. The outcome of this battle will be determined by many factors, the most important of which are: human capital and the level of various skills it possesses, the degree of progress of the economy and infrastructure, the size of the informal sector, the relative costs of capital and labor, trade barriers, and lack of information ...etc.
- 2- By 2025, it is expected that the adoption of certain technologies will increase such as cloud computing, big data, e-commerce, artificial intelligence, and data security are high priorities, so companies are expected to restructure their workforce in response to these new technologies.
- 3- The global GDP is also expected to increase to reach 14% in 2030 as a result of accelerating the development and use of artificial intelligence, driven by gains in increased productivity and growth in consumer demand. Thus, the industry would become one of the most important investment opportunities for the business community. Estimates indicate that the countries of the Middle East region will be able to achieve economic gains (equivalent to 11% of the GDP) by taking advantage of AI technologies by 2030.
- 4- There is a strong difference and many difficulties in estimating the number of jobs that may be lost as a result of mechanization and the technology of the fourth industrial revolution. On the other hand, there is almost complete agreement that this industrial revolution has made two basic changes. Firstly, re-engineering many job skills and duties and changing the way of working. Secondly, the creation of many other professions and jobs that are called future professions and jobs.
- 5- Job roles such as data analysts, scientists, artificial intelligence and machine learning specialists, robotics engineers, software and application developers, as well as digital

transformation specialists, will be heavily in demand. However, job roles such as process automation specialists, information security analysts, and IoT specialists will be in demand more than employers. Thus, this reflects the acceleration of mechanization as well as the growing cyber security risks and a clear risk to employers that will witness a decline in demand for them; factory workers and construction workers (blue-collar workers).

- 6- Covid-19 pandemic development results have accelerated the intensity and speed of adopting the applications of the fourth industrial revolution to face the economic and social challenges imposed by the pandemic. Three main trends are expected to continue in the future, the potential for the continuation of the hybrid remote work model, the growing share of e-commerce and the delivery economy, and the increasing resort of companies to automation and artificial intelligence. Thus, the scope of changing occupations for the workforce during the pandemic may be more than expectations before it.
- 7- Technology is changing the demand for skills in favor of cognitive skills and social behavioral skills, which are largely formed in the early years of life. Therefore, enhancing investments in human capital is required, as it is the safest and the most effective way to build future skills for labor markets.
- 8- The skills gap and the weak ability to attract talented experts represent one of the biggest obstacles to companies' adoption of new technologies. The skills related to marketing and management do not suffer from a lack of the required skill level. They did not record gaps, compared to the precise technical skills that require additional effort to be able to perform jobs like new skills such as data science skills, and cloud computing, and an almost complete gap in artificial intelligence capabilities.
- 9- The most important skill sets that will be in demand are thinking and critical analysis, problem-solving, and self-management skills such as active learning, stamina, working under pressure, and flexibility. There is also a set of specialized skills needed for future jobs, such as product marketing skills, digital marketing, and human interaction with computers, which have been called Cross-cutting skills because they are easily applied across many professions and roles.
- 10- The development of digital skills will be a critical issue in addressing several challenges in the Middle East. It will help the internationalization of the local industry and the modernization of government services. Skills development systems for the MENA region also need to be innovated to absorb the young workforce. By 2050, more than 300 million young people will come into the labor market and women will participate in the workforce.
- 11- The improvement in the rate of economic growth was accompanied by a decrease in unemployment and employment rate at the same time, which reflects the decline in the rate of contribution to economic activity during the study period. It was noted that it decreased from 46.9% in 2015 to 41.5% in 2020.
- 12- The increase in the share of the private sector outside the establishments from the total number of employees, compared to the decline in the share of the organized private sector and the government sector. In 2020 the workers outside the establishments

represented 35% and 44% inside the establishments compared to 28% outside the establishments and 48% within the establishments in 2015. Indicators show weak work quality in the private sector, especially outside establishments. The percentage of social insurance subscribers, health insurance subscribers, and workers with a legal contract does not exceed an average of 10%, 2%, and 2% respectively.

- 13- Services account for the largest share of job opportunities, as they account for 67% of the total employees in 2020 and were 63% in 2015. There was a decline in the share of agriculture and fishing to only 20% in 2020, while the share of the manufacturing sector is still modest, even if it witnessed slight improvement recently, it reached 13% in 2020 compared to 11% in 2015. The construction, wholesale and retail trade are the services that accommodate the most workers.
- 14- Despite the decline in unemployment rates, disparities persist. The unemployment rate is still higher than the average at the national level among youth, females, those with qualifications, urban governorates, and borders.
- 15- Covid19 pandemic caused a decline in the economic growth rate and an increase in the unemployment rate to reach 9.6% during the fourth quarter of the fiscal year 2019/2020. It is worth noting that there is a discrepancy in the characteristics of the unemployed during the pandemic, specifically in the educational situation and the geographical region, from what is usual and previously mentioned; in the regions. During the second quarter of 2020, the border provinces witnessed the highest unemployment rate, reaching 14.6%, which indicates the impact of the crisis on their economic activities, especially tourism. According to the educational status of the unemployed, those of intermediate qualifications were of the highest unemployment rate and this is logical due to the low rate of economic activity as a result of the crisis. Consequently, the dispensation of many categories of machine operators and administrators, followed by those with a university qualification and above, where the rate of unemployment reached 14%, which decreased by 1.6% compared to the previous quarter. This indicates a high demand for this category as a result of the crisis imposed by companies and individuals towards increasing the use of technology in all areas of education, health, government services, and others, which is related to the higher educational level.
- 16- The labor market in Egypt is still far from meeting the requirements of readiness to face technological developments. It suffers from multiple challenges that weaken its ability to face the technological revolution changes and take advantage of the opportunities that it may offer and face the challenges it imposes. These challenges can be divided into two types: first, what was highlighted by employment indicators in Egypt, and the second is valid organizational challenges referred to by multiple studies.
- 17- Among the most important organizational challenges are:
Information Gap: Data on the supply and demand sides is still not comprehensive, and demand data in particular is limited. There is limited information provided by business owners about the opportunities available. They do not have information

about the skills of job seekers, in addition to the limitations in the channels that can link between business owners and job seekers. Thus, this makes it difficult to build employment policies in light of rapid and dynamic technological changes that reflect developments on the supply and demand sides and go beyond jobs, but also identify the required skills.

- 18- The institutional framework governing employment in Egypt is still characterized by a plurality of actors; for example, the Ministry of Manpower, the Ministry of Trade and Industry, the Ministry of Education, the Ministry of Planning and Economic Development, the Ministry of Finance and International Cooperation, and a large number of international organizations and institutions. There is no guarantee for the continuation of effective coordination among them in a way that improves the regulatory framework for the labor market. This was the role that was supposed to be played by the Supreme Council for Human Resources, which is still largely far from activation despite its increasing importance now. The accompanying challenges and technological developments associated with the fourth industrial revolution exceeds the ability of any single party to deal with it.
- 19- The economic participation rate in Egypt reached 42.3% in 2020, which is lower than the average economic participation rate in the Arab region, which reached 47.9%, while the economic participation rate in the world was 60.51%.
- 20- There is relative stability in the economic participation rate for males from 2016 to 2020, as the participation rate reached 35.2% in 2020. While the economic participation rate for females decreased from 11.3% in 2016 to 7.1% in 2020.
- 21- The average economic participation rate reached 44.96% from 2016 to 2020.
- 22- The illiteracy rate among females has increased, reaching 24.7%, while the illiteracy rate among males has reached 13.7%.
- 23- The dropout rate from primary education was 0.3% (60% males and 40% females) in 2018 and 2019.
- 24- The dropout rate from secondary education reached 2.7% (52.6% males and 47.4% females). The high dropout rates at this stage may be due to the tendency to work in some rural governorates or too early marriage.
- 25- The working-age population is expected to reach 76.3 million in 2030.
- 26- According to population projections, the population of Egypt in 2030 is expected to range between 117.3 million and 125 million.
- 27- According to population projections (the medium hypothesis), the number of males and females is expected to increase from 2022 to 2030 by 13.4% and 17.9%, respectively. This indicates the need to provide decent work opportunities for females in the coming years to avoid an increase in the gender gap in unemployment rates by 2030.
- 28- According to population projections (the high hypothesis), which is the closest to the application from our point of view, the population will reach 121 million in 2030, as the number of females and males increases between 2022 and 2030 by 14.7% and 14.3%, respectively.

- 29- According to the forecast results, the size of the workforce in Egypt is expected to rise to 38.2 million in 2030, a 34.3% increase over the actual size of the workforce in 2020, as 9.7 million people will enter the labor market during the ten years (2020-2030). This indicates the need to provide approximately one million job opportunities annually to maintain the unemployment rate as it is now.
- 30- According to the prediction results, the male and female labor force will increase by 28.8% and 66.8%, respectively, from 2020 to 2030.
- 31- According to the forecast results, in 2030 the number of holders of intermediate technical qualifications is expected to reach 12.8 million, the number of holders of university and postgraduate qualifications is expected to reach 7.6 million and the number of holders of the qualification above average and below university will reach 1.6 million.
- 32- The plan worked to confront the employment problem by relying on both fiscal and monetary policy, as it encouraged the establishment of medium, small and micro enterprises to reduce the unemployment rate among youth.

Recommendations

The research team recommends the need to work on directing policies at the state level.

1- The focus should be on four areas:

A- Investing in human capital to develop all basic and future skills:

At the state level, it requires investment in human capital by directing the current education systems to focus on forming new generations specialized and brilliant in the fields of science, technology, engineering, and mathematics on which artificial intelligence techniques are based, from kindergarten to university education. Private companies and the governmental public sector can also work on retraining and rehabilitating existing workers to acquire new skills and experiences that are directly relevant to future jobs.

B- Providing digital and technological infrastructure and ensuring equitable access to it by all segments of society.

The degree of progress of the economy and the provision of infrastructure - especially technological - is one of the basic requirements necessary to prepare and integrate into the new future jobs in light of the fourth industrial revolution and the post COVID 19 situations. This ensures the equitable access of this digital infrastructure to all segments of society to ensure a fair distribution of economic opportunities.

C- Strengthening social protection to facilitate the process of moving towards future jobs.

The structural changes imposed by the fourth industrial revolution will require a greater role for the state. It provides social protection for informal workers and low-

skilled workers through retraining and rehabilitating them on the one hand, and deepening the role of social safety nets to reduce the expected gap in income levels on the other hand.

D - Creating a financial space in the general budget to support and finance the development of human capital and social protection systems.

Providing the necessary funding to achieve the above three factors requires interventions by the state on the level of fiscal policy. It imposes taxes on capital and giant technology companies and uses the proceeds from this tax to support the rehabilitation of workers and strengthen the capabilities of social protection networks to provide the necessary support to face job loss.

2- The need to work on developing the digital and technological skills of technical education graduates due to the requirements of the labor market (electronics, software, and other technological fields), especially in light of the fourth industrial revolution and the technological development that distinguishes it.

3- The necessity of working on developing the current technical education and introducing some technological specializations to meet the requirements of the labor market, whether it is currently or short-term.

4- The necessity of adding ICT subjects to the basic education stages (primary and preparatory), and considering it part of the curriculum to be added to the total mark to increase the interest of school students in this subject.

5- Update the legislation on basic education and monitor the activation of such legislation to combat the phenomenon of dropouts from education at that stage.

6- The necessity of providing decent work opportunities for females that are appropriate to the current technological development, to avoid increasing the specific unemployment rates between males and females.

7- The necessity of developing academic curricula in university education (especially faculties of computing, information technology, artificial intelligence, technological universities, etc.). Teaching courses that include topics of cyber security, information security, outsourcing services, and other technological topics.

8- Provide more technical schools and specialized technological universities that prepare students for the labor market.

9- The double influence of technology and globalization (the fourth industrial revolution). There is no doubt that the dual power of globalization and technology that the fourth industrial revolution proposed has re-modified the features of the global economy and the relations between the states. This was manifested in labor markets. The fourth industrial revolution differs from the previous three revolutions in speed and

reliance on electronic platforms and the introduction of artificial intelligence in all aspects of life.

Policy Impactions

1- Pay attention to the policy of Investing in human capital to develop all basic and future skills.

A- At the state level, it requires investment in human capital by directing the current education systems to focus on forming new specialized and brilliant generations in the fields of science, technology, engineering, and mathematics on which artificial intelligence techniques are based, from kindergarten to university education.

Private companies and the governmental public sector can also work on retraining and rehabilitating existing workers to acquire new skills and experiences that are directly relevant to emerging and future jobs.

B- Providing digital and technological infrastructure and ensuring equitable access to it by all segments of society.

The degree of progress of the economy and the provision of infrastructure - especially technological - is one of the basic requirements necessary to prepare and integrate into the new future jobs in light of the fourth industrial revolution and the post-COVID 19 situations. This ensures the equitable access of this digital infrastructure to all segments of society to ensure a fair distribution of economic opportunities.

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