The emergence of the "information have-less" class of labor in the information age and its presence in Egypt

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Abstract

Purpose – At the beginning of the 21st century, a new class of information workers, the "information have-less" has risen. This class of workers alleviates the influence of information and communication technologies (ICTs) revolution on poverty and unemployment. The purpose of this study is to investigate the presence of this class of workers in Egypt and assess the size and potential growth of this category of workers.

Design/methodology/approach – The study clarifies the conceptual framework of the new division of labor, in the information age. The Central Agency for Public Mobilization and Statistics, American Chamber of Commerce in Egypt, Ministry of Communications and Information Technology and Information and Decision Support Center websites provided secondary data for this study. These data are used to assess the size of "the information have less" in Egypt.

Findings – The division of work and class, in the 21st century, depends on the level of skills possessed to work with ICTs. So, class and labor nowadays could be divided into self-programmable labor (Innovators). Information have-less labor class, adding value to the economy by learning skills and presenting repetitive work. Generic labor class, who cannot work with ICTs, and work in jobs, that do not need computers or other ICTs. The study has shown that the "information have-less" labor class is present in Egypt since the beginning of the 21st century, in all its categories; entrepreneurism, the service sector and the manufacturing sector. There are approximately 50% of this labor class in the service sector and only 13% of the information have-less works in manufacturing sector despite the great opportunities that Egypt has to expand manufacturing to absorb more employment. The inclusion of information technology (IT), in all domains, has not decreased employment in Western countries but has reallocated information have-less employment toward the service sector, and there would probably be the same effect in Egypt.

Practical implications – The study highlights the need for Egyptian policymakers to encourage the manufacturing and service sectors to provide huge working opportunities. The Egyptian government has to change the educational policies, at all stages, to include digital learning skills so IT can be incorporated in a wide range of economic activities. Further research includes: conducting a survey to measure the contribution of the entrepreneurial part of the information have-less employment in Egypt. In addition, a model may be developed, by the researcher to examine the reallocation of employees in Egypt.

Originality/value – Studying employment, in Egypt, using the conceptual framework of the information age is rarely being done.

Keywords Social morphology, Network society, Timeless time,
Space of flows and "information have-less" labor class

Paper type Research paper

1. Introduction

A new paradigm, referred to as the Information Age, emerged in the late 20th century, as a result of the diffusion and the spread of information and communication technologies (ICTs),

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especially the Internet. This new paradigm brought about a new social morphology and social structure, which are continually evolving.

A paradigm, in general, is a conceptual pattern that determines the standards for performance. A new paradigm has new concepts, new sciences and new ways of thinking that could help in solving problems. It organizes discoveries into a system of relationships characterized by its synergy, which means that the added value of the system is bigger than the added value of its individual components (Kuhn, 1962). Social morphology could be defined as "*It is made up of the mass of individuals who constitute society, the manner in which they have settled upon the earth, the nature and configuration of those things of all kinds which affect collective relationship*" (Durkheim and Lukes, 1982).

The information age or the informational mode of development is the technological paradigm that constitutes the material basis of early 21st-century societies. The literature contains various theorizations about the information society analyzing the relation between the ICT revolution and social changes. These social changes are comprehensive, including cultural, institutional, economic and power transformations. The most important researchers in this field are Daniel Bell (1919–2011) and Manual Castells (born in 1942); their thoughts and theories have had a deep influence on other researchers until the present day.

Since the 1960s, there has been a continuous effort to build a multidisciplinary framework for analyzing the relation between society and ICTs. In the early 1970s, Daniel Bell used the term information society and knowledge society to describe the social development and transformations of the post-industrial society (Bell, 1973).

Bell expected several structural transformations in society, mainly, a change from manufacturing to services in economic activities, a change toward science-based manufacturing and also, the emergence of a new technical class (elites), resulting in social stratification.

Bell predicted the presence of a ruling or influential class of well-educated people, having skills and the ability to use information and technologies. This class' innovations produce value added to augment the processing power of technologies. Bell expected that this trend would continuously grow; leading this class to have the best jobs and higher earning power. The majority of people, who do not have these skills, would suffer from unemployment, resulting in great stratification in the working class structure, and, in general, a Western style capitalism that would dominate the global economy (Bell, 1973).

Bell's theory concerning structural transformations of the society due to the spread of ICTs, dominated theoretical thinking for decades. His thoughts were developed and emphasized by the concept of "end of history" (Fukuyama, 1992) and the "end of geography" (Obrien, 1992).

In the mid-1990s, Manuel Castells proposed a more comprehensive theory describing social transformations in the information age in his trilogy of the Information Age (Castells, 2000, 2004,). Castells theory of the network society provided a more comprehensive and, more diverse framework for understanding the social transformation in the information age. In general, this theory provided a milestone for the development of social theory. The network society could be defined as "the social, political, economic and cultural changes caused by the spread of networked, digital information and communications technologies" (Castells, 2000, 2004).

Castells explained the informational mode of development and introduced the concept of "informationalism" which represents "*a technological paradigm based on the augmentation of the human capacity of information processing and communication made possible by the revolutions in microelectronics, software, and genetic engineering*" (Castells, 2004).

Space, time and class are the basic physical dimensions of society. These dimensions are interlinked in their nature and in society. These dimensions are being transformed under the combined effect of information technology and of social forms and processes brought by the

current process of historical change. The paper will be divided into two main sections: the first will represent the environment that give the have-less labor class the opportunity to emerge and the changes that happened to the perception of the society dimensions. The second will discuss the presence of this labor class in Egypt.

2. Environment surrounding the emergence of the have-less labor class

Networking prevailed as the main way to do any activity, in the 21st century; raising the Network Society, which includes lots of new concepts and organization forms like The network of the global financial markets and the network enterprise. This continuous and fundamental transformation, not only change the way markets organize themselves, it also changes people view of history and life cycles (Bell, 1973).

2.1 Space of flows and places

Castells proposes the idea that there is a new spatial form characterizing social practices and that this spatial form dominates and shapes the network society, he called this new form: "The space of flows." *"The space of flows is the material organization of time-sharing social practices that work through flows"* (Castells, 2000a, b). Flows represent determined, repetitive, programmable series of exchange and interaction between social actors in the economic, political and symbolic structures of society. Flows could take several forms; flows of capital, technology, information, flows of organizational interaction, flows of images, sounds and symbols. The dominant social activities of the information age are characterized by simultaneity (happening at the same time) and do not depend on physical contiguity (same place).

Global cities constitute the main nodes in the networks of the space of flows. These cities, in the information age, function in four ways: first, as a leader in the organization of the world economy; second, as main locations for finance and for specialized service firms; third, as sites of production, including the production of innovations in these sites of production; and fourth, as markets for the products and innovations produced (Castells, 2004).

The network global cities are a "milieu of innovation" where the networkers (innovators and creative) exist. Cities compete with each other to attract wealth and talent to become network global cities.

The cities that are not global cities are marginalized, which constitute "the space of places." The space of places is the space of isolated and increasingly powerless local populations. These neglected cities are just places; a place is a location whose function is local; within the boundaries of physical contiguity (Castells, 2004).

In 2005, Castells developed a more complex analysis regarding intra-urban dualism; he implies that the space of flows and the space of places are linked together in a way, they cannot be separated. And he calls the cities, cyborg cities or hybrid cities, which are composed of flows and places (Castells, 2005).

2.2 New conceptualization of time in the information age

The conception of time has varied considerably throughout history, which indicates the complexity of this concept (Whitrow, 1988). Due to the information technology revolution, there is a transformation in the concept or the meaning of time, as shaped by social practices. This transformation in the concept of time is an important foundation of the network society, completely linked to the emergence of the space of flows.

The relationship between time, space and society could be seen, in-depth, in the research of Anthony Giddens, where the link between time and space is separated, he called this the

time-space distanciation (Giddens, 1991). Harvey introduces the notion of time-space compression where the importance of space is destroyed by time (Harvey, 1989).

In order to analyze the time and space relationship, Castells introduces the concepts of the space of flows and timeless time. He mentions several meanings to the timeless time, depending on the social practices (Castells, 2004).

Timeless time refers, in general, to speeding up; making things faster is one of the most important necessities of the information age. So, instantaneity is one form of timeless time. Another form is called by Castells "desequencing": due to the multimedia age that we live in. This age is characterized by infinite access to flows of live and archived materials, as well as several ways to predict or imagine the future. So, we can always have a mixture of instants taken from several temporal contexts: past, present and future, where these instants are unassembled and gathered in other ways by people. "*Without anchoring the temporality, we live in a perpetual present: the future arrives almost before we've thought of it, the past comes back at us in sound bites: we live in the encyclopedia of historical experience, all our tenses at the same time, being able to reorder them in a composite created by our own fantasy or our interests*" (Castells and Pekka, 2002). For example of this process, digital photography gives greater capacity for archiving our own lives by reviewing and editing the masses of pasts we collect and store (Van Dijk, 2005).

Generally, timeless time could be seen by Castells in split-second financial transactions on the global market, in so-called "instant wars" comprising surgical strikes, and in the technological transformation of the lifecycle, through new reproductive technologies, anti-ageing and even, through cryogenics; the idea of deferring death (Castells, 2005). So, we have a mixture of ephemeral and eternal activities. Castells calls this the breaking down of "*rhythmicity*," which is the normal rhythm of life. Castells thinks also, that most people do still live by biological time and clock time; timeless time primarily characterizes dominant social groups and functions in the network society.

2.3 Labor class in the information age

Although time and space are the two fundamental dimensions of social organization, labor and the transformation of social classes is another important dimension of the society. The labor and class dimension describes the new division of labor; which is, a measure of what is valued and what is not in labor contribution.

At the end of the 20th century, the well-educated and knowledge-possessing class of meritocracy was at the head of a new social order. Daniel Bell emphasizes that this class has grown and attained the most sophisticated jobs with high wages (Bell, 1999). Manuel Castells also uses the binary classification of self-programmable labor and generic labor to clarify the polarization of work and employment conditions in the network society, at this time (Castells, 1989).

Self-programmable labors are innovators. They have the autonomous capacity to focus on the goal assigned to them in the process of production, find significant information, transform this information into knowledge, using the available knowledge stock and apply it in the form of tasks oriented toward the goals of the process. The more our information systems are complex and interactively connected to databases and information sources, the more labor needs the ability to use this searching and recombining ability. This requires creative and innovative skills and the ability to evolve with organizations and with the addition of knowledge in society. The self-programmable labor needs to keep learning and updating their knowledge and skills to continue creating value for their employers (Castells, 2004).

On the other hand, tasks that are not valued are assigned to "generic labor," eventually being replaced by machines or decentralized to low-cost production sites, depending on a dynamic cost-benefit analysis, and they can easily be dismissed from work. The

overwhelming mass of working people worldwide as well as the majority in advanced countries, are generic labor. They can only do non-technical work to earn subsistence-level wages, except if they emphasize their right to exist as humans and citizens through collective actions (Castells, 2004).

In terms of value-making, it is the self-programmable workers that matter for any organization. Thus, labor organization in the network society acts on a binary logic, differentiating between self-programmable labor and generic labor. In addition, the flexibility and adaptability of both kinds of labor to a constantly changing environment is a precondition for their use as labor (Castells, 2004).

This specific division of labor is gendered to some extent, especially in western countries. The rise of flexible (generic) labor is directly related to the feminization of the paid labor force, a fundamental trend in the social structure of the last 3 decades of the 20th century (Carnoy, 2000). Women became the ideal workers of the networked, global economy: able to work efficiently and adapt to the changing requirements of business. This is why more than 70% of temporary workers and part-time workers in most western countries were women at this period of time.

Researchers were very pessimistic concerning the workers' situation, at the end of the 20th century, as work in all activities started to be more dependent on ICTs. They believed that the world would suffer from unemployment and polarization and questioned if there would be solutions for this situation; "*Is there an alternative model for the digital economy that does not increase polarization in the informational city? Can ICTs be shaped in particular ways to become "information technologies with a human face?"* (Castells, 1999).

However, at the beginning of the 21st century, the spread of ICTs worldwide and the rise of emerging economies of the global south, more patterns of class formation have been observed. These patterns emerged to alleviate the pessimistic expectations concerning labor force. The paper will detect the emergence of this class formation, worldwide, in the first decade of the 21st century.

A new class of labor the "information has-less" starts to exist between the digital divide of self-programmable labor and generic labor. This class of labor started to exist and to be very noticed in China, at the beginning of the 21st century (Castells, 2005). This labor class consists of low-end skilled or semi-skilled employees who form a new section of non-elite knowledge workers, sometimes called "programmable labor." The developments of relatively low-end digital media in China and their users, at the beginning of the 21st century, improve the possibility to create many jobs under certain social, institutional and transformational contexts, in the information age.

The "information have-less" labor is mainly a social, and economic class of millions of rural migrants to urban places and laid-off workers, in China. Leaving sectors of agricultural and industrial production, the information have-less gets the opportunity to earn money from low-cost ICT services such as Internet cafés, prepaid phone cards and little smart mobile phones (Castells, 2005).

In China, hundreds of millions of migrants (rural to urban), state-sector employees, discharged workers, retired persons and other low-income groups populate a wide gray zone in the digital divide. The middle class in China (around 650 million people) want wireless service but can only afford lower cost ICTs, which give opportunities for the formation of the have-less labor workers. Have-less ICTs provide inexpensive technologies and services for have-less populations (Qiu, 2009).

Many of the more entrepreneurial migrants and laid-off workers attempt to take part in the new economy by providing digital media. But, constrained by the availability of financial and social capital, such entrepreneurs are limited to selling prepaid phone cards and inexpensive mobile handsets, or at most setting up Internet cafés, all of which appeal to residents in low-income communities.

In China, major cities including Beijing, Shanghai and Guangzhou have a very big class of "have-less" labor; they were low-end ICT users and transformed to be part in the network society formations, through either formal or informal economic activities. An important example, concerning this point, is Shipai village in Guangzhou in south China; this is a working-class community, in which, 481 commercial informational services were identified and grouped into 46 categories. These informational services relate to computer, Internet and mobile phone services; for instance, many stores offer content downloading services to help customers download ringtones or mp3 music for a certain fee. Others rent digital cameras on a daily basis or computers and ADSL broadband service on a monthly basis (Qiu, 2009).

According to Xinhua News Agency, approximately 10,000 Internet cafés existed in China in February 2003 (Xinhua, 2004). Official statistics show that the total number of Internet cafés users has been increasing rapidly from 0.06 million in January 1999 to 19.14 million in July 2004. Its percentage as China's total user population increased from 3% in January 1999 to 21% in July 2000. Since then, it has been at a relatively stable level of around 22%. The upward trend is likely to continue. The main attraction of the Internet cafés is low cost (Qiu, 2009).

Besides working-class entrepreneurialism, a huge population of the labor force called in literature as "gray collars" were formed in the workplaces. They do repetitive work in front of computers in the service sector, for example, in quality control or basic level graphic design, banks (Qiu, 2013).

Tables 1–3 and Table 5 show how the economy transformed from being dominated by agriculture activities towards services activities. Figure 1 shows how female participate greatly in the labor force in the information age.

Table 1.
Development of GDP in different economic sector in China (percentage)

Years/sectors	1978	1993	2004	% of annual growth (1992–2004)	2015	2019	2021	2022
Agriculture	28	19	13	3.7	8.4	7.1	7.2	7.3
Manufacturing and constructions	48	46	46	11.5	40.8	38.6	39.3	39.9
Services	24	35	41	9.8	50.8	54.3	53.5	52.8

Source(s): China Statistical Yearbook (2022)

Table 2.
Development of number of employees in different economic sector in China

Years/sectors	1978	1993	36	2013	2015	2017	2019	2021	2022
Agriculture (by millions)	283	355	348	241	224	211	195	179	177
Agriculture (percentage)	70.5	52.2	46.9	31.4	28	26.7	24.7	22.9	24.1
Manufacturing (by millions)	69	157	167	231	238	227	223	227	211
Manufacturing (percentage)	17.3	23	22.5	30.1	29.7	28.6	28.2	29.1	28.8
Services (by millions)	49	169	227	296	339	352	372	374	346
Services (percentage)	12.2	24.8	30.6	38.5	42.3	44.7	47.1	48	47.1

Source(s): China Statistical yearbook (2022)

Table 3.
Information economy indicators in China

	2005	2010	2015	2020
ICT goods % of total exports	30.72	29.12	26.56	27.09
ICT goods % of total imports	25.28	20.40	23.35	25.12
Workforce involved in the ICT sector	–	–	–	–

Source(s): UNCTADstat (2020)

The information have-less class did not emerge and get noticed only in China but in several countries. In India, a similar emergence of this class of workers is recorded. In Delhi, large populations initiate media practices, which cooperatively construct a "Pirate kingdom" of non-legal digital urban life, for example, they copy multiple media objects like CDs, videotapes (Sundaram, 2010).

In India, also, in the mid-1990s, there was a huge demand for Indian labor, having some IT skills to prevent systems being affected by the Y2K bug. Most IT companies operating in the US, Europe, the Middle East, Japan and Australia, outsource their technical manpower from India. This is how "the global body shopping" of software engineers started from Hyderabad.

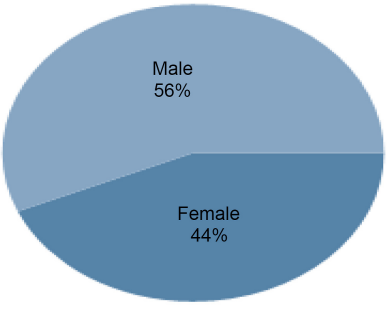
During the period of 1996–1997, IT companies based in India responded to the heavy demand by recruiting and training local Indian graduates. This is how huge numbers of intelligent jobs were created by IT industry in India, and they turned out to be traditional labor-intense sectors, regarding work conditions and employment benefits.

Indian firms succeeded by first providing manpower to large US clients, and later by doing custom applications for them – in other words, by taking on any kind of work that they were prepared to give. They developed a loyal list of clients amongst the largest firms but were unspecialized in terms of work. According to a NASSCOM (Chamber of commerce of the Tech Industry in India), 90% of America's 1,352 largest corporations used outside service providers; of those, 44% used overseas providers in 2001. Programming is extremely teachable, large quantity of students and other Indians had been trained to work in this programming field. This has created lots of jobs for have-less class inside and outside the IT industry (NASSCOM, 2010).

Also, in India, due to the high cost of Internet access, school students access Internet mainly from Internet cafés, which helped to the spread of these Internet café in India. In general, Internet Cafés were popular around the world, in the beginning of the new millennium for different reasons including accessing the Internet, meeting friends and exchanging knowledge, providing a mixed environment which includes a possible opportunity to learn through computing and being connected to the net while being in a friendly environment with friends and colleagues, etc. . . . Internet Cafés played an important role in Internet and ICT diffusion (Llahiane and Sherry, 2008).

Generally, the rapid diffusion of ICTs provides growth to ICT-related places such as electronics malls, bazaars, Internet cafés, computer kiosks and street-corner stands selling used handsets or prepaid mobile phone cards, which widely exist throughout the Global South, providing millions of have-less jobs around the globe (Llahiane and Sherry, 2008).

The manufacturing places and communities of workers who produce hardware, software and provide services, often for consumers far away, have expanded all over the southern part



Source(s): UNCTADstat (2020)

Figure 1.
Labor force by gender in 2020 in China (as percentage of total labor force, all sectors)

of the globe. These places include working-class communities of information technology (IT) factory workers such as Foxconn, the main manufacturer of Apple products (Qiu, 2009) and communities of call center employees in India, Kenya, or the Philippines (Russell, 2008).

Two profound dynamics are underlying urban transformations in major metropolitan areas, small towns and countryside, in the beginning of the 21s century. First, the growth of a space of flows necessitates the creation of new places and the renewal of some traditional places. Second, the new and renewed places are highly heterogeneous; they could be local, translocal or regional. There is not a single "space of places" but many "spaces of places" (Qiu, 2013).

In addition, the emergence of have-less class of workers happens to a large degree in Western countries as well. As demonstrated in Sassen's (2001), this classic work records how New York, London and Tokyo became command centers for the global economy and more precisely the center of the global financial sector. Sassen's study emphasize the formation of cross-border dynamics through which these cities and the growing number of other global cities begin to form strategic transnational networks. These global networks produce as many low-end jobs as high-end ones. Also, in the back alleys of bank towers, there exists countless low-end jobs and repetitive jobs (Sassen, 2001).

Internet café has also, spread in the UK, the model of Internet café in the UK, become the world's leading Internet café model. It provides the cheapest way to get online, Easy Internet a way of entertaining customers while having a low cost, automated system with vending machines and also with a family-friendly content (Sassen, 2001).

Definitely, the expansion of network societies globally has depended on the enlargement of the industrial systems in manufacturing computers and mobile phones and in providing content and services to these new devices. And this fact also provides millions of have-less jobs in the whole world.

Recently, researchers have differentiated between old and new generations of IT. The history of IT development, could be divided into two phases: prior to 2010, is known as the old generation of IT. This stage includes mainly the Internet and networking in general. In the second phase, starting from 2010, IT developed strongly, with an accelerated rate and has been widely applied, such as the Internet of Things (the collected network of connected devices), big data, cloud computing, machine learning, artificial intelligence, wearable Internet, Bitcoin and blockchain (Spottl and Windelband, 2021).

Countries around the world have responded to these new developments in IT by introducing their own advanced manufacturing development strategies, in 2011. For example, the US strategy was called the "Industrial Internet," Germany introduced "Industry 4.0" and China introduced "Made in China 2025." All these strategies intend to use the new generation of information technology to realize intelligent manufacturing; which is manufacturing that uses new technologies to create optimal production conditions (Zhong *et al.*, 2017).

The study of Li, Wang and Xu, in 2022, investigates the role of the new generation of IT in explaining the process of structural labor change in China. The study develops a general equilibrium model of structural labor change driven by both the new technology and the old technology (Li *et al.*, 2022). The study introduced the new technology penetration rate as a variable and considered the differences in the employment structure, using labor market data from 1978 to 2018. The authors concluded that the integration of the new generation of IT has a deep influence on the development of traditional sectors like the agricultural, industrial and services sectors, resulting in structural change, which consists mainly in the redistribution of labor across sectors. Starting from 2010, the share of labor in agriculture has declined steadily over time, while the share of labor in services has been increasing gradually. Regarding the share of labor in industry, this share increased in the early stages of the redistribution process and then decreased slightly starting from 2015, as shown in Table 2. Since 2010, the increased penetration of the new generation of IT into traditional agriculture has greatly promoted

automation, intelligent production and greatly improved total factor productivity (TFP) of the agricultural sector, resulting in an outflow of labor from agriculture. Since 2010, the decline in the labor share in agriculture compared to previous periods was obviously faster and large quantity labor resources transferred to industry and services.

The reallocation of labor resources absorbed by industry and services depends mainly on the penetration rate of the new generation of IT in services and industry. When the penetration rate of the new generation of IT to services was higher, the demand for labor in services was also relatively higher. But, when the penetration rate of the new generation of IT into the industry was higher, the share of labor in the industry decreased slightly, since 2011 (Li *et al.*, 2022).

Monteforte, also, in 2020, developed a general equilibrium model to examine the role of the involvement of new IT in making sectoral increases in productivity in Spain, during the period 2011 to 2019. This involvement of new IT has driven structural change, as concluded by the previous study, and has explained the importance of labor reallocation (Monteforte, 2020).

The relationship between technological development and structural changes were analyzed in the study of Swicki (2017). The study used data from 45 diverse countries over the period 1970–2005, and the results indicate that a sector's technological change is a main determinant in explaining the shift of labor from the manufacturing sector to the services sector (Swicki, 2017). Song, also, in 2021, studied the factors that drive labor share changes and showed the significant role of technological progress (Song, 2021).

The survey on European Skills and Jobs presents estimates on automation from 2011 to 2018. The survey concludes that approximately 14% of the workplaces in the European Union were subject to automation (Pouliakas, 2018). About 35–40% of these automated workplaces change the tasks and qualification requirements of their workforce, with fewer job losses in the medium term.

The study of Harteis (2019) concludes that there is no evidence that technological progress leads to less employment, in Europe. However, technological developments have led to structural shifts between sectors and occupations, which can be expected to continue in the future. The study concludes that IT not only offers potential for substitution but could also increase productivity and employment (Harteis, 2019).

In 2020, Spöttl and Windelband conducted a survey that aims, in the context of Industry 4.0, to identify the changes that occurred to the demand for semi-skilled employees (the information have-less) in the manufacturing sector in Germany, from 2011 until 2019. The survey concludes that in Germany, and in industrialized countries, in general, the number of semi-skilled employees' occupations was reduced greatly and many occupations were merged into core occupations, in the manufacturing industry (Spottl and Windelband, 2021).

The study of Ahn *et al.* (2022) tried to analyze whether technological changes in the fourth industrial revolution (4IR); as independent variables; can influence employment, as the dependent variable. Employment in this study focused only on the demand part of labor in industry, until 2018. The study gathered data from Korean samples, of small and medium-sized enterprises (SMEs). The entrepreneur and their employees were subject to a survey and questionnaires (Ahn *et al.*, 2022). The study concludes that the continuous adoption of new technologies, in Korea decreases the demand for employment in the industry sector. And that the country's policies must include goals to create highly skilled and qualified jobs in manufacturing" and "to secure employment."

The study of Gayatri *et al.* (2022) shows that the advancement of IT has led to major changes in the industry and the labor system in Indonesia. The study expects a potential oversupply of graduates within 2021–2025, as a result of the penetration of the new technology in Industry. This oversupply cannot be absorbed in industry, and Indonesia needs to immediately improve digital labor policies (Gayartri *et al.*, 2022).

3. Have-less labor class in Egypt

The emergence of the have-less labor class, first in China, then in the whole world, in the beginning of the 21st century, had a great influence on the theory describing the nature of the information age. This theory predicted that at the end of the 20th century unemployment, poverty and class stratification would prevail in the whole world, due to the spread of ICTs technology worldwide. The emergence of the have-less labor class in huge numbers around the world changed this perception and theory, giving hope for the spread of development and employment around the world, as the ICTs started to evolve and penetrate all activities worldwide (Castells, 2005).

This part of the paper will try to investigate the emergence of the have-less labor class in Egypt, at the beginning of the 21st century and the opportunities of growth of this class of workers, in Egypt. The have-less labor class, as stated in the literature could be divided into three categories: entrepreneurism, workers in the service sector; and; workers in the manufacturing sector.

3.1 History of ICTs penetration in Egypt

Egypt has invested heavily in technology and information infrastructure since 1985, to enhance the economy's development and growth. A partnership between the government and the private sector, at this time, has had a great impact on the build-up of Egypt's information infrastructure (Kamel, 2010).

During the period from 1985 to 1995, hundreds of informatics centers and projects were formed through public and private sector organizations. These projects included human, technology and financial infrastructure development in order to build up information technology and a well-educated society capable of leading Egypt into the 21st century from an information perspective.

In 1999, the development of the ICT sector officially became a priority for the country, by announcing a new cabinet ministry; the Ministry of Communications and Information Technology (MCIT) (2022). The goal of the new ministry was to increase, systematically, investment in ICTs and infrastructure build-up. Thus, the growth of the ICT industry took massive steps during the first decade of the 21st century in different aspects including human, information, legislation and infrastructure (Kamel, 2010).

In 2008, the number of ICT companies was above 1750, compared to over 300 companies in 1999 (MCIT, 2022). These companies work in several areas such as sales, technical support of hardware, software and in the development of IT solutions, systems integration and consultation. This has helped to create employment opportunities for fresh graduates within key cities, and more importantly in the distant and neglected communities, directly contributing to improving their economic status.

Moreover, ICT multinational companies expanded their businesses to work in Egypt, as the potential for a large IT marketplace grew. These ICT multinational companies created more than 15,000 job opportunities over the first decade of the 21st century, in Egypt (MCIT, 2022).

Examples of these ICT multinational companies include Vodafone Egypt, which has been successfully operating and leading Egypt's telecom market since the beginning of the new millennium, with investments exceeding EGP 40 billion, serving more than 40 million customers, employing 13,000 employees; Microsoft Egypt, which began working in Egypt in 1995, and, Oracle Egypt, which began operating in Egypt in 1996 and has now become one of the largest operations in the Middle East and North Africa region with over 500 employees in the country office (Amcham Egypt, 2022).

The ICTs sector, in Egypt, has added over 2.9bn US dollars into the economy during the period from 2000 to 2010. So, the sector has become a value-added sector, providing employment, development and growth opportunities (MCIT, 2022).

The MCIT continuously develops basic and professional ICTs skills by collaborating with government ministries, multinationals and private companies to develop a variety of training programs. Some of the initiatives and projects that contributed to the investments in human capacities included the Smart Schools Network, the eLearning Competence Center as well as the support received from Egypt's ICT Trust Fund which was established in cooperation with UNDP in 2002 (MCIT, 2022).

The Internet introduced in Egypt in 1993 was used only by the government and academic institutions. Subsequently, it has become a tool of research and communication used by everyone from the government to academic institutions to individual users, companies and other commercial organizations and hospitals and medical centers (Kamel, 2010).

In 1994, as an attempt to diffuse Internet usage within society, the Cabinet of Egypt Information and Decision Support Center (IDSC) (2022) and the Regional Information Technology and Software Engineering Center (RITSEC) provided free Internet access on a trial basis to public, private, government and non-government organizations. The free access formula was accredited for boosting in the rate of growth of Internet users, especially within small- and medium-sized enterprises and industry and sector professionals (Kamel, 2010).

In 1996, the government replaced its free Internet access policy with an open access policy, and, Internet services for the commercial domain were privatized: 12 Internet service providers (ISP) started their operation. By 2005, there are around 50 ISPs serving over 3.6 million Internet users (MCIT, 2022). In January 2002, the government of Egypt launched a new initiative through the Ministry of Communications and Information Technology providing free nationwide access to the Internet to all citizens of the country. This has created a larger demand for connectivity and has also had an impact on the streets of Egypt with the establishment of Internet cyber-cafés reflecting a sign that there is a strong market demand for the Internet in Egypt.

The government still provides strong support for the ISPs in the form of upgrading the infrastructure to enable them to offer better connection speeds to their users as well as providing them with technical support in the administration of their servers. In addition to the hardware and infrastructure, the Internet market is witnessing a growth in the software market with more web programmers being trained and more web design companies being established encouraging commercial users to utilize the web as a business development engine.

Even though, the effort of the government and private sector in the ICTs sector, the number of employees in this sector still compose a small portion of the total employees in Egypt, as shown in Tables 4–6. In addition, the percentage of women's employment is still weak, as shown in Table 7 (CAPMAS, 2023).

Although there is a lack of data, the paper will try to investigate the have-less labor class in Egypt, in all the categories of this class.

3.2 Have-less labor class: entrepreneurial category

The entrepreneurial category includes individuals or companies that initiate new business, when seeing profit opportunities and bear all risks accompanying this business. The goal of the business (to be a part of the have-less labor class) is not innovation but just to present a service concerning ICTs (Kamel, 2010).

years	2004	2005	2006	2007	2008	2009	2010	2011	2012	2013	*2021*	*June2022*
Internet users	4.5	5.4	7.0	9.7	13.5	19.7	25.9	31.2	36.0	44.7	*94.2*	*102.8*

Source(s): CAPMAS (2023)

Table 4. Development of Internet users in Egypt in millions

This category can be noticed in Egypt as well as the entire world, in Internet cafés, computer shops, computer malls, even in small kiosks (found on every street in Egypt) selling telephone cards, ringtones. There are no specific statistics concerning the numbers of these businesses and the numbers of employees, working in it, in Egypt. However, the paper will try to investigate the history of these businesses and estimate its size (Kamel, 2010).

The Internet café, or cyber café, mainly provides Internet access to the public. For example, users may open or renew accounts or arrange for web development with the technical support provided by highly trained and qualified staff. In 1996, the first Internet café was established, in Garden City (downtown of Cairo). Soon after, other Internet Cafés appeared in Egypt. During that time, the Internet in Egypt was not for free and the Cafés were used as a point of sale, where people used open Internet accounts as well as to purchase devices such as headphones, microphones, notebooks and PCs from the Internet Café (MCIT, 2022).

In 2005, the number of Internet Cafés reached over 500. Internet cafés provide a world of entertainment through personal computers connected to the World Wide Web. A decision to

Table 5.
Relative distribution of employees in economic activities

Sector	Percentage
Agriculture and Hunting	20.3
Wholesale and retail trade	14.5
Construction	13.4
Manufacturing	13
Education	7.7
Transportation and storage	8.6
Public administration and defense; compulsory social security	5.9
Other sectors	16.6

Source(s): CAPMAS (2023)

Table 6.
Numbers of employees (in millions) in Egypt and the numbers of employees (in millions) in the service sector

Years	2011	2012	2013	2014	2015	2016	2017	2018	2021
Gross number of employees	26.7	27.2	27	27.7	29.8	31.9	29.9	29.9	28.8
Number of employees in service sector	13.6	13.9	13.8	13	14.1	15.1	14.2	14.7	14.7
%of employees in service sector	51%	51%	51%	47%	47.2%	47.3%	47.3%	49.1%	51.09

Source(s): World FACTBOOK, CIA (2021)

Table 7.
Rate of employment by gender from 2015 to 2020

Years	Male	Female
2015	63.9%	17%
2016	63.4%	17.5%
2017	61.3%	16.9%
2018	63%	14.4%
2019	64.1%	12.2%
2020	63.4%	11.8%
2021	68.25%	14.62%
2022	68.25%	15.12%

Note(s): The rate of employment is the number of employees divided by the total manpower
Source(s): CAPMAS (2023)

open an Internet Café was a response to the increased demand for Internet connections. In 2005, from the 75 million people living in Egypt, only 1.6 million owned a personal computer (PC), so at that time there was a great opportunity for these Internet cafés to offer a solution to those who cannot afford to have their own PCs (MCIT, 2022).

It is important to note that the concept of Internet Cafés differs from one country to another. For example, there are IT technology clubs that serve the same purpose as Internet Cafés but are not considered as cafés and they exceed 1,000 clubs across the 26 provinces in Egypt (Kamel, 2010).

Most of the Cafés are located in Cairo (the capital) and Alexandria (the second largest city). Internet Cafés function as outlets for all Internet Egypt services. After 2005, as the Internet evolved and was available in a great amount of people's homes and along with the booming of computer manufacturing in Egypt, the need for Internet cafés decreased in the sense of being a place where people would go and simply "surf the web" (Kamel, 2010).

As more and more people started to gain access to the Internet at home, Internet cafes evolved into "gamming lounges," offering those who enjoy online games a place where they could come together, play and compete. Thousands of gamming lounges could be found in Egypt.

Since 1995, computer shops have spread all over Egypt, selling computers, hardware parts, mobiles, accessories, copyrights software and illegal software copies. It is frequent to see big computer malls, gathering hundreds of computer shops in every district in Egypt. In Yellow Pages, it is easy to find the addresses of thousands of computer shops in Egypt.

3.3 Have-less labor class: manufacturing worker category

This category involves employees working in the manufacturing sector and able to use computers and applications such as databases. These employees, after being trained, do repetitive work, and each employee does a specific job (Qiu, 2009). This working class could be found, in all industries, after the computer's penetration to all fields, especially in the electronics industry, which has boomed since the beginning of the 21st century, worldwide, including Egypt.

The electronics industry encompasses the manufacture of transistors and silicon chips, to produce devices such as radios, televisions, computers, all household appliances. The electronics manufacturing sector has provided 3.8% to manufacturing value added, in Egypt, in 2018. This percentage represented 0.6% of the gross domestic product (GDP). The electronics manufacturing sector hires 55,000 employees, which represent 2% of total employment in the manufacturing sector in Egypt, in 2017 (IDSC, 2022).

A presidential initiative was launched in 2021; Egypt Makes Electronics (EME), to make the electronics industry a source of growth in the Egyptian economy. This initiative aims to double Egyptian exports, reduce imports of electronic and electrical appliances to the local market and provide hundreds of thousands of jobs for researchers, engineers, skilled technicians, semi-skilled technicians and workers (MCIT, 2022).

The EME initiative focuses on two main scopes. The first is the superior design and production of electronic circuits and systems with high added-value and backed with a high level of technical support. The second is creating a labor-intensive electronics manufacturing industry. The initiative also aims to attract investors to manufacture electronic products like mobile phones, tablets, GPS devices, LED TVs and solar energy systems; empower research and innovations in electronics and empower the collaboration between industry and academic organizations; and enhance investment in equipment and people to fulfill the needs of the industry.

3.4 Have-less labor class: service worker category

This category involves employees working in the service sector and able to use computers and applications such as databases. These employees, after being trained, do repetitive work,

and each employee does a specific job (Qiu, 2009). Services are a major part of the global economy, generating more than two-thirds of global GDP, attracting over three-quarters of foreign direct investment in advanced economies, employing the majority of workers and creating most new jobs globally (OECD, 2022a, b).

Economists divide all economic activities into two categories, goods and services. Goods-producing industries are agriculture, mining, manufacturing and construction; each of them creates some kind of tangible object. Service industries include everything else: banking, communications, wholesale and retail trade, all professional services such as engineering, computer software development, medicine, nonprofit economic activity, all consumer services and all government services, including defense and administration of justice.

A services-dominated economy is a characteristic of developed countries. In less-developed countries great proportion of people are employed in primary activities such as agriculture and mining. In the USA, for example, the service sector accounted for more than three-quarters of the whole American economy, in 1993. In the early 21st century, service industries grew greatly, worldwide and employed more than one-third of the labor force worldwide (OECD, 2022a, b).

The reason for the growth of the service industries is that goods production has become increasingly mechanized, so a smaller number of employees are needed to produce tangible goods. The service functions of distribution, management, finance and sales became relatively more important, regarding employment. Growth in the service sector also results from a large increase in government spending and employment.

Software development, customer service and IT helpdesk are the major service types delivered in Egypt. The Association of Business Service Leaders (ABSL) ranked Egypt among the top 18 countries for service center locations in the Europe, Middle East and Africa region (EMEA): 25,800 companies have registered on the egypt-business.com website since its launch until 2010. The majority of employees working in this sector are have-less employees (OECD, 2022a, b).

4. Conclusion

The empirical results agreed with the prediction of Daniel Bell, and other researchers, in that the industry will change toward "science-based manufacturing" and that service sector will increase its part gradually in the GDP in all countries. But it contradicts with Bell in his expectation of huge unemployment around the world. The results agreed more with Castells comprehensive theory, and other researchers, describing the presence of a self-programmable (skilled) class of labor, but at the same time, the emergence of the class of information have-less (semi-skilled), which includes the majority of workers all around the world. I think Castells has succeeded in naming the new paradigm "Informationalism" which means the augmentation of human power by the continuous development of Information technologies.

The division of work and class, in the 21st century, depends on the level of skills possessed to work with ICTs. So, class and labor nowadays could be divided to Castells (2005).

(1) Self-programmable labor (Innovators).

(2) Information have-less labor class, adding value to the economy by learning skills and presenting repetitive work.

(3) Generic labor class, who cannot work with ICTs, and work in jobs, that do not need computers or other ICTs.

Although there is no specific data for Egypt concerning have-less labor, this labor class is present and has opportunities to expand greatly in the future. Egypt has several characteristics, making it one of the most attractive destinations for IT and business

process services globally. Its central location, physical proximity to Europe, Middle East and Africa; Egypt also has a similar time zone to these regions, which facilitates productive business interactions.

Since the early 2000s, the Egyptian government has opened up the economy and the Egyptian service industry have gone through rapid growth, despite the political turmoil of the 2011 revolution, establishing itself as a reliable and much-needed partner not only for European but also USA, African and Middle East markets. Currently, the ICT sector in Egypt is the fastest-growing sector and the largest contributor to GDP. In 2016, the sector's exports stood at USD 1.7bn (IDSC, 2022).

Egypt has a very large and highly educated population, which provides a unique opportunity for larger operations with about 500,000 annual graduates from over 35 universities and 100 institutes. Every year, about 220,000 students in business process services-related fields and 50,000 students in IT-related fields graduate ready to deliver advanced processes and knowledge services in over 20 languages across more than 100 countries. With these numbers, Egypt is positioned among Poland and the Philippines, traditionally strong sourcing destinations (IDSC, 2022).

As concluded from the literature and from the experiences of IT involvement in all activities in China, Europe and other regions, the researcher recommends the importance of including new technologies in Egypt in all domains, agriculture, industry and services; because the inclusion of IT increases the productivity of factors of production in these sectors, resulting in the decrease of prices. And as the main target of Egypt, to overcome the problem of lack of foreign currency, is to increase exports, Egypt has to use all new technologies to reduce the prices of its products. The technological gap between Egypt and the western countries must decrease, so, Egypt's products can compete in the international market. At the same time, the inclusion of IT has not decreased employment in western countries but has reallocated the information have-less employments toward the service sector, and there would probably be the same effect in Egypt.

The Egyptian government has to change the educational policies, in all stages, include digital learning skills needed, so IT can be incorporated into a wide range of economic activities, and encourage the expansion of the service sector, especially in tourism and ports services, that have the ability to absorb unemployment. In addition, the Egyptian government has to encourage the private sector, especially, the small- and medium-sized enterprises, which could increase employment.

The lack of data concerning the information have-less employment in Egypt, specially, the entrepreneurial part of the information have-less employment is the main limitation of the research. There was a preliminary attempt from CAPMAS to conduct a survey to measure the size of have-less information labor force in 2010, but this attempt was not completed possibly due to the 2011 revolution (CAPMAS, 2023).

Concerning further research; the researcher will conduct a survey to measure the contribution of the entrepreneurial part of the information have-less employment in Egypt. In addition, a model may be developed, by the researcher to examine the reallocation of employees in Egypt.

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