Scientific Papers Series Management, Economic Engineering in Agriculture and Rural Development
Vol. 20, Issue 3, 2020
PRINT ISSN 2284-7995, E-ISSN 2285-3952

IMPACT OF THE FOURTH INDUSTRIAL REVOLUTION ON THE DEVELOPMENT OF SCIENTIFIC RESEARCH IN THE FIELD OF AGRICULTURAL ENGINEERING IN EGYPT AND ARAB WORLD

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Abstract

The fourth industrial revolution that the world is witnessing in the field of technology casts a shadow over all aspects of life, which results in new types of distinct and advanced jobs and skills. The successful adoption of these new technologies can boost global productivity to the same extent that personal computers and the Internet achieved during the late 1990s. For investors, the fourth revolution offers opportunities for profit similar to the ones that preceded the ones that preceded it. Indeed, the owners of technology in this early stage of the industrial revolution are asking for very large prices for their technology, and because there are many oryx Data that can not artificial intelligence and robots being able to perform; leaving us an open society of the human element, in order to cope with the rapid changes has to be the transfer of knowledge and enhance leadership skills, creativity, and value judgments and the ability to adapt; to remain the most valuable skill through education, training and professional development. This creates many areas of work related to modern technologies that are rapidly invented by the Fourth Industrial Revolution, so cooperation between academic institutions and economic sectors must be developed to develop human resources capable of keeping pace with the digital transformation resulting from artificial intelligence, which also requires us to be a mirror of societal values and a reflection of them; thus It makes us entrusted with verifying the ethics and legitimacy of artificial intelligence in a way that serves security and occupational safety and serves social and economic goals. the training and education is the primary focus of any future strategy, education has had the greatest impact on the Fourth Industrial Revolution and influencing it, this digital transformation of the industry needs different teaching mechanisms and high-level professional skills; in order to keep pace with the nutrition of robotics systems and the complexities of artificial intelligence and also the future need for interaction skills Digital and communication skills with what's new. The knowledge revolution resulted in a society with special features called the knowledge society, which imposed a set of roles and responsibilities, and thus the transformation of universities in developed countries into investment universities, which made them required to change their structural, financial and administrative policy to change their outputs, which led to increased restrictions on universities, and also imposed competition between Universities in the production of knowledge so that the pressure on universities increased and they need to provide more knowledge because they are the only ones that provide human elements at the highest level to lead the community.

Key words**:** *agricultural, engineering, fourth industrial revolution, training and education, scientific research*

INTRODUCTION

Agricultural engineering as part of this broad system is also affected by this industrial revolution, and the spread of digital technology and artificial intelligence leads to a change in many areas such as automation of agricultural equipment, and agricultural equipment automation must face the need to develop modern approaches as auxiliary sciences for agricultural engineering to understand the operation Equipment; from courses for automatic control and electronic circuits, as well as the spread of digital technology in the field of satellite image analysis by adding courses such as digital image analysis and digital sound analysis and creating courses that help Understanding of information technology and processing; to create digital work platforms and self (software design); which will develop the skills and creates value through the use of technology in achieving interdependence between human beings and the equipment and the surrounding environment.

Research problem: The world is moving rapidly towards a new era that differs in its features and characteristics from what we

have learned. When the world changes around us, it is necessary to change our lifestyles, teach and learn, and the basic skill of radical change and adaptation to new conditions becomes the ability to learn and access knowledge, then re-learn until Our old habits do not become a reason for our delay, by applying the principle of lifelong learning. The digital age has revolutionized education, whereby the tools of this era have enabled researchers to become more active and more independent in their learning. The Internet has allowed the creation of gatherings with new knowledge structures in which researchers can collaborate and learn from one another, and has allowed them to take responsibility for learning through exploration Expression and experience.

In 2003, National Planning Institute [7] made a study which aimed to determine the priorities of scientific research and investment in the agricultural sector, and found a deficit in the agricultural trade balance with the outside world as a result of the limited natural agricultural resources in agricultural production and coupled with an increased presence of demand for agricultural products. The research aims to increase agricultural production, reduce poverty, increase employment and improve Agricultural entry level. This, in turn, imposes the need to prioritize investment in such agricultural development programs. Increasing agricultural production by increasing the area of agricultural area and devising new crops through cooperation between the fields of scientific research and agricultural extension.

In 2016, [4] outlined the problems that Egyptian universities are facing. Based on the reality of previous studies and personal interviews with members of the teaching staff and support bodies and some of the university leaders represented in the research sample, there were pointed out the following aspects: - Delay in the improvement processes and rigid templates within which teaching and support staff are working; - The repulsive environment and the lack of encouragement for innovation and creativity; - The absence of a policy of cooperation within the university through its various colleges and departments, and between the university and other universities inside and outside Egypt; - Bureaucratic practices and red tape are the main obstacle to any innovation and creativity; - There is no effective link or cooperation between the university and the various industrial sectors within the community; - The problem of financing research that is characterized by innovation and creativity; - The problem of the lack of external missions and the lack of training courses, especially for the personnel of the support staff. It is clear from the previous narration of the problems that hinder the achievement of our goal and is to achieve excellence in university performance, the researcher mentioned that the problems can be divided into three main axes:

The first axis relates to the problems of knowledge transfer inside and outside the university. These are the problems that relate to knowledge transfer processes between the university and industry, and among the members of the teaching staff and their auxiliary bodies and between students and researchers.

The second axis is related to the delay in the processes of development and development of the performance of faculty members and supportive bodies. These are problems that relate to the stagnation of the processes of developing the performance of faculty members, aid bodies and rigid templates within which they work. [6] made a study aiming to clarify the effects of the Fourth Industrial Revolution and artificial intelligence and the resulting inventions and their clear effects on companies, employment and all aspects of life. These positive effects will lead to the existence of networked organizations via the Internet in addition to global competition between companies and benefit from the inventions that dependence on artificial intelligence will provide, and offer extensive opportunities to use new innovations to improve products and services. [1] developed a research which in its first part there were presented the different concepts of the knowledge economy, and explained the difference between the new growth theory based on the knowledge economy and the

modern classic theory. He presented the amount of investment in the field of knowledge in some countries, and also summarized the most prominent features of the knowledge economy. Then, he then presented to the basic pillars of the knowledge economy, and pointed out four methods and models used to measure the knowledge economy. He also mentioned the experiences of Ireland, Finland, Korea and Singapore in applying the knowledge economy. In the second part of his study, the author was focused on the case study of Egypt, and presented the method of knowledge assessment in which the World Bank works to study the case of Egypt. The steps taken by Egypt in the direction of the knowledge economy were presented, then Egypt's indicators were studied in the pillars that make up the knowledge economy. A comparison has been made regarding the values of the various indicators of Egypt with the different groups to which they belong: the Middle East and North Africa Group, the Africa Group, the Group of Minimum Middle Income Countries and the Group of Countries with an Average Human Development Index. Also, a comparison between the different indicators for Egypt in two different time periods, and a study of the changes that occurred in Egypt with respect to the different indicators in the two time periods under study have been presented as well. In the end, the most important measures that were required to enter Egypt in the knowledge economy were presented through the recommendations of the study. [3] studied the use of artificial intelligence in all aspects of life, presenting a brief philosophy of artificial intelligence, its classification destined to highlight what we have in reality and what we might expect from future developments, and also the study provided information on attempts to organize artificial intelligence from a legal perspective, and discussed how the legal approach is a guarantor of the balance between the development of artificial intelligence and human control over it.

[8] aimed to monitor the impact of integrating scientific research and technological development on knowledge-based development as one of the main pillars of the knowledge economy, as well as to measure the impact of indicators of knowledge and technological progress on the gross domestic product. Through an analysis of the reality of the state's economic and social plans during the study period, the researcher concluded that the successive economic and social plans of the country did not integrate scientific and technological research effectively and comprehensively in the development process and its effects on the development process in Egypt were not reflected, which means that scientific research and technological development did not contribute In the positive development of the national economy, thus, research and development did not play a major role in the field of development.

[2] aimed to clarify the progress in artificial intelligence and robotics and may lead to a new industrial revolution. The study provided an analysis model for the effects of inequality and marginalization, and a set of variables that reflect how to automate the labor market was analyzed, and the results of the study confirmed that automation is a good thing for economic growth and bad from the point of view justice and equality, real wages decrease in the short term and ultimately rise.

[5] highlighted the penetration of artificial intelligence systems for many organizational processes, which led to a growing fear that smart devices and their solutions to humans will also dominate decision-making processes, and thanks to the computing capacity of computer information processing and its analytical approach helped broaden human perceptions when dealing with complex matters, while humans can understand the axioms and use a more comprehensive approach when dealing with decisions.

The research importance:

(1) The research coincides with the nature of the current era and its rapid developments, and the imposed new forms in the field of scientific research.

(2) It is hoped that the results of the research will benefit decision-makers and those concerned with higher education and scientific research, by examining the reality of scientific research and keeping pace with the

times and identifying obstacles and challenges.

(3)The current research may help those involved in higher education to review the scientific programs provided to researchers in the field of agricultural engineering.

(4) It is hoped that the results of the research will benefit the owners of factories and projects in benefiting from and activating the research topics presented.

The research aims: This fourth industrial revolution should be matched by a change in education, and not merely a development or change, as its vocabulary imposes the qualification of the teacher technologically, and his technical empowerment, as he prepares the "trump card" in the digital future, to build generations that keep pace with the requirements of that revolution. Hence the importance of linking between the Fourth Industrial Revolution, as a civilized phenomenon that represents a major breakthrough towards the future and the education system in general, and to build that relationship, it is required to define the intellectual pattern required to establish in order to build a system of education that is different from what is now prevailing, so that this heterogeneous educational system establishes a new mindset capable of participation in the construction and development of the fourth industrial revolution. In addition to the current trend towards non-space-related education, lifelong learning, education based on the current need, self-education, effective education, and in order to achieve this union and integration between the principles of the Fourth Industrial Revolution in the fields of education; we must enhance the level of teaching of applied sciences and advanced technologies and modernity and focus on the level of professionalism in educational institutions and the transformation of these educational institutions into research centers, in addition to informing learners of global experiences and all of this will open broader horizons and continuous accompaniment to the results and applications of this revolution and to become the goal of education Lq industry healthy, safe and more diverse world.

MATERIALS AND METHODS

Research Methodology

The current research used the descriptive survey method, through analysing research, whether in the master's or doctorate level or promotion studies in the field of agricultural engineering at The Arab world in the last five years, and identifying the research that benefited from the ideas of the fourth industrial revolution and the results of these research that are compatible with the ideas of this revolution.

Terminology of study

Agricultural engineering: It is a science and art that studies the science that relates to humans, land and plants and farm equipment

Agricultural engineering is engineering applications in the fields of agriculture and is part of the engineering sciences and branches into several areas, including agricultural production, including natural resource management. (The Author)

The Fourth Industrial Revolution:

The Fourth Industrial Revolution or “The Fourth Industrial Revolution”, Globalization 4.0 is the name given by the World Economic Forum in Davos, Switzerland, in 2016, to the last episode of the series of industrial revolutions, which is under Starting now, it refers to "the process of integrating physical or physical sciences with digital and biological systems into manufacturing processes via electronically controlled machines and smart machines connected to the Internet such as Internet of Things and three-dimensional printing, artificial intelligence and robotics and computing, biotechnology, energy storage and others in the form of Implementation they have interfered in all areas of life and work.

RESULTS AND DISCUSSIONS

The requirements and needs imposed on us by the current era, which make e-learning and distance education - as one of the technological innovations - the strategic option that is not irreplaceable, and from these needs, the need for continuous education, the need for flexible education, and the need to

communicate and open up to Others, in addition to the current trend towards non-space-related education, life-long education, education based on the current need, self-education, effective education, and in order to achieve this union and integration between the principles of the fourth industrial revolution in the fields of education; we must strengthen the level of The Head of Applied Sciences, advanced and modern technologies, focusing on the level of professionalism and professionalism in educational institutions and transforming these educational institutions into research centers, in addition to informing learners about global experiences, all of which will open a broader horizon and continuous accompaniment to the results and applications of this revolution and to become the goal of education related to the manufacture of a healthy, safe and more diverse world.

International statistics show that spending on scientific research is low in the Arab world in general (Fig. 1).

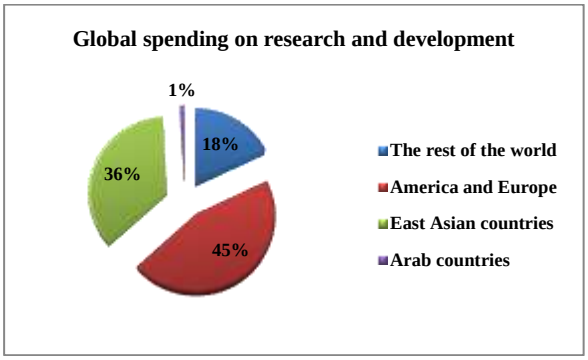

Fig. 1. Global spending on research and development
The rest of the world 19%, America and Europe 48%, East Asian countries 38% and Arab countries 1%
Source: United Nations Science, Culture and UNESCO 2013 [9].

Higher levels of research spending

According to UNESCO Science Report: towards 2030, the Arabic edition of which was presented to more than 100 high-level officials and journalists on 24 January 2019.

Egypt is one of several Arab countries which have raised their level of domestic spending on R&D in recent years. Egypt invested 0.71% of GDP in R&D in 2016, up from 0.43% in 2010. This places Egypt on a par with Morocco for this indicator.

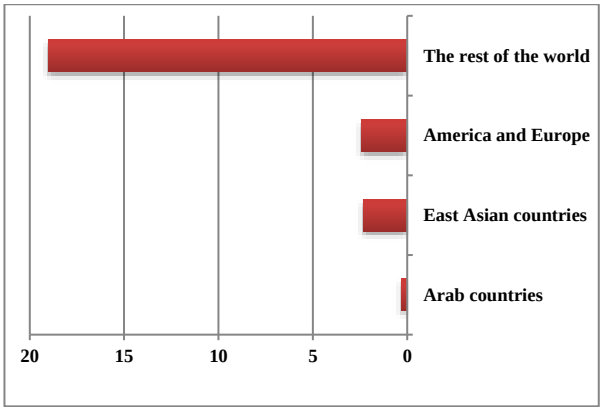

Fig.2 Spending as a share of GDP
The rest of the world 19%, America and Europe 2.40%, Arab countries 0.30%, East Asian countries a 2.30%
Source: United Nations Science, Culture and UNESCO 2013 [9].

Only a handful of Arab countries have covered more ground in such a short space of time. Saudi Arabia devoted 0.82% of GDP to R&D in 2013, a considerable improvement on the 0.05% of GDP invested five years earlier. The United Arab Emirates flirted with the symbolic threshold of 1% of GDP in 2016 (0.99% of GDP), after doubling its level of commitment to R&D since 2011.

A number of Arab countries have announced plans to hoist their ratio of research spending to 1% of GDP – or more – over the next few years. The 1% target has even been inscribed in the Egyptian Constitution since 2014. This is an important goal, as the Arab world still boxes beneath its weight: in 2013, the region contributed 6% of global GDP but just 1% of global research spending, according to the UNESCO Science Report.

Of course, some countries' research systems have been decimated by years of conflict. Once a leader for science in the Arab world, Iraq could only muster a research intensity of 0.04% of GDP in 2016.The great majority of Arab countries hover around the 0.3-0.5% mark, including Jordan, Kuwait and Qatar. Jordan, however, has invested heavily in the construction of the region's first particle accelerator, the Synchrotron-light for Experimental Science and Applications in the Middle East (SESAME), which was inaugurated by H.M. King Abdulla II in 2017. The UNESCO Science Report stresses the need for more champions of science in the region. Currently, the two Muslim countries

with the greatest research intensity are Malaysia (1.30% of GDP in 2015) and Turkey (1.01% in 2014). Both countries have doubled their research intensity since 2004 and Malaysia is even planning to devote 2% of GDP to R&D by 2020. The world average in 2013 was 1.70% of GDP.

The number of researchers in the Arab region is growing. There were 391 researchers (in full-time equivalents) per million inhabitants in 2009 and 417 per million four years later, even though some countries in the throes of political turmoil have seen their pool of researchers shrink.

The greater human and financial investment in the Arab world is translating into greater scientific output. The volume of scientific publications from the region grew more rapidly (+109.6%) between 2005 and 2014 than in any other part of the world, according to the report, pushing up the region's modest share from 1.4% to 2.4% of the global total (Thomson Reuters' Web of Science, Science Citation Index Expanded).

CONCLUSIONS

From previous studies, we find that:

•Automation of equipment is good for economic growth;

•The use of artificial intelligence systems in many decision-making processes, and thanks to the capacity of information processing, it helped expand human perceptions when dealing with complex matters;

•The integration of scientific research and technological development has an impact on knowledge-based development;

The effects of the Fourth Industrial Revolution, artificial intelligence and the resulting inventions will lead to the existence of interconnected organizations, and provide ample opportunities to use new innovations to improve products and services.

The problems facing Egyptian universities are:

-Delay in improvement processes and stereotypes within which faculty members and the support staff work

-The lack of a policy of cooperation between the university and other universities

- There is no effective link and cooperation between the university and various industrial sectors and the problem of research funding

It was noticed through the monitoring of research in the field of agricultural engineering in Egypt and Arab world, the start clear slightly increase in scientific research that directly benefited from the applications of the Fourth Industrial Revolution; through the technological availability provided by the university to researchers, and even that appeared in the outputs of this scientific research what we can say It is a support and enrichment of this industrial revolution, and this is what we will explain through this scientific research that monitors this clear change in the field of research, whether at the master's or doctorate level or the promotion research at Egypt and Arab world.

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