MANAGEMENT OF INFORMATION TECHNOLOGY IN THE 4TH INDUSTRIAL REVOLUTION ERA

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Abstract

Industry 4.0 has evolved in response to developments in information and data technology. A shift in workplace culture has been highlighted by the Internet of Things (IoT) through the exponential growth of smart devices that connect all things, data, and services, with people. Entire value chains are interconnected by autonomous systems created by intelligent machine and data networks. This study examines the management of information technology in the 4th Industrial revolution era. The study will adopt Technology Acceptance Model and use expository research method where various relevant literatures will be reviewed. Technology is arguably one of the most significant forces affecting business competition. Technology is used to reduce operational costs, improve quality, and expedite innovation with the objective of creating sophisticated products and markets. Technologies such as smart and intelligent machines, artificial intelligence, cyber production systems, and three-dimensional technology are increasingly being used to accelerate product or service competitiveness. The fourth industrial revolution is transforming the economic paradigm and mechanisms used to create value and generate benefits, i.e., efficiency, effectiveness, and customization, as well as quality and innovative products, projects, and services. The extensive utilization of technological advancements in many smart city sectors, a topical IoT related development, has become the most effective way of improving quality of life. Technological breakthroughs impact on the way in which we live, work, and interact in the urban space. The integration of smart cities technologies is becoming more visible and enhancing the lived urban experience.

Keywords: Information Technology, industry fourth industrial revolution, ICT, Smart Cities

Introduction

The term “Industry 4.0” refers to the concept that technology has permeated all areas of society: production, finance, services, transportation, and communications (Cividinoet al. 2019). Such developments are driven by digital integration (with devices and processes capable of transmitting and processing huge masses of data) and automation (the availability of machines capable of carrying out tasks of medium–high complexity) (Muscio and Ciffolilli 2019). The pervasiveness of the Internet and smart mobile phones, along with the emergence of technologies such as the Internet of Things, biometrics, big data, advanced analytics, artificial intelligence, blockchain, etc., has created an organizational focus on designing and developing pre-designed products and services, and personalized and customized services are provided for people. Emerging technologies have opened the door to a range of applications and inter-industrial collaborations that were previously only imagined in dreams. New applications have changed current business models, paved the way for innovation, and created new opportunities for revenue generation.

Some researchers suggested that the notion of Industry 4.0 supposes blurring the differences between the work of people and the work of machines (Ślusarczyk. 2018). Lu (2017) argued that the concept of Industry 4.0 can be summarized as an integrated, adapted, optimized, service-oriented and interoperable manufacturing process that is correlated with algorithms, big data, and advanced technologies. The Fourth Industrial Revolution, also known as Industry 4.0, provides smart, efficient, effective, individualized, and customized production at reasonable cost (Erol et al., 2016). According to Stock and Seliger (2016), the concept of Industry 4.0 includes three fundamental dimensions of integration: (1) the horizontal integration across the entire value creation network, (2) vertical integration and networked manufacturing systems, and finally (3) end-to-end engineering across the entire product life cycle.

The present global economy is constantly changing, so innovation and technological development are key issues in the context of a sustainable approach. Industry 4.0 should be perceived as a great opportunity due to its new technologies. Moreover, Ślusarczyk (2018) argued that the main objective of Industry 4.0 is to achieve a higher level of operational

effectiveness and productivity, and simultaneously a higher level of automation. Certain researchers also suggested that the four major pillars of Industry 4.0 are the following: Internet of Things (IoT), Industrial Internet of Things (IIoT), cloud-based manufacturing, and smart manufacturing, which contribute significantly to the metamorphosis of the manufacturing process into a completely digitized and intelligent process (Vaidya et al. 2018). Companies are interested in meeting their customers' needs, but also in obtaining useful information from them, which can be used for innovation (Nethravathiet al. 2020).

This paper examines management of information technology in the 4th industry revolution era.

Literature Review

Concept of Fourth Industry Revolution

Technology has evolved over time in human history. The first industrial revolution (Industry 1.0) determined the evolution from the mercantile city, which grew based on the exchange of goods and products obtained from agriculture, to the industrial city, which grew based on increased productivity (Rosca, 2016). This transformation laid the foundations of the modern world, and by changing the social structure of human capital, the primordial importance of agriculture in the economic and social life has been taken over by industry. According to Frey and Osborne (2017), people had a fear of technological unemployment. For this reason, several hundred years passed between the first knitting machine invented in 1589 by William Lee and the first industrial revolution. Moreover, this revolution led to the replacement of workers' skills by simplifying their tasks (Bulte, 2018). The workers took over the role of supervision, regulation, and control of the machines (Poliak et al, 2019). The second industrial revolution (Industry 2.0) brought the transition from the industrial city to the planned city. In the planned city, the new type of worker was exempted from the productive processes that involved gross physical labor, which has been replaced by social and security services, mechanical equipment, and total automation. The third industrial revolution (Industry 3.0) caused a transition from the planned city to the fragmented city, where industries were increasingly moving away from the markets, thus changing the economic systems and methods of production. In the fragmented city, a new economic-social order was born, separating, even more, the housing from the workplace, consumers, urban life, and research and innovation institutions. The fourth industrial revolution

(Industry 4.0) brought about the transition from the fragmented city to the smart city (Mumford, 1961). At this current stage, the economic-social transformations do not have their roots in discovering a new form of energy, but they are based on the latest technological phenomenon—digitalization. The technology has made possible new products and services that have generated significant transformations in both personal and professional life, emphasizing the interaction between machines and people.

According to the Industry 4.0 concept, the Fourth Industrial Revolution dawned through the use of cyber-physical systems (CPSs), the Internet of Things (IOT), and services (Jazdi, 2014). Industry 4.0 cannot be defined well, but it includes the following: smart factories, cyber-physical systems, self-organization, new systems in distribution and procurement, new systems in the development of products and services, adaptation to human needs, and corporate social responsibility (Lasi et al, 2014). The Fourth Industrial Revolution can be defined as the revolutionary change that occurs when IT proliferates in all industries, that is, the primary, secondary, and tertiary industries. In other words, it is a result of the horizontal expansion of IT. Therefore, the Fourth Industrial Revolution features the creative connection between technology and the market in all industries based on IT, that is, the creative and open combination of technology and the market through open innovation, or growth based on the open business model (Yun, 2017). However, the characteristics of the Fourth Industrial Revolution can be completely defined only when technical innovation is combined with institutional innovation as in the Second Industrial Revolution.

New Industrial Revolution with IOT, Big Data, AI, and Block Chain

The future society brought about by the Fourth Industrial Revolution is expected to experience many changes for the first time. In this regard, it is necessary to develop logic to cope with the emerging social issues related to productivity, jobs, quality of life, as well as social and ethical problems. In general, technological innovation and industry-based revolution are very different. The former is very short-term, whereas the latter is a long-term concept that spans centuries. Of course, depending on the point of view and field of study, the First Industrial Revolution was the start of steam-powered machinery, and the Second Industrial Revolution was the point of factory automation that began with the use of electricity. The common point of the First and Second Industrial Revolutions is that modernization of mankind was achieved by increasing efficiency or

productivity of physical space for the use of labor, capital, and land, which are the three elements of existing production. On the other hand, the Third Industrial Revolution can be traced to the use of computers and the networking of computers to expand human activity from existing physical space to cyberspace. Then, what is the Fourth Industrial Revolution? Technically, it is possible to utilize production factors different from those of the Industrial Revolution, such as the Internet (IoT), big data (new capital), AI, and block chains (trust). It can be defined as an intelligent revolution of industry characterized by continuous short-term innovation with varying levels of speed, scope, depth, and trust. In other words, if the First and Second Industrial Revolutions modernized the physical space and the Third Industrial Revolution revolutionized modernization in cyberspace, the Fourth Industrial Revolution brought about a fusion of physical space and cyberspace. In particular, the characteristics of the society of the Fourth Industrial Revolution, called the hyper-connected society, are somewhat different from those of the connected society of the IT-based Third Industrial Revolution. In the traditional information age, information technology has acted as an adhesive between different disciplines or technologies. However, with the introduction of artificial intelligence, the separation of intelligence and recognition and the fusion of virtual space and actual space were achieved. The First and Second Industrial Revolutions constituted a centralized network, and the Third Industrial Revolution constituted a decentralized network in which powerful hubs were dispersed. On the other hand, the Fourth Industrial Revolution constitutes a distributed network wherein all connection points have equal power.

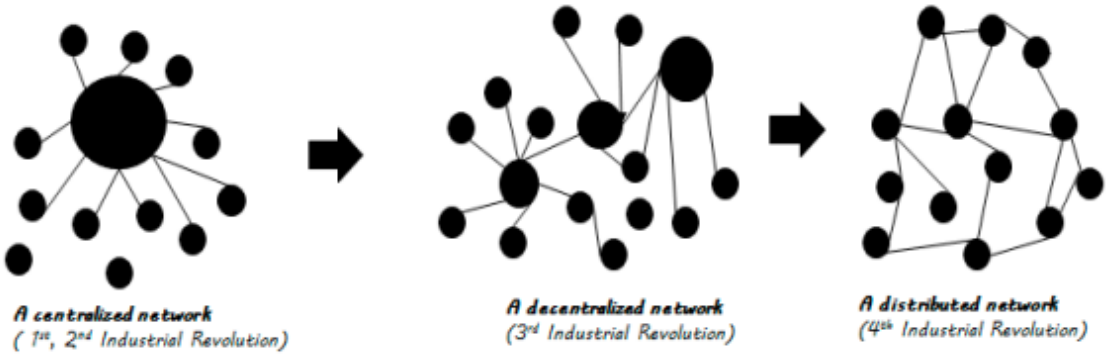

Figure 1: Industrial revolutions and network relationships

Theory of Technology Acceptance Model

The technology acceptance model (TAM) is an information systems theory that models how users come to accept and use a technology. Technology Acceptance Model (TAM) is theory majorly in the information system. It focuses on modeling computer users and showing them on how they can accept and adopt a new technology. It was designed to predict the technology adoption decisions of users. Technology Acceptance Model is usually used to predict. It indicates that there are only two components that determine the users' acceptance of a computer system. The two components that determine computer acceptance are the perceived usefulness and the perceived ease of use of the system. The main aim of this model is that it emphasizes the potential of the users. In other words, it underscores, for example, when a developer of a given technology believes that his or her system is friendly to the users. Inversely, the system is not be accepted by the users not unless the developers share the benefits and advantages of the technology system, as stated by Ibrahim et al. (2017). The perceived usefulness component in Technology Acceptance Model is the degree to which a computer system user believes that using a particular computer system will enhance his or her performance (Opoku, 2020). It usually refers to consumers' perceptions based on the outcome of their experience. The existence of perceived usefulness has significantly been recognized in many businesses, primarily in the banking sector. In other occurrences, it is regarded and taken as a determinant of actual behavior whereby a user is encouraged to use an innovative and user-friendly self-service technology to improve and establish greater autonomy in performing some banking activities such as transactions. However, in the banking industry, the perceived usefulness component is based. It depends on the services offered by the bank, such as applying for loans, checking balances, checking, and paying utility bills. For instance, it is a critical component in this sector since it determines the adaptation of innovation. The technology acceptance model (TAM) is a critical aspect in many sectors, including the education setting. When it is in place, people have the intention and attitude to use technology.

Conclusion

This paper examines management of information technology in the 4th industrial revolution era. The Fourth Industrial Revolution brought about the possibility to utilize production factors different from those of the Industrial Revolution, such as the Internet (IoT), big data (new capital), AI, and block chains (trust). The First and Second Industrial Revolutions modernized the physical space and the Third Industrial Revolution revolutionized modernization in cyberspace, the Fourth Industrial Revolution brought about a fusion of physical space and cyberspace. With the Fourth Revolution, big data can be handled effectively and analyzed using Artificial Intelligence (AI) models.

The fourth industrial revolution is transforming the economic paradigm and mechanisms used to create value and generate benefits, i.e., efficiency, effectiveness, and customization, as well as quality and innovative products, projects, and services. The extensive utilization of technological advancements in many smart city sectors, a topical IoT related development, has become the most effective way of improving quality of life. Technological breakthroughs impact on the way in which we live, work, and interact in the urban space. The integration of smart cities technologies is becoming more visible and enhancing the lived urban experience. From the point of view of Industry 4.0, a successful economy has the most assets, activities, and focus in digitizing its assets. The experience of using technology is very new, even in the world.

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