

Fourth Industrial Revolution (Industry 4.0)

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The fourth industrial revolution has emerged as one of the most important topics among world leaders, academia, practitioners, experts, and policymakers, and has been identified by many countries as one of the top priorities for their economic growth and development. With the new technologies and innovations such as artificial intelligence (AI) and robotics, the fourth industrial revolution is expected to exert tremendous impacts on every aspect of life, including governance, society, and economic structures. Despite all the opportunities and excitements from the new and super-advanced technology, the future of the fourth industrial revolution is associated with a degree of uncertainty. The industrial revolution does not constitute something entirely new, yet the 4.0 version of itself is, to some extent, unfamiliar to most people. Therefore, this aide-mémoire will offer general explanation about the fourth industrial revolution and illustrate briefly some of its impacts on society, global economy and business.

What is Industrial Revolution?

Initially developed in Great Britain, industrial revolution was described as period of industrialization and innovation that, as some argued, gave rise to capitalism and turned the traditional ways of production into industrial manufacturing (Chen, 2019). The industrial revolution has tremendously and radically transformed rural and urban areas in many parts of Europe and America into industrialized cities that generated revenues and spurred rapid economic development through the industry-based

production (History, 2019). The standard of living increased as more and more people could earn higher incomes when working in factories rather than doing the farming. Communication and transportation on the other hand became quicker and more advanced with new innovations as well as the technologies developed during the industrial revolution.

As the Founder and Executive Chairman of World Economic Forum Klaus Schwab points out, the industrial revolution has gone through a few stages before it comes to where it is today (Schwab, 2016a). The first industrial revolution occurred between 1760 and 1840 and introduced mechanical production for the first time which could be achieved by steam engine and rail roads. With such invention, it paved the way for early industrial productions such as iron and steel industries to rapidly emerge into the manufacturing processes. Appeared at the end of 19th century and in the early 20th century, the second industrial revolution took place as a result of the discovery of electricity and the manifestation of the assembly line. Mass production, furthermore, was used to characterize the second stage of industrial revolution. With the beginning of the digital era in the 1960s, the third industrial revolution was based on technological and digital development of the internet, information technology (IT), semiconductors, and computerization. However, the fourth industrial revolution is believed to be already underway and will exert greater impacts on human life more than ever before.

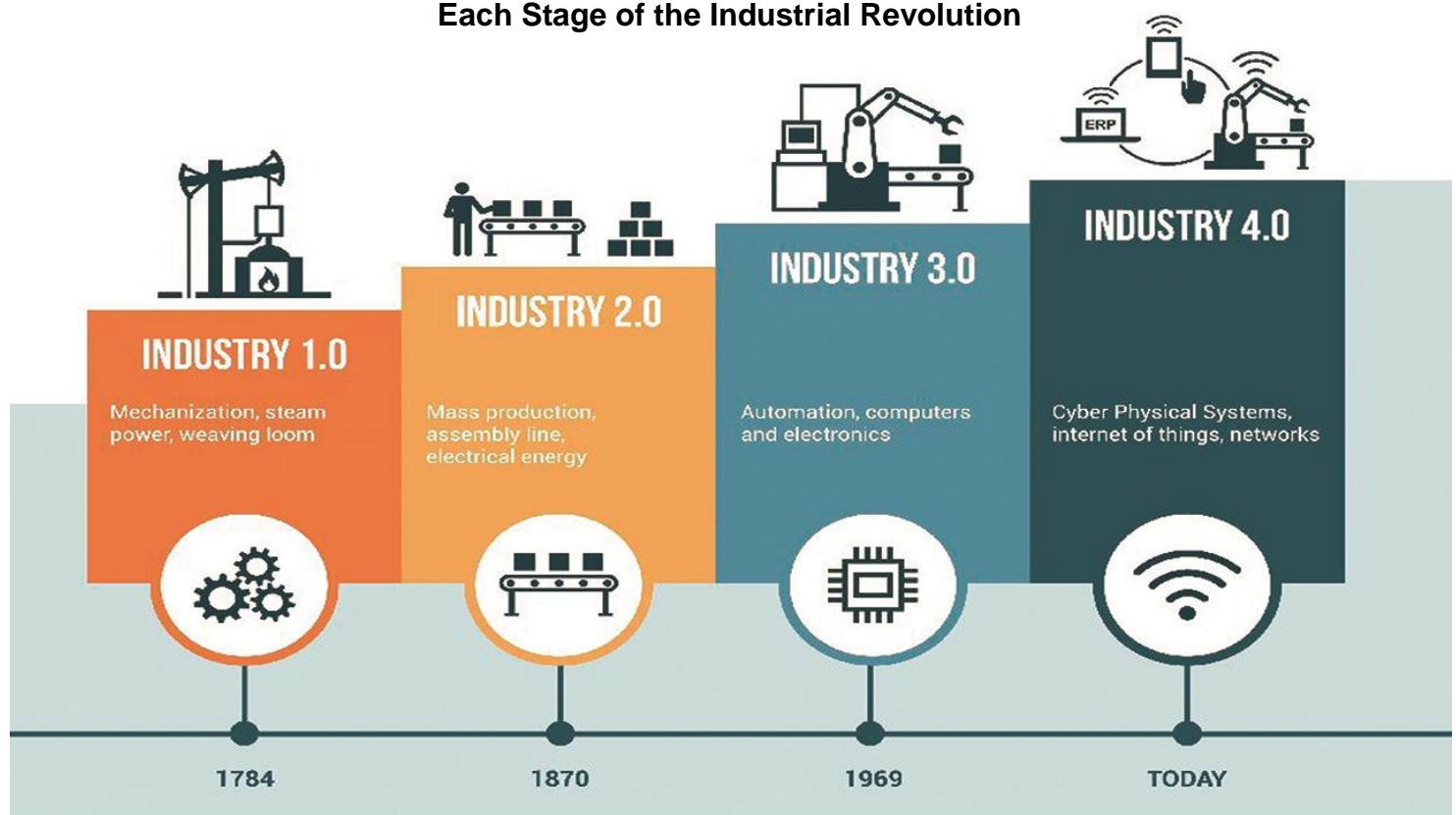
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The Fourth Industrial Revolution or Industry 4.0

Schwab believes that the fourth industrial revolution has been in progress since the beginning of the 21st century, in which it builds upon the digital foundation of third industrial revolution. Because of the super-advanced technological innovations such as big data analytics, nanotechnology, gene sequencing, and quantum computing, the fourth industrial revolution is occurring in a much wider scope, and therefore forcing physical, digital and biological world to become entangled. The diffusion of the emerging technologies is also faster and more widely; the internet, for example, took less than a decade to spread around the globe. Schwab highlighted a number of scientific discoveries and new technologies that contribute to the inception of the fourth industrial revolution, which he clusters into physical (3D printing, advanced robotics, autonomous vehicles), digital (the Internet of Things-IoT, sensors) and biological (genetic sequencing,

genetic editing) categories with which they interact and depend on the development progress of one another. It is important to note that the development and application of cyber-physical systems is what makes the fourth distinct from the third. Physical entities such as machines and smart devices require less human intervention for control and operation because they are computed to interact and communicate automatically and independently across the systems. The fourth industrial revolution is at times referred to as the “Industry 4.0”. While the fourth industrial revolution is concerned with overall technological changes in various aspects of life, the industry 4.0 is limited to the technological transformation of manufacturing in industries. Coined at the Hannover Fair in 2011 in Germany, the industry 4.0 has been used alongside the fourth industrial revolution to denote changes in global value chains shaped by cooperation between virtual and physical systems of manufacturing in “smart factories” (Schwab, 2016a).

Each Stage of the Industrial Revolution



Source: *The Guardian* ¹

¹ See more at Adepotun, A. (2018, October 03). Fourth industrial revolution Nigeria's next phase of growth? *The Guardian*. Retrieved from <https://guardian.ng/technology/fourth-industrial-revolution-nigerias-next-phase-of-growth/>

Impacts of the Industry 4.0

The fourth industrial revolution is predicted to cause profound impacts on every aspect of life, both positive and negative in which it depends on how the technologies are utilized and how much societies across the region and world are ready to get adapted to the enormous changes brought by the industry 4.0. On the bright side, the technologies and innovations of the fourth industrial revolution are expected to enhance the quality of life and improve the way we live and transport. Take smart cities and IoT technologies as an example – combined with IoT systems, smart cities can transform the existing experience of urban life into a new one which is more secure and efficient. In term of security, smart cities are equipped with CCTV (Closed Circuit Television) camera system that enables smart facial recognition feature to identify suspicious individuals before or after they commit crimes (Low, 2018). Likewise, to make transportation much more efficient, smart mobile apps are used to provide time estimates for different means of transportation based on the current traffic patterns in the city (Low, 2018). In addition, the development of 5G network also facilitates the systems and technologies in smart cities. For instance, 5G technology allows connected vehicles to transfer and share traffic signals to reduce traffic congestion (Castro, 2019). Self-driving cars or autonomous vehicles developed in modern and advanced places like smart cities significantly require the assistance of 5G because the operation of such vehicles demands faster connections and low latency capability which 5G can provide.

The technologies of the fourth industrial revolution also raise the level of personal satisfaction of those who have access to the digital realm as many types of services such as online shopping and flight booking can be applied remotely (Schwab, 2016b). Moreover, by using data transmitted from different devices which are connected to the cloud, AI and big data analytics will be able to make analysis and predictions to create smart customer services in

many fields, such as healthcare, transportation, finance, insurance, and public government services.

Industry 4.0, in a broader sense, also brings economic opportunities to industrial sectors of the economies that have undertaken technological and digital transformation. It has been found that the countries that have invested in industrial IoT are predicted to achieve high economic value. Accenture and General Electric report in 2015 indicated that the development of the Industry 4.0 technologies in various industrial sectors could yield high economic opportunities, and the US would be the country that is most likely to get the largest benefits, followed by China, Germany and the UK respectively (Pettillo, Felice, Cioffi, & Zomparelli, 2018). For small and medium enterprises (SMEs), they are given opportunity to improve productivity and efficiency from new technologies like sensors and big data analytics that allow a better understanding of production process details and help them to find better options for production that require less time and resources (Smith, 2018).

Nonetheless, the fourth industrial revolution also comes with widespread concerns, one of which is the rise, if not takeover, of AI and automation in workplaces that will replace human labors and lead to the loss of jobs and massive unemployment. According to World Bank report in 2016, an estimate of 77% of job in China alone is under the risk of being replaced by automation (Citi and Oxford Martin School, 2016). Although the displacement of workers depends on the pace of adoption of technologies by businesses and economies, approximately 375 million workers would still have to change their occupations by 2030 (McKinsey Global Institute, 2017). Therefore, new skills and knowledge or adaptability to the new technologies and machines shall be the priorities.

Another downside of the future of industry 4.0 is the increase of inequality. As mentioned above, the fourth industrial revolution has the potentials to improve the quality of life. However, there are still

many people who cannot even grasp the benefits provided by the previous industrial revolutions. Mechanization, the technology found during the first industrial revolution, is unavailable to at least 600 million people who live on farms, and around 4 billion people across the world still cannot have access to the internet (Trailhead, n.d.). Moreover, it seems that the largest beneficiaries of the new technologies and innovations are almost only the suppliers of capital, including innovators, shareholders and investors (Schwab, 2016b). Hence, the situation could lead to more social distrust and disillusion among the middle class as the income gap between the capital owners and workers widens.

Besides, cybersecurity is what many countries and businesses are concerned about during the age of digitalization. Threats and risks in cyber security become even more alarming when millions of user data, including personal information, bank accounts, and even routine activities, are transferred from sensors embedded in many devices. Governments and businesses need up-to-date cybersecurity measures and response mechanisms to seal off sensitive data and valuable assets from being exploited by hackers. A global ransomware attack, the WannaCry ransomware in 2017, which affected around 200,000 computers in over 100 countries (Comptroller and Auditor General 2017), clearly showed that the unpredictability of cyber-attacks requires a high level of precaution for digital security, especially in time like now where almost everything is being digitalized. In other cases, cyber warfare also concerns government worldwide that the super-advanced technologies are used to steal intelligence or cause political chaos in their countries.

The Trend of the Fourth Industrial Revolution

Many countries are preparing for the fourth industrial revolution to make sure their societies could seize the opportunities and benefits provided by the revolution rather than facing the danger. The Chinese government, for example, has launched an initiative called “Made in China 2025” in a bid to transform the country into a technological powerhouse

and enhance the development of technology for the fourth industrial revolution (Kania, 2019). Singapore, likewise, has been an active country in Southeast Asia that promotes technological and digital transformation. Apart from the vision of building smart cities, Singapore has made efforts to assist local companies in creating strategies to digitalize their business models by releasing the Smart Industry Readiness Index – used to identify and focus on critical aspects for their transformations – and Assessment Matrix – used to map out transformation activities and evaluate their digital maturity (Singapore Economic Development Board, 2018).

In Cambodian context, the trend of digital transformation has also been followed closely by the government of Cambodia as well as the private sector. For example, a number of initiatives have been created and supported by private companies to encourage young entrepreneurs to create their own digital startups. Furthermore, the Ministry of Economics and Finance has initiated an SME bank in order to provide better access to funding for SMEs and to promote digital startups in the country. Recently, Cambodian Prime Minister advised the Committee for Economic and Financial Policy to formulate frameworks for the digital economy in order to enhance the socio-economic development by focusing on three main aspects: 1) the development of infrastructure for the digital sector and preparation for e-payment systems; 2) the establishment of the digital platform and digital business ecosystem; and 3) the promotion of the digital government, digital entrepreneurship, and open data. In addition, Cambodian government has also expressed efforts and intention to improve digital security in the country by formulating policies, legal regulations and standards to ensure a safe environment for doing businesses in the digital economy. However, whether this is enough for the government, the commercial institutions, the society, and particularly the people to get ready for the industry 4.0 remains uncertain.

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