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Perspectives in The Industrial Revolution 4.0 and A Glance Review of Impact to Suply Chain

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Abstract. Behind the magnitude of influence and benefits of the digital industry in various dimensions in most scientific literature, likewise, there are the contradictive arguments. This paper aims to figure out various theory statements, either the pros or cons of the industrial revolution and also a glance of the impact the Industrial 4.0 to supply chain in an enterprise. A comparison of viewpoint both the Neo-Classic group and Marxists on this paper is a difference with other references. That this paper using a literature review in which materials were from many sources like Scopus, Science Direct, Sage Pub, etc. The element of dynamic process and now we called by innovation is the Schumpeter theory. Marx's foresight will happen because the mechanical process on production will prune the class worker and massive unemployment occurs.

Keywords: Industrial revolution 4.0, supply chain

INTRODUCTION

That fourth industrial makes the magnificent change both qualitative and quantitative wide scales in life [1]. In 2011, Germany proposes industrial 4.0 thought on an economic policy that is based on advanced technology [2]. Provided that can apply dual strategies in smart manufacturing industrial through keep in integration information and communication technology, Germany will be a leader in the world [3]. Now, many countries race to adopt a smart-tech in all sectors to the easiness of its citizens. People in rich countries can access easily the world in hand, for instance: transportation, shopping, education, etc. However, that is not easy for others which is inhabitant work in the labor-intensive industry, especially in the third world, because they will be replaced by robotic. According to [4] that there are many implications of the industrial revolution 4.0, even more, people can be connected to others, many organizations more simply, but the shift and disruption can bring to impending doom.

Further, the industrial revolution 4.0 has been developing rapidly in most of the sectors. A few years ago, most governments and organizations around the world accepted the change of technology 4.0 [5]. That IR 4.0 has been being implemented in the construction industry has big challenges to ensure success in which social factor is one of the big barriers [6]. Moreover, in Brazil, with 27 sectors representing 2,225 firms, industry 4.0 gives a positive and negative contribution to industrial performance [7].

Behind the magnitude of influence and benefits of the digital industry in various dimensions mentioned in most scientific literature, likewise, there are the contradictive arguments. Advocates of the growth theory in economics that consider the technology as a stimulus, sentence the technological change as a result of increasing demand in society. To saving time, less price, less investment, low cost of input, machinery and robotic can be the way out.

In contrast, a wave of change in industrialization that effect of invention in technology information became the target of criticism from Marxists. Suspicion Marxists of full technology in many works will drag workers to the line. Finally, the disparity on class more yawn. This paper aims to figure out various theory statements, either the pros or cons of the industrial revolution. A comparison of point of view by both of the Neo-Classic group and Marxists on this paper is a difference with other references.

METHOD

Many views from theorists who started about this phenomenon in which it can change the pattern and communication model of the human being. The research tries to arrange the point of views by the predecessor related to both pros and cons. That this paper uses a literature review in which materials were from many sources like Scopus, Science Direct, Tandfonline, etc. This paper reviews the struggle of both Neo-Classical and Marxism perspectives.

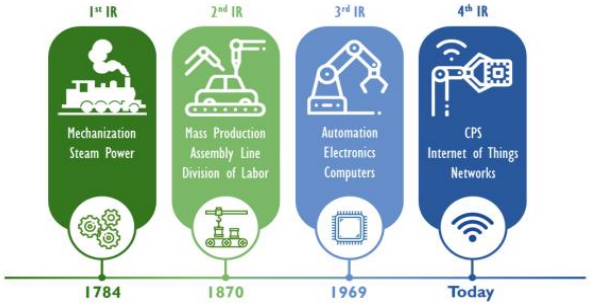
On the other hand, related to Industrial 4.0, many researchers have used a literary review to figure out their perspectives like [8–16]. However, none of them has discussed two perspectives simultaneously. Therefore, this paper is an attempt to provide a narrative about the framework of founders and to present the main points of thought about the fate of the economy in the digital world.

RESULTS AND DISCUSSION

Several theorists have predicted the development of human science in the field of technology to achieve in industrial 4.0. Not many of them contra views about it. In this part, the foundation of debate is given through the progress of theoretical literature.

A Brief History of Industrial Revolution

In England, the process of using water and steam around 1784 was regarded as the industrial revolution 1.0 and then followed by other breakthroughs such as the textile industry, and the idea of manufacturing is quickly spread. The industrial revolution 2.0 marked by electrical findings in England, Germany, and America in 1870 which is an increasingly sophisticated machine has an impact on the scale in industrial production. Furthermore, the industrial revolution using 3.0 electronics and information technology. This era is identified by the presence of a computer and introduced a more automatic system. Industrial 4.0 is the era of smart machines with key elements such as big data, cloud computing, cognitive computing, Cyber-Physical System [17–20]. To illustrate the narration, look at the following picture.



Source: [19] : The Four Industrial Revolution (IR)

Technology in Historical Approach

The studies with the historical approach are still general and try to figure out the long-term pattern in innovation and economic activities. The evolutionary innovation model is understanding the market in which special technology will survive [21]. Subsequently, the Shaping Social of Technology (SST) examines the technology involved in innovation. This approach is also looking for the factor of social-economic having formed the change of technology on society [22].

Induced Technological Change

The direction of technological change can be seen at the impact of the economic environment in the three ways [23]. First, Demand-Pull Tradition focusing on market demand for science and technology. Previous [24,25] state that the demand is the most important to encourage the invention and land of discovery. Another impact is on macroeconomics. This theory has a weakness that is the innovation of possibility frontier has a function for evaluating the trade-off between economic output and environment. The other impact is on microeconomics model found by Hicks's observation. Hicks stated that innovation in technology can lead to relative prices.

Theory of Evolutionary

For the first time, production activities, factory expansion, individual action, product combination, and R & D dominate the model. According to [26] there are two mechanisms on evolutionary theory, search for better technology and innovational selection by the market. Also, the local search of innovation technology,

imitation process, and satisfaction on economic behaviour can cause technological change. Furthermore, encouragement co-evolutionary inter-supply and demand side are the element of economic development [27]. Bicycle is one of the examples of a shift in technological innovation [21].

Theory of Path Dependence

Path-dependence is known as one of the revolutionary theories on the neo-classical view that supply an analytical perspective for economics [28]. The complex interaction among the firms reveals the basic characteristic of technological change. The characteristics seem irreversibility, creativity, feedbacks, and contingent disturbing factors [29]. Then, likewise, according to [30] that path-dependence is a set of small accidents and dynamically on the limit time that is influenced by economic activities in the long run.

Paul David is one of the economists who trigger the term of path-dependence in 1985. On the viewpoint of this theory, technology is as a bridge that can influence the future dimension and becomes a trigger in the change of science. Further, the technology will follow the times and tend to dynamic. Technology is spread out in all of the sectors in life. No field of works is untouched

Perspectives: Neo-Classic vs Marxism

Neo-Classical Paradigm

Neo-classical is a term for several schools of thought about economics that is based on prices, production, and distribution of funds through offers and offers in the market. The assumption of maximization of utility is the main slogan of this school or better known as marginalist economic flow. The initiators of this school were Leon Walras, Carl Menger, and William Stanley. However, Thorstein Veblen was the first to introduce this term in 1900 to categorize a group of economists who supported the marginalist revolution initiated by William Stanley Jevons. Among these economists are Alfred Marshall and Austrian economists (Austrian School). Some of the characteristics of neo-classical economic theory are [31], [32], [33]:

- The development of production factors and technological progress are the main factors that will determine the level of economic growth at a certain time and its development from time to time.
- The government has intervened in the country's economy.
- The tax system has been implemented and inflation is, likely, to occur.
- Look at how each factor of production and technological development influences economic growth.
- Analysis on the contribution of capital stock development and technological development in economic development.

The consequence of technological change that can rapidly change in socio-economic development was failing to be observed by the economic historian in nineteenth-century [34]. The neo-classical concept does not consider technical change is part of growth theory which tries to describe long-run development in the production structure. Specific production technology is a production function. Utilization technology will be more efficient because do not need extra labour [35]. The element of dynamic process and now we called by innovation is the Schumpeter theory. Schumpeter defines innovation as a ”spontaneous and discontinuous change in the channels of flow, disturbance of equilibrium which, forever alters and displaces the equilibrium state previously existing” [36].

Marxism Perspective

Marx and Engels focus on the effect of the Industrial Revolution on the working class. At the first volume on “Capital”, Marx said that the industrial revolution will eventually bring disaster. First, agriculture land is seized in the name of industry and then industry uses mechanization and will slowly reduce the wages of workers [37]. From time to time, Marx state that the definition of capitalism in productive labour like the contribution of production of value/surplus to capitalism itself. The proletariat will take over the capitalist economic system driven by the bourgeoisie which is continuously revolutionizing the means of production that make up the capitalist system, and this is what Marx and Engels suspected [38].

Marx’s foresight is likely to be realized because the mechanical process on production will prune the class worker and massive unemployment will occur [39]. According to [40], that Marx stated that “automation is a process of absorption into the machine of the ‘general productive forces of the social brain’ such as ‘knowledge of skill’, which hence appears as an attribute of capital rather than as the product of social labour”. According to [41], since the era of artificial intelligence emerged, the difference in the boundary between capital and labour is ultimately thinner which labour can be reduced to capital goods

In this case, the debate is increasingly sharp between the supporters of capital and anti-capital. Regarding the emergence of technology, it could be a solution for human needs with such a dense routine. On the other hand, it can also damage a country’s economy, especially for developing countries that are highly

dependent on labour-intensive investment. Furthermore, [42] said that Marx's said: "All that is solid melts into air". To get the balance, two things are needed both constant change and disruption. Consequently, modern people will be destroyed if there is an equilibrium, due that a financial will go to zero and continue it can certainly increase bankruptcy.

Impact on the Supply Chain

Industrial 4.0 has an impact to supply chain management notably in order fulfilment and transport logistics. Besides that, 53,84% will be opportunities in order fulfilment and the meantime, 61,54% was identified as opportunities in transport logistics [43]. Hereinafter, Industrial 4.0 creates a few of opportunities at once challenges faced in enterprises. Those opportunities identified are flexibility, speed, load balancing, less document, data usability, saving in cost, reduction on labour wage, easily tracked, shorter for storage, reducing shipping errors. Meanwhile, for the challenges are identified such as susceptible to damage, standard errors, inadequate of data quality, inadequate of IT infrastructure, dependency to IT, the security of data, over labour function, lack of knowledge, and lack of ways of use [44].

Furthermore, [45] revealed the impact of 4.0 to supply chain innovation can be summaries on three findings in which first, expanding the scalability and flexibility of production. Second, eliminate pedestal in humans and smart device. Third, establish the new environment of start-up model. However, industrial 4.0 can be a trigger to business development, but it also can be an obstacle if the company use the neo-classical business model [46]. In the supply chain management, industrial 4.0 will be able to change the operational management of companies. Companies will certainly be more efficient in many ways.

Discussion

Each perspective has the power of analysis based on reality. In neo-classical viewpoint, demand for technology to support the development process is unavoidable. Marxists assume that technology will replace the rule of humans in a sector that absorbs a large number of workers. Marx's prediction looks like a nightmare.

In the author's view, technological change is a social dilemma in which, on the one hand, the benefits cannot be denied, on the other hand, it triggers social-economic matters. The benefits that we can get in various aspects are in the fields of education, trade, and other social life. Anyone easily accesses the information in just a few touches on the smartphone. Through the IoT concept, people will be connected to the digital world. Access traces will be easily detected through the data mining process. In today's digital industry, the world is becoming increasingly narrow. There is no screen in the digital world. Even the secrecy or identity of a person in seconds can be known quickly. All traces are recorded properly as big data so it is very precise if the data is likely oil int the digital world, hunted and expensive.

However, developing countries where a part of the populations works in traditional industries with simple mechanization can be a threat to the presence of industry 4.0. If the production system can be done through a digital system for efficiency reasons, then these treats and challenges are for developing countries, and also for the world.

CONCLUSION

Since the first to the fourth revolution, Marxists always had a contradictory view which added to the wide gap between the working class and capital owners. Meanwhile, for the Neo-Classic scholar, development should ideally be supported by advanced technologies for the achievement of goals in business, namely efficiency. The evolution of digital industries will certainly change the social and supply chain in enterprises of a country, especially in developing countries with minimal preparation of resources and human resource capabilities that are still far below that of developed countries.

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