

Aspects of social transformation in the Fourth Industrial Revolution

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Abstract: *The fourth industrial revolutions (Industry 4.0) has been changing the way people live, work and interact with each other. The most profound transformations take place in the field of employment, which then spread to other areas of life. So far, analyses of the Industry 4.0 have mainly focused on technological transformation and economic impacts, leaving social dimensions with inadequate attention. The article analyzes some aspects of social transformation in the Industry 4.0 era, such as employment, inequality, aging population and social networks.*

Keywords: Industrial revolution, Industry 4.0, Sociology, Social transformation.

I. The Formation of the Fourth Industrial Revolution

Human history has so far witnessed four industrial revolutions as perceptions of the world and manufacturing technology change. Each revolution made profound changes in the economic system, structure of the society and culture in very different ways.

The first industrial revolution took place in the period 1760-1840 with the construction of railways, the invention of steam engines

and the beginning of the mechanical manufacturing era. The second industrial revolution was the outbreak of electricity and assembly lines from the late 19th century to the early 20th century. Since 1960, the development of semi-conductors and the emerging waves of computer and the Internet marked the third industrial revolution - commonly known as automation revolution. The achievements of the three industrial revolutions spawned the formation of the fourth revolution in the

early 21st century. This revolution is characterized by the integration of physical systems and cyber systems. In the factories 4.0, machines are Internet-connected and inter-connected through a system which is able to guide the entire manufacturing process and make decisions, gradually reducing the presence of human. Mobile devices connect billions of people around the world and provide access to big data in many areas. Compared to previous revolutions, Industry 4.0 brings technological innovations to every corner of human life through tiny sensors, artificial intelligence or learning machine. With Internet of Things (IoT) and Internet of System (IoS) as its core, Industry 4.0 is bridging the gap among physical, digital and biological fields.

This emerging trend also creates profound changes in the way people work, communicate, express themselves, and access to information and entertainment (Klau Schwab, 2016). Many individuals are now able to work at home or anywhere without going to the office as they used to do. They can also participate in large social networks, access to unlimited opportunities for education, entertainment, and personal development through modern digital devices. Every task, from running a business to daily activities such as taxi booking, airline ticket booking, shopping, music, etc. can all be done remotely through the Internet. Technological advancements in the digital era also affect privacy, ownership awareness and social interaction. Thus, the biggest beneficiaries of the Industry 4.0 are those who are able to access and utilize the digital world.

With the above characteristics, the fourth industrial revolution is of great importance and has strong influence on the socio-economic development of all countries. Countries that make full use of the achievements brought about by the Industry 4.0 will have a huge advantage to develop in the era of globalization. Developed countries are the pioneers in restructuring and reshaping their economic development and manufacturing strategies in the Industry 4.0 era. In this context, the manufacturing and labor markets are the places to experience the most dramatic changes, and are driving the transformation of important aspects such as education, social equality, aging population, and social network. This new revolution also raises concerns about decreasing social skills and collective empathy as less and less face-to-face interactions take place. However, it is impossible to anticipate all the changes that the fourth industrial revolution is bringing to our lives.

II. The Fourth Industrial Revolution from a sociological perspective

1. Employment

In 2008, stemming from the idea of taxi booking from Internet-connected phone, Uber company was born (the company is now valued at USD 70 billion). Uber has substantially transformed the way people use transportation services and employment in the field. Uber is a typical product of the Industry 4.0 era when people utilize the advantages of technology and the Internet to change the way they work, do business and use services. Nowadays, many technological

ideas have been making significant changes in employment across the world. In that context, many argue that a large proportion of laborers will be replaced by automation and modern machinery and equipment (Klau Schawb, 2016). Carl Fery and Michael Osborne (2013) in their study predicted that about 47 percent of jobs in the United States will be automatized in the next two decades. Accordingly, the most highly automatized occupations include: telephone operator, tax preparer, customer service job through call center, real estate broker, etc. Some of the less likely automatized occupations are psychological consultant, social worker, sociological researcher. In other words, technological innovation and the use of algorithms will eliminate some jobs, particularly simple, routine ones, forcing laborers to quit or shift to other jobs.

On the other hand, the Industry 4.0 also creates new types of job and business model such as digital occupations and jobs that use the “human resource cloud”. Digital employment is the replacement of people by algorithms, and the human resource cloud is where the individual employee performs specific tasks instead of traditional salaried work. However, the Industry 4.0 is seen as creating fewer jobs in new industries than previous revolutions. According to estimates by the Oxford Martin Programme on Technology and Employment, the Industry 4.0 created only 0.5% of new jobs, much lower than the previous automation revolution (12.5% created during 1980-1990) (Klau Schawb, 2016). In other words, Industry 4.0 creates new jobs but at the same time

removes many existing jobs. As such, job transformation is a major trend in the labor market of the Industry 4.0 era.

More job losses mean that a part of the workforce will become unemployed because of the inability to find a job in highly demanding and technologically advanced fields. The economist Guy Standing discussed the emergence of “precariat”^(*) - a class of workers who shift from one job to another to earn a living without the labor rights, bargaining power and work security. Consequently, the separation, isolation and exclusion in the society between those who are able to catch up with the flow of technology and those who are more vulnerable in the changing context will become more and more evident. The fourth industry revolution could lead to “the dark side of employment“ in the future (Lynda Gratton, 2011).

Industry 4.0 not only creates significant disturbances in the labor market, but also deeply affects the individuals. The high speed of change in technology requires employees to have the capacity and skills to adapt to the development of those technologies. The *Future of Jobs* Report by the World Economic Forum (2016)

(*) “Precariat” is a term used by the English economist Guy Standing to describe a group of people who feel insecure about their occupation, their community and their life in general. Specifically, “the part-timer, minimum wage workers, temporary foreign workers, non office-based workers, old agers who struggle with shrinking welfare , native citizens who are pushed to unstable employment status, helpless single mothers, generations that are not entitled to and do not want retirement or pension” (Guy Standing, 2011).

states that by 2020 there will be dramatic changes in the skills employed in most industries. In particular, complex problem-solving skills, social skills and systemic skills will be demanded more than physical and technical skills.

The development of technology can be disruptive but eventually it will always improve productivity and increase wealth. Some studies have shown a trend of increasing revenue by improving automatic driving sensors. Total infrared sensor market revenue increased from USD 1,461 billion in 2013 to USD 1,665 billion by 2014, 14% higher than that in other LED industrial applications. Instead of employing more workers to create new products, Industry 4.0 tends to use technology and information (Klau Schawb, 2016). The employment trend in the Industry 4.0 era is the promotion of skills that improve productivity, especially those that promote and complement automation and digitization. Traditional skills such as physical skills and resource management which used to play an important role in the previous periods are being replaced by machines, thus the sharp incline in the rate of interest.

2. *Social inequality*

* Income inequality

Analyses on employment in the context of Industry 4.0 show that the most negatively affected labor group is those with simple, routine works and low skills. On the contrary, this revolution brings about more opportunity for those who own and can effectively utilize technology. The consequence is the enlargement of income and wealth gap among social strata, with

the disadvantaged group due to limited skills, low adaptivity to technology development, being highly replaceable by robots and automation on one side, and on the other side is the group who are able to gain benefit thanks to technological ideas. In the most recent decades, many young billionaires have emerged due to technology-related ideas and innovations such as Mark Zuckerberg (Facebook) or Travis Kananick (Uber).

Nowadays, the global polarization between the rich and the poor is ever-increasing. Noticeably, the wealth owned by the richest people, which accounts for one percent of the global population, is equivalent to that owned by the remainder 99 percent; and 0.01 percent of the richest people are also those with most rapidly increasing wealth, accounting for 12 percent of the total social wealth. According to Organization for Economic Co-operation and Development (OECD), in OECD countries, the average income of the 10 percent richest group is nine times higher than that of the 10 percent poorest group. Income inequality is increasing in almost all countries, even in countries with significant achievement in poverty reduction. For example, the Gini index^(*) of China increases from 30 percent in 1980 to above 45 percent in 2010 (Solt Frederick, 2014).

^(*)Gini Coefficient indicates the inequality in income distribution. The coefficient's value ranges from 0-1. Meanwhile Gini index is the Gini coefficient demonstrated in percentage, equal to Gini coefficient multiplies by 100. Gini index indicates the level of inequality in income distribution among income groups in population.

According to experts' opinion, the Industry 4.0 can worsen the rich-poor divide (World Economic Forum, 2016). The group of rich people who are high-skilled laborers, own capital and technologies will take these advantages to enlarge their business scale, innovate production methods, and thus increasing their income. Nowadays, many companies are using robots and algorithms to replace human labor. Developing firms based on digital foundation also help investors reduce costs and capital intensity. On the contrary, the group of poor people and manual laborers will face the situation of underemployment or unemployment, which will reduce the already modest income level. The consequences are that the income gap among social strata is widening and the social stratification is intensifying.

* Gender inequality

Women being more marginalized than men in terms of development opportunities remains a global issue that has not yet been solved thoroughly. In the Industry 4.0 era, men will be even more advantaged than women as they are dominating in occupations related to computer science, math, manufacturing technology and automation. Men stand for higher chance to find job compared to women in the Industry 4.0 era (Klaus Schwab, 2016) and this may cause the situation of underemployment or unemployment among a proportion of female laborers. The consequence is that the households whose sole source of income is from the female family member will be put at risk, or that the women's contribution to household income will decrease, enlarging the gender gap.

In Vietnam, though gender inequality has been improve, there remain several persistent issues. Industry 4.0 can help narrow the development gap between women and men if women's job positions and social statuses are improved. However, the traditional norms and standards and the career choice tendency in Vietnam still restrain women in the low-paid and high risk of unemployment jobs. The proportion of female students in technical and applied technology majors (those that will be of high demand in the Industry 4.0 era) is modest. Women are also less likely to hold leading and management positions than men. Particularly, female farmers, 50 percent of whom have not yet attained primary education level, have very limited opportunities to get access to knowledge, technology and market (UNWOMEN, 2016). On the other hand, although female laborers comprise the larger proportion in the labor force, they are lack of skills and training; therefore, they work mostly in labor-intensive industries such as footwear and textile (78.5 percent), food processing and manufacturing (66.8 percent), ceramic and glass (59.2 percent) (Nguyễn et al., 2014). These industries are also among those with highest risk of job redundancy in the era of automation and digitalization. Generally, Industry 4.0 poses more challenges than opportunities to narrow the gender gap in Vietnam.

At the moment, it is not yet possible to anticipate the impact of the Industry 4.0 on every aspects of family life, such as employment, marriage, child rearing, etc. However, given the tendency of this

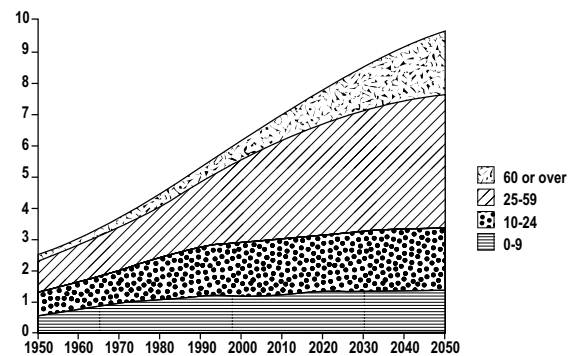
revolution, it is very likely that male members in the family will mostly take over the economic roles, meanwhile female members will manage the houseworks and child rearing. Consequently, the former “male-dominant” tendency, which human beings have been struggling for decades to eliminate, will resurrect. The following consequences can be the tendencies of delayed marriage or not getting marriage due to the extreme enlargement of gender gap.

3. Aging population

Aging population has become a global issue with the proportion of the elderly tends to increase rapidly due to the decreasing birth rate and higher life expectancy. In 1950, there were roughly 200 million people of 60 years of age or higher worldwide. In 2000, this figure increased to 550 million (accounting for 10 percent of world population). It is estimated that to 2025, this figure will reach 1.2 billion (accounting for 20 percent of world population) (see Figure 1). The Industry 4.0 has been introducing many achievements in medical, health care, cell transplant methods and genetic technologies. These innovations will help increase human average life expectancy. Klaus Schwab (2016) demonstrates that more effective technology-based medical

treatment methods via personalized medicine^(*) will increase human average life expectancy, thus increasing the number of elderly people globally. In other words, the Industry 4.0 speeds up the issue of aging population, especially in developed countries.

Figure 1: Global population estimates by age (1950-2050) (Unit: billion people)



Source: United Nations (2015), *World Population Prospects: The 2015 Revision*

Aging population reduces productivity and at the same time causes burdens to social expenditures, health care and social welfare. This issue is more serious in developing countries, where the productivity is still low and there remain many limitations in the social welfare system. However, the Industry 4.0 also introduces several options to response to aging population issue. These countries can take advantage of “smarter job opportunities without demanding more working hours and physical strength” that is enabled by the Industry 4.0 to utilize the older human resource. The old agers often possess capacity in management and skills in synthesizing and solving complex issues, which are the valuable advantages in the context of digitalization. The biggest challenge in order to transform this

(*) Personalized medicine is a medical model in which treatment method is customized, the medical decisions (prescription, preventives, care and treatment) and medical products (medicine, supplement dietary, etc.) are tailored to individual patient based on his/her genetic information and nature of the illness.

opportunity into reality is to restructure the labor market to create more jobs that are suitable to the old agers as well as the population structure.

4. Social, individuals and community networks

The digital communication media are connecting people in various different new ways. In a traditional society, an individual engages in many different social networks (schools, workplaces, business associations, hobby groups, friend groups, etc.) mainly in forms of face-to-face interactions, and then integrate into social life through these activities. Each individual can participate in different groups, and absorb, comply to group standards or values, and amass his/her own social capital. However, the level of participation is often limited in a certain social space due to the barriers of geographical distance, mobility and group norms. In the Industry 4.0 era, people can participate in those social networks without face-to-face meetings. Internet-connected mobile devices and computers enable us to join in networks and reinforce the social interaction with little dependency on physical distance or time zone difference. New technology also allows the individuals who have problems in terms of social, physical or geographical isolation to connect to various social groups. Not only transforming the forms and methods of interaction, the Industry 4.0 also facilitates the expansion of the networks at an unprecedented scale, transcending all the social, economic, politic, religious and ideological barriers.

The access to online social networks and modern information systems benefits

many people and brings about unlimited opportunities for studying and development, and even for survival. In the Syrian military crisis, many refugees used Google Maps and Facebook pages to formulate routes and avoid human traffickers. Digital communication also creates many opportunities for individuals to express their opinions, help them participate more vigorously in civil discourse and policy making process, and thus promoting democracy. In 2011, the social networks played an important role in gathering people to go on protests on every corner of Egypt, putting the pressure on the President who had been in power over the last 20 years to resign, and the government to negotiate. However, social networks and Internet can also manipulate the righteous policy making process. The enormous information load on Internet also contains distorted information, which manipulates the perception of receivers. This issue is becoming more concerning as nowadays many people tend to rely on information retrieved from Internet rather than spending time to observe, experience and interact in reality to come up with righteous decisions.

On the other hand, since their introduction, social networks have gradually become the major means of communication among people who have already had acquaintance relationship in real life. Now these networks are not simply the intermediate means to connect individuals and groups, but they have become a communication entity. Many individuals has been interacting in virtual environment, for example the online dating trend between virtual characters is

becoming more and more popular in Japan. Many people have become “isolated to the real-life society” since they started joining in online social networks. They neglect or distance themselves from the important relationships in real life such as family, friends or schoolmates. As a result, they can not keep up with the flow of real life, start neglecting their studying, decrease work productivity, become mentally ill, and immerse themselves in the virtual world. The most serious consequence is the distorted perception, which is a route to the commit of legal violating activities by many, particularly youngsters.

At community level, the formation of groups with opposing systems of values and standards also increases the level of social polarization. The American presidential election in 2016 witnessed a profound separation in the American society when different groups of voters demonstrated hostile attitudes and utmost contrast opinions towards each other. These opinions were densely disseminated on social networks when voters created pages to demonstrate their support to their preferred candidates for presidency. They also exploited information on private life of the candidates, used offensive and violent wording to criticize, separate and racially discriminate the opponent party. The digital communication devices contributed to increase the level of this social polarization. In long term, it may lead to the breakdown in social cohesion, pushing the members of the society away from each others, making it difficult in achieving social consensus to collectively solve the common issues of the society, nation, or humankind.

Conclusion

The very first wind of change in the Industry 4.0 era has become visible in the area of employment in many countries. Jobs that require high level of knowledge and skills to master advanced technologies such as automation, computing, digitalization are becoming more prevalent; meanwhile the demand for jobs such as accountant, journalist, librarian, chauffeur, etc. is on the decline. The Industry 4.0 is leading to an important transitional phase of employment: the quantity of jobs does not change significantly, yet the nature of work transforms profoundly, where the advantages of ideas and skills play an important role. This will lead to material changes in the labor market and, thus, affect all aspects of life. At the same time, the Industry 4.0 may create new momentum to break or reform the traditional economic institutions and social norms.

The Industry 4.0 will enlarge the development gaps among social strata and countries with different level of technology development, worsening the social polarization. Female workers and older workers will have to face more challenges, but at the same time have more opportunities to develop in the context of Industry 4.0. They have advantages in certain jobs where machine can not replace human, such as psychologist, therapist, personal trainer, event organizer, nurse, and jobs that require synthesizing skill and experience. Therefore, increasing studying and job opportunities for female workers and older workers is a huge challenge to humankind, especially in developing countries.

As for Vietnam, the Industry 4.0 creates several opportunities to narrow the

development gap among social strata and resolve challenging issues such as unemployment, aging population or human development. On the other hand, the Industry 4.0 also exposes Vietnam to the risk of being lagged behind if the country can not utilize the advantages, given the context that Vietnam has not yet attained the fundamental criteria of the Industry 3.0. Thus, Vietnam needs to formulate a clear policy pathway to resolve the urgent social issues, seize the opportunities and overcome the challenges in the fourth industrial revolution □

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