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UNLOCKING INDUSTRY5.0 POST-COVID 19 CATASTROPHE

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ABSTRACT

A new industrial revolution has erupted amid the Covid-2019 catastrophe. Covid-2019 has certainly pushed the swift development of Industry 4.0 but has also further led to the fast evolution to a new worker-centric style termed Industry 5.0. It can be said firmly that, unlike all the previous four revolutions which were based on technological advancements the new revolution is people-centric. The European countries are leading from the front in the implementation of this new revolution to empower employees instead of replacing them with new technologies. Industry 4.0 had been on a boom in the past decade but had a major shortcoming of over-dependence on industrialization. The dire need was felt to collaborate workers with their smart industries for optimization of business productivity. This paper is an attempt to understand the new human-centric revolution termed Industry 5.0and a few challenges being identified to be effective in competitive businesses. Lastly, it is found that the execution of Industry 5.0 could reduce the over-dependence on technology and would emphasize the association between workers and industries.

Keywords: Industry 5.0, COVID-2019, Industrial Revolution, Artificial Intelligence (AI)

INTRODUCTION TO VARIOUS INDUSTRIAL REVOLUTIONS

The first and foremost swing of the industrial revolution came in the early nineteenth century in Britain, using mechanical equipment like the power of steam and water. It addressed the traditional manufacturing processes which were painstaking for workers and animals. The introduction of Water and steam-powered machines were basically to assist workers in the large production of commodities.

Then after a small-time duration came the Second revolution when electrical machines and instruments were introduced. Electrical energy was the main energy source, and new electrical gadgets were far better than mechanical systems.

The Third industrial revolution termed the automation revolution started around 1970 with the development of a wide range of electronic instruments. The electronic instruments were highly accurate and full of precision with many more features than the previous electrical and mechanical instruments. This revolution resulted in the replacement of human beings who were not ready to acclimatize to this new revolution. Industry 3.0 is called an automation revolution because there had been a rapid rise in electronics, telecommunication, and computers. It witnessed production through Computerized Control Systems (DCS), and Programmable Controllers

(PLCs) along with Printed Circuit Boards (PCB), Mobiles, and the internet (Pathak, 2021, He D 2017).

Figure 1: The timeline of the Industrial Revolution and the emergence of Industry 5.0 amid the Covid-2019 Catastrophe in 2020

The Fourth industrial revolution is called an era of digitization in which there was extensive use of cyber-physical systems in connected devices. There had been an abrupt burst of smart sensors to measure all physical parameters and then communicate all that information to the user through the Internet, especially amid the Covid era. Information Technology (IT) using the World Wide Web (www) and the internet transformed the world digitally which has brought a huge revolution to communicate, collect and share any kind of information across the globe. The World Wide Web has brought sudden transformation in outdated industrial processes (ITU 2017).

This digital revolution (Industry 4.0) made a bent on all the conventional manufacturing processes. The smart sensors and smart plants use TCP/IP Protocols to communicate with their users effectively. The management of the organizations found convenient and flexible manufacturing techniques due to the digitalization of their production systems in the Covid-2019 period to meet the demands of their clients. There was suddenly huge relevant data from all the smart sensors produced by the industry.

The concept of Industry 4.0 had been discussed at a technical summit/fair in Hannover, Germany in the year 2011. However, there is no doubt that the Covid catastrophe expedited the digitalization process globally. Digital connectivity has transformed the industrial process, leading to smart manufacturing that can be controlled from anywhere in the world. Industry 4.0emphasized firmly analysing the data at remote locations obtained from smart sensors installed in industries. Smart Sensors have transformed conventional manufacturing plants. The production data, obtained from factories has redefined global business models and has brought tremendous transparency and flexibility to its end users. Smart industries, Robots, and instrumentation have been found to be highly effective in the present manufacturing systems. Smart Sensors' role has become decisive across the globe due to their enormous benefits.

According to research conducted developed nations like Germany, Japan, USA, France, China, S. Korea, and Holland are way ahead in the implementation of Industry 4.0. The underdeveloped and developing nations do not have enough funds to purchase new machinery and will continue the use outdated traditional technologies. There is a big digital divide between the developed nations as 81% of the population is using the internet. On the other hand, only 17.5% of people are using the internet in third-world countries (Breque M 2021).

The latest industrial revolution had been named Industry 5.0 As Industries were adapting to Industry 4.0, there were two virtual workshops on the 2nd and 9th of July 2020 amid Covid 19 pandemic to discuss the concept of Industry 5.0. The virtual workshops were followed by a roundtable in Europe held on dated 27th

April 2022. The need was felt to identify the aspects of security and happiness of the industrial employees beyond their jobs and growth. Industry 5.0 is a forward-looking and innovative model in which there is an emphasis on human-centric, sustainability, and flexibility in the industry.
The essential fact about Industry 5.0 is that the first-time social development of employees has been given priority and the main focus is supporting them and not super seeding human beings.

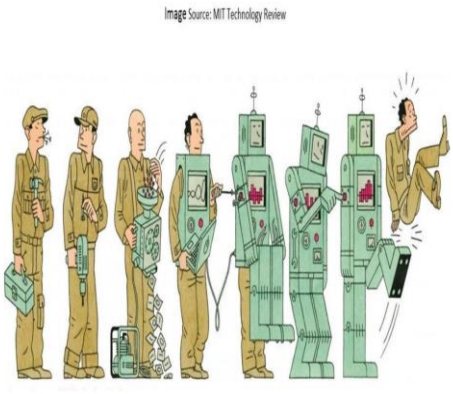

Figure 2: Realization that Industry 4.0 is not Human- Centric (Realizing society 2020)

Industry 5.0 is unlike previous revolutions and is an effort to make a balance between human capabilities and productivity.

It is observed that Covid-19 has pushed Industry 5.0 rapidly. It is determined that 40% of the Japanese population will be 65 years and more in another 30 years (Fujii T). The country relies heavily on robots and other unconventional machinery in its household jobs. Industry 5.0 revolution has the solution to the problems of elderly people as robots can take care of them. The vast applications of AI can be used very effectively to help the senior citizens of their society. Japan has declared that the progress of Industry 5.0 has begun (Demir KA 2019).

China has also taken initiative in this direction and is making strategies to use this State-of-the-art technology. Chinese have very well understood the role and influence of robotics amid catastrophes. Chinese have illustrated the usage of robotics in supply chain management, production houses, transport systems, food, medication, etc (Martos V 2021).

Definitions of Industry 5.0

1. Industry 5.0 mentions those persons who are at work with sensors, Instruments, robots, and smart factories. It is like machines helping people to take decisions in multi-criteria decision-making (MCDM) conditions along with analysis of big data (Imoize AL 2021, Ocicka B 2021).

- Industry 5.0 is a revolution where men and machines are exploring new procedures and practices for achieving manufacturing production efficiently and effectively (Carayannis EG 2021).

- Ocicka and Turek (Masood T 2020) recommended that this new revolution is bound to focus on new approaches for people-centric methods in industrialization.

- The revolution (Industry 5.0) is a linkage between the smart factories, in which there is communication between instruments/robots and persons (Carayannis EG 2021, Ietto B 2022).

- Industry 5.0 has emphasized a worker-centric, approach to long-time sustainability. It will transform industrial organizations across the globe by saving precious time of manpower (Narvez Rojas C 2021). Smart machines and robots will break existing industrial supply chain management

systems and will certainly promote them to new unparalleled levels.

Challenges for Industry 5.0

1. The study has identified the diverse challenges of this human-centric revolution post-COVID-19 termed Industry 5.0. It has enormous advantages in sectors like manufacturing, health care, education, banking, etc., especially where remote services are required to be provided.

2. Training and developing existing employees of the company to work in associations with smart instruments and gadgets is a challenging issue (Pathak 2021). Apart from gathering information, practical knowledge is the most essential issue for human workers otherwise they will become obsolete in a competitive atmosphere (Liu Y 2020, Abdelmageed S 2020). High proficiency in these new challenging jobs is daunting for existing employees.

3. Learning innovative skills needs plenty of time and courage from employees. The running of industries from remote locations using AI, IoT, and Big Data had been inevitable and in fact led to the rapid progression of industry 5.0 (Sun W 2020, Tripathy HP 2020, Wang Y 2018, Yin Z 2020)

4. Advanced technologies need huge investments. There is a huge Opportunity cost involved in preparing workers for new technologies Re-skilling off European manpower, predominantly digital skills had been in the implementation of industry 5.0 (Ghobakhloo M 2021). The execution of Industry 5.0 may involve huge investments at the beginning as this new revolution needs extremely trained workers.

5. Security and Privacy is another uphill task for Industry 5.0 as it is a serious concern to create faith among its stakeholders like investors, top management, representatives from trade unions, and other stakeholders. The various security issues and validation of access to networks and smart industry and other devices installed at remote locations is a serious concern (Kent MD 2020, Rashidi M 2020, Feng H 2020).

The current challenges are being identified as safety, confidentiality, absence of experts, time, and huge investments in the beginning. The approval of industry 5.0 needs to abide by the stringent trade regulations and practices worldwide. (Golosova J 2018, Hakak S 2020, Haleem A 2019, Ha ER 2019, Sarfraz Z 2021) The concept of Industry 5.0 is largely to build an interface between workers and the diverse equipment used in smart factories, smart hospitals, IT-driven banking systems, education, etc.

CONCLUSION

It is finally mentioned the paper began with the Introduction to Various Industrial Revolutions. Primarily, the foremost emphasis of the study had been on the latest industrial revolution which has evolved post-Covid Catastrophe. The paper also attempted to bring together various definitions of learned authors from the available literature to comprehend exactly the new revolution in contrast to all the four preceding revolutions which were only based on technological advancements. The work is also able to bring about the diverse challenges imposed by the new revolution.

Industry 5.0 is a well-thought-out novel model where the attention is on the interface between worker and their instruments. The main applications of Industry 5.0 are a disaster recovery management plan, smart education,

banking, supply chain management, smart hospital, production management, etc.

FINAL WORDS

The development of Industry 5.0 is inevitable as the author has finally reached to a decision that it is a ground-breaking and attractive model in which there is an emphasis on communication between workers and their instruments. Industry 5.0 has superseded all the previous models where the entire focus had been on technology and its advancements. This collaborative model refers to the people only who are working with robots and smart Instruments. Finally, this is the first model in which the main attention is on workers and not on technological advancements.

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