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INDUSTRY 4.0: PREPARING DIGITAL WORK FORCE FOR INDUSTRIES

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ABSTRACT

The purpose of this paper is to demonstrate how the digital force is influencing work dimensions as a result of Industry 4.0. The industry 4.0 serves as a stepping stone to the new evolutionary digital era and the key labour force for the future development of industries. The use of Internet-based digitally driven technology leads to automation, which opens up the path and bridges the gap between the creation of new finished products/goods and their arrival on the market. Through data analytics, Industry 4.0 has the capacity to predict and avoid problems. Robotics and automation usage in Industry 4.0 would shorten production cycles, minimise time-to-market, and maximise resource use.

Keywords: *Industry 4.0, industrial internet of things (IIoT), Virtual reality, artificial intelligence [AI] ,Data analytics, cyber-physical systems (CPS).*

Introduction

Since the beginning of time, our world has been undergoing an on-going change, and evolutionary processes have been the driving force behind the growth of human civilization. As a result, technological advancements in production and items change at a rapid rate. Industry 4.0 is characterised by remarkable technology advancements that demonstrate how industrial production evolves day by day to achieve its apex. As a result, the man, the machine, and the production are all digital forces that lead to a self-contained IoT network.

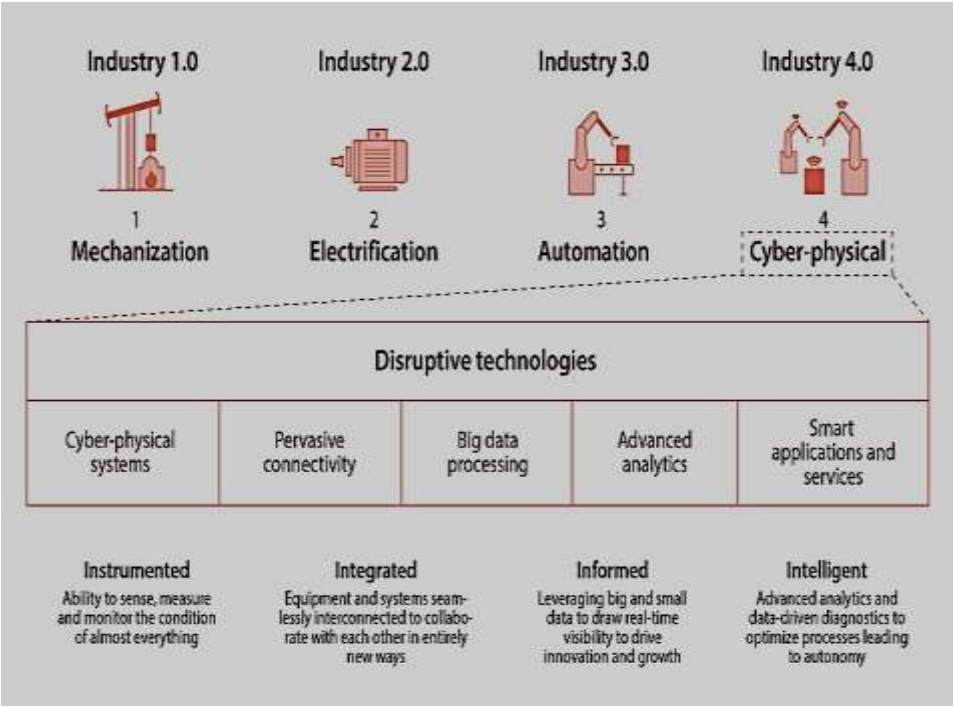

Fig. 1: Industry 4.0 and the track of technologies

Industry 4.0 is the industry-specific subgroup of the fourth industrial revolution. The fourth industrial revolution includes sectors that aren't traditionally categorised as industries, such as smart cities. Despite the fact that the terms "industry 4.0" and "fourth industrial revolution" are frequently used interchangeably, "industry 4.0" factories have machines that are enhanced with wireless connectivity

and sensors and are connected to a system that can visualise the entire production line and make decisions on its own. Cyber-physical systems (CPS), the internet of things (IoT), the industrial internet of things (IIOT), cloud computing, cognitive computing, and artificial intelligence are all part of the Industry 4.0 push toward automation and data exchange in manufacturing technologies and processes.

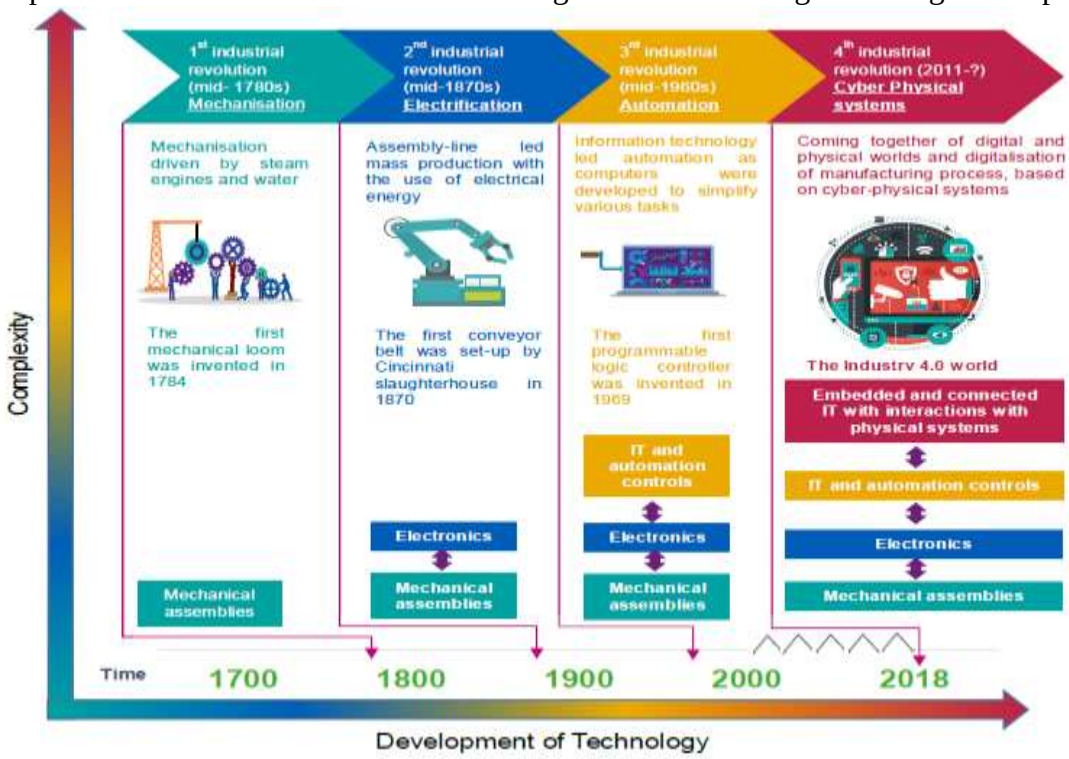

Fig 2 : Evolution of industry 4.0

Industry 4.0 Drivers

1. Digitization and integration of vertical and horizontal value chains:

Industry 4.0 combines processes across the entire company, such as product development, manufacturing, logistics, and service, whereas Industry 4.0 horizontally encompasses internal operations from suppliers to customers, as well as all important value chain partners.

2. Digitization of product and service offerings:

Integrating new data gathering and analysis methods, such as through the expansion of existing products or the production of new digitised products, aids organisations in generating data on product usage and, as a result, in refining products to better satisfy the needs of customers.

3. Digital business models and customer access:

Customer satisfaction is a multi-stage, never-ending process that must be updated on a regular basis as customers' needs evolve. As a result, businesses expand their offerings by building disruptive digital business models in order to provide digital solutions that best fit their consumers' needs.

Challenges

Challenges in implementation of Industry 4.0:

[1] Economic

- Exorbitant financial charges
- Changes in business models
- Uncertain economic benefits/excessive expenditure

[2] Social

- Concerns about privacy

- Surveillance and suspicion
- Stakeholders' general aversion to change
- Threat of corporate IT department redundancy
- Many employments have been lost due to automated and IT-controlled procedures, particularly among blue-collar workers.

[3] Political

- Lack of regulation, standards and forms of certifications
- Unclear legal issues and data security

[4] Organizational/ Internal

- IT security concerns, which are exacerbated by the necessity to reopen previously shuttered production facilities.
- IT security concerns, which are exacerbated by the necessity to reopen previously shuttered production facilities.
- Maintaining the integrity of production processes is essential.
- Any IT issues must be avoided, as they would result in costly production outages.
- The need to safeguard industrial know-how (contained also in the control files for the industrial automation gear)
- Inadequate skill sets required to accelerate the transition to the fourth industrial revolution
- A lack of commitment from high management
- Employees who aren't well-qualified.

Role of Big Data Analytics in Industry 4.0

Modern information and communication technologies, such as cyber-physical systems, big data analytics, and cloud computing, will aid in the early detection of defects and production failures, allowing them to be avoided and resulting in increased productivity, quality, and agility, all of which have significant competitive value.

In the integrated Industry 4.0 and cyber physical systems context, big data analytics comprises 6Cs. The 6C system are as follows:

1. Connection (sensor and networks)
2. Cloud (computing and data on demand)
3. Cyber (model & memory)
4. Content/context (meaning and correlation)
5. Community (sharing & collaboration)
6. Customization (personalization and value)

Industry 4.0 and Its Consequences

Technology has progressed to the point where we are approaching the Fourth Industrial Revolution. New technological developments such as artificial intelligence, the internet of things, and big data, among others, will alter the current industry landscape. Industry 4.0 will transform the way we work, live, think, and interact with one another.

Artificial Intelligence is one of the most important aspects of Industry 4.0. (AI). It allows machines to think, learn, and make decisions. AI is likely to have a dramatic impact on the space sector as well. In the not-too-distant future, robots will be deployed to space instead of humans, resulting in new advances in space science. AI will boost not only the space industry, but every sector from agriculture to healthcare and education.

On the one hand, AI will be utilised to address difficult issues such as security, terrorism, surveillance, and traffic control, while on the other hand, it will bring about dynamic changes in banking, airlines, medical technology, and education. We can also undertake important cancer surgeries using nanotechnology.

Smart classrooms will replace traditional classrooms in the future, allowing pupils to study more effectively. Although this technology is now more expensive, it is predicted to become more accessible as technology advances. Not only that, but AI and machine learning will be included in future generation curriculum because knowledge of these topics is critical for the next generation.

This technical breakthrough is not without its drawbacks. According to studies, robots will make humans lazy. Although advances in healthcare will extend human life, it is also true that humans will grow less fit and lazy. Those that use technology wisely to maintain a healthy lifestyle will benefit more than others in this situation.

Human life is extremely expensive. As a result, robot warriors may be found in future generation armed forces. However, in nations like India, where the armed services employ tens of thousands of people, this will result in significant unemployment. Imagine if governments began to deploy robots to carry out their expansionist policies. This would be a serious danger to world peace and could lead to a third world war.

Another technological advance is the Internet of Things (IOT), which allows machines to connect with one another. The integration of IoT and AI will turn factories into smart factories, towns into smart cities, automobiles into smart cars, and homes into smart homes. If this occurs, human efforts will be reduced to a bare minimum.

Industry 4.0 also necessitates the use of big data analytics. It was created primarily to collect consumer information and data so that producers could create appropriate products and services for them. Data is extremely crucial to us in today's digital environment.

The industrial revolution has a significant impact on the global economy and alters its fundamental structure. The first industrial revolution, for example, changed the agrarian economy into a manufacturing economy; the second industrial revolution moulded it into a service-based economy; and the world's economy became a knowledge-based economy during the IT revolution. However, in order to keep up with this advancement, one must learn new skills and techniques. When tractors and electric pumps were first introduced to the farming industry, for example, only those farmers who had trained themselves in line with contemporary technology were able to sustain themselves, while the rest failed.

Oxford University researchers discovered that jobs requiring manual dexterity, strong cognitive skills, and social skills are difficult to computerise, and people should concentrate on honing these skills.

Doctors will be replaced by AI robots in the future, but a doctor who has been trained in hospitality and caregiving abilities will be preferred above a robot-doctor. It suggests that occupations will become more knowledge-based and talent-based. If a construction worker wants to develop an automated smart home with sensors, he or she must learn something about electronics in addition to construction skills. Hospitality, sympathy, and politeness are some of the attributes that should be learned because they will give worth to our character.

Key Drivers of Indian Industry 4.0

- India is committed to Industry 4.0 and has already taken several efforts in this direction. The Indian government wants the manufacturing sector to contribute 25% of GDP by 2025, up from the current level of 16%, according to IBEF. With the Make in India drive, India is also preparing for global competition. It is prepared to rule the world with Smart Manufacturing.
- The ministry of heavy industries and public enterprises is aiding in the establishment of four Industry 4.0 centres around the country.
- India's first smart factory is located in Bengaluru. The Internet of Things and manufacturing data exchange fuel this smart factory (IoT). At the Indian Institute of Science's (IISc) Centre for Product Design and Manufacturing, the Boeing Company is financing the development of this Smart Factory (CPDM).

- Collaborative Robots, or Cobots, have begun to be used in the manufacturing processes of the Indian FMCG sector. Cobots, or industrial robots, work alongside people in a factory and require little supervision. Cobots can help factories with substandard infrastructure and a limited workforce reduce lead times and increase capacity utilisation.
- Vodafone Business Services provides smart IoT connectivity solutions for a variety of industries, including manufacturing, automotive, healthcare, smart cities, and utilities management.
- Diabetacare's smart glucometers are a typical illustration of how IoT may help people better control their diabetes. In the field of medicine. By connecting gadgets, the Internet of Things is making an impact in healthcare. This aids patients in keeping track of their blood sugar, blood pressure, and other vital statistics.

Future of Industry 4.0

The Industry 4.0 transformation will change long-held dynamics in commerce and global economic balance of power. Industry 4.0 Market Research forecasts that the market will undergo a major transformation in 2019-2023 via the following drivers:

- Fast-growing market with a projected value of $1 trillion by early 2030.
- The manufacturing industry is becoming increasingly competitive on a global scale.
- Unprecedented opportunity to improve manufacturing operations.
- Governments and the private sector of high-wage economies invest in Industry 4.0 in order to expand their industrial base and compete with low-wage countries.
- Low-cost economies' private sector and governments invest in Industry 4.0 to maintain their industrial base, which is being eroded by high-cost countries' Industry 4.0 investments.
- Projects, R&D, subsidies, and tax incentives financed by the government.
- Industry 4.0 provides opportunities for start-ups and SMEs to create and provide downstream services.
- Industry 4.0 dynamic business and technical procedures enable last-minute production modifications and give suppliers and customers the capacity to respond flexibly to disruptions and failures.
- End-to-end transparency of the manufacturing process is provided, allowing for better decision-making.

Industry 4.0 and Security

The integration of new cyber-physical systems and networked systems between partners, suppliers, and customers increases the number of potential access points for bad actors, resulting in a whole new set of security risks on factory floors and in products.

Fig 5: Cyber threat

Conclusion

Industry 4.0 is the product of a technological innovation tipping point. Decades ago, the foundations for the revolution were laid. Industry 4.0 is being pushed forward by IoT, cloud, big data, and other technologies. This industry has the potential to revolutionise the way businesses are conducted. Business models will be reimagined, more processes will be automated, and organisations, value chains will be further optimised. Lower costs, more efficiency, easier inventory management, shorter payback times, and increased output are all obvious and measurable benefits of Industry 4.0. All of this is accomplished through the purposeful and clever application of advanced technologies. The benefits of the industrial revolution are also felt in developing countries like India, where prior technological discoveries were missed. Professionals on the shop floor and manufacturers get to work in the factories of the future, improving their business and growth while providing customers with exactly what they desire.

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