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# Emergence of Industrial Revolutions and Industrial Revolution 4.0 Benefits

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**Abstract** – This paper gives the information about the emergence of the first industrial Revolution, Second Industrial Revolution and Third Industrial Revolution. Their impact on the market, innovation and the use of the sources. Remedies and benefits which occurs during the industrial revolution. This paper also covers the benefits of Industrial revolution 4.0 and different technology implemented during the industrial revolution 4.0. Comparison is tabulated so easily can access the difference in the different industrial revolution.

**Key Words**: Industrial 4.0, Revolution, Manufacturing systems, Digitalization

## 1. Introduction And Overview

**First Industrial Revolution (1.0)**

The first industrial revolution (1784–1870) is of steam and coal with the machines. This revolution has made impact on the production rate and efficiency of the worker. Use of steam and coal has impact on the industry like mechanized cotton industry, wrought iron, machinery Steam engine and machinery, iron and coal mining, railway construction, rolling stock production Cheap steel, steam engine for steel ships, heavy chemistry and civil engineering, electrical equipment industry, copper and cables. This is the period where requirement of skilled labor has increased.

**Second Industrial Revolution (2.0)**

Second Industrial Revolution started from 1908 includes the sources of energy like electricity which has impact on the mass production. The sources of energy had effects on many industries like chemicals, steel, Mass-produced automobiles, cheap oil and oil fuels, petrochemicals (synthetics), internal combustion engine, home electrical appliances, refrigerated and frozen foods and rail road's. During this revolution highly specialized machines were emerged and mass production increased rapidly as a result competition also increased.

**Third Industrial Revolution (3.0)**

Third Industrial revolution started from 1969 to 2010. During this revolution there is use of electronics and information technology (IT) to automate manufacturing. This revolution gave birth to the Advanced Manufacturing Technology (AMT) which includes computer Aided Design (CAD), computer integrated manufacturing (CIM) and computer aided manufacturing (CIM) and others. As this technology introduced to make the production faster, bring greater flexibility, and reduce production cycle, accuracy of the process and better control over the processes. Also

to adopt the condition of the market change easily. As there is a combination of electronics and mechanical started so production of chip microelectronics ICTs, Internet and digital revolution, control instruments, biotech and new materials begin.

## 2. Industrial Revolution 4.0

The aim of the fourth industrial revolution is for change of industrial manufacturing through digitalization and use of potentials of new technologies. The characteristics of 4.0 production system are flexibility and Individualized and customized products. part of this phase of industrial change is the joining of technologies like artificial intelligence, gene editing, to advanced robotics.. The Fourth Industrial Revolution has been defined as technological developments in cyber-physical systems such as high capacity connectivity; new human-machine interaction modes such as touch interfaces and virtual reality systems; and improvements in transferring digital instructions to the physical world including robotics and 3D printing (additive manufacturing),the Internet of Things "big data" and cloud computing, artificial intelligence-based systems, improvements to systems solar, wind, wave, and hydroelectric.

## 3. Advantages of Industrial revolution 4.0

Fourth industrial revolution also looks towards the security of data and communication networks. It is not only data protection but also the protection and security of workers, industrial assets, critical infrastructure and physical security.

Due to automation and continuous improvement factories able to improve the efficiency and resources optimized automatically. Industry 4.0 is all about creativity and innovation. At every stage data is collected and various teams know the status of the data collection at every stage of the production system. So they can easily analyze the process and can do the improvement within short period of time.

As the market trends are changing rapidly, revolution 4.0 allows the industries to keep with the market through the new design and new technology. As there is less wastage in the revolution 4.0, reduced wastage and less ideal time causes less product cost and high profit margins. So revolution 4.0 connects the machine and industries with other factories without human intervention.

## .4. Table of Industrial Revolution

| Industrial Revolution | Technical change | Sectors | Disadvantages |
|---|---|---|---|
| First Industrial revolution (1784–1870) | Use of Steam and coal | -Steam Engine<br>- Railway construction<br>- iron and coal mining | -lower wages<br>- lesser incentives |
| Second Industrial Revolution (1871-1914) | Use of electricity | -chemicals,<br>-steel<br>- Mass-produced automobiles<br>- internal combustion engine | -Unskilled labor<br>-Reduction in prices |

| | | | |
|---|---|---|---|
| Third Industrial revolution (1969 - 2010 ) | Use of electronics and IT | - chip microelectronics<br>- Internet and digital revolution<br>-control instruments | -availability of labor<br>- low wages |
| Fourth Revolution (2015 onwards) | Use of digitalization | -Artificial intelligence<br>-Advance robotics<br>-3D printing<br>-Internet services<br>-Internet for people<br>-Smart energy grids | -Rapid change in the market demand<br>-Technology become outdated quickly |

## 5 Conclusion

Industrial Revolution 4.0 has drastically accepted the changes in the design of the product. Industrial revolution 4.0 allows the different industries to communicate easily and everyone from the team knows the status of product. As market changing rapidly and product easily get outdated, Industrial evolution 4.0 easily make changes and allows the industries to make with the current design and market situation.

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