iJRASET
International Journal For Research in Applied Science and Engineering Technology



INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Volume: 8 **Issue:** VI **Month of publication:** June 2020

DOI: http://doi.org/10.22214/ijraset.2020.6280

www.ijraset.com

Call: 08813907089 | E-mail ID: ijraset@gmail.com

International Journal for Research in Applied Science & Engineering Technology (IJRASET)
ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VI June 2020- Available at www.ijraset.com

Industry 4.0: The Industrial Revolution and New Concepts for the Factory of Future

Ashish Gautam
O. P Jindal University

Abstract: ***The objective of this paper is to visualize and to show the direction of Industry 4.0 to develop smart factories in future. The application of new techniques and technologies which are based upon the Internet of things (IOT) ,block chain technology, cloud computing and cyber physical system have paved the path of significant improvement such as increase of automation, quality of production and reduced the time between the development of new products and its launch.***
Keywords: Industry 4.0 , smart factory, Internet of things, Internet cloud system, block chain technology

I. INTRODUCTION

The world is changing day by day along with the development of human civilization and transformation in society. Therefore the methods of production, processes in the factories are changing as well .Industry 4.0 is the model of development which shows that how industry is opting the latest development in technology and its application. Industry 4.0 is the digital transformation of manufacturing, related industries and value creation processes. It is used interchangeably with the fourth industrial revolution and represents a new stage in the organization and control of the industrial value chain.

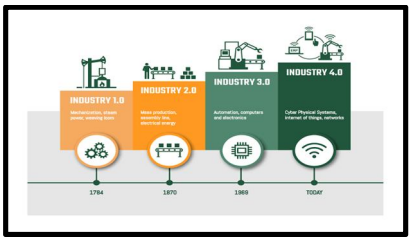
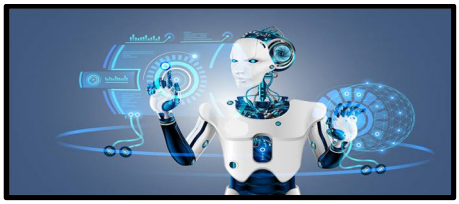


Image 1.The four stages of the industrial revolution

Industry 4.0 describes the growing trend towards automation and data exchange in technology and processes within the Industries including:-

1) Smart factories
2) Cloud computing
3) Cognitive competitive
4) Internet of things
5) Artificial intelligence
6) Data structures
7) Cyber physical systems

It refers to a new phase in the Industrial Revolution that focuses heavily on Inter connectivity, automation, machine learning and real time data. It is also sometimes referred to smart manufacturing, connecting inter-relation between physical production and operation to create a holistic approach for over all development of the factory. The term industry 4.0 means the smart factory in which digital devices are networked and they communicate with raw material, semi-finished products, machines, tools, robots and men. In the networked factory, robots and men are becoming equal partners having a higher degree of artificial intelligence in relation to previous generation of robots.


Image 2.An example of future smart robot

©IJRASET: All Rights are Reserved

The use of the model "Industry 4.0" will practically enhance the way of business. In order to achieve this,digital innovation and its use is required. The major factors that will help to achieve this goal are hardware and software solutions for the real -time evaluation of data.The digital innovation can be applied to the production to improve the life cycle from 2-D ,3-D product design, tools through automation, system for product control, supply chain management and logistics till the recycling.

A. The Major Objective Of The Digitally Innovative Techniques Is To

1) Drive manufacturing to be faster,more efficient and customer centric while pushing beyond automation and optimization to discover new business opportunities and models.

2) Increase productivity(By shortening the time period between development of new product and its delivery to customers in market)

3) Energy saving(example- while waiting for materials processing, Robots can be switched off, if necessary which saves up to 15% of electricity) to ensure competitiveness in global market.



Image 3.Smart factory.

B. The Action plan for the fourth ASIAN Industrial Revolution

The rise of fourth Industrial Revolution will shape the future for Asian manufacturers and the region's landscape. Now it is the most appropriate time for leading manufacturers in Asia to seize the opportunities to become lighthouses for advanced manufacturing and leapfrog onto the global stage.

A 7 points approach can develop the fourth industrial Revolution journey for Asian manufacturers :-

1) Focusing on critical points: Identifying immediate problems to solve that is based on key value drivers specific to each manufacturing archetypes for example commodities, specialized mass market and intermediate.

2) Conducting collaborative sprint based pilots: Co-create solutions with vendors, testing and learning in pilot sprints fit for Government purposes.

3) Sustaining the transformation momentum: Installing organizational enablers, including digital transformation strategy, an organizational structure, capabilities, metrics and process redesign with emphasis on man-machine interactions and continuous improvement efforts.

4) Government must continue to invest in building manufacturing-specific capabilities and skills while promoting innovation in manufacturing.

5) Manufacturing platforms and application providers need to fortify their value propositions by offering interoperable and integrated solution

6) IT enterprise platforms and applications providers need to focus on flexibility and leverage their ERP system entry point to expand into the operational technology(OT) space.

7) OT OEMs should consolidate their positioning and maximize opportunities to expand into higher value-added services.

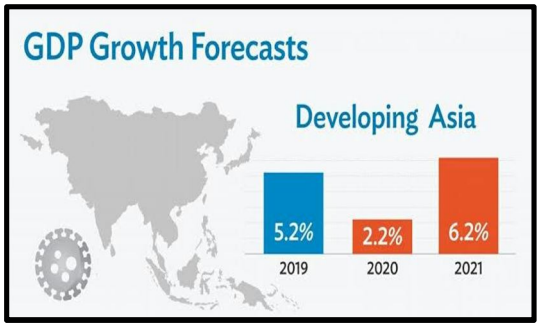


Image 4.GDP growth across Asia due to digital Transformation.

©IJRASET: All Rights are Reserved

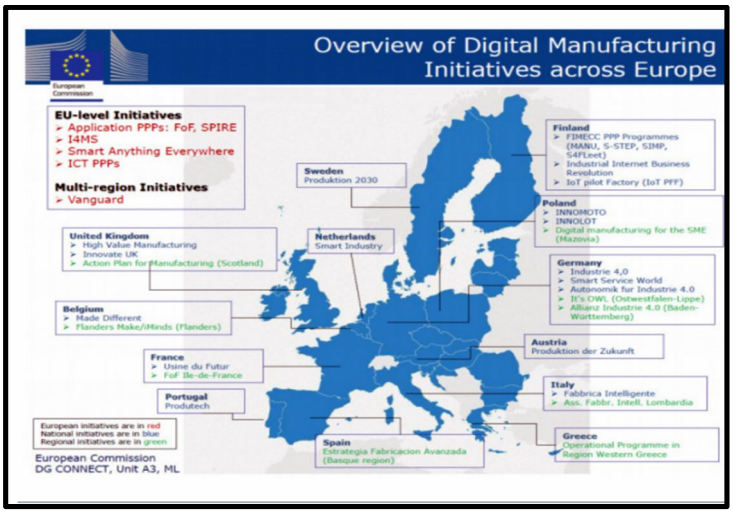


Image 5.Overview of digital manufacturing Initiative across Europe.

C. What does this mean for India ?

According to IBEF, the government of India has set and ambitious target of increasing the contribution of manufacturing output to 25% of GDP(gross domestic product) by 2025, from 16% currently. IOT, being one of the most important aspects of Industries 4.0 for India is expected to capture close to 20% share in global IOT market in the next five years .According to IBEF forecast, the IOT market in India is projected to grow a CAGR of more than 28% during 2015-2020.Government of ´India has taken initiative such as Green corridors and Make in India .

Steps to make India a leading manufacturing hub:-

India is one of the threshold of major reforms and is poised to become the 3rd largest economy of world by 2030.In the words of our Hon'ble Prime minister India offers the 3 'Ds' for business to thrive democracy, demograph and demand. Adding to that a tech-savvy and educated population, skilled labour, robust legal, IPR regime and a strong commitment to Regulated liberalisation, India is a destination that global investors cannot overlook. India's manufacturing sector has evolved through several phases from the initial liberalisation, license-raj to authentication and the current phase companies in several sectors are targeting global markets and amongst the most competitive in their sectors. Talking about the automotive industry specifically the equipment manufacturers, the government and the customer plays a major role in shaping the industry.

Developments/Components that will support India-

1) Convergence of disruptive technology
2) Safety concerns and measures- R and D:Front end structures with adjustable impact properties, advanced driver assistance systems and active safety system.
3) Adaptation and Innovation in connected mobility segment.
4) Internet of things
5) Big data and analytics
6) Cyber security

The Initiative by Government of India:

The Indian government has created Green energy corridors to bring more renewable energies, to make smart grids which will support the variable input of renewable energies and create storage. India has started projects in many states such as Andhra Pradesh, Rajasthan, TamilNadu, Gujarat and Himachal Pradesh. Major Indian states are taking initiative to adapt to Industry 4.0.Andhra Pradesh has taken an initiative to capitalise on the IOT potential in the country. The state government has approved the first-of-it's kind IOT policy with an aim to turn the state into an IOT hub by 2021 and tap close to 10% market share in the country. India's first smart factory, moving from automation to autonomy, where machines speak with each other is being set up in Bengaluru. It is making progress at an Indian Institute of Science's (IISc) centre for product design and manufacturing with an investment from Boieng company. A smart factory, armed with data exchange in manufacturing and the Internet of Things(IOT) is the future and experts are calling it Industry revolution 4.0.Government of India is taking major steps to enhance focus on IOT in tackling the domestic challenge.

©IJRASET: All Rights are Reserved



Image 6.8th VDMA Mechanical Engineering Summit on Industry 4.0

D. Factors needed for the introduction of Industry 4.0

1) Internet of things
2) High quality team of employees and experienced team of associated
3) Logistics 4.0
4) Data structures
5) Cyber security(Information security)
6) Software for data processing-Big data
7) *Smart Factory:* Robots, autonomous vehicle, 3-D printing, advanced manufacturing system, sensors, Nanotechnology, Industrial mobile devices and mass customisation.

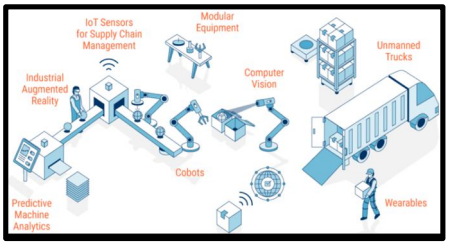


Image 7. A smart factory working plan.

E. Aspects which make Industry 4.0

1) Auto-Id for customized product manufacturing creates unique identification and link to the virtual world.
2) Networked systems provide connectivity for local decentralised information processing.
3) Intelligent field devices using software that allows for the global dynamic distribution of functionality is an integral part of the system integration.
4) Mobile device management (MDM):Man-Machine interfaces for initiative operation of complex systems without special training.
5) Progressive miniaturization allows for small, low cost and high performance sensors and actuators.

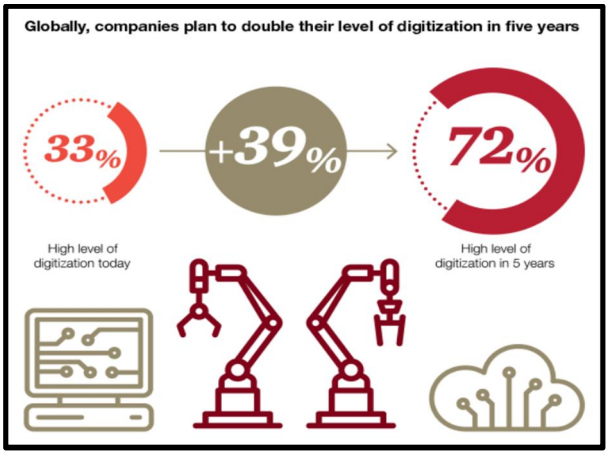


Image 8. Percentage growth In digitalization.

©IJRASET: All Rights are Reserved

ISSN: 2321-9653; IC Value: 45.98; SJ Impact Factor: 7.429
Volume 8 Issue VI June 2020- Available at www.ijraset.com

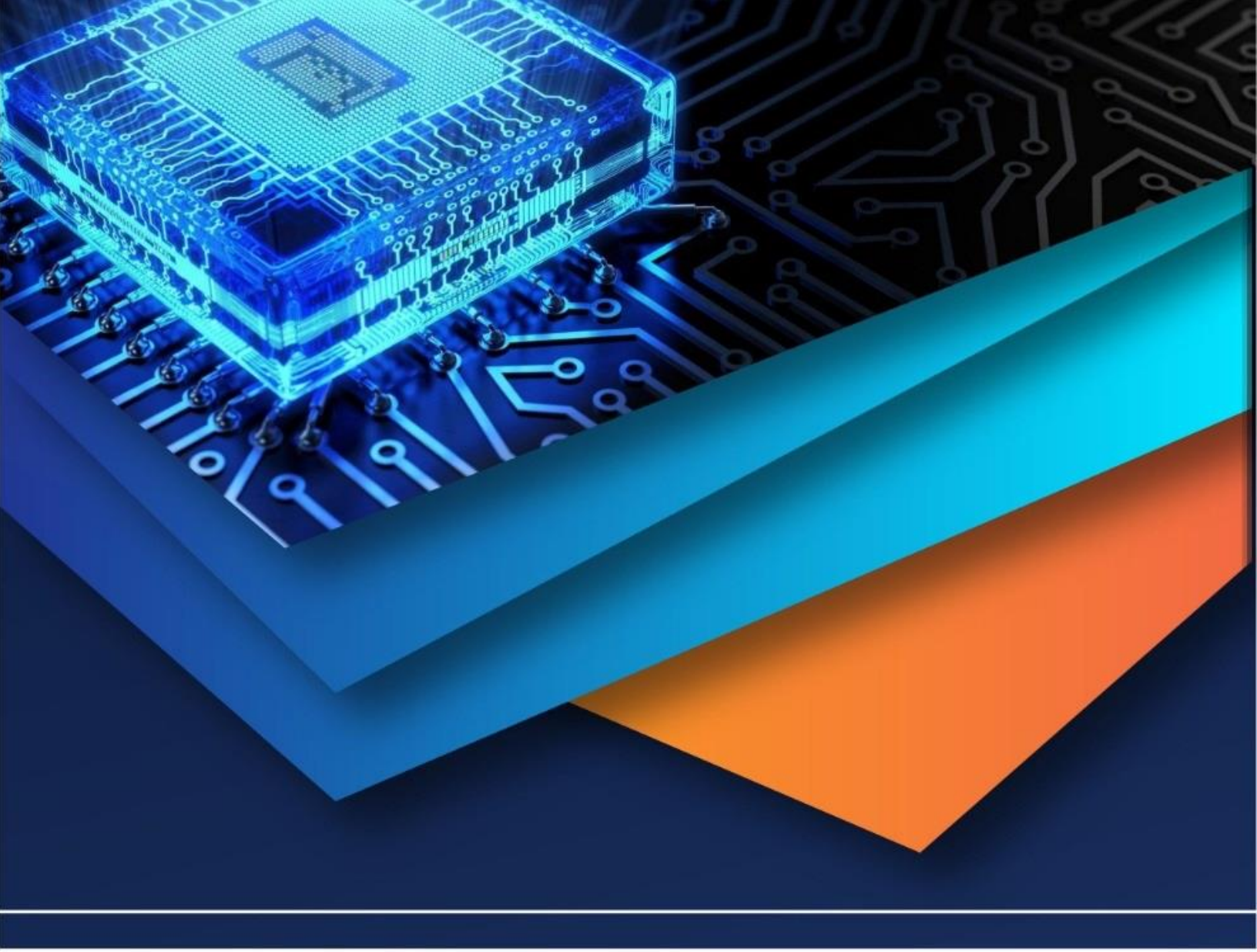
II. CONCLUSION

The fourth Industrial Revolution or Industry 4.0 is the transformation of traditional manufacturing and Industrial practises with its latest smart technology. It is the new industrial revolution which enables companies to create "smarter" products and services by reducing costs and increasing efficiency, where the human factor is crucial. Smart Innovative factories are the highly digitalized and connected production facility that relies on smart manufacturing. Thought to be the so-called factory of the future and still in its infancy, the concepts of the smart factory is considered an important outcome of fourth Industrial revolution. Adoption of Industry 4.0 is expected to result in operational efficiencies, cost control and revenue growth. It will have as it's mainstay on increasing digitalization and Interconnection of products, value chains and business models. Industry 4.0 will revolutionise manufacturing around the globe, as did the first 3 industrial revolution with global supply chains and highly interactive markets generating results which will be heretofore unexpected. In closing it is appropriate to quote Brian Holliday (Managing Director of digital Factory) "Today manufacturing is changing faster than even before and the drivers for this include globalization, individualization, time to market and sustainability".

REFERENCES

[1] Networked Readiness Index, Global Information Technology report,World economic forum.
[2] Goutam Das,"Indian manufacturing warming up to Industry 4.0" Business today.
[3] G.sampath,"Missing the big picture on Big data", The Hindu.
[4] Niranjan Manohar,"Industry 4.0 and the digital transformation of automotive industry ",Automotive World.
[5] IMPULS foundation of VDMA,Industry 4.0 Readiness
[6] Doug Drink water,"Germany wants partners to accelerate Industry 4.0 adoption",Internet of Business.
[7] Mehul Lanvers,"Industry 4.0 could make India a global leader in manufacturing" The Huffington Post.
[8] R krishnamoorthy,"Manufacturing sector's contribution to GDP.

©IJRASET: All Rights are Reserved



10.22214/IJRASET

45.98

IMPACT FACTOR: 7.129

IMPACT FACTOR: 7.429

INTERNATIONAL JOURNAL FOR RESEARCH

IN APPLIED SCIENCE & ENGINEERING TECHNOLOGY

Call : 08813907089 (24*7 Support on Whatsapp)