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ROLE OF DIGITAL TRANSFORMATION IN MANUFACTURING INDUSTRY- ITS IMPACT AND CHALLENGES

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Abstract

'Digital transformation is the process of replacing old traditional technique with the modern digital technique for doing businesses.' This ideal shift is developing every dimension of manufacturing, providing a competitive advantage, and restructuring operational processes. In manufacturing sector, the digital transformation depicts a notable opportunity to improve operational efficiency, magnify the customer experience and minimise the overall cost. It has revolutionised the whole process by which a company conducts its operations. It also elevates employee's satisfaction and provide the organisation with ample opportunities to offer a finer customer experience. In fact, there should be an all-round transformation i.e. technologies should be incorporated into all aspects of the business. Digital transformation in manufacturing involves incorporation of digital technologies to transform several elements of the manufacturing process, right from the beginning of product design to the actual production and development to the distribution of finished goods. The key technologies for efficient digital transformation in manufacturing sector are: Artificial Intelligence (AI), The Internet of Things (IOT), and Advanced Analytics. Although these technological innovations vow major benefits, their application and implementation still encounter many challenges and difficulties in its way. This study will assess the problems, barriers in the path of digital transformation and observe the key aspects to overcome it. The research paper uses qualitative measures based on secondary data to highlight the positive impacts on the manufacturing sector.

Keyword: Digital transformation, manufacturing, artificial intelligence.

1. INTRODUCTION

In manufacturing industry, the digital transformation plays a crucial role in keeping the business into the sphere of competition. (abdallah y. o., 2021). Industry 4.0, an initiative from Germany, is remodelling the process by which companies manufacture, develop, and distribute their products. (What is Industry 4.0?)

To be alive and sustain inside any competitive market, it has become a must to transform traditional business processes with that to the digital one.

"At least 40% of all businesses will die in the next 10 years. ... If they do not figure out how to change their entire company to accommodate new technologies." JOHN CHAMBERS, CISCO

Manufacturing industry is immensely affected by the digitalisation of manufacturing processes through innovation and development of new technologies that can be used to boost the productivity of the operations.

Regardless of several uncertainties and risk involved with digital transformation, it is still becoming prominent and trendy among the manufacturers because of its huge significance like with the use of up-to-date equipment, power saving technologies and adequate production, it is favoured by the manufacturers. (Kupriyanova1*, 2023).

The incorporation of several digital technologies such as artificial intelligence to robotics to data analysis is the fundamental of any digital transformation. The focus of digital transformation should be on innovation.

Objective

1. To assess the impact of digital transformation in manufacturing industry.
2. To examine the challenges faced in the implementation of digital transformation in manufacturing industry.
3. To find out how digital transformation serves as a source of competitive advantage within the manufacturing industry.

Research Methodology

This study employs the qualitative measures based on secondary data extracted from different reports, research papers and other websites.

This study tries to highlight the impact of digital transformation in manufacturing industry and also evaluate the challenges in the path of digital transformation and observe the key ways to overcome it.

Impact of digital transformation on manufacturing industry:

In manufacturing, the impact of digital transformation incudes advanced safety, better quality, improved efficiency and at the same time minimising the cost and keeping in pace with the competition. Digital transformation had a great impact on the growth of Indian economy especially in the manufacturing sector.

Walking on the path of digitalization, the manufacturing sector has come out as one of the flourishing areas in India.

The government of India's "MAKE IN INDIA" programme was launched with the main aim of transforming and making India a global manufacturing hub. In the era of various digital technologies such as artificial intelligence, robotics etc, the manufacturing sector of India does not want to lag behind other sectors, so it is embracing several major transformations regarding business operations. Several incentives taken by the Indian government such as PRODUCTION – LINKED INCENTIVE SCHEME (PLI) and "MAKE IN INDIA" have greatly chipped in to the development of appropriate and favourable environment in domestic market to the manufacturing sector. (small enterprise india.com), (mint)

According to a report by PwC, Indian companies in adopting analytics and AI are indicating an upward trend with current implementation rate of 54%.

In manufacturing, the digital transformation has offered several benefits over the years. Apart from high productivity, low expense and better quality, there are various other significant impacts of digital transformation which are: (spiceworks, 2022)

1. **Useful insights –** digital technology has helped the employees in tracking essential operational metrics and precisely interpret data in manufacturing. And these data – driven insights prove to be very beneficial to the employees in making structured business plan and ultimately enhancing revenues.
2. **Automation and faster time to market –** in manufacturing digital transformation has streamlined marketing processes and optimised most of the errands which will faster the time to market the goods. By inserting different automated tools and equipment the operational efficiency has increased. This automation has also helped in reduction of repetitive tasks which will ultimately save time, allowing the goods to reach the marketplace effectively on time.
3. **Innovation –** in manufacturing continuous innovation can help in getting competitive advantage. With innovation in their work, manufacturers can better respond to customer demands, reduce wastage, and can also come up with superior product quality.

Digital transformation challenges in manufacturing

With every boon and comfort comes various challenges and risk associated with it. In manufacturing digital transformation is evolving every day and every evolution comes with a unique challenge. So, the manufacturers need to carry on with the fast change along with assisting business growth. Following are some of the challenges that comes in the way of digital transformation in manufacturing that one has to overcome: (Linkedin, 2023), (Kumari, 2023), (Olmstead, 2022).

1. **Reluctant to change -** Various manufacturing company follows traditional process and show resistance to change. Few old employees or the ones who are less familiar with technology show resistance to digital transformation due to lack of confidence in their ability to accept, adapt and learn the new techniques.

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2. **Capital investment -** While digitally transforming a business operation, a huge amount of capital is required to invest initially, and this becomes the major cause of concern. But the entrepreneurs should focus on long -term objectives where the ROI is more.

3. **Insufficient digital expertise -** A basic knowledge of technology is very essential for getting the things done, but unfortunately it is very difficult to find a suitable candidate for such position with the required technical knowledge.

4. **Inflexible infrastructure –** From the very initial stage of getting digital it is necessary that the existing infrastructure needs to be compatible with the latest technology. But manufacturing companies still depends on the old designed infrastructure for digital operations.

5. **Lack of strategy to carry out transformation –** With no predetermined strategy, a transformation project cannot be executed successfully. So, a proper planning is required, the transformation plan may include the thought process and mindset of workers, the process involved, decision making and the infrastructure available.

6. **Rapid change in customer demand –** The demands of customers are constantly changing. The transformation process requires lot of effort and time and also requires huge initial capital investment. So, it is not easy to be flexible while implementing a transformation project.

7. **Safety concerns –** With the numerous importance of digital transformation and its future benefits comes the security concerns. With the hacking getting very frequent it becomes difficult to incorporate new systems with existing cybersecurity protocol.

8. **Knowledge of investing in the right technology –** Innovating the new technology and keeping in pace with the competition is essential but not enough. There should be right technology for the right job, then only can the manufacturing company succeed. And moreover, the tools should be adaptable and scalable.

Strategies to overcome digital transformation challenges

1. **Involve employees in the transformation process from the inception –** The manufacturing company can let the reluctant employees be the part of transformation process from its very inception, include them in decision making process and also speak about transformation benefits for the industry. Company should try to conduct training programmes relating to new technologies for the employees which will help them in adapting it.

2. **Create an estimate of expenditure and revenues –** Challenge the company need to make a rough budget of the expenditure and also roughly estimate the expected revenue it can make after, transforming the business, this will help in better planning and decision making. One can also take in account the risk involved, and the resource available.

3. **Hire a digital transformation consultant –** Reshaping the industry in accordance with technology is complex and challenging, and to handle this will require the right people with tech knowledge. Although, the manufacturing company to have their own tech people is not very common, so outsourcing the required tech team will help in minimising the stress. The manufacturing company can also take advice from professional consultant which will help in fulfilling the long-term objective of the company

4. **Compatible infrastructure –** Replacing legacy infrastructure one at a time is not at all easy, so the company can start replacing with minor leading to major, keeping in mind where digital transformation will impact more.

5. **Monitor security concerns –** Manufacturing companies can use several cybersecurity measures to protect their data from threat. But as we know prevention is better than cure, so the company must embrace a safety-first attitude.

Cases for use of digital transformation in manufacturing industry

1. **Electrification or automation of production processes:** The repetitive tasks should be automated using digital technologies, like inspection and assembly, to enhance productivity and minimise the need for physical labour. (Digital Tranformation Skills)

2. **Improving supply chain:** The movement of goods can be tracked using digital technologies throughout the supply chain. It will help manufacturers to spot the blockage and find the inefficiencies.

3. **Forecast maintenance:** By examining and analysing data from sensors the manufacturers can forecast the breakdown of equipment and take corrective measures to avoid delay or stoppage.

4. Development and design of product: Digital tools like computer-aided design (CAD) software can be used by the manufacturers to make virtual prototypes of products, allowing them to test and improve their design before they are produced and brought to the market.

5. Product quality control: Machine learning and Artificial intelligence are the digital technologies which can be used by the manufacturers to refine and enhance the products quality by identifying defects and other problems in the production process.

6. Efficient energy use: The manufacturers can observe and optimise their energy consumption by using sensors and other digital technologies which will benefit in minimising their cost and overall improving their environmental performance.

7. Providing customer service and support: VIRTUAL ASSISTANTS AND CHATBOTS, are the digital technologies which can be used to provide personalised assistance to customers which will improve their experience and this will also help manufacturers maintain their business.

8. Communication and collaboration: Cloud - Based Project Management Software such as ProofHub, Microsoft Project etc., are the digital tools which can be used to improve collaboration and communication between the team mates and this will help the manufacturers to work more efficiently and effectively.

9. Interpretation and evaluation of data: Collecting and then analysing data from several sources the manufacturers can get insights into their business operations and make data-based decisions to enhance their efficiency.

10. Development and training of employees: Online learning platforms help employees with the knowledge and skills they require to work with new technologies and enhance their performance.

Conclusion

In conclusion, digital transformation is revamping the manufacturing sector and leading the industry towards a dynamic and sustainable future.

Technology and innovation are the important component of digital transformation. The manufacturers can now easily track consumer behaviour and get to know their preference by the help of digital IT tools.

Digital transformation in manufacturing is complex and needs diligent planning and investment. Although the importance of digital transformation can be significant which includes greater efficiency, improved quality, better customer experience and more innovation. So, to conclude we can say digital transformation has the potential to restructure and revolutionise the manufacturing sector.

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