

DIGITALIZATION STRATEGY FOR RESHAPING BUSINESS AND ECONOMY: A CASE OF MANUFACTURING SECTOR

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ABSTRACT

Digitalisation has become very essential in current makeover of the manufacturing sector. It brings great opportunities and is a vigilant devised strategy for companies. Manufacturers are increasingly relying on digitalization including process, knowledge and communication technologies to enhance their profitability and customer relations. The objective of this paper is to broaden understanding about the strategic role of digitalization in reshaping business especially, the manufacturing sector by examining the impact of digital technology over industry performance. This paper mainly focuses on digitalization investments and its capabilities in drawing upon customers closer to the company.

The article is based on secondary research. Magazines, journals both online and offline, periodicals, newspapers etc have been taken as source of secondary information. The use of digital technologies is often a prerequisite for the reshape of businesses. However, some manufacturers believe digitalisation involves huge capital costs and is dilatory. They are of the view that digitalisation is treacherous as it involves huge loan amounts from banks for technological investments. A review of the available literature indicates that digitalisation is highly effective for large scale manufacturing industries which are digitally advanced at every level of production chain which saves time, increases productivity and reduces overall unit costs. But a large part of the manufacturing sector comprises of small scale industries which face the greatest barrier of lack of awareness & knowledge regarding digitalisation which makes it complicated to choose the precise digital tools with limited resources. While there are some companies who have worked solely on data driven business models and developed quality services and products for the customers. Through the article, attention is drawn to a significant and reframed role of digitalisation with the use of intelligent autonomous systems comprising of advanced robotics and integrated sensors in the manufacturing firms. The paper concludes that digitalisation has made communication easy for businesses to connect smartly with the customers on social, local, mobile and digital platforms.

Keywords: Digitalization, Manufacturing Sector, Communication, Technology

INTRODUCTION

Digitalization is the integration of digital technologies into everyday life by the digitization of everything that can be digitized. Digitalization strategy in manufacturing is the use of an integrated, computer-based system comprised of simulation, three-dimensional (3D) visualization, analytics and various collaboration tools to manufacture a product.

Digitalization has great impact on how firms do business and causes rapid shifts in the strategic environment. Many long-term benefits can be achieved through comprehensive use of digitalization strategy in manufacturing. The modern era of manufacturing has been around for a century now and has

moved through multiple phases, from basic mechanization to electrification and into automation. However, it's now entering into a new era with digitalization. We see a transition from a full human operated world towards a human-machine operated world within which machines are smarter and embed the know-how. In the new paradigm, the manufacturing order can be accomplished by an autonomous system to reach the outcome.

Indian economy has seen unprecedented growth of e-commerce in the last 5 years. Increasing internet penetration, rapid technology adoption and high sale of technical gadgets

like smartphones, tablets, etc, have led to an attractive online customer base. Digitalization has brought social transformation in the life of common Indians. The present government has taken up an initiative called “Digital India” for modernization of the society that will connect every corner of the country. Studies reveal that use of internet by Indian Small Manufacturing Industries would fetch 32% more revenue, 8 to 43 % higher profit, 13 % higher employment, 22 % higher employment growth, and 18 % more customers.

Digitalization in manufacturing industries helps in achieving innovation in mechanical products and in raising the level of product design, processing and management. What we looked into throughout this research is the use of direct digital manufacturing technologies over the conventional production practices in achieving loyal customers and competitive advantage.

Digitalisation changes the behavior of consumer from traditional consumer to digital media. In this new era, to succeed in this global world, digitalisation is a major driver of future competitiveness and innovation in the Indian economy. Nonetheless, a shortage of IT skills, data protection and data security, high investment and operating costs and internet connection speeds are the issues mostly commonly cited by SMEs as obstacles to digitalisation. This digital trend is changing the way of manufacturing.

The remainder of this paper is organized as follows: Section 2 presents objectives and Section 3 explains the research methodology. This paper ends with section 4 conclusions; summarizing the research outcomes, and suggestions for future investigation are provided.

¹In this report, Nathan Economic Consulting India Private Limited (Nathan India) joined with the Federation of Indian Chambers of Commerce and Industry (FICCI) and Google India to analyze the economic impact of the Internet on India's small and medium sized enterprises (SMEs). The survey-based study of 951 firms in various industrial and geographical clusters across India examined how SMEs use the Internet, quantifies the impact of Internet use on SMEs' economic performance.

OBJECTIVES

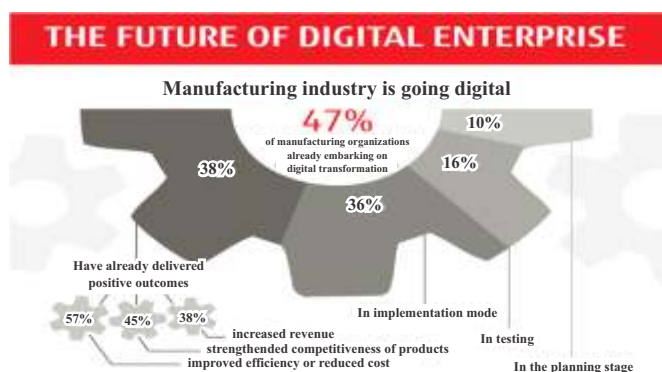
- To study the impact of digitalization in transforming industries.
- To identify the advantages and disadvantages of digitalization strategy in manufacturing industry.
- To identify the impact of industry 4.0 over manufacturing.

RESEARCH METHODOLOGY

The data has been collected from secondary sources from websites, journals, magazines, newspaper, thesis etc.

The digital revolution offers a great opportunity to transform. To succeed in the digital world, innovation acceptance and identification of new business models is required. Digitalization requires grasping new opportunities that exist outside traditional markets. Creating and adopting a strategy of this kind requires strong senior leadership, a focus on the customer experience management, and innovation within the operating model. A commitment to digitalization means that even giants need to be alert. Companies therefore need to develop end-to-end digital engagement strategies and comprehensive digital operating models that concentrate on suppliers and employees just as much as customers.

Figure 1 Future of Digitalisation in Manufacturing



Source- Fujitsu 2017 Global Digital Transformation Survey Report

DIGITALIZATION IS TRANSFORMING MANUFACTURING IN A NUMBER OF WAYS

- Digital technologies are used to develop intelligent products that communicate with each other (Internet-of-things) and/or report back to producers in order to optimize use, maintenance and energy consumption.
- Digital technologies link companies closer to suppliers and customers allowing for closer cooperation on innovation, flows of intermediates, inventory control, adjustment to demand patterns, etc.
- Production becomes more digitalised and automated through the use of robotics and computer aided manufacturing systems that allow for leaps forward in labour productivity performance.
- Administration tasks are being automated, as well as communication between different functions in the internal value chain.

Figure 2 A programme to transform India into digital empowered society and knowledge economy.



Source: Digital India

Since the launch of “Make in India” in 2014, much progress has been achieved in pursuing the country's manufacturing agenda and global competitiveness. Globally, India is the sixth-largest manufacturing nation and the biggest recipient of foreign direct investments (FDIs), with inflows touching \$60 billion in 2016-17, the highest-ever annual inflow into the country. India has also improved its rank on the Global Competitiveness Index and Global Innovation Index. India's manufacturing sector, accounting for just 16-17% of gross domestic product (GDP), holds enough untapped potential.

India's industrial sector is on verge of a major digital transformation. Around 65 per cent of the manufacturing companies in India would have globally competitive levels of digitization in the next 5 years. The current level of digitization stands at 27 per cent. Globally, 33 per cent of the manufacturing firms have already employed digital strategies and 72 per cent of them would have digitally transformed by 2020. 53% of the industrial companies in India are using data analytics and more than 90% expect data to have a significant impact on their decision-making in five years.

India has been ranked 53rd among 60 countries in the 2017 Digital Evolution Index (DEI). The list is topped by Norway,

2 This article “shaping the Future of manufacturing in India” was written by Seema Gaur (Senior Economic Adviser Ministry of Electronics and Information Technology) in Livemint E-paper. The article focused on India's manufacturing sector, its potential and challenges faced.

3 The PwC Global Industry 4.0 Survey was based on research conducted between November 2015 and January 2016 with almost 2,100 senior executives from industrial products companies in 26 countries across Europe, the Americas, Asia-Pacific, the Middle East and Africa. The majority of participants were chief digital officers (CDOs) or other senior executives with top-level responsibility in their company for industry 4.0 strategy and activity. The territory findings report was based on interviews with 50 plus executives in India.

followed by Sweden, Switzerland, Denmark and Finland. The Index is a comprehensive research that tracks the progress of the digital economy across 60 countries, taking into account more than 100 different indicators across four key drivers: supply, consumer demand, institutional environment, and innovation.

ADVANTAGES OF DIGITALIZATION STRATEGY

• LOWER RISK & REDUCED COSTS

Through digital innovations such as prototyping and simulation software, corporations can reduce risks associated with typical testing. Digital tools used to test products allow for a more efficient production process, as well as a platform for sharing and developing knowledge in an easier way. While implementing these innovations may get costly, a digital strategy also allows manufacturing corporations to lower costs through digitizing their analytics and paperwork, allowing digital planning and information to be shared throughout the workforce without excess manufacturing and engineering costs.

• FASTER TIME-TO-MARKET

With increased optimization also comes quicker time-to-market by automating processes and integrating digital strategies within the workforce. When processes are automated and made clearer throughout an organization, collaboration and manufacturing can happen quicker, allowing products to move from the floor to the market in a more efficient way. Faster time-to-market doesn't just benefit the company, it benefits the customer, which, in turn, fosters an important relationship between the organization and its customers.

• FOSTERING INNOVATION

Digital tools have a significant impact on the fostering of innovation and new ideas for manufacturing businesses. Empowering employees through unique, improved technology allows for an environment of change and modernization. Technology connects users, and this allows collaboration, sharing of vital information, remote meetups and conversations, greater idea generation, and accelerated development. By empowering your employees with a digital strategy, you provide your business with a new atmosphere of innovation.

• INCREASED CUSTOMER AWARENESS

A digital strategy naturally leaks its way into marketing and sales, and this is not a bad thing. Pushing your digital strategy

outside the boundaries of your workforce allows customers to be exposed to your brand in a whole new way. Digital campaigns and targeted marketing improve customer satisfaction and increase brand awareness, positively impacting sales. Digital advancement also allows manufacturing corporations to improve business operations that directly impact customers, such as offering customer-specific solutions and, overall, improving customer satisfaction.

- **OPTIMIZED WORKER OPERATIONS & INCREASED PRODUCTIVITY**

A digital strategy can help streamline processes in the workplace, creating an optimized work environment that flows more efficiently and allows employees to do their jobs more easily. Technologies such as factory virtualization, online paperwork, digital planning and processing tools, remote communication software, and online collaboration allow employees to be more productive on the floor and in the office.

- **ACCESS TO GLOBAL MARKETS**

Utilizing digitization of supply chain management allows manufacturers to become competitive in the global market. When a supply chain management system is digitized, real-time analytics, virtualization of the supply chain, online order tracking, and efficient material flows all occur, giving the manufacturer a leg up in a globally competitive market. Also, enabling a digital supply chain allows for the opportunity to outsource certain areas of the process, integrate external suppliers, as well as digitally check product quality in real-time. These benefits put the manufacturer in an key competitive position.

- **CUSTOMER ENGAGEMENT**

Digitalization makes it possible to link customers closer to the company and engage them in the development and test of new products.

DISADVANTAGES OF DIGITALISATION STRATEGY

- **SCARCE MANAGEMENT RESOURCES**

Scarce management resources characterize most of the small manufacturers, partly because the management – besides being manager – is also engaged in the day to day operational tasks. Often it keeps small companies from digital advancement because it is time consuming to find the right technological solution and customize it in accordance with the specific needs companies have.

CAPITAL AND HIGH MARKET PRICES

Outcomes of digital innovation are always uncertain and require significant investments in developing, testing and marketing of new intelligent products and services. Implementing new technologies is costly and mostly prices on technology are the same to all companies no matter their size. SMEs often perceive prices as disproportionately high compared to the needs of the company. This makes manufacturers more risk-averse and banks more reluctant to grant loans for technology investments.

- **LACK OF ICT-SKILLS AND LACK OF ACCESS TO INDEPENDENT COUNSELING SERVICES**

Many SMEs lack ICT-skills, and find it difficult to identify and access specific needs for new investments in digitalization technologies. Furthermore, managers of small manufacturers often have limited knowledge about the market for digital and automated technology. Hence, they find it difficult to navigate in the market for ICT-counseling services.

- **ACCESS TO CUSTOMIZED SOLUTIONS**

Small manufacturers often produce in small batches and experience shifting orders. This places heavy demands on the flexibility of automated solutions, such as industrial robots. Furthermore, it makes it difficult to find technological solutions that are both easy to program and easy to customize according to different parts of the production.

- **ACCESS TO DATA AND DATA SECURITY**

The connection of internal and external data contains substantial business opportunities. But regularly digital products and new digital business models are associated with risks of leakage, hacking and abuse. To avoid this, companies that experiment with innovative use of data are obliged to make substantial investments in monitoring and safety systems.

- **MATCHMAKING AND ACCESS TO PROTOTYPING FACILITIES**

As core competencies of manufacturers typically lie within “non-digital” technical areas, they commonly lack certain forms of expert knowledge, e.g. within software development. In addition, only few companies have access to prototyping facilities (e.g. 3D printing) where they can test and customise new products in accordance with customer feedback.

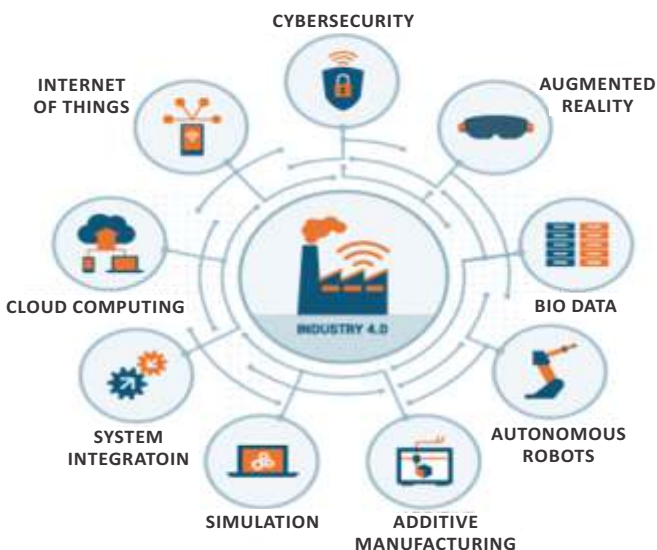
INDUSTRY 4.0

India has been gearing up for Industry 4.0, outshining

another industrial revolution. Industry 4.0, is the current trend of automation and data exchange in manufacturing technologies.

The fourth wave of technological advancement: the rise of new digital industrial technology known as Industry 4.0, a transformation that is powered by nine foundational technology advances. In this transformation, sensors, machines, work pieces, and IT systems are connected along the value chain beyond a single enterprise. These connected systems interact with one another using standard Internet-based protocols and analyze data to predict failure, configure themselves, and adapt to changes. Industry 4.0 makes it possible to gather and analyze data across machines, enabling faster, more flexible, and more efficient processes to produce higher-quality goods at reduced costs. This in turn increases manufacturing productivity, shift economics, fosters industrial growth, and modifies the profile of the workforce—ultimately changing the competitiveness of companies and regions.

Figure 3 Digitalisation Reshaping Industries



Source: Boston Consulting

Many of the nine advances in technology that form the foundation for Industry 4.0 transforms production: isolated, optimized cells comes together as a fully integrated, automated, and optimized production flow, leading to greater efficiencies and changing traditional production relationships among suppliers, producers, and customers—as well as between human and machine.

BIG DATA

It is used to describe the collection of large and potentially complex data sets containing both structured and unstructured data into commonly accessible data sets. Big data has the potential to aggregate a large number of

transactional or task-oriented data sets into a single ubiquitous access point where behavioral and statistical analysis techniques can be applied to uncover new behavioural patterns and market segments (Demirkan et al. 2015).

AUTONOMOUS ROBOTS

Robots interact with one another and work safely side by side with humans and learn from them. These robots cost less and have a greater range of capabilities than those used in manufacturing today.

SIMULATION

Simulations are being used extensively in plant operations as well. The simulations leverage real-time data to mirror the physical world in a virtual model, which include machines, products, and humans. This allows operators to test and optimize the machine settings for the next product in line in the virtual world before the physical changeover, thereby driving down machine setup times and increasing quality.

SYSTEM INTEGRATION

With Industry 4.0, companies, departments, functions, and capabilities become much more cohesive, as cross-company, universal data-integration networks evolve and enable truly automated value chains.

INTERNET OF THINGS

With the Industrial Internet of Things, more devices—sometimes including even unfinished products are enriched with embedded computing and connected using standard technologies allowing field devices to communicate and interact both with one another and with more centralized controllers. It also decentralizes analytics and decision making, enabling real-time responses. It is the Internet of the future, a global network in which billions of devices can be heterogeneously interconnected to exchange data and interact to extend their functions beyond the physical world and reach common goals without direct human intervention (Li, Da Xu, and Zhao 2015; Evans and Annunziata 2012; Atzori, Iera and Morabito 2010).

CYBERSECURITY

Cyber security brings a broad variety of connectivity advantages (Colombo et al., 2014) and risks with them.

CLOUD COMPUTING

Cloud computing: allows ubiquitous access to a shared pool of computing re-sources – such as servers, storages and operating systems – that can be convenient, configured and provisioned on-demand, with minimal management effort

(Mell and Grance 2010; Arockiam, Monikandan and Parthasarathy 2011). The performance of cloud technologies improves achieving reaction times of just several milliseconds. As a result, machine data and functionality can be deployed to the cloud, enabling more data-driven services for production systems. Even systems that monitor and control processes have become cloud based.

ADDITIVE MANUFACTURING

Companies have just begun to adopt additive manufacturing, such as 3-D printing, which they use mostly to prototype and produce individual components. With Industry 4.0, these additive-manufacturing methods are widely being used to produce small batches of customized products that offer construction advantages, such as complex, lightweight designs. High-performance, decentralized additive manufacturing systems reduces transport distances and stock on hand. Additive manufacturing, also referred to as 3D-Printing, is a fabrication technique involving the progressive deposition of material onto a substrate, layer by layer. Such a technology enables the creation of high-complexity parts, and thus it is widely employed in economic sectors that either require personalised goods or geometry-driven performances (Conner, et al., 2014).

AUGMENTED REALITY

These systems support a variety of services, such as selecting parts in a warehouse and sending repair instructions over mobile devices. These systems are currently in their infancy, but in the future, companies will make much broader use of augmented reality to provide workers with real-time information to improve decision making and work procedures.

ADVANTAGES OF INDUSTRY 4.0

- **Reduced operational costs**

With increased digitalization and more technological devices, even unfinished products can be enriched with embedded computing and connected using advanced technologies. This allows field devices to communicate with each other and enables significant improvements in efficiency in the factory.

- **Increased productivity-**

Industry 4.0 presents an opportunity for manufacturers to implement the integration of smart materials and equipments that can diagnose and fix itself which helps streamline processes, makes more versatile production decisions and invariably increases a company's profitability.

- **Increases customer satisfaction-**

Industry 4.0 creates the ability for manufacturing companies to personalize a product to an individual's consumer requirement whilst still employing mass production techniques.

DISADVANTAGES OF INDUSTRY 4.0

- **Fall in low skilled jobs**

Use of new technologies in industrial production means that a majority of jobs require digital competencies and other technical skills. Moreover automation results in manual job functions are replaced by machines. As more jobs are automated and done by machines or robots, a significant share of low skilled jobs will disappear.

- **Complex**

The approach is Top to bottom; leaders must drive the revolution and should be fluent with the open source software, cyber physical systems or cloud solutions. For managers not known to such systems, industry 4.0 is complex to adopt.

- **Lack of Competence**

Industry 4.0 competence needs to be developed in all areas of production and business related processes. As all levels of management come under the roof of industry 4.0, in such cases, competence is required from all the employees and labourers which lacks at some point.

- **Lack of communication**

The next point is the change in the working culture. In a connected Industry before machines are able to talk to machines, the right people need to talk to each other. Only an effective collaboration of IT-guys, technologists and other people can deliver the right solution. There has to be a right flow of communication from the top management to the lower management of the company. Lack of communication often leads to misleading beliefs.

- **Expensive and Costly**

Industry 4.0 requires huge amount of capital for all types of the new digital technologies for their business models.

- **Change in digital technologies**

The new digital technologies are radically changing the way services can be delivered. In such a case their adoption is crucial for manufacturers to move towards more service-based business models.

CONCLUSION

Today, most companies are either thinking about or pressing ahead with digital transformation initiatives. Digitalization might represent a window of opportunities for a much better manufacturing performance than seen during the past two decades. There is a huge potential for further digitalisation in Indian manufacturing, hence transforming increased digitalisation into higher productivity and better competitiveness.

Moreover, increased digitalisation is important to stay competitive within new business models (servitization, data driven business models, etc.) and new types of products and production models (Internet-of things, 3D-printing, etc.). Thus, effective transmission of new digital technologies will also pave the way for more effective ways to meet customer demands.

The report concludes that several barriers to digitalisation in the manufacturing industry exist, and that these barriers are common to mostly all SME's.

There is a need to understand the current limitations and possibilities. To fully realize the benefits of digitalization, the government and enterprises recognize the need the need to create the right ecosystem requiring huge investments in infrastructure. But, investment alone is unlikely to usher in the digital transformation our country aspires. Neither can the government alone steer this transformation at the required pace. Co-creation by manufacturing industry and the government can create an ecosystem by fostering digital market places, digital sourcing, digital governance and the creation of truly digital enterprises.

In the last few years, the country has seen positive steps in drafting appropriate policies that foster a technology and knowledge-driven society. The Digital India initiative aims to deliver good governance by synchronizing the work done by Central and state governments. In 2015, the government unveiled the 'GI Cloud' and IOT Policies which hinge on the use of ICT – enabled services to stimulate growth in manufacturing and digital enablement. To truly capture new growth in manufacturing and from the industrial Internet of Things (IOT), should follow three approaches: boost revenues by increasing production, create new product-service hybrid business models and exploit intelligent technologies to fuel innovation and transform their workforce.

However, the main limitation of this research is rooted in the lack of real world cases in the area of Digitalisation in manufacturing which makes it hard to assess the situation fully. However, we see a significant opportunity for researchers to speculate and spread the possibilities of improvement to the industrial managers that they become aware of the potential for investments and improvements through this novel digital manufacturing technology.

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