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Role of Big Data in Make in India Smart city and in manufacturing products

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Abstract—Big Data is the buzzword in the field of technology for some time now. The demand for Big Data Technology is now felt by each and every organization of the world. The benefits of Big Data are immense. It is a study of role Big Data can play in Make in India smart city project. The make in India smart is about manufacturing products in India. The Big Data can revolutionize smartly the entire process of manufacturing. Not only it can decrease manufacturing cost losses but can also help companies achieve customer satisfaction so customer enjoy the living in smart city. From better streamlining of processes in a manufacturing unit to helping create a better working environment, big data has brought a wave of change that cannot be ignored. Further, the Make in India smart city not only brings a lot of investment but a lot of jobs too in India and we really are in need of a technology to manage the large amount of data generated. By use of Big data companies can implement better production techniques and thus can get an edge over their competitors. This study aims to help companies in India and abroad to understand the benefits of Big Data in Manufacturing their products smartly. It may also help companies who have already implemented Big Data but are not taking full advantage of it.

Keywords: *Big Data, Design, Manufacturing, Big Data Analytics, Machine Learning, Make in India, Production, Survey, Report.*

I. INTRODUCTION

Make in India is an initiative launched by the Government of India on 25 September 2014 to encourage the multi-national, as well as national companies to manufacture their products in India. After the initiation of this programme in 2015 India would emerge as the top destination in the world for foreign direct investment. The major objective behind the initiative is to focus on job creation and skill enhancement in 25 sectors of the economy. The initiative also aims to achieve the high quality standards combined with minimum impact on the environment. The initiative hopes to attract technological as well as capital investment in India. [1]

Smart Cities India is going to become the most populated country in the world. The growing population will be shifting to the top tier cities of India. It will be difficult to cope up with the growing population in cities with the present available resources. With this context, Prime Minister Narendra Modi's vision "Digital India," has set an ambitious plan to build 100 smart cities across the country [2].

Big data is a buzzword which means a massive volume of both structured and unstructured data that is so large that it is difficult to process and analyse it using traditional database and software techniques. The rate data is generated is too fast and the database is becomes too large for the traditional databases to handle. [3].

Companies can improve their operations and, make faster and more intelligent decisions with the help of Big Data analysis. The data collected can be manipulated, stored and analysed to help companies gain the useful insight to increase their revenues, get or retain the customers, and finally improve the operations. [4]

Big Data analysis works in the favour of manufacturing industries on multiple fronts. From reducing product flaws to improving production quality while raising overall efficiency, not to mention saving a lot of time and money, the advantages are being garnered by many businesses around the world.

Big data has applications in just about every industry – retail, healthcare, financial services, government. Any organization that can assimilate data to answer nagging questions about their operations can benefit from big data. All big data projects start with a viable use case. Big Data can play a very important role in helping companies develop new business models. Additionally, Big Data helps companies become proactive in cases of operational decision making in areas of improving product design, production failure etc. In the field of manufacturing, the operations managers can use Big Data analytics to check the historical process data, identify various patterns and

relationships among different small process steps and inputs, and then can work on to optimize the factors that can prove to have the greatest effect on yield of the product [5]. Big data can help companies in improving the process of manufacturing by product assessing the process interdependencies [6] using big data analytics and were able to identify the different parameters. It also has applications in the custom design on products [6]. It offers high assurance of quality [6] and managing supply chain risk [6]. This, Big Data has lot of roles when it comes to manufacturing and it can surely change the entire manufacturing process.

II. Key roles of Big Data in Make in India Smart Cities

- **It helps in reducing emissions.** By means of Big Data companies can keep a check on the emissions and can apply techniques to bring down the emissions through analysis. It will also help the government in setting the emission parameters analysing data of each industry [7].
- **Sensors can be fitted on roads to collect the traffic information and emissions.** This technique can be implemented through the big data. The data through sensors can be stored through big data techniques and can be analysed [7].
- **It can reduce the parking problems.** Cars can have sensors attached to them which can take them to the nearest parking spot [7].
- **It can help in keeping a check on the garbage generated in the entire city and how it is disposed.** This technique has been already implemented in Songdo a city in South Korea [7].
- **It can help in saving electricity.** Smart energy grids can be developed which can sense the presence of people in an area thus can help regulate the street lights in an area [7].
- **It can help in security.** Predictive analytics can be implemented to find out the areas where crimes are most likely to take place. Thus more security can be placed at those areas.
- **It increases the accuracy, quality and the yield of the pharmaceutical production companies.** There are around 200 variables which needs to be taken care of to ensure the purity of ingredients. The yields can vary from 50 to 100%. Based on Big Data analytics the yield was increased by around 50% [8].
- **It helps in accelerating the IT, manufacturing and operational systems integration.** Big Data is used for optimizing the production schedules on various constraints. Big Data analytics will become a critical reason for the success of various multifunctional departments. [8].
- **It helps to integrate analytics over Six Sigma framework.** It helps in making the production work flows better by analysing the various aspects of production and helps in delivering optimum quality products**.** [8].
- **It helps in analysing the supplier performance and quality over time.** By means of Big Data analytics, manufacturers are able to keep a view on the product quality and the accuracy of delivery in real-time, which helps in suppliers receive the products on time. It also helps in maintaining quality [8].
- **It helps in measuring the minute details of machinery and processes.** With the help of sensors, the information of each process is provided to the operations managers. Thus it shows the quality and efficiency of each machine and its operators**.** [8]
- **It helps in companies understand and sell the most profitable product configuration which has the least effect on the production.** Manufacturers are discovering which build-to-order configurations they should sell which makes a minimal impact to the existing production schedules. [8].
- **It helps in managing the supply chain risk.** Supply chain is the key risk area where companies are quite concerned. Big Data analytics may help companies overcome the supply chain challenges. For example, predictive analysis may help companies find out the probabilities of delay and hence companies may work accordingly**.** [6]
- **It helps in quantifying how production may influence the financial performance.** It has always been a problem for firms to set a connection between the daily production to the financial performance. But with the help of Big Data the scenario is changing. With big Data companies may have live information about a factory floor functioning and can help them scale the operations [9] [10] [11] [12] [13] [14] [15] [16]better. [8]
- **It helps companies achieve the goal of Customer Satisfaction.** With the help of Big Data companies are able to keep a track of all the problems faced by their customers while using their products and thus, companies may work to find the solutions to the problems. It also helps companies analyse the benefits being provided by the other organizations and thus they can improve their customer services which finally leads to an increase in profit [8].

III. SURVEYS

The following survey has been done by McKinsey and Company illustrating how Big Data and advanced analytics are helping companies to streamline the manufacturing value chains by finding the most important determinants measuring process performance, and the taking decisions to improve them continually. [8].

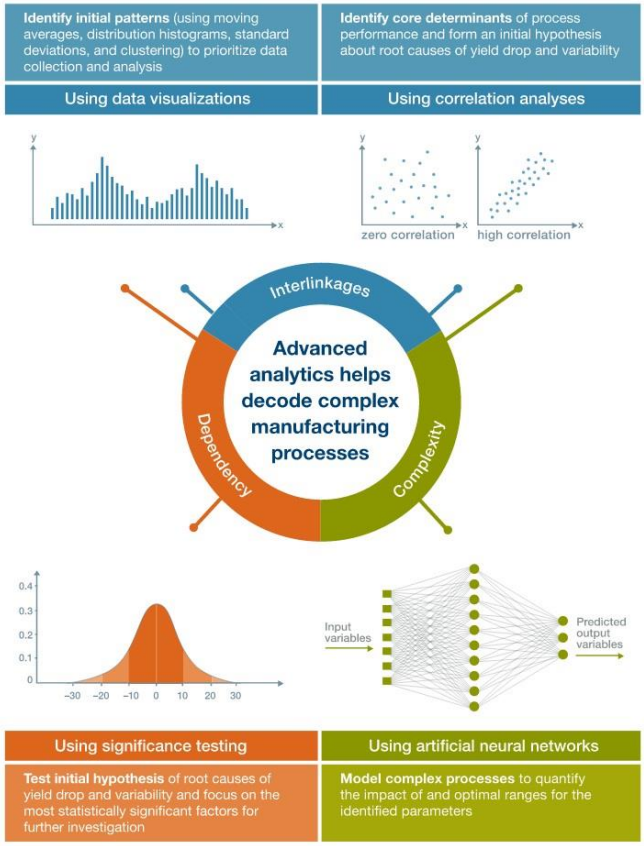

FIG 1. RESULT OF SURVEY CONDUCTED BY MCKINSEY [16]

By making use of Big Data analytics we can reduce the flaws during processing, increase the efficiency, and save time and money. **Tata Consultancy Services** conducted a survey in which it asked various manufacturers to rate the following big data benefits on a scale of one to five [17]:

- Quality of product and tracking defects– 3.37
- Planning the supply mechanism – 3.34
- Defect tracking of manufacturing processes – 3.32
- Supplier, components, and parts defect tracking – 3.11
- Supplier performance data to inform contract negotiations – 3.08
- Forecasting the output – 3.03
- Increase in the energy efficiency – 2.97
- Testing and simulation of new manufacturing processes – 2.88
- Mass-customization of manufacturing support- 2.75 [18]

The following graph shows the findings of a recent survey conducted by **LNS Research and MESA International** to see where big data is showing the greatest manufacturing performance improvements today [8].

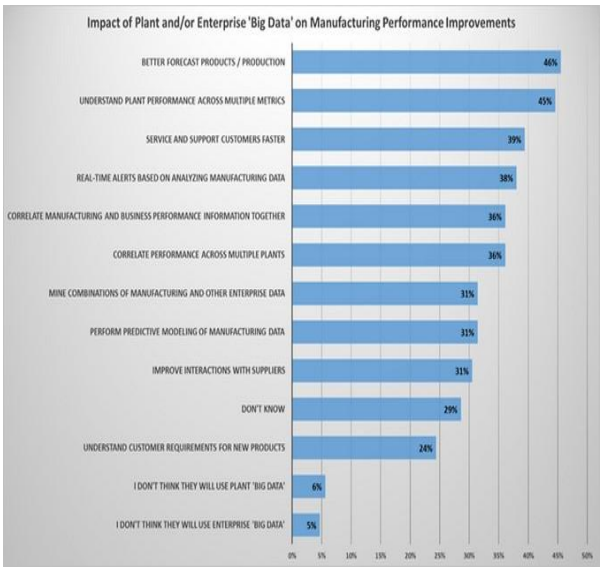

Fig 2. Impact of Big Data on Manufacturing performance improvements [8]

IV. OBSERVATIONS

According to the above mentioned surveys and the studies I have done about Big Data and its applications, it shows a significant role Big Data can play in make in India smart cities. The results have been quite positive and they show how beneficial it is to implement Big Data. There has been a gradual increase in the production of the companies after implementing Big Data in their companies. Further factors like understanding plants performance across multiple matrices and real time alerts based on analyzing manufacturing data [19] have gone up significantly. Its one of the biggest impact is on customer services and support which is one of the most important factor for companies. Customers focus a lot on the customer services and thus helps in building company's reputation. Many other factor have also shown a steady increase and there are many other factors that will show a gradual increase with time. Also manufacturers have given good ratings for the benefits of big data in various aspects of manufacturing. The benefits like product quality, defects ratings and supply planning etc. have been given good rating by various companies. Thus, it shows that manufacturers have understood the value of Big Data and are in favor of using it. The time is near when each and every company would be using the Big Data technology. Many global organizations have supported the use of Big Data. Big Data and Make in India together can help in building a new India. This will benefit each and every company which invests in make in India. Big Data has worked in other countries and it will work in India too. It will help in understanding the need of people and

the type of products needed to be built. Many world level surveys support Big Data in manufacturing. The best thing about Big data is that it is not for a specific industry. Thus it can lead to overall industrial growth in the country with benefits for everyone ranging from customers to manufacturers. Big Data is a new concept and it will take time for companies to adapt to it. But results show what Big Data can do to Manufacturing. The more industrialized a nation is, the more developed it is. Hence, Big Data and Make in India ds to a bright future of India. Time is near when we hope to see India in the top nations of the world in aspect.

V. Conclusion

The surveys mentioned above shows what Big Data can do in the field of Make in India Smart Cities. It will lead to planning of smart cities. The smart cities developed with the help of big data will have all the resources needed for the growing population demand. It has led to the growth in the production as well as lead to the increase in the customer satisfaction. Many MNCs are already using it and they have seen a steady growth in their production. Big Data also helps in managing large data set of employees. The amount of benefits Big Data provides, easily overcomes its one or two draw backs. Make in India is one of the best initiative of Indian government and it has led to large investments in India and the amount of investments will surely go on increasing. India needs industrialization to increase jobs and to increase the growth rate. Big Data and Make in India combined together can bring an industrial Revolution in India. So, if implemented properly Big Data will change the manufacturing industry in India and soon we will see India in top industrialized nations of the world. The scope of Big Data is immense in India and companies who are not making use of Make in India should learn from the companies who are already using Big Data. It will surely take time combining Make in India and Big Data, companies would have to invest more but the benefits would be great and long term. Thus, Big Data will prove be a boon for everyone and will help in making people life better.

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