INDUSTRY 4.0: A CONNECTING JOURNEY IN MARKETPLACE

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Abstract:
The 4th industrial revolution is about how new technological solutions like IoT, Cognitive computing, Automation, Cloud technologies, Analytics etc are improving the efficiency and output of manufacturing firms. Industry 4.0 is paving the way for the new relationship between the firm and its market. The adoption of industry 4.0 is inevitable for manufacturing firms as far as value creation & competitive advantage remains top priority among the firms

The objective of writing this paper is to create an understanding & awareness of Industry 4.0 ecosystem and how it is transforming the manufacturing ecosystem paving the way for innovation, product excellence, and customer centricity.

This paper will depict what does digital transformation means to the organization, how the adoption of Industry 4.0 will benefit in short term & long term, emerging trends, strategic element, challenges, implications and potential threats involved in embedding the 4th industrial revolution in manufacturing systems / processes.

This paper will also bring out key insights on Why India should adopt Industry 4.0, Key sectors who are leading the way in the adoption, How India is preparing to adopt Industry 4.0.

Keywords: Awareness, Manufacturing Systems, Transforming Manufacturing Ecosystem, etc.

Introduction

The manufacturing domain is undergoing rapid technological transformation enforcing organizations to adopt technologically driven new techniques in their value chain to explore and internalize technological advancements in their systems and processes. The revolution in the manufacturing domain is expected to increase productivity, enhance efficiency, boost growth, shift economic gears, change workforce management. However, all these changes will ultimately lead to the competitive positioning of the companies with higher sustainability advantage.

The existing manufacturing ecosystem and technological innovations are causing a revolution in the global economy which is called 4th Industrial revolution and is currently transforming manufacturing ecosystems in phases. Industry 4.0 is expected to create greater efficiencies and change the relationship between producers, suppliers, and customers. Key technologies which are transforming the manufacturing firms include big data / analytics, RPA, Horizontal and vertical system integration, the Industrial Internet of Things (IoT), Cloud, Cybersecurity, Augmented Reality, etc.

What Is Industry 4.0

Industry 4.0 is nothing but computerization of industrial manufacturing process(originated from Germany) wherein blend of technological forces like advanced analytics, Big Data, Robotics & Automation, Artificial Intelligence, Internet of Things (IoT) will come together to digitize the process across the business value chain which promises consequence in terms of better predictive maintenance, enhanced customer experiences, improved asset management and innovative business models which will disrupt the existing ecosystem.

The key business objectives which are expected to be addressed by the ongoing industry 4.0 transformation basically revolves around 2 parameters operational excellence and expanded services which will pave the way for new markets and higher revenues from digitally refined products.

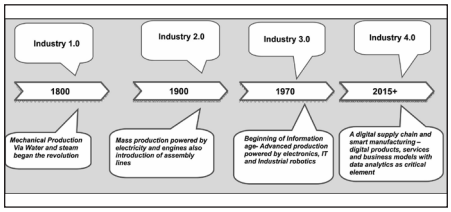

Figure 1: Journey towards Connected Manufacturing Ecosystem – Industry 4.0

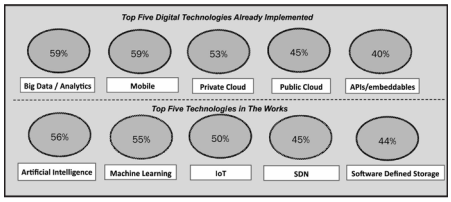

Figure 2: Current State of Digital

Table 1: What Does Digitalization Mean to Organizations?

Asset Utilization	30-50% reduction of total machine downtime
Quality	Cost for quality reduced by 10-20%
Service / Aftersales	10-40% reduction of maintenance cost
Inventories	Cost of inventory holding decreased by 20-50%
Labour	40-55% increased productivity through automation
Supply / Demand	Forecasting accuracy increased to more than 85%
Processes	Overall productivity increase of 3-5%
Time to market	20-50% reduction in time to market

Key Technology Contributors in Industry 4.0

The below mentioned framework of key technologies will contribute towards reinvention of business models which will lead to better customer access, integration of horizontal and vertical value chains and digitization of offerings in terms of product & services. The entire value chain will be enabled by the track and trace devices to real time integration and execution.

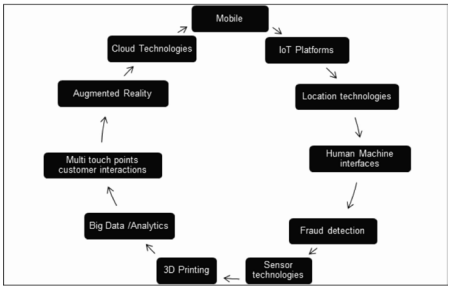

Figure 3: Key Technology Contributors in Industry 4.0

How Smart Factory will empower the manufacturing ecosystem

The concept of Industry 4.0 indicates mitigating the typical challenges faced by manufacturing sector like machine failure / downtime, defective products, scraps etc. as 4th industrial revolution is expected to enable manufacturing firms to operate more efficiently mitigating the loss associated with it. Many technological innovations in the past have positively impacted the manufacturing; but with the advent of advanced communications, ever growing demand of production efficiency, business leaders, suppliers and consumers are always looking out for newer solutions for maximizing output with more accuracy, insights, efficient production techniques, innovative distribution channels and connected consumer experiences. However, I feel there are five elements through which industry 4.0 will become empowering connected experience for the entire value chain of the business ecosystem which are listed as below;

- Connected Products: Adoption of industry 4.0 will ensure product competitive advantage because 4.0 holds the potential to increase the customer lifetime value by identifying the most used features of the product / much needed product features.
- Connected Demand: A reinvented business model with increased customer centricity, new revenue models, cost reduction by using real time data as a means to drive customer satisfaction and development of new products.
- Connected manufacturing: Manufacturing sector has immense scope for improvising plant efficiency and product quality by resolving the issues that lie in the ecosystem by leveraging data points from thousands of sensors.
- Connected service: Empower the timely replacement of defective parts and minimize the downtime of machines & equipment's.
- Connected Value Chain: Enable the development of specialist / customized products rather approaching the market with "one fit size".

How Can you assess the readiness for Industry 4.0

As per the current understanding / assessment of industry 4.0 the manufacturing firms can be categorized under 4 categories - pre conceptualization, conceptualized, evolved and revolutionary (who adopted end-end industry 4.0 best practices). However, to completely transform into smart factory there are few strategic elements which need to embedded in the operational / enablement layer of the manufacturing process which consists of -

- Interoperability — machines, devices, sensors and people that connect and communicate with one another.
- Information transparency — Systems which will create a virtual copy of the physical world through sensor data in order to contextualize information.
- Technical assistance — Development of two-way systems which has the ability to support humans in making decisions and solving problems and also the ability to assist humans with tasks that are too difficult or not viable for humans.
- Decentralized decision-making —The ability of cyber-physical systems to make simple decisions on their own and become as autonomous as possible.

Who Can Reap Benefits: First Movers will have competitive Advantage

Over the last couple of years, we have seen how Amazon, Google, and Facebook had been retaining dominant mindshare & market share in their respective market zones primarily because they invented new business models with significant data ownership

compared to other players in the industry. The same rationale applies in manufacturing domain also since they thrive on data rich environment and if they can tweak their business models which will make use of the data powerhouse available in manufacturing space then they can truly benefit from the value industry 4.0 delivers. "According to PwC within the next 5 years, an advanced implementation of Industry 4.0 will become a "qualifier to compete" and the companies who will not invest will find themselves struggling to maintain market share, on top of facing higher capital funding costs."

The "wait & watch" firms will find it difficult to cope with rapid technological transformational change in the manufacturing sector and can be called as short sighted players in crafting their adoption strategy as the challenge is not only technology revolution as the biggest impediment lies in organizational & cultural transformational programmes which will impact the benefits to be reaped from the industry 4.0.

Key Impediments in Adoption of Industry 4.0

Any industrial disruption is not easy to be adapted and along with opportunities / benefits brings in challenges also. Most of the organization will foresee formidable challenges in the adoption of innovative technologies. Every organization mandatorily needs to broaden their knowledge with regards to the new technologies and also its applications and then should accordingly come up with customized digital strategies / process specific to their nature of the business. However, there are few challenges which can be foreseen as a part of ongoing digital transformation phase which includes:

- Data security: Integration of external systems and more frequent access to data systems will lead to the data security issues. Intellectual Property of the company may be affected due to onset of the data sharing economy.
- Heavy digital investments especially when there is a lack of clear vision with regards to the digital operations blueprint.
- Automation will lead to loss of human jobs which can impact the economic cycle.
- Slow expansion of infrastructure systems especially India may deter the firms from realizing the full potential value of Industry 4.0.

However, these challenges can always be mitigated by adopting the following practices

- Robust encryption: Embedding strong encryption and security features in the product design will mitigate the loss from data security issues.
- Consensus among vendors and companies on acceptance of commonly established standards will help in setting up standards and process.
- Chart out a viable digital strategy for the organization and make the investment in phases and create scorecard for measuring the impact.

What does Industry 4.0 symbolizes for India

India is one of the largest internet markets with 500 million users and with the advent of Industry 4.0 India is actively participating in digital transformation journey with few companies already exploring industry 4.0 applications and majority of them are yet to access technologies like IoT, Artificial Intelligences, RPA, etc.

Currently, India is running behind the pace compared to its peer regions in the adoption of Industry 4.0; the integration of cyber physical systems is still at a very insignificant proportion. India is hub MSME (Micro, Small Medium Enterprises) and they have limited access to technological innovations due to high cost associated with it. However, India is preparing itself to accelerate the technological adoption process by charting out few strategies which includes:

- One of the largest manufacturers of two-wheelers (Bajaj Auto) in India has installed co-bots at its plant to automate the assembly lines.
- The largest two-wheeler manufacturer (Hero MotoCorp) of India is using additive manufacturing for product designing of all two-wheeler parts for fitment and functional testing leading to reduction time –to-market.
- A Bengaluru-based packaging company has connected machines over a network that provides a monthly dashboard about the machines.
- India's first Smart factory is being set up at Bengaluru Indian Institute of Science's (IISc). This smart factory powered by data exchange in manufacturing and the Internet of Things (IoT).
- The heavy industries and public enterprises ministry are facilitating the establishment of four centres in the country to help SMEs implement Industry 4.0.
- Make in India Programme is one of the other initiatives undertaken by the Government to face the competition and showcase smart factory capabilities of the country.

Blueprint for Successful Industry 4.0 Adoption

1. Map Out the Strategy: Assess the digital maturity of your organization and set a target for the next 5 years in phases. Do a thorough viability study of technologies which are triggering Industry 4.0 to understand the

areas of strength, weakness and areas of improvement for your organization.

2. Run Pilot Projects: As the concept of Industry 4.0 is receiving overwhelming response from all corners of the world, challenges and issues will also arise accordingly. It may not possible to get funding immediately so it becomes mandatory to run some pilot projects and validate the fund to be received.
3. Define the capabilities: Understand the nature of your business, and capabilities it will require to run those functions. Develop an agile IT function that will respond to flexible business demands.
4. Become Data efficient: Just gathering of data will not suffice adoption of Industry 4.0 but analyzing it efficiently will enable decision making skills of the organization which requires solid single integrated solution / data analytics platform.

Conclusion

There is lot conversed and written about Industry 4.0 across various technological and industrial forums. Most of the countries are taking initiatives to lead the world in smart manufacturing and some countries are almost there in getting converted into smart manufacturing countries. However, the wider audience is yet to quantify the impact of its implementation. There is no doubt that there is no full proof technology available in the world however the real smart countries will be those who can mitigate the challenges which Industry 4.0 carries along with it.

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