Best practises for digital implementation*

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ABSTRACT

Smart factory owners, manufacturing executives, and operation managers are looking for improving the budgets, targets, goal settings, deadlines, speed, efficiency, and lead-time. Maintain product quality after factory changes. With Industry 4.0, everyone is trying to transform the production process that accomplishes the factors mentioned above. There are multiple approaches found for manufacturing industries. However, there are few best practices that will help in digitization and implement digital factory. By analyzing the transformative approach of Industry 4.0, these practices are built for any organization to progress gradually. This paper aims to bring you the different perspectives gained while studying the transformation that can occur in the next few years. Also, it emphasizes on various key challenges faced to implement the practices in the industry. Finally, gives an overview of the best practices to implement the digital factory.

1. Introduction

Industry 4.0 involves utilizing the advancement in Information technology and communication to improve the degree of automation and digitization of production. The manufacturing and industrial processes are now focused on the ultimate goal to manage the entire value chain process. This will include improving the efficiency in the production process and coming up with various premium quality products and services.

The factory of future is envisioned to operate with great efficiency where all the process is performed and conducted effectively. Here are the four important trendsetters of the Industry 4.0.

- There is a drastic increase in the data volume while computing power and connectivity. It is a new area to choose the wide-area network with less power consumption. Industries find themselves a great prospect with new user data in manufacturing operations
- There is an advancement of analytics and capabilities. By consistently analyzing various technical and non-technical elements will help the organization to grow successfully. The solid analysis is the higher key of how the end product is made with the best quality. There is a lot of analysis that comes in to play while improving the efficiencies in the business operations.
- Introducing the new form of human and machine interaction will develop the value chain process. Development also includes technology like augmented reality systems that make the touch and feel interfaces and other hands-free operating systems.
- The innovation is easy while transferring the digital data and something that is physically usable. This will include the improvement in automation of the process and making the technology accessible for the customers.

The above mentioned four aspects are the basement of any products developed for building products by implementing Industrial 4.0. Industries are finding it increasingly imperative to remain competitive in the industry. There are few best practices build over keeping the distinct characteristics in mind.

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2. Trends In Manufacturing Industries

2.1. Vertical integration of smart production systems

The vertical integration of data and information from the workplace can be controlled and operated anywhere on the corporate level. The internet of thing and another network of IT can provide access to the production systems easily. Here the data is processed, and we can collect adequate information about the management. Hence Vertical Integration is defined as the integration of various hierarchy levels in production and other equipment involved in the production. The integration takes places in the IT systems only.

Digital factories are essentially the core of Industry 4.0, and they may not be able to work alone. Every smart product, production systems, and smart factory may require high networking capabilities. The derivative of vertical networking is based out of the Cyber-Physical Production System (CPPS). They allow access to the rapid-action technology and other appropriate variables in both factories and another production system. This will also include various variables such as demand levels, machine defects, stock level, and delays in the delivery.

Networking and integration involve smart marketing logistics and services for any organization. They are digitized services as every production process is customized.

2.2. Horizontal integration

Through the integration of manufacturing systems and other network related IT technologies, there is a system as an exchange of data and information. This has been established geographically across every remote site in the value chain. Therefore Horizontal Integration is an integration of various stages of production and planning resources with the system of automated production equipment.

The integration will facilitate the establishment of networks that will add to the value chain. Here the focus is on the communication between the business partner and customer. The relationship between them is highly established, and the value chain is built on customer needs and requirements. This can also mean the integration of business models in the business. This is an innovative transformation adopted across the global network and the countries.

2.3. Consistent engineering

Here the system of the value chain and production is subjected through engineering. The complete product-lifecycle is highlighted at this level. Under other situation, the cycle will focus on the manufacturing process despite the output. Here the Industry 4.0 covers both the output and also the process through which they have been submitted.

2.4. People as the main director of value

Business operations are particularly specific to the manufacturing in which you can use the technologies. They are already expositing and completely operational for a very long time based on the customers. However, the technologies are emerging day by day and becoming better and different, especially customer-centric. These technologies are soon very much capable of being ready for the market. They are also accessible by more industries and business because of the exponential resources.

3. Six Stages of Transformation Cycle

The transformation in every segment and industry will occur only through a continuous cycle which happens as per the following cycle.

3.1. Discover

The product will be discovered by understanding the current state and market disruption. Every aspect of the discovery will focus on the requirement and need of the product. Here is where the company has to decide on the technology that can be implemented under industry 4.0. With the strategic alignment, if everything falls in place, the product shall be launched in the market.

3.2. Define

Products that need communicability with the design thinking approach that resolve the problems. In this phase, a business model will play a major role. As industry 4.0 is making the product that is suitable as the service as well. Also, the company will set a cross-functional team who is skilled under all the important process involved in the production.

3.3. Analyze

The company deploys and invests majorly on analyzing the production process. This is where digital maturity and rationalization begin. In fact, by implementing industry 4.0, one can predict the various decisions to be taken in the company. It is a well-informed decision-making ecosystem that provides a various business case.

3.4. Proof of value

Here the scope of the project is analyzed, and the products are developed based on the problem statements arise. The investments are a crucial part of this phase as the company seeks sponsorships. You can measure the product in the market during your pilot projects and understand the different values being adopted by the product in this environment.

3.5. Evolve

It is the advanced level of the product. After the product has been launched with the help of Industry 4.0 implementation, the products are scaled in the market. They will be marketed across the globe using the network systems only. The products are accelerating for the business where real buying occurs.

3.6. Improve

After you set the product in the market, every cycle is analyzed to check the output. You can evaluate continuously on every cycle. The aggregate helps you to improve the product and optimize them according to the customer need. Every business and the product takes a reshapes and gets a new form of the product here.

4. Key Challenges

Right now, according to the World Economic Forum, it is found that 15% of the manufacturers are investing in Industry 4.0 and also IIOT technology. This will majorly involve large production and process companies and other industries that require a large amount of automation. But the prediction says the 15 % may grow up to 65% in the very next five years. Experts and people in the IIoT field also feel that the technology will be exploited for the various resources and utilized for the great benefit.

However, there are majorly four big challenges for implementing Industry 4.0 in the companies.

4.1. Awareness

Most of the organization continues to contend with the conventional production system because they are not aware of how the Industry 4.0 is currently positioned. Also, the majority of the product owners are still waiting for how they can kick start the digitization process. Still many are unsure about figuring the roadmap of the different set of goal towards Industrial 4.0. Also, if implemented, what will be ways in which they will deal with the ROI in the critical business case.

4.2. Technology

From sensors to software analytics today, Augmented Reality is taking the upscale. Even though these platforms are scalable, they are isolated. The fear of adoption is one of the key reasons why deploying is becoming difficult. The organizations have to asses, configure, integrate, and deploy skilled people for the IIOT for the overall transformation. The entire platform is completely generic, and there is no specified platform for each industry.

4.3. Implementation

The biggest challenge is in the implementation process in the industry. The ICT infrastructure across various factories does not facilitate Industrial 4.0. The machine integration and connectivity are the two important elements that need focus to develop, and major features are missing. The Downtime of m/c while integration IIOT is not widely accepted by the manufacturers. Even though there are numerous sources to prove the performance of sensors and devices, every industry does not support the system.

4.4. Validation and adoption

For any industry to build the trust of adopting the IIOT, initially they have to validate their existing data. The administration is not very comfortable in sharing or integrating the data sent for analyzing. The IIOT environment must be 100 % available for the data accuracy and other applications. There is no standard security policies audit conducted for the IIOT operations. Every employer and the user must be trained for the transformation that takes place in the process.

5. Digital Factory Implementation Best Practises

Digital factory implementation process excellence is a method that helps the conventional industry owners to transform for the industry 4.0 slowly. Starting from the project invitation to the entire process of product development, here we had listed down few practices that might help you implement the digital factory. This methodology helps the customer to map their process (Project initiation, Assessment & Infra plan, Requirement & Design, Hardware Management, Machine Integration & Configuration, Testing & Validation, User acceptance testing & Deployment, Adoption Strategy & Continuous improvement) with the key enablers (Process, Quality, Timeline, Budget, Knowledge, Stakeholders, Empathy, Roles & Responsibilities, Rewards & Recognition) for the digital transformation.

If you closely see this, the process chart helps every segment and industry across the globe. The people can also customize these features according to the industry and based on their manufacturing style. Also here the employees are also given equal importance as they become an integral part of the production process.

6. Business Benefit Model

The business benefit model will help any organization fit into the right channel of business. It is divided into two stages: Analysis, Design making based on the insights produced and Secondly the improvement activities for increasing the efficiency in production.

6.1. Analysis and design

The business model will go under the process of collecting real-time data and analyze them for production. The reasoning and insights will help you find the customer needs and how well the equipment can perform for bringing the products to live. The root cause analysis is the right phase where we can understand different aspects involved in the processing.

6.2. Improvement activities

Based on the Analysis and Design, we can come up with the improvement activities which will result in the benefits like downtime reduction, productivity improvement, process standardization which can I turn can be attributed to Return on Investment. The value improvement will focus mainly on productivity, quality, cost, delivery, safety and Morale.

6.3. Contingency plan for major risk in IIOT implementation

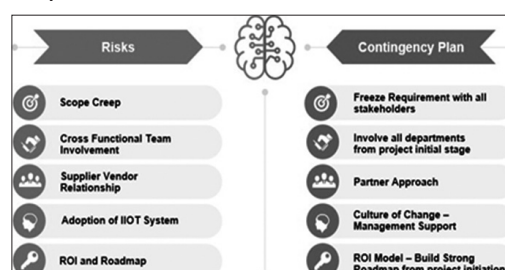| Risks	Contingency Plan
Scope Creep	Freeze Requirement with all stakeholders
Cross Functional Team Involvement	Involve all departments from project initial stage
Supplier Vendor Relationship	Partner Approach
Adoption of IIOT System	Culture of Change – Management Support
ROI and Roadmap	ROI Model – Build Strong Roadmap from project initiation

Fig. 1. Explains how each of the risks is tackled using the contingency plans.

Before implementing the digital factory, you can have the contingency plan as your backup for you to improve efficiency and performance.

7. Conclusion

The paper aims at the penetration of Industry 4.0 in the production process and operations. The information flow, advanced technologies, and other materials are converted for the insights that can drive your organization better and the best. To put it simply here, both digital and physical technology will be accessed for the real-time information and converted as the actionable insights. However, many production companies are still struggling their way out to implement these ideas. Hence the best practices mentioned above will potentially revolutionize the value chains and the business models.

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