AGILE MANUFACTURING THROUGH MANAGEMENT DRIVER

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ABSTRACT

In the present scenario of competitive market, manufacturing companies are struggling to grab the interest and requirements of customers in a well manner by providing sufficient and innovative services in agile manner. Companies those who have adopted agile manufacturing methods have gain a lot of market shares and profits. It is seen as the winning strategy to be adopted by manufacturers bracing themselves for dramatic performance enhancements to become national and international leaders in an increasingly competitive market of fast changing customer requirements. To further the understanding of agility, this paper reviews the meaning of agility from different management driver’s criteria and attributes and suggests a comprehensive definition which can be adopted as a working definition by practitioners. The main aim of this study is to emphasis on the management drivers of agile manufacturing and make them more efficient by sucking out the drawbacks inside them and focus on some beneficial criteria’s of each management drivers.

Keywords: Manufacturing, Agile, Driver, Attributes

1. INTRODUCTION

Agile manufacturing is a term applied to an organization that has created the processes, tools, and training to enable it to respond quickly to customer needs and market changes while still controlling cost and quality [1]. Any traditional organization particularly those are situated in developing and under developed countries, lack sufficient financial power and skilled manpower to adopt advanced technologies for digitalizing the products, processes and services for achieving agility. Hence, it is preferable to start the agile manufacturing practices in traditional organizations by initiating changes that would not require much investment of money and human resources. To
execute agile manufacturing practices in traditional organizations we start with employing management driven criteria. These management driven criteria are divided into eight management driven criteria.

2. ORGANIZATIONAL STRUCTURE FOR ACHIEVING AGILITY

From the past many years, traditional organizations have been adopting vertical organizational structure. In this structure the power and authority flow from president to the lower level of the employees through vertical channels. This vertical structure elongates the time for making any kinds of decisions [2]. This process is lengthy and time consuming. Hence an organization incorporated with vertical organizational structure cannot make quick decisions. But making quick decisions is the requirement of agile manufacturing paradigm in organizations. After observing this long time consuming and bureaucratic procedures in organization structures researchers and practitioners advocate the following criteria’s:

- Execution of decentralization processes.
- Flattened organizational structure
- Smooth information flow
- Team management for decision making
- Interchange-ability of personnel

![Organizational structure through manufacturing cells](image-url)
Though the decentralization processes the reduced time consumption it results in certain drawbacks like misuse of power and lack of accountability. After the evolution of agile manufacturing paradigm researchers had found out that more the decentralization the collective and focused participation of employees is required to react quickly in accordance with the dynamic demands of the customers [3]. In this context to implement agile manufacturing paradigm it is suggested to drop the flattened organization. According to this organizational structure an organizational groups the personnel according due to specific contribution that they can make. In this type of organizational structure in order to design and develop a product, manufacturing cells are formed. In this a customer specifies a product requirement to the president the relevant information needs to be communicate to the manufacturing cell that is competed to manufacture that product. In case any secrecy is involved the president may filter the confidential elements and communicates only the relevant information to these manufacturing cells [4, 5]. This information shall necessarily include the product specifications quantity requirements, cost details and schedules of carrying out the activities. The manufacturing cells are required to make use of this information to produce the products according to the customer specifications while adhering to the schedules but without compromising quality and profitability.

3. DEVOLUTION OF THE AUTHORITY FOR IMPLEMENTING AGILE MANUFACTURING PRACTICES

The attributes inside the agile criteria (devolution of authority) includes of:
• Clear definition of personnel's responsibility and authority
• Education and training to create the self-managed teams

As mentioned in previous section, when a new product is offered in agile manner, a manufacturing cell with all the team members is formed. These manufacturing cells are to be provided with the required authorities to accomplish the task [5]. Those authorities shall include the power to design the product, service and procedures, select the materials and facilities, and decide to make or outsource, and share the workload among the members.

In case any secrecy is involved the president may filter the confidential elements and communicates only the relevant information to these manufacturing cells. However a system has to be in place to check the misuse of authorities. This has to be done so by introducing control elements which would ensure that the system elements are focused towards producing the products or offering the service in an agile manner.

3.1 Employee status in agile manufacturing environment

In traditional manufacturing environment, employees are differentiated on the basis of the levels they occupy in the organizational structure and the department to which they belong to. This differentiation creates gap between the personal of the organization. This differentiation occurring due to the employee’s status and departmental affiliation is to be eliminated in an agile manufacturing environment. In order to overcome this differentiation the requirement to producing the product of offering service in an agile manner are to be pooled in a manufacturing cell created exclusively for this purpose and the work load are to be shared on mutually agreeable basis. This action may sometimes results in imbalance in the sharing of workload among the employees as a particular dynamic demand may require a specific competency which may be possessed by only single or a few team members of the manufacturing cells. In order to avoid this kind of disparity in an agile manufacturing environment it is necessary that employees are made to acquire multi skill and imbibe multi knowledge. The status of employee in agile manufacturing environment depends on following aspects:
• Flexible workforce to accept the adoption of new technologies
• Multi-skilled personnel
• Implementation of job rotation system
• Education and cross-training imparted to all the existing and new employees

In order to accomplish these requirements once the customer’s specifications are received all the team members are made to undergo educational and training programmes. On the whole, the employee status in agile manufacturing environment is to be normalized by bringing out team culture, infusing of new knowledge and multi skilling of the employees.

3.2 Agile manufacturing through employee involvement

In an agile manufacturing environment, all the employees becoming the team members of the manufacturing cells shall have to involve in the task of meeting customers dynamic demands within a short period of time but without compromising on quality, productivity and profitability. In order to involve all the team members in this task, an exposure programme explaining the customers’ requirements, facilities available and challenges involved is required to be conducted. Each employee will be required to view and understand her work in terms of the whole rather than the part. For example, an aircraft wing designer must perceive herself as an aircraft manufacturer and place her work in the context of aircraft manufacture and sales [4].

The attributes of agile manufacturing through employee involvement involves:
• Strong employee spirit and cooperation
• Employee empowerment
• Institution of employee suggestion schemes
• Conduct of meetings
• Total workforce involvement
• Promoting creative thinking
• Decision making
• Innovation embedded culture

3.3 Nature of management required for implementing agile manufacturing practices

Strategic management is of utter importance. According to this approach, a company is to be managed by focusing its resources towards achieving strategy by applying continuous improvement technique and tool. The agility level needs to be assessed, to know the strategic position, thus enabling them to identify the areas in which they could focus for further improvement [2]. In this the aim of management is to apply continuous improvement in organization over a long period where few models of product and services are offered to the customers. Some of the attributes for nature of management required for implementing agile manufacturing practices are as follows:
• Participative management style
• Clearly known management goal
• Management involvement
• Profit motivation coupled with humanitarian approach
• Transparency in information sharing
• Regular conduct of management—employees meetings
• Rapid evaluation and implementation of employee suggestions

However the application of the strategic management in agile manufacturing environment, the projects are short life and hence their goals need to be achieved in the short period of time. Moreover, during the execution of these projects innovation need to be evolved and managed.
Hence, the principle of strategic management needs to be employed with provision for making decision quickly and meeting the customer requirement in dynamic manner.

4. AGILE MANUFACTURING THROUGH EXECUTING CHANGES IN BUSINESS AND TECHNICAL PROCESSES

After the induction of ISO 9001 standard based quality system, documentation of processes is being carried out intensively in organization situated in many parts of the world [3]. This situation has arisen due to emphasis made by ISO 9001 standard towards the documentation. In agile manufacturing changes in business and technical processes leads to the execution of these attributes:

- Flexible business system
- Application of BPR for reinventing and reengineering the organization
- Employee's attitude tuned to accept the changes
- Conduct of pilot study on new production/business processes

Documentation is an effective process as it results in recording of activities in proper and known value adding manner which results in the innovation of technical and businesses. Hence, it becomes necessary for the modern organizations to implement agile manufacturing practices and the need to check the documentation of business and technical processes for their capability in carrying out efficient transaction through non value adding activities.

5. AGILE MANUFACTURING THROUGH TIME MANAGEMENT

In agile manufacturing environment time needs to be managed properly. There are two directions in which time management is done in agile manufacturing environment.

5.1 In one direction, time management of employees need to be carried out. Agile manufacturing principle stipulates an organization to equally treat the employees. But this approach cannot be applied when the salary structure and duties are a differentiated among the employees. Various factors which leads to differentiation of salaries among the employees are:

- Quality of expertise required
- The skills involved
- The number of years of experience of employees

This differentiation in salary requires the time management of employees as this will results in efficient utilization of employees time which will reduce the profit of the products manufacture [2, 3]. Appropriate time management of employees will overcome this deficient situation in agile manufacturing environment.

5.2 In another direction of applying time management in agile environment is the execution of the project in an efficient manner to either deliver the product or offer the service to quickly meet the dynamic demand of the customer. Numbers of steps are necessary to be followed to implement this type of time management in an agile environment which are as follows:

- In the first step the time required to carry out the business and technical process to produce one unit of the product or offered one service is to be estimated [3, 5]. If the solution of this requirement exceeds the cycle time then the step has to be analyzed for the possibility of carrying out some of them concurrently. If this is not possible then the possibility of out sourcing of the activities to be considered.
- The second step comprises of line balancing of activities. It involves management or arrangement of manufacturing cells in such a way that each manufacturing cell consumes equal time
to deliver component or sub-assembly [2]. The time consume should be equal or less than takt time otherwise the facilities, infrastructure need to be increased or activities need to be outsourced.

- Third step involve the utilization of project networking techniques. Project networking techniques are PERT and CPM may be employed to map the processes using network diagram and analyzes the performances of project. During the analysis of the project critical activities, critical path and crashing of activities are carried out.

6. AGILE MANUFACTURING THROUGH CUSTOMER FEEDBACK/RESPONSE ADOPTION

In manufacturing agility, agile manufacturing through customer response is one of the vital criteria for development of firm/company. It owes its success to the continuous customer improvement through customer service based on the customer response about the product. Evaluating the needs of the customer and new innovative changes in the products keeps the market competitive and the firm profitable [3, 4]. The attributes of agile manufacturing through customer response can be achieved through following:

- Prevalence of continuous improvement culture
- Communication media to collect the customer responses
- Incorporation of customer’s feedback into products
- Empowerment of personnel to resolve customer problems
- Efficient information system

7. CONCLUSION

In the present century, to develop a better product in short span of time agility has contributed much more to the scenario of drastic change in the market conditions. Day by day the competitions are arising more due to customer’s demand of innovative changes. This condition demands for fast response from the enterprise, so as not only to meet the customer demands but also to sustain in the present market. These aspects have been addressed in the paradigm called agility. Few researchers have contributed certain techniques. In this article, the 8-criteria agility assessment model has been conceptualized, and the assessment has been done using proper literature review. Agile manufacturing may be new as a concept but aspects of the practices embodied in agility are already in place separately. To extend understanding of agility there is the need to develop a working understanding and models of agile manufacturing. Such models may not be radically different from those of the existing manufacturing paradigms, since agility does not negate any of the earlier paradigms. What is required is a methodology for synthesizing the existing models to aid their application.

In the future, more studies could be conducted in varied sections of manufacturing branches for improving the effectiveness of the model, and the advanced agility assessment also based on fuzzy approaches could be developed for enhancing the effectiveness of agility assessment.
8. REFERENCES


