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An Implementation Study in Agile Manufacturing

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Abstract In the development of manufacturing industry firstly started with "how to produce" and currently changing to "how to manage", an organization has been built having always nearly same purpose but the goals differed. Certain researchers believed a follow-up for lean manufacturing and some thought against lean manufacturing also few sighted a mixture of enhanced manufacturing methods, agile manufacturing was firstly described on Iacocca Institute in 1991. The main purposes with agile manufacturing are making an easier way for co-operation and information sharing in global industry, or in another word to reach sources and collaborations earth, and to respond to continuously changing and current demands quickly. Agile manufacturing is not an easy method for manufacturers to follow-up, it is also the change of mentality for whole structure. By having new case studies, it will be an appropriate way for industries to see how to implement in their organizations.

Keywords Agility, Agile manufacturing, production management, organizational change, manufacturing system

Introduction

Individuals continued their existence by using minimal labor and using the maximum capacity. They aimed to raise the level of prosperity by making continuous improvements to meet their ever-ending needs. With the aim of reaching this goal, the tools used became unserviceable in time, and the need for production emerged. The basis of production has arisen from the fact that individuals usually work to meet basic needs (food-hunting, marriage, security, etc.), which are usually based on human power and supported by assistive devices.

The producer has acted in common with other individuals over time, which he could not do on his own. The concept of value has developed in the sense that individuals or groups can still meet the needs of other individuals or groups. Individuals have to make a new production in order to pay the price of these values. This production based on human power, usually in individual or small groups, is called craft production.

Over time, increasing needs in different forms, and therefore production, have enabled individuals and masses to act together. In the 18th Century, James Watt, an English engineer at the age of 28, invented the steam engine and started the fabrication in production. From that date onwards, the manufacturing started to become a state in which workers co-operate with the machines, endeavor at certain times of the day. In addition to learning to be able to reach and use raw materials, production managers have begun to search for new methods in their production systems to design and manufacture machines according to their needs.

The development that takes place over time in production management is examined chronologically in four terms of production models. Each of these models has emerged according to the requirements of time. These models can be classified as craft production, mass production, lean production, agile production. In this paper, an encouragement for using this new manufacturing method is intended.

Materials and Methods

The production bases itself in the early days of mankind with a production style called the hand-crafted production system or the artisanal production system. Hand-crafted production was a mode of production that

made one in every model, and each one of the products was unlike any other, at the same time unit costs were high [1]. By the occuring of American System production, the concept of replaceable parts has emerged and has led to the standardization of parts. Mass production is based on the ability to standardize the parts produced and the semi-products that are produced during manufacturing and to produce them continuously and in batches with appropriate machines. Replaceable parts in mass production are important. Different nomenclatures have been made in the mass production literature. The most common of them is the Fordist production method or Fordism bearing the name of Henry Ford, the first known implementer of this production system.

The mass production management developed in U.S.A soon spread to Europe and started to be used in many series production suitable for the automotive sector. The technology and user demand is the key to development of production technology. Consumers have begun to come to the producers with different demands instead of using the same kind of products. In addition, inventory costs and damage of faulty products to the production line have lowered the advantage of mass production over time.

The Japanese industry, which suffered severe damage after World War II, wanted to apply the mass production model to be competitive, but it lacks the resources and economic power to achieve it. But their desire to be competitive has led them to develop a new production management. This production management system, given a lean manufacturing name, was introduced and developed by Toyota, a car brand. This new Japanese technique will put an end to the hegemony of mass production and a new production management that will take the world [2]. Lean manufacturing; better, faster and cheaper than their competitors in the ongoing competitive market; need less space, development and working time; is a production system that removes applications that require waste and that do not directly add value to the product [3]. The revolution of manufacturing systems continues by the change of needs and demands. Agile Production is a concept that is able to respond to the dynamic and fast changing market in recent years [4] and is essential for the competitiveness of production companies [5]. In this context, Kidd [6] defines agile production; companies, knowledgeable and talented people, and advanced technologies is combined at a common point to meet the needs of customers by supplying high quality and customized products through innovation and cooperation. Agile production is not a mere operational decision but a strategic orientation to be found in each cell of the organizational structure and must therefore align strategical direction with production strategies [7].

Why Agile Production?

Today, one of the biggest problems of manufacturing companies is the constantly changing customer demands. Agility is the management of sudden changes. The ability to control change also offers the advantage of managing opportunities. An agile company, teeming with suppliers, customers and competitors. If necessary, they can act together. This can be in many ways, such as technology, finance and information technologies. It is important for the agile management system to quickly adapt to changes and participate in opportunities.

Key Factor: Speed

The most important feature expected from a company with agile production system is to react quickly in many areas. There is no doubt that the high quality products, the minimization of costs, customer satisfaction, organizational structures etc. are very important as it is noticed in other production systems and it is necessary for the continuation of the company. However, once you have fulfilled these requirements, the customer is not waiting for you to send orders. For this reason, in today's market conditions, it is very important for the businesses to have these qualities and competences as well as to comply with the time that the customer desires.

Managing Change

In the daily business we hear many times "the crisis has forced hundreds of companies to bankrupt", or many producers use phrases "we have become unable to produce because of imported products". But sometimes there are also those who convert this crisis into opportunity. These companies are the ones who manage change. Many internal and external factors cause change and these changes often do not stop. Businesses do not have much time to wait for adapting this change. In agile production method, there should be a proactive or predictive approach. There are two options for managing change; to control unpredictable change and cope with the effects of unpredictable change.

Implementation

Agile production application is made in Konya, Turkey, a company that manufactures fasteners. The company has a monthly production capacity of 275 tons of hot forged parts. According to production planning values, generally the machines are full of orders for the next 7-8 weeks. In addition to this, on the market there are customers who will accept to pay more than the normal sales price for the product which is delivered within 1 week - 10 days. In cases, companies are ready to pay higher than product price in order to meet these urgent demands and to provide customer satisfaction.

The need for agility is in this case the ability to respond to a demand that exceeds the capacity of the firm. In the firm where the implementation study is done, temporary solutions are tried to be found against these uncertainties. The alternatives that the company will follow in these situations can be determined as follows:

- Overworking against urgent requests
- Increase production capacity
- Finding supportive suppliers
- Reject opportunities
- Evaluate the opportunities that will arise in the future.

Conclusion

Because of today's constantly changing customer demands and inconsistencies in the situations encountered by the producers, the agile production system is seen as a management method to be considered for the producers. The importance and content of the agile production system has been evaluated in the study. In the last part, a sample company study was carried out on the applicability of agile production. In this case study, it is seen that the different demands coming from customers sometimes have positive effects as being paid for more price but also has risks to not to be on time for normal scheduled deliveries. Agile manufacturing is a new concept in production and by more case studies, it is advised to be more common.

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