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Design of a rapid response and high efficiency service by lean production principles: Methodology and evaluation of variability of performance

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Abstract

Management based on lean production principles has enabled enterprises to attain very high levels of efficiency, competitiveness and flexibility in production systems. Nowadays, a number of industrial processes are managed in accordance with these advanced management principles, although this is not usually the case with service processes. This work proposes a methodology for implementation of lean management in a services production system, as applied to the case of telecommunication services. In addition, since services are subject to a much greater degree of variability of features than industrial production, this work includes an analysis of that variability and a proposal for action to be taken when it is excessive.

Keywords: Lean production; Added value; Waste; *O–T* diagram; Flow production; Takt time; Maximum cycle time; Minimum cycle time; Waits; Productivity; Variability of service time

1. Introduction

Lean production techniques have contributed to a spectacular improvement in efficiency, speed of response and flexibility in production at many industrial enterprises, through *process-based* management, elimination of *waste* and the highly *flexible* implementation of these processes. Lean management has allowed these enterprises to offer a **highly diversified range of products**, at the **lowest cost**, with high levels of **productivity**, **speed** of delivery, **minimum stock** levels and optimum **quality**.

Service enterprises can also benefit from the advantages of lean management, although the approach is less common at this type of enterprise. The objective of this work is to obtain an ordered proposal for management measures aimed at moving from a conventional approach to one of lean production in service enterprises, and to determine the level of improvement thus attained. In addition, since the activities comprising service processes are normally subject to a certain degree of variability in their features, this work also aims to provide an analysis of this variability, together with proposal for action to be taken when it is excessive. For greater clarity, we will also apply this methodology to a case of telecommunication services, a type of service that is of undeniable interest at present, in view of the growing

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importance of information and communication technologies.

2. Lean production management

The lean management makes it possible to obtain a product that is adapted to actual demand using the minimum amount of resources and therefore minimising the cost, with the appropriate quality and very high speed of response. Since the production system must produce in accordance with demand, it cannot resort to economies of scale by dealing in large batches, as in the case of conventional management systems. In order to attune production to demand and obtain high performance without recourse to economies of scale, lean management is based on two main inherent characteristics:

(1) Firstly, it operates with the least possible number of activities, thereby obtaining economies that are not economies of scale but rather of resources; for this purpose, all activities that do not *add value*, called *wasteful*, must be eliminated, including inappropriate processes, unnecessary carriage, unnecessary movement, stocks of all kinds which would result in increased costs, as well as quality defects and all manner of delays and times, which would be detrimental as regards the quality and response. Furthermore, production that is not attuned to demand is also wasteful (excess production), and avoiding this waste will result in a product or service that is faster, more appropriate and less costly.
(2) This last aspect is covered by the second main characteristic of lean management, i.e., *flexibility*, which means that the system must be attuned at all times to the type and volume of production required by demand.

Implementation of the processes adapted to lean production must be accompanied by the design and management of each of the aspects involved to allow maximum elimination of waste and introduction of the required degree of flexibility. The following table (Fig. 1) contains a proposal for the features to be introduced for each of the aspects related to process implementation and management, in order to bring them in line with lean production.

3. Service processes: Differential characteristics

Service production seeks, the same as the industrial production, to implement added value processes along with the appropriate consumer resources, although the result is not a material good that the consumer can obtain: services have got an intangible product and, as long as material goods exist, they are not obtained but only used. Services differ from the industrial production in the following aspects:

- With acquisition of industrial products, propriety is transferred; in service operations, it is not.
- Industrial products are tangible. Services have basically got an intangible character, although they can include the use of tangible goods.
- Industrial products can be stored away; services cannot. It does not mean that there cannot be stocks accumulated in services, since imbalance between operations accumulate the material goods used or it can be people queuing, depending on the type of service.
- In industrial production, products and operations are much more approved than services. In services, the product that works well for a client can be a failure for another. As for operations, services concerned, it is more difficult to standardise them and to fix precise times.
- In services, the productive process can coincide with enjoyment of the service and the client can even take part in the process (self-service).

Regarding services arrangement, there are also some variants which affect the way to carry it out:

- Services with physical distribution: they are developed with a physical arrangement and a flow of materials or people. This type of services allows application of the same techniques as the industrial production, properly attuned, especially the case in which the flow is of people.