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Quality Management, Production Process, Innovation and Productivity

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Abstract

This paper aims to analyse quality management systems, production process, innovation and productivity of manufacturing firms. In order to obtain that, we have taken into account aspects such as product standardization, the use of quality management systems, the complexity of the production system and some considerations on technological innovation.

Keywords: Quality Management; Production Process; Productivity; Complexity

Literature Review

Today everything is in continuous development, especially those aspects related to technology, both in everyday life, as in the workplace. The current companies are forced to improve every day. This goes from the staff, where workers continue to expand their knowledge through courses or training for new technologies, to manufacturing processes, where new machines, new techniques or even new materials are always appearing. Within all of this, there are several relevant aspects, which will be analyzed in this work, such as quality management or innovation.

If we focus on quality, we could say that there is a concern for everything with which it has a relationship and for its integration into production systems. It is not enough to obtain quality, but it must be at a low cost, which forces companies to optimize products and processes. All this together with the high competitiveness of the market, forces to improve the organization and management of all the processes of the company. This goes along the lines of what is known as Total Quality Management or TQM [1].

Innovation, on the other hand, is an issue that in recent years has become crucial for the competitiveness of companies. Companies have the need to continue expanding or modifying what they offer. But to carry out this innovation process, they have to value the options they have. Not all companies have the resources and capabilities to develop a new product or a change in the production process. This is why many companies opt for technological collaboration [2].

Nowadays it is very important for companies to document all the information that may influence the productivity of them. This is a basic part of quality management and is reflected in the ISO 9001: 2015 standard on quality management systems. Companies that wish to have a good quality management system can follow the requirements of this standard. In section 7.5 of this ISO standard, regarding the collection of information, it records what information companies should collect. In addition, it also mentions the importance, for the planning and operation of the quality management systems, of the external documented information.

Regarding innovation, it is worth mentioning the one that affects a product and / or service or process, new or

improved; a new marketing system or a new organizational method such as: business practices, work organization and external relations [3]. That is, the minimum requirements for an innovation to exist are that the product, process, marketing systems or organizational methods are new or significantly new for the company.

A topic closely related to innovation is the investment of companies in research and development (R & D). Regarding this topic there is a lot of related literature. Griffith, et al. show that R & D stimulates growth through innovation and technology transfer [4]. Barge-Gil & Lopez state that R & D is the main source of innovation and is a determining factor in the productivity increases of companies [5]. Within the possibilities of innovation, variables can be grouped into five categories: product development; process development; design engineering; design and redesign of machine and equipment; and production organization how it explains [6]. Within these categories, there are different types of variables, for example: within the innovation activities related to the product, a current one can be modified, the competition can be copied or a completely new one can be developed; and the same could happen with the type of process. All these activities can have a great impact at the strategic level of the company, since according to the emphasis that there is on a certain type of innovation activity and the frequency with which it is carried out, it is an important element in the choice of the technological strategy of the company.

If we focus on product innovations, another important factor is the degree of novelty; this implies that, depending on the degree of originality, the risk and uncertainty will vary to a greater or lesser extent. Based on this, we can distinguish between radical innovations, where the product is totally new and entails greater market risk and uncertainty, and incremental innovations, where improvements are made to existing products with a lower risk than the previous ones [2]. The same article concludes that it is the largest companies that are more inclined to innovate in product, but when they focus on the type of product innovation, the study shows that it is medium-sized companies that tend to perform radical innovations, while small and large innovations are characterized by incremental innovations.

Finally, another option that allows improving the innovation of companies is the cooperation and absorption of information. Especially, external cooperation in innovation and assimilation of knowledge allow companies to act in an agile and effective way to changes in the needs of customers, in addition to having the ability to improve their production processes [7].

Within the production of manufacturing companies, there is a concept with great relevance: the agile production or Lean Manufacturing. This concept dates back to the 1950s, when through Eiji Toyoda and Taiichi Ohno, from the Toyota automobile factory, the Toyota production system was born, which is the basis of what we know as lean manufacturing [8].

Since the birth of TPS, many of the tools and techniques of agile production have been widely used, such as: Just in time, cellular manufacturing, totals productive maintenance, Single-Minute Exchange of Dies, production leveling, the Kaizen method (continuous improvement) or the PokaYoke (fail-safe). These activities are oriented towards the Toyota Production System (TPS). This system provides a systematic approach to production, trying to identify and eliminate activities that cause waste of any type of resource (time, materials, machinery, etc.) through continuous improvement [9].

Despite the great confusion regarding the explanations and interpretations of the concept, the fact that agile manufacturing is a multidimensional concept with different facets, has led to the appearance of numerous definitions. Each of them tries to emphasize a particular dimension or aspect. There are definitions based on their results (flexibility, innovation, etc.) and based on their operation or implementation (cooperation, technological use, etc.) [10].

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