

Methods for Inventory and Purchasing Management Applied to Maintenance

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ABSTRACT

The market is becoming increasingly competitive. Faced with this scenario of competitiveness, companies need to remain prepared to confront competition and meet the demands of customers who exhibit a demanding profile regarding quality and deadlines. The methodology employed in the research was a qualitative bibliographic documentary approach. Biographies, scientific articles, dissertations, books, magazines, and internet sites were utilized, along with articles accessed from databases such as Scielo and Google Scholar, among others. The overarching objective of the research is to analyze the strategic policy of inventory and procurement management applied to maintenance. It was concluded that the best inventory and procurement strategy applied to maintenance within each industrial segment should be tailored to the reality and objectives set forth by the company, ensuring its competitiveness in the market in which it operates.

Keywords: *Market; Management; Inventory; Procurement.*

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I. INTRODUCTION

The present research focuses on methods for inventory and purchasing management applied to the maintenance sector. The industrial sector has experienced significant growth in recent decades, represented by organizations operating within an increasingly technological and integrated field. To remain competitive in the market, continuous updating is necessary. Each organization and sector must adapt to the constantly changing reality, adjusting to a world in constant motion [1].

Given this premise, it is necessary to identify the dynamics and market updates of supply management applied to maintenance and the adversities that surround this topic. The industrial sector has always been fueled by daily challenges, seeking ways to stay in the market. Reducing direct and indirect costs will always be a differential for companies to remain competitive in their respective sectors. Strategic inventory and purchasing management for maintenance through existing scientific methods have gained increasing importance within companies' strategies. The destructive impacts on financial and productive results due to stockouts and/or poor procurement strategies can lead to significant and irrecoverable financial and legal losses [2].

The research content was developed based on the theoretical framework, which addresses methods for inventory and purchasing management applied to maintenance. The research methodology used was bibliographical documentary with a qualitative approach. Thus, biographies, scientific articles, dissertations, books, magazines, and internet sites, including articles accessed from databases such as Scielo and Google Scholar, were utilized. Therefore, all the information gathering for the research was conducted through bibliographic and documentary analysis. The general objective of the research is to analyze the strategic policy of inventory and purchasing management applied to maintenance. The specific objectives are: to address inventory and purchasing management applied to maintenance, to investigate how it is possible to improve management methods and the best inventory and purchasing strategies applied to maintenance within each industrial segment, and to discuss purchasing applied to maintenance. This article is structured into four sections: introduction, theoretical framework, methodology applied to research, and final considerations.

II. MATERIAL AND METHODS

Methodology is the combination of the Greek words "metodos" and "logos," which mean organization and systematic study, respectively. Thus, it is the systematic study of organization and the directions to be followed with the purpose of conducting research or a study [3].

According to Tartuce (2006, cited in Gerhardt; Silveira, 2009), methodology basically involves a set of initial data and a system of operations, which, according to predetermined objectives, must be adequately arranged to formulate conclusions [4]. According to Lakatos and Marconi (2007, p. 157), "once the decision to conduct research has been made, the elaboration of a scheme that may or may not be modified and that facilitates its feasibility should be considered" [5]. The scheme assists the researcher in achieving a more objective approach, providing a logical order to the work.

The present research is based on bibliographical research, seeking published theoretical references with the objective of gathering information or prior knowledge about the topic addressed. The inclusions of publications in this project were articles, journals, and books in the Portuguese language.

III. THEORETICAL FRAMEWORK

This theoretical foundation is organized into three sections. The first section elaborates on an analysis of the strategic policy of inventory and purchasing management applied to maintenance. In the second section, a brief study is conducted on methods for inventory management. The third section discusses industrial maintenance inventory management as a means to increase industrial productivity.

3.1 General Aspects of Logistics

Inventory Management The inventory department within organizations was initially perceived as an asset, akin to a financial report detailing the company's expenditures. However, over time, the role of the inventory department has evolved, particularly with the decrease in product lifecycles and the obsolescence of certain products. Failure to effectively manage the inventory can lead to significant financial losses [6].

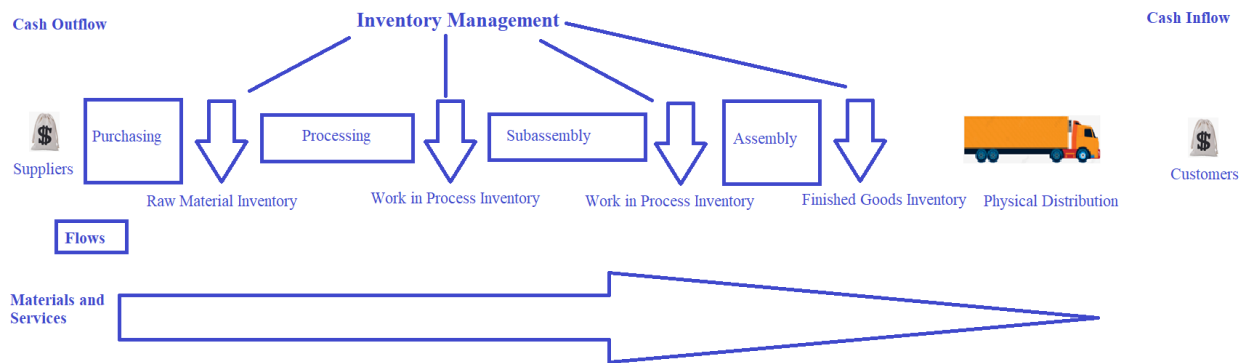
Whenever a company invests in stocking a product, it incurs a significant investment, thus making inventory a liability within the company. Effective management is crucial for ensuring that inventory remains a productive sector. As Stockton (1976, p.16) states: "Inventories constitute an asset of the firm and, as such, are reflected in monetary value on the company's balance sheet. From a financial perspective, inventories represent a capital investment and must therefore compete with other assets of the firm [7]."

In this context, inventory within an organization can become obsolete or unnecessary when the company accurately forecasts the demand for materials used within its operations. As Assaf Neto (2009, p.40) further elaborates: "Inventories are materials, merchandise, or products that are physically kept available by the company, with the expectation of entering the production cycle, following its normal production course, or being sold [8]."

The inventory department is responsible for quantifying the items and resources used in management, with the manager tasked with finding solutions to make inventory a sector capable of meeting the company's demands without material wastage. Thus, inventory serves as a regulator of material flow, controlling the timing of product inflow and outflow, and mitigating variations. Ineffective management of variations in product inflow and outflow can lead to the accumulation of raw materials, supplies, components, and products stored unproductively, resulting in losses for the company [9].

Inventory management arises from the need to control product inflow and outflow, whether through direct sales, indirect channels, or production. The objective is to plan, organize, and control the flow of materials within a company [9]. Figure 1 illustrates the incorporation of inventory management at each stage within the company.

Figure 1 - Inventory Management and Material Flow



Source: Ballou (2006) [10]

3.2 Methods for Inventory Management

Inventory management policy should be tailored to each type of company, according to its business objectives, in order to ensure alignment with the organization's competitive strategy. Inventory can be a sector where the company faces significant financial bottlenecks, especially when the inventory management model is based solely on maintaining high product stocks.

According to Fontes and Loos (2016, p. 6): "A few decades ago, production was seen as highly wasteful, responsible for large production batches, high inventories, poor product quality, and consequently delays in delivering products to customers [11]."

This type of inventory model is characterized by large product volumes, seasonal purchases, without considering the real need for products by the company, representing wasted financial investment. It is necessary for inventory to have material control, such as product inflow and outflow, periodic inventories, differentiation and classification of items according to their specific characteristics. Optimization and technological investment are essential in this sector.

According to Martins and Alt (2009, p. 46):

The merchandise is validated and the location where it will be allocated is indicated, and then it is arranged. In some cases, it may be necessary to label the merchandise, attaching a label containing the necessary information to ensure product traceability [2].

The basic function of inventory is to provide at least a level of product and service availability to meet a customer's consumption needs quickly and punctually. Through inventory management, it is possible to analyze the inflow and outflow of products and the need for replenishment. Different inventory management methods are used by companies, the most common being: • LIFO (Last In, First Out): This method prioritizes the sale of the product, only replenishing it when the last item leaves the inventory. • FIFO (First In, First Out): This method emphasizes the need to sell the latest items, i.e., to avoid certain products from becoming stagnant. The main characteristic is inventory valuation. • Average Cost: This method adjusts the prices of inventory products to market prices, enabling a higher profit margin. • ABC Analysis: ABC analysis is based on three pillars: turnover, revenue, and profitability. • Just In Time (JIT): Aims at cost reduction. Thus, the inventory keeps only what is necessary for the company's operation.

Inventory Management optimizes company resources, saves time, and makes the company competitive in the market.

3.3 Purchasing Applied to Maintenance

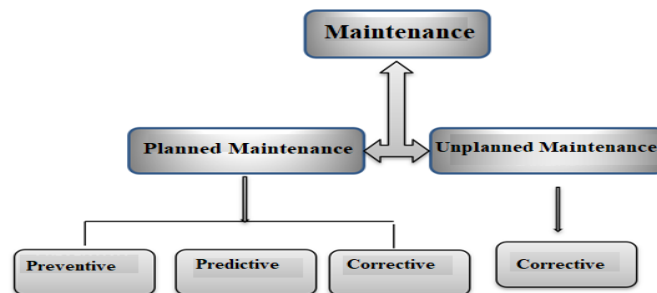
There are two main types of maintenance: preventive and corrective maintenance. Preventive maintenance aims to prevent damage to the equipment used, thus avoiding interruptions in the company's production system. By performing preventive maintenance, the company replaces parts that are in a period of wear and tear, and these parts can be acquired within a purchasing scheme, observing the exact consumption period. Planning revisions and replacing parts before they fail [12].

Corrective maintenance occurs when preventive maintenance is not performed or when an unexpected failure of the part or product occurs. Stocking maintenance parts carries the risk of these parts becoming obsolete, so it is more viable to purchase an emergency part than to keep it in stock [13].

Maintenance planning directly assists in cost reduction by preventing possible errors and failures in machinery and equipment. According to ABNT (1994), maintenance is the combination of actions and techniques, including supervision actions, aimed at maintaining or restoring equipment to satisfactory operation.

The criteria for dividing maintenance are based on planned and unplanned maintenance in relation to the equipment. Figure 2 illustrates the branches of maintenance.

Figure 2 - Branches of Maintenance



Source: Mirshawka and Olmedo (1993, p.13) [14].

Companies seek to restrict investment in raw materials and supplies, and the control over these stocks is often not directed towards spare parts for the company's machinery, which often leads to stocking high-priced parts as a means of preventing potential mechanical failures.

The costs of inventory storage, which we will not discuss in detail, reflect storage expenses, insurance premiums, and interest on investment. They also include the risks of obsolescence, i.e., the potential losses resulting from the fact that the spare part may never be used, as the machine is taken out of service before its components fail. Storage costs and sometimes machine obsolescence result in unused or unnecessary parts in stock for the presented defect. Therefore, calculating the probability of an occurrence should be done through product failure statistics, and it is up to the company to assess the consequential loss related to the acquisition of spare parts and machinery breakdown in order to make the best decision [15].

IV. DISCUSSION AND CONCLUSION

The methodology used in the mentioned research was able to compile relevant research sources on the topic. From there, it was possible to develop an analysis of the strategic policy of inventory and purchasing management applied to maintenance.

The need to reduce costs to remain competitive in the market has led companies to seek a strategic policy of inventory management, reducing costs and enabling better customer service. The inventory management strategy has become important within this context as a means of cost reduction.

Inventory and purchasing management applied to maintenance are directly influenced by the statistics of the lifespan of acquired machinery, which should be investigated by the company when acquiring its machines.

The best inventory and purchasing strategy applied to maintenance within each industrial segment should be developed within the reality and objectives proposed by the company, so that it can remain competitive in the market in which it operates. It is considered that the objectives proposed by the article were fully achieved; therefore, it is expected that this article can contribute to future work.

REFERENCES

- [1]. Colleti, J. de A. R., et al. (2002). The importance of purchasing management for company competitiveness: The case of Rede Super. In Encontro Nacional de Engenharia de Produção (22nd: 2002: Curitiba). Proceedings... Curitiba, ABEPRO.
- [2]. Martins, P. G., & Alt, P. R. C. (2009). Management of materials and asset resources. (3rd ed.). São Paulo: Saraiva.
- [3]. Gil, A. C. (2011). Higher education methodology. (4th ed.). São Paulo: Atlas.
- [4]. Gerhardt, T. E., & Silveira, D. T. (Eds.). (2009). Research methods. (1st Ed.). Porto Alegre: UFRGS Publisher.
- [5]. Lakatos, E. M., & Marconi, M. de A. (2006). Fundamentals of scientific methodology. (7th ed.). São Paulo: Atlas.
- [6]. Gasnier, D. G. (2002). Inventory dynamics. São Paulo: IMAM.
- [7]. Stockton, R. S. (1976). Basic inventory control systems: Concepts and analysis. São Paulo: Atlas.
- [8]. Assaf Neto, A. (2009). Corporate finance and value. (4th ed.). São Paulo: Atlas.
- [9]. Rodrigues, A. L., Cruz, R. S. Q., Sousa, J. C. de, & Rodrigues, L. da L. (2020). The importance of inventory management in achieving success in organizational administration. Id on Line Rev.Mult. Psic., 14(49), 518-530. ISSN: 1981-1179.
- [10]. Ballou, R. H. (2006). Supply chain management. (5th ed.). Porto Alegre: Bookman.
- [11]. Fontes, É. G., & Loos, M. J. (2017). Application of Kaizen methodology: A case study in a textile industry in the center-west of Brazil. Revista Espacios, 38(21), 6.
- [12]. Slack, N., Chambers, S., & Johnston, R. (2009). Production management. (3rd ed.). São Paulo: Atlas.
- [13]. Martins, E. (2001). Cost accounting. (9th ed.). São Paulo: Atlas.
- [14]. Mirshawka, V., & Olmedo, N. L. (1993). Maintenance: Combating inefficiency costs - Brazil's turn. São Paulo: Makron Books.
- [15]. Moreira, T. B., et al. (2019). Proposal for application of reliability-centered maintenance in the development of the maintenance strategic plan: A case study. Brazilian Journal of Business, 1(3), 842-856.