THE RELEVANCE OF INVENTORY MANAGEMENT IN THE SUPPLY CHAIN OF THE GRAIN PROCESSING MACHINERY AND EQUIPMENT INDUSTRY

A RELEVÂNCIA DA GESTÃO DE ESTOQUES NA CADEIA DE SUPRIMENTOS DA INDÚSTRIA DE MÁQUINAS E EQUIPAMENTOS PARA BENEFICIAMENTO DE CEREAIS

LA RELEVANCIA DE LA GESTIÓN DE INVENTARIOS EN LA CADENA DE SUMINISTRO DE LA INDUSTRIA DE MAQUINARIA Y EQUIPOS PARA EL PROCESAMIENTO DE CEREALES

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ABSTRACT

This article analyzes the relevance of inventory management in the supply chain of the grain processing machinery and equipment industry, focusing on its implications for operational efficiency. The research, theoretical in nature and with a descriptive-exploratory approach, was developed through a systematic literature review of books and specialized journals in the fields of logistics, operations management, and supply chain management. The study is structured around three topics: the inventory management methods and practices applied to the sector, the relationship between inventory control and the efficiency of logistics and production processes, and the role of inventory management in supply chain integration and performance. The results show that the adoption of more consistent inventory management practices, such as ABC classification, cycle counting, and safety stock management, significantly contributes to reducing operational costs, preventing supply disruptions, and ensuring the continuity of production processes within the supply chain. It is concluded that inventory management represents a strategic factor for competitiveness and improved performance in the sector in the face of uncertainties in the global market, recommending investments in technologies and collaborative practices with suppliers and distributors.

Keywords: Inventory Management. Supply Chain. Grain Processing. Operational Efficiency.

RESUMO

Este artigo analisa a relevância da gestão de estoques na cadeia de suprimentos da indústria de máquinas e equipamentos para beneficiamento de cereais, com foco em suas implicações para a eficiência operacional. A pesquisa, de natureza teórica e caráter descritivo-exploratório, foi desenvolvida por meio de revisão bibliográfica sistemática em obras e periódicos especializados nas áreas de logística, gestão de operações e gestão da cadeia de suprimentos. O estudo está estruturado em torno de três tópicos: os métodos e

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práticas de gestão de estoques aplicados ao setor, a relação entre o controle de inventário e a eficiência dos processos logísticos e produtivos, e o papel da gestão de estoques na integração e no desempenho da cadeia de suprimentos. Os resultados evidenciam que a adoção de práticas mais consistentes de gestão de estoques como classificação ABC, inventários cíclicos, e gestão do estoque de segurança, contribui significativamente para a redução de custos operacionais, de quebras no abastecimento e garantia da manutenção dos processos produtivos da cadeia. Conclui-se que a gestão de estoques representa um fator estratégico para a competitividade e um melhor desempenho do segmento diante das incertezas do mercado mundial, recomendando-se investimentos em tecnologias e em práticas colaborativas com fornecedores e distribuidores.

Palavras-chave: Gestão de Estoques. Cadeia de Suprimentos. Beneficiamento de Cereais. Eficiência Operacional.

RESUMEN

Este artículo analiza la relevancia de la gestión de inventarios en la cadena de suministro de la industria de maquinaria y equipos para el procesamiento de cereales, con enfoque en sus implicaciones para la eficiencia operativa. La investigación, de naturaleza teórica y carácter descriptivo-exploratorio, fue desarrollada mediante una revisión bibliográfica sistemática de libros y revistas especializadas en las áreas de logística, gestión de operaciones y gestión de la cadena de suministro. El estudio está estructurado en torno a tres temas: los métodos y prácticas de gestión de inventarios aplicados al sector, la relación entre el control de inventarios y la eficiencia de los procesos logísticos y productivos, y el papel de la gestión de inventarios en la integración y el desempeño de la cadena de suministro. Los resultados evidencian que la adopción de prácticas más consistentes de gestión de inventarios, como la clasificación ABC, los inventarios cíclicos y la gestión del stock de seguridad, contribuye significativamente a la reducción de costos operativos, a la disminución de interrupciones en el abastecimiento y a la garantía de continuidad de los procesos productivos de la cadena. Se concluye que la gestión de inventarios representa un factor estratégico para la competitividad y un mejor desempeño del sector frente a las incertidumbres del mercado mundial, recomendándose inversiones en tecnologías y en prácticas colaborativas con proveedores y distribuidores.

Palabras clave: Gestión de Inventarios. Cadena de Suministro. Procesamiento de Cereales. Eficiencia Operativa.

1 INTRODUCTION

Inventory management represents one of the main points of balance in supply chain processes, contributing to the full achievement of the objectives of industrial organizations and, consequently, of their customers with efficiency and lower cost, fostering the competitiveness and sustainability of the business. When we talk about the industry in the field of machinery and equipment for cereal processing, we understand more intensely the relevance of the topic that was addressed, given the technical and logistical complexity of this segment, regarding the control and availability of inputs, parts and equipment.

In a broader market scenario, increasingly demanding for cost reduction, shorter delivery times and production efficiency, the supply chain in this sector needs greater integration between the links that compose it, in order to make inventory management increasingly efficient and strategic to minimize supply breaks, and ensure the maintenance of production processes. Companies that adopt more consistent inventory management methods and practices tend to perform better in the face of the uncertainties of the world market, as evidenced in recent surveys and studies.

In this context, the present study aims to analyze the relevance of inventory management in the supply chain of the machinery and equipment industry for cereal processing, considering its implications for operational efficiency. To achieve this objective, it seeks to identify the main methods and practices applied to the sector, evaluate the influence of inventory management on logistics and production processes, and examine its impacts on the integration and performance of the supply chain.

This investigation becomes even more relevant academically and in practice, due to the limited availability of specialized literature regarding the analysis of inventory management in this specific industrial segment and the growing demand for solutions that reconcile operational efficiency with the complexity of the market for machinery and equipment for cereal processing. Therefore, this research is based on a systematic literature review, based on authors and recognized studies in the areas of logistics, supply chain management and operations management.

The article was structured in four main sections, in order to ensure logical organization and coherence in the presentation of the study: the introduction, which contextualizes the theme and delimits the objectives of the research; the methodology, in which the procedures and methods adopted to conduct the investigation are described; the theoretical foundation, which gathers and discusses the main conceptual references that support the analysis; and, finally,

the final considerations, aimed at the synthesis of the results, the conclusions of the study and the possible implications for future research.

2 METHODOLOGY

The methodology used in the present work was bibliographic research, based on the study of published texts on inventory management in the supply chain in various segments. This was the research method that was most suitable and allowed a better deepening of the studies. A qualitative approach with an exploratory and descriptive character was adopted with a focus on the contributions of the numerous authors, aiming at a more detailed understanding of what was proposed (Severino, 2017).

According to Santana and Narciso (2025, p. 05), "The qualitative methods, [...], stand out for their depth in data analysis, allowing the exploration of meanings, perceptions, and experiences of the subjects involved in the phenomenon studied".

The procedure adopted consisted of reading selected articles by several authors on the proposed theme, either through digital resources or through the reading of printed material, highlighting important concepts and collaborations that allowed to verify, compare and organize the information collected throughout the process.

To this end, several cultural and scientific contributions related to the subject in question were analyzed. In this way, we sought to remove and analyze several studied citations from several works by different authors, of which the following stand out: Santos *et al.*, 2022, Magalhães *et al.*, 2022, Silva, Moura and Ribas, 2023, Gonçalves *et al.*, 2024, Assereui *et al.* 2025.

Thus, the positions taken during the future article were aided by the positions of the authors consulted and which served as a reference for the formation of the corpus of the present text. (Huhne, 1999)

The entire research was based on ethics and respect for the authors and the works selected and cited in this work. The bibliographic methodology chosen presented the expected results, bringing new possibilities and collaborations in the study of the relevance of inventory management and, thus, proved to be the best choice.

3 THEORETICAL FOUNDATION

This rationale was organized into 3 subtopics. In the first, the Methods and Practices of Inventory Management in the Industry of Machinery and Equipment for Cereal Processing were discussed. In the second, it was researched on Inventory Management and Operational

Efficiency in Production and Logistics Processes. And, finally, in the third, Supply Chain Integration and the Role of Inventory Management were addressed.

3.1 METHODS AND PRACTICES OF INVENTORY MANAGEMENT IN THE INDUSTRY OF MACHINERY AND EQUIPMENT FOR CEREAL PROCESSING

In the market for machinery and equipment for cereal processing, the demand comes from industrial plant projects for wheat, corn, rice mills, feed mills, among others, whether in their complete structure, inclusion of product lines, only electrical or automation projects, supply of spare parts and technical assistance (Vidal *et al.,* 2023).

Projects can be developed from scratch, that is, there is no knowledge of the type of raw material, nor of the components to be used in their structures, or they can be composed of numerous equipment or machines that are already part of a standard product mix, but need customization to suit the specific needs of each customer (Vidal *et al.,* 2023).

Due to the complexity of the processes of development, manufacture, and assembly of these machines and equipment, it is necessary to use various inventory management methods and practices to meet the deadlines of the projects in the company's order book, aiming at customer satisfaction and business profitability (Vidal *et al.,* 2023).

Among the inventory management methods most frequently used in the machinery and equipment industry for cereal processing, we can highlight the ABC Curve, the Cyclical or Rotating Inventory, Minimum Stock or Safety Stock (ES), Order Point (PP) or Resupply Point (RP), because they are methods that allow a better monitoring of stock levels, thus ensuring more efficient management (Vidal *et al.,* 2023).

3.1.1 ABC Curve

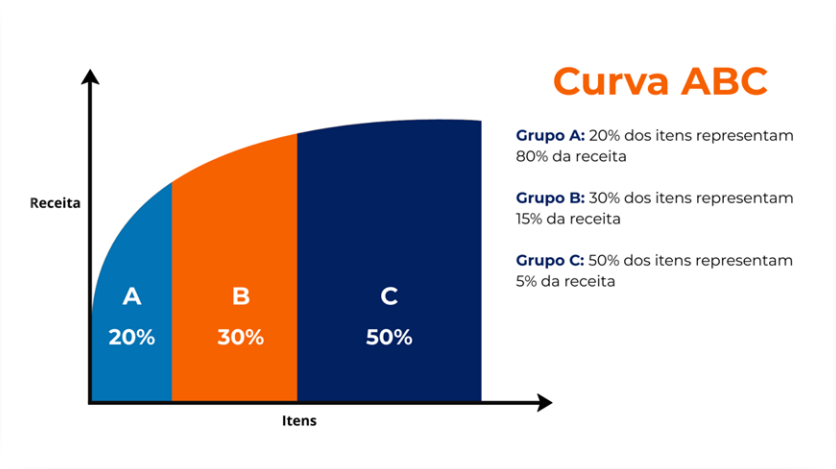
ABC curve is an analytical tool used for supply chain management, which allows the manager to assess the importance of inventory items based on their sales value, acquisition cost, and availability. "This tool can help detect which items should be prioritized in logistics, improving the accuracy and efficiency of supply chain processes (Jacobs; Chase, 2012 *apud* Silva; Moura; Ribas, 2023, p. 25 - 26)".

The ABC Curve classifies the items according to their importance, allowing a focus on the most relevant products, which is fundamental for the production process of the machinery and equipment industry for cereal processing, as the range of materials from the structures of the machines at their various levels is very complex.

It is understood through Figure 1 that the items located in (A) have special and priority treatment, because they are items of greater criticality and bring the highest percentage of revenue to the company, (B) it then becomes intermediary and (C) the one with the lowest criticality and revenue. (I asserted *et al.* 2025)

Figure 1

ABC curve



Source: https://logsmartbrasil.com.br/wp-content/uploads/2023/09/Imagem-Curva-ABC-1536x864.png

In this context of the complexity of the materials of this industry model, it can be seen that the ABC curve is a method of inventory management allied to the good performance of the production processes.

3.1.2 Cyclical or Rotating Inventory

Aguiar and Terazzi (2024, p. 4) state that "Cyclical Inventory is a systematic approach to inventory management, which is distinguished by performing counts and reviews of inventory levels at regular and fixed intervals".

This practice brings security and reliability to inventories, allowing the identification of divergences and facilitating control, especially of products with the highest turnover and value within the processes (Diniz; Parmegieani; Marcucci, 2024).

Carrying out a cyclical or rotating inventory in the machinery and equipment industry for cereal processing that uses a large amount of raw material in its initial processes, such as steel sheets, acrylic sheets or plastic derivatives, such as steel tubes and bars, which are materials that generate industrial waste, scrap, is necessary to avoid delays in the other stages of production (Belisario; Rodolpho, 2022).

3.1.3 Minimum Stock/Safety Stock (ES)

In the view of Fenili (2016 *apud* Assereui *et al.* 2025, p. 5), "safety stock is an additional stock to maintain continuous supply in emergencies". This additional inventory, although it generates a storage cost, allows the industry to ensure that the production process will be maintained, even if there are interferences in the market, whether due to production failures by suppliers, delays by carriers, wars or natural disasters.

The machinery and equipment industry for cereal processing that has a standard product line, such as for the wheat mill segment, are cylinder banks, rotary valves, extractors, sieves and others, most of them choose to have a safety stock in terms of the number of machines, thus bringing greater peace of mind in the face of various situations of shortage.

3.1.4 Purchase Order Point (PP)/Resupply Point (RP)

Still on the perspective of not breaking stocks in order to avoid production stoppage and, consequently, non-compliance with the agreement with customers, the machinery and equipment industry for cereal processing uses the Order Point (PP)/Resupply Point (RP) method as another management strategy.

Assereui *et al.* (2025, p. 05) remind us that "[...] Understanding the right time to order is of paramount importance to avoid bottlenecks that compromise stock security levels [...]". In view of an effective safety stock for efficient production, this monitoring is paramount.

The cereal processing machinery and equipment industry also adopts some other important methods and practices to achieve its objectives, such as Lead time/Resupply Time (TR) and Economic Purchase Lot (LEC).

3.2 INVENTORY MANAGEMENT AND OPERATIONAL EFFICIENCY IN PRODUCTION AND LOGISTICS PROCESSES

The cereal processing machinery and equipment industry is the sector responsible for the manufacture of equipment used in the processing of grains such as wheat, corn, rice, among others.

It is a highly technical segment, as these machines and equipment mostly come from large projects or plants, which requires precision, quality and reliability, both in terms of the product and the delivery time, making inventory management even more critical.

According to Viana (2009, p. 117 *apud* Santos *et al.,* 2022, p. 04), inventory management is "a set of activities that aims, through the respective inventory policies, to fully meet the company's needs, with maximum efficiency and at the lowest cost".

Based on this first, efficiency and lower, the machinery and equipment industry for cereal processing remains focused on increasingly accurate inventory management.

According to Silva and Lima (2020, p. 14 *apud* Magalhães *et al.,* 2022, p. 03):

> Inventories have several functionalities for the company in which they are inserted, and their management involves monitoring the movements of incoming and outgoing goods throughout the production cycle, in order to prevent any phase or event of production from being interrupted, which can generate losses to the company.

These precautions in relation to inventory management are justified by the complexity of the processes [several stages of production in this segment of industry] that involve a large number of agents, in their various departments.

Figure 02 below presents us with the various processes, methods [some already mentioned in this article] and results acquired as a result of the good practice of inventory management.

Figure 2

Inventory management methods and processes and their results

Source: https://procurementgarage.com/wp-content/uploads/2022/07/Gestao-de-Estoques-Conteudo.png. 2026

It is known that inventory management brings many challenges in a universe of possibilities that are constantly presented in industrial processes, but with good practice the objectives are achieved.

3.2.1 Cost reduction and resource optimization

When it comes to cost reduction in the machinery and equipment industry for cereal processing, it is one of the biggest challenges and objectives of any manager, as it involves all levels of operation and management, which require time, practice and daily monitoring of each immediate manager with each operator, in each of the production processes.

It is also necessary not to lose focus on the processes of acquisition of goods with the purchasing sector to guarantee or improve lead time and in the process of shipping the machinery and equipment produced, seeking to better consolidate the loads and thus better freight values.

Bowersox and Closs (2011 *apud* Gonçalves *et al.,* 2024, p. 03) "state that efficient logistics can provide competitive advantage, contributing to greater flexibility, improved services and cost reduction".

Cost reduction allows the company to ensure profitability and can increasingly invest in technologies to become more competitive in an increasingly demanding market.

3.2.2 Technologies Applied to Inventory Management for Resource Optimization

With technological advancement, an improvement in methods and practices has been achieved and with it, a visible improvement in inventory management, through ERP systems, warehouse automation, use of barcodes and RFID and artificial intelligence for demand forecasting, among others.

For Silva and Moura and Ribas, (2023, p. 32)

The adoption of advanced technology can optimize production and logistics processes, reduce costs, and improve the efficiency and quality of products, tools such as integrated management systems, robotic process automation (RPA), and reverse logistics can bring significant benefits to the entire production chain.

By optimizing resources in all processes of the machinery and equipment industry for cereal processing, with the use of technologies, many of the expectations of inventory management in the supply chain can be fulfilled.

3.3 SUPPLY CHAIN INTEGRATION AND THE ROLE OF INVENTORY MANAGEMENT

As already discussed in this article, the role of inventory management in the supply chain is increasingly relevant to meet the needs of the company and customers, because from good inventory management the company consolidates itself in the market, achieving its mission and expanding its vision for a short and increasingly promising future.

However, when good inventory management is not done, numerous losses can be obtained for the company and, consequently, for the customer [in the wheat segment, when there is a delay in the delivery of the plant, the loss is daily, as it is tons per hour, depending on the plant's flow] who has schedules to execute.

3.3.1 Impacts of Poor Inventory Management

Improper inventory management can generate several problems, from lack of products, excess materials, increased costs, loss of customers, and reduced competitiveness. Therefore, it is essential to have excellent coordination between suppliers, to obtain an efficient production and distribution of machinery and equipment.

Leão (2004 *apud* Gonçalves *et al.,* 2024, p. 07) state that:

> [...] In the procurement and purchasing stage, organizations seek and hire suppliers to obtain raw materials or products, and it is essential to establish good relationships with them to ensure quality, competitive prices, and delivery times. A good relationship with business partners, with good follow-up generate satisfactory results for the company.

According to Gonçalves *et al.* (2024, p. 03), "[...] Logistics in the business context is a key strategic function that aims to optimize the flow of products, information, and services along the supply chain.

The company's performance in the market stems from the good practices of inventory management and the entire supply chain, integrated in all its processes, to achieve the results expected by the management, board of directors and partners of the organization.

4 FINAL CONSIDERATIONS

Inventory management is essential for the good performance of the supply chain of the machinery and equipment industry for cereal processing, due to the achievement of the organization's objectives. Its good practice, with a focus on cost reduction and production efficiency, enables it to stand out in the world market.

The research fully met the objectives, when it presented the relevance of inventory management for this specific segment, through the use of assertive methods and practices, highlighting the influence of this management in reducing costs and optimizing resources, as well as the impacts on the logistics performance of the supply chain.

The study showed that it is necessary to maintain and improve these inventory management methods and practices, as it represents a strategic factor for competitiveness and a better performance of the segment in the face of the uncertainties of the world market. Finally,

it is recommended that investments be implemented in advanced technologies to improve production processes, monitoring and control of inventories, in collaborative practices with suppliers and distributors, in improving communication between the productive sectors.

Future research on this topic is essential for a better understanding of the importance of inventory management in this segment of the industry, strengthening the supply chain and growing the interest of new researchers on the subject.

REFERENCES

Aguiar, G. O., & Terazzi, L. F. (2024). Análise da gestão de estoque e seu impacto na eficiência operacional: Um estudo de caso em uma empresa de materiais elétricos e hidráulicos. Interface Tecnológica, 21(2). https://doi.org/10.31510/infa.v21i2.2034

Assereui, L. F., et al. (2025). Avaliação de estratégias de gestão de estoque para maximização de processos produtivos. Revista de Gestão e Secretariado – GeSec, 16(3), 1–17.

Belisario, D. J., & Rodolpho, D. (2022). A gestão de inventário para eficiência operacional e eficácia da empresa: Um estudo de caso. Revista Interface Tecnológica, 19(1), 400–412. https://doi.org/10.31510/infa.v19i1.1391

Diniz, B. R., Parmegieani, S. M., & Marcucci, S. M. P. (2024). Gerenciamento de estoque com ferramentas da qualidade e gestão. Journal of Exact Sciences – JES, 42(3), 36–41.

Gonçalves, M. A., et al. (2024). A importância da efetividade do processo de logística empresarial no gerenciamento operacional da empresa. Revista Ibero-Americana de Humanidades, Ciências e Educação, 10(11).

Huhne, L. M. (1999). Metodologia científica. Vozes.

Magalhães, M. de A., et al. (2022). A relevância da gestão de estoque nas empresas. Revista Científica Multidisciplinar Núcleo do Conhecimento, 7(11), 169–178. https://doi.org/10.32749/nucleodoconhecimento.com.br/contabilidade/relevancia-da-gestao

Santana, A. C. de A., & Narciso, R. (2025). Pilares da pesquisa educacional: Autores e metodologias científicas em destaque. ARACÊ, 7(1), 1577–1590.

Santos, O. S. dos, et al. (2022). Gestão de estoques e armazenagem de produtos perecíveis. Brazilian Journal of Development, 8(11), 73567–73577.

Severino, A. J. (2017). Metodologia do trabalho científico (24ª ed.) [Livro eletrônico]. Cortez.

Silva, D. K. G. da, Moura, E. da S., & Ribas, V. H. L. (2023). A importância da gestão de estoque para o aumento da produtividade nas organizações (Trabalho de conclusão de curso de graduação, Centro Universitário Brasileiro – UNIBRA).

Vidal, L. de C., Guimarães, N. A., Monteiro, J. R., et al. (Orgs.). (2023). Engenharias - automação, robótica, metrologia e energia: Estudos e tendências. Científica Digital. https://doi.org/10.37885/978-65-5360-278-6