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Distribution and Logistics Tools a Process Management Case Study

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Abstract

The main idea of this case study is to understand what is the key ingredient for a just-in-time supply chain and compare the effectiveness of pull and push tools, introducing Kanban system in the process.

The methodology used was the analysis of a case study article and a thesis case study of a company in the distribution sector that was optimized in September 2014 with the title "Just in Time Order Cycle Optimization (JIT): A logistical case study".

During our analysis, we highlighted some important aspects for the distribution sector, in this case, with the clear objective of achieving, in the JIT process, the complete elimination of losses, which always occur in a production process. For this, we check the Pull and Push processes as a way of trying to reach this end.

For the company, given the number of stores and geographic dispersion, we clearly identified that the KANBAN system is capable of promoting the best experience both at the group level and in terms of customer satisfaction.

The Kanban system provides great results when the production flow is distributed over time and in an organized manner, but always in short and quick interventions, but it is not always the most efficient when considering high demand volatility.

Keywords: Supply Chain Management, Value Chain, Just in Time, Pull, Push, Kanban

Introduction

Companies in general, be they smaller bigger or medium developed must look in their supply chain. Is important to avoid wasting time, money, and various resources, such as inputs, trucks, and labor. If well applied, distribution logistics allows for a more attentive control of the merchandise's trajectory, from the factory to the final client(Herrera, 2018).

Pull and push applied to JIT. The basic difference between pull and push is that pull systems start production based on current demand, while push systems start production by anticipating future demand (Chopra & Meindl, 2013).

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With the intent of pursuing the perfection in the supply chain, we decided to compare pull and push in a distribution logistics company reality (Batista, 2014).

We developed our article by four major elements besides the introduction, beginning with a literature review, consequently explaining the methodology implemented and approached, then verifying the results and discussing them, and ending with a conclusion corroborating our scientific article.

Knowing that in recent times the importance of the distribution chain has increased significantly and that the doctrines used to obtain the greatest efficiency in the field of PULL and PUSH operations in JIT are constant we identify that the convergence of the concepts of "value chain" and "supply chain" allows for a holistic approach in which companies can define more effective adaptive strategies in the face of continued market uncertainty.

This is the case of the retail supply chain that this article will examine. In this case, the company dominates the national food distribution sector. Part of the strategy involves optimizing logistics operations, and one of the key points in optimizing the logistics network is related to order cycle planning. Today, stores can place orders to warehouses seven days a week, regardless of product quantity and delivery time, increasing uncertainty and inefficiency in warehouses and in the global supply chain (Batista 2014).

Regarding the factory, the basic principle of the just-in-time philosophy in production management is that you shouldn't do anything that doesn't add value to the products. Because of this, all efforts are concentrated on the complete elimination of losses (waste) that may occur in the production process. Among the main items considered as losses (because they do not objectively add value to the to the products), one can cite: stocks in general waiting times, material handling, defects, stopped machines defects, stopped machines, etc. (Romana 2014).

*"Chandra et al. (2007) describes the supply chain as a network of suppliers, manufacturers, warehouses, distributors and retailers, where raw materials are converted into final products through coordinative planning and activities. In this process, there is sharing of material and information flows between the different elements in the chain. Thus, the goal of supply chain management is then to incorporate in an optimized form the different activities along the chain, resulting in increased value to the consumer and reduced overall costs. "*in (Batista 2014).

Pull supply chain needs long time to make reactions for the change of market, which will induce a series of bad reactions, for example, in the pinnacle term of demand, because it is difficult to fulfill consumers' demand, the service level will be descended, or when some product demands disappear, it will make supply chain produce large numbers of repertory even products out of season (Simchi-Levi&Kaminsky, 1999, p.112).

In a Push process, execution is related to end customer requirements. This execution is started as expected Forecast-based customer orders. This process can also be described as speculative because it is processed in response to speculated, or predicted, demand, rather than the actual

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demand. The Push process operates in an uncertain environment because customer demand is still unknown (Chopra & Meindl, 2013).

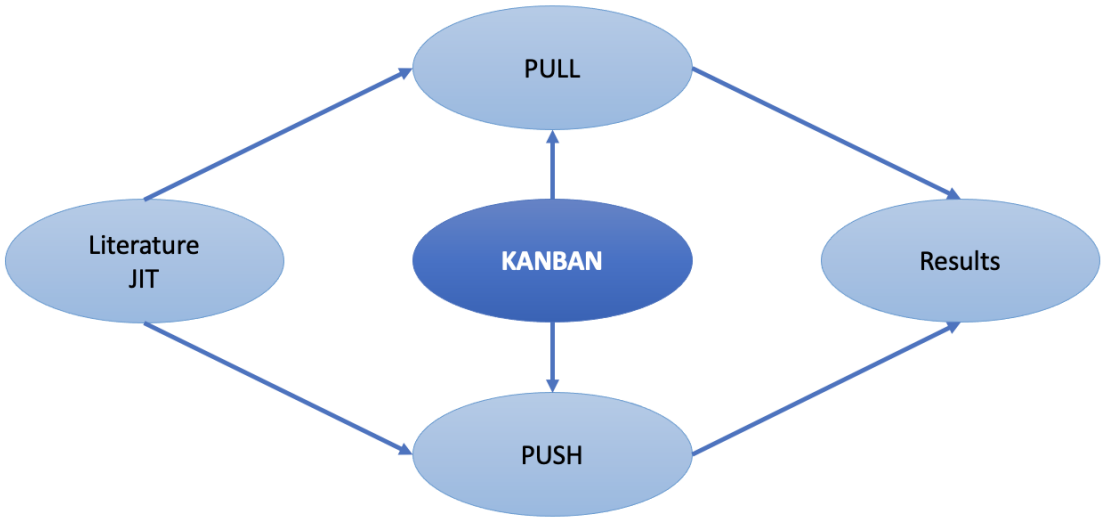
The concepts of push production and pull production emerged in the 50s and 60s, with the need to meet customer demand in the industry. The evolution of the model occurred mainly with the Toyota Production System, a model to support JIT (Just in Time) and Kanban, a visual method to control production. Kanban is a philosophy of checking the flow of materials and information, it was developed by Toyota in the 50's in order to minimize material costs and reduce stocks between processes, it informs about what to produce and in what quantities (Ohno & Bodek, 1978)

Methodology–Case Study in Pratice

After the succinct and thorough analysis of the literature and the main concepts clear and well-rounded in our structured study it's clear that the supply chain is the heart of the modern company and that will not be different in our case study. Said this after the literature review, we did a graphic sustaining our methodology that links the most key elements in this article which are JIT, in systems PULL and PUSH, the results and our idea that we think that will upgrade the supply chain of JM that's the KANBAN philosophy.

With this study we intend to show that the system used by JM in 2014 can be even better utilized and improved with the integration of the KANBAN philosophy. Moving on to the explanation of the *Scheme1* designed by the authors based on the exposed article we can say that JM moved the method of moving stocks between stores, warehouses, and suppliers on the assumption that the moved items would be the same.

Scheme1 - Methodological Framework



Source 1 - performed by the authors

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With this scheme we want to allude between JIT systems and their connections with PULL and PUSH systems and their direct connection with the results and we want to corroborate that the introduction of a Kanban philosophy in these systems can result in an amplification of the supply chain.

For the relation of this Scheme we used the methodological literature supported by content analysis (Bardin, 1977) and the Introduction of qualitative research (Flick, 2018) as a basis, for the method used, so the results were collected from the company internal reports and expressed in Graphs 1 and 2, in results and discussion section of the paper.

So, the content literature analysis of the JIT model in Batista (2014), was linked with the Pull and Push systems, supported by Kanban toll, this method is based in the (Bardin, 1977), related procedure for a text or document interpretation, organized according to the qualitative categories, conducting to the final results obtained (Flick, 2018), as our aim was to demonstrate the possible improvement processes by introducing Kanban system in the JIT process.

Results & Discussion

After conducting the literature review and designing the methodology of analysis and design of our case study we come to the phase of addressing the results and discussion about them.

Kanban is a system for producing in small batches. Each batch has a defined number of parts and is stored in uniform containers. For each batch there is a corresponding Kanban card. The parts inside the containers, always accompanied by their respective card, are moved through the work centers undergoing the various process operations until they reach the dispatch in the form of finished product.

The quantity of containers, or the capacity of each of the containers, is calculated using the following formula.

$K = (PDLT + SS) / C$

K - is the number of containers

PDLT - average demand during lead time

C - container capacity

SS - safety stock

The application of the pull system requires the presence of the Kanban system to manage manufacturing operations. The Kanban serves as a signal for the replenishment of products upstream and is a storage point for stock that allows the customer to respond to customer requests. Without the Kanban, the PULL system will run out of stock and consequently the customer will have to wait. The quantities held in stock on the Kanban allow continuous supply to the customers while disciplining manufacturing and material handling.

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In an ideal process, with lead time close to zero, without errors or defects, the use of Kanban's would be unnecessary.

This system has simple rules that are designed to facilitate the flow of materials while maintaining control over stock levels. Thus, each container must contain only one card, the assembly areas always pull components from the production areas, they must never push components without an actual need for them. The containers should always contain the same number of components, the use of non-standard containers or irregular quantities in each container causes disturbances in the manufacturing flow. Finally, the total production should not exceed the total quantity authorized by the Kanban system.

It is essential that the Kanban transmits information in a simple and visual way, and that its rules are always respected. Depending on the characteristics of the operations site where it will be implemented, a Kanban system can take many different forms. The main forms are the card, marks painted on the floor, the two-box system, light indication, the electronic Kanban and the gravity model, (Pinto 2009).

In manufacturing areas operating in a just-in-time environment, supermarkets are dynamic storage areas strategically located to make a quick supply of materials. They are fed by Kanban systems through a supply operator (internal) who supplies materials to the various work points, when alerted of a rupture in some article, or if a rupture of some article is verified during the check of the line-edge supermarkets. The supermarket is formed by several aisles delimited by storage shelves. Each shelf is divided into small spaces that are filled with a single type of product, this technique allows a product to be found quickly by its address.

The quantity and variety of materials to be placed in the supermarket depends on the proximity of the supplier, the consumption rate and the amount of materials involved and the value of the materials or components, (Pinto 2009).

In the Kanban Board method, the level of organization that the philosophy conveys by dividing the process by To Do, in progress, Ready for Deploy, Approving and finally Done, after the literature we found that by following this principle we will more easily achieve an increase in the efficiency of the supply chain process.

"Furthermore, JIT is a business strategy that requires the commitment of the organization. An important factor for the successful implementation of JIT in organizations is the realization of demand forecasts, in order to match the demand and supply effectively (Bowman, 1991). Additionally, suppliers must have access to real-time information of the company's operation and should share critical information and planning with the same, avoiding problems related to product delivery, including timings, quantities and quality (Yasin et.al. 1997)" in (Batista 2014).

One of the most interesting quotes of the literature review is quite with this quote addressed in the article in any implementation in any area there must be a commitment of the organization and obviously change our daily processes to have information to the second in several areas of any

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company, is not easy and sometimes requires quite dynamic and work effectively, including timings quantities quality deliveries and receptions of raw materials.

"Supply chains need to be flexible, thus must have the ability to efficiently adapt to the surrounding environment. In this context there tail industry is facing a high pressure to become flexible as their supply chains contact directly with the final market (Levy et.al. 2012)" in (Batista 2014).

As mentioned before, we must be dynamic to face the high pressure of the current market because the demand becomes more and more important, as they are in direct contact with the final market.

Logistics management practices were distinguished with 1st prize in the Supply Chain Designer Awards 2014, in the category of "Commerce" developed by the magazine "*Eurologistics*" and the consultancy firm Data Group Consulting.

The Supply Chain is a vital process that benefits in the case study not only the end consumer but the company itself. It conserves resources, reduces our need to collect raw materials, and keeps materials and stocks under control. A well-organized supply chain with the Kanban philosophy can extend the longevity of materials by giving items additional uses before they become obsolete.

Supply chain management is an essential part of any organization as it improves efficiency, efficiency, resource management, and more. It also builds good and prominent relationships with stakeholders such as suppliers, customers, etc. It integrates and combines all business activities and is responsible for every step that ultimately contributes to customer satisfaction and company goals.

The order planning model is built to balance the execution activities in the warehouse. Because it is an analysis of several articles with different characteristics, where joining is a critical point in its execution, the construction of the model becomes more robust, instead of using heuristics to solve the problem. Currently there are no studies of auxiliary models in which elements of the route planning model were incorporated due to the similarities found. In order to make the construction of the model as simple and comprehensive as possible, while echoing the reality of the warehouse, some assumptions are introduced, highlighting that this layer does not consider the supply time. The conclusion is that applying any scenario to the real world of the warehouse can improve operations.

Scenarios that do not limit capacity allow the most prominent improvements, with the highest values for employee reduction and the lowest values for variance and average order days. Graph 1 is the food flow and Graph 2 is the non-food flow.

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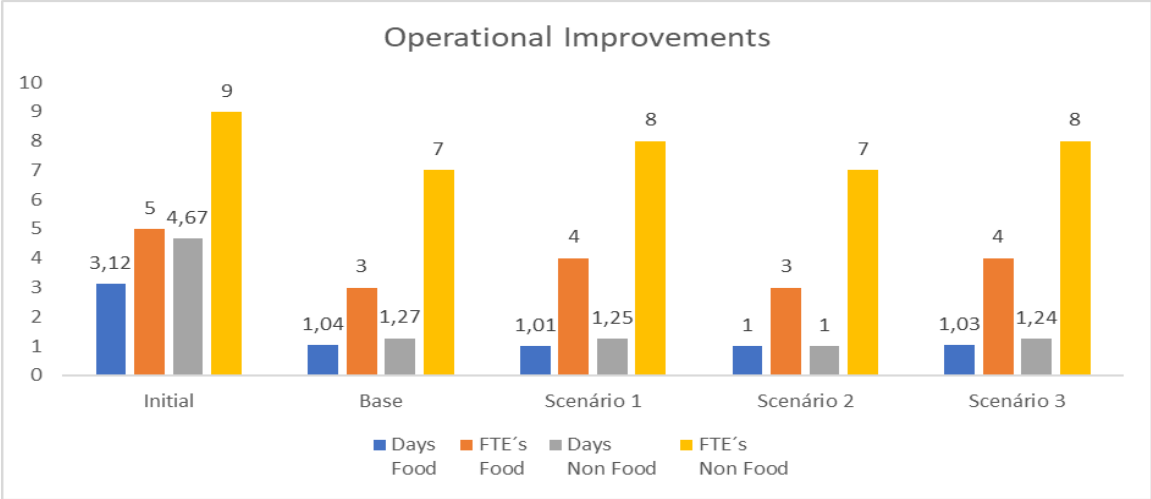
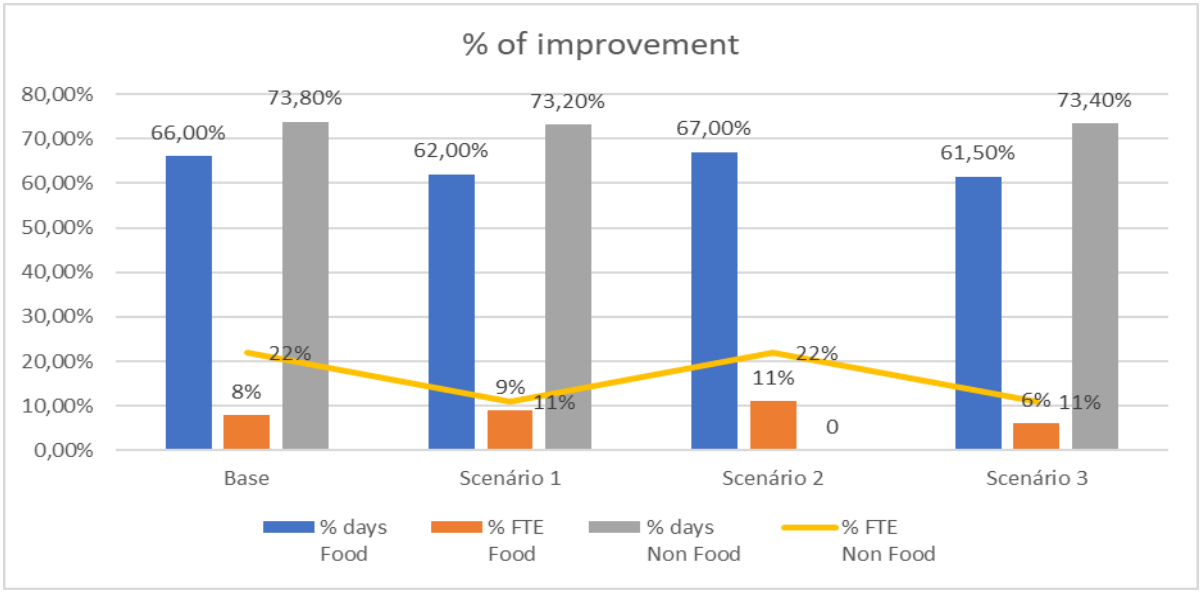
Graph 1 - Summary of operational improvements in each scenario for the Food flow



Source 2 - performed by the authors based on Batista (2014) data

Graph 2 - Summary of operational improvements in each scenario for the Non-Food flow



Source 2 - performed by the authors based on Batista (2014) data

The Kanban method is the perfect ally of the just-in-time system because:

It allows you to visualize the work development and thus easily identify each phase of the production or replenishment cycle. With the Kanban system it is easy to define the limit of the work in progress (also called WIP - Work in Progress) to avoid bottlenecks.

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You can measure the lead time between processes, i.e. the time it takes to complete each phase.

By linking the different stages, it works as a system to control production and the materials available in the different storage facilities.

It avoids falling into situations of overproduction or excess stock, which generates savings in storage space.

Some of its restrictions mean that it is not always the most suitable method:

The Kanban system provides optimal results when the production flow is evenly distributed throughout the year and is organized in short series with similar volumes. On the other hand, if the business is subject to high demand volatility that requires abrupt adjustments in production, the Kanban method suffers inefficiencies that discourage its use, (Júnior, Neto, Fensterseifer, 1989).

It can exacerbate delays in the production chain if any of the links fail (a card is lost or an order is issued incorrectly, for example).

The Kanban system is not the most flexible to handle major changes in product manufacturing techniques.

It does not work properly if suppliers do not apply the same Kanban rules for replenishment.

Conclusion

Inventory management in companies is fundamental to reduce costs. High and precariously managed inventories are factors that increase the final price of the products, as well as an improper application of the companies' working capital. The competitiveness of companies in the globalized world requires a correct maintenance of this asset, being fundamental to keep only the necessary quantities for production.

The correct inventory management in the supply chain cannot be done in isolation, some production control measures can be implemented by the company. However, it is fundamental that the supply chain is at the same level of evolution and that the client-supplier relationship is in total synchronism (Romana, 2016), of course this statement represents the most important limitation on the study, as we need to confirm the results in some more future research works, in order to obtain much more sustainable data.

References

Batista, B. (2014). *Order cycle optimization in Just in Time: The case study of Jerónimo Martins*. Técnico Lisboa.

Bardin, L. (1977). *Análise de conteúdo*. https://ia802902.us.archive.org/8/items/bardin-laurence-analise-de-conteudo/bardin-laurence-analise-de-conteudo.pdf

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ISSN: 2456-7760

Chopra, S., & Meindl, P. (2013). *Supply chain management: Strategy, planning, and operation*. (5th Ed.)Upper Saddle River, N.J: Prentice Hall. https://mu.ac.in/wp-content/uploads/2021/02/Logistics-and-Supply-Chain-Management-Sunil-Chopra-1.pdf

Simchi-levi, D. & Kaminsky, P. (1999). Designing and Managing the Supply Chain: Concepts, Strategies and Case Studies. Published by Mc Graw Hill. Aug 20. p.112, 113, 115.

Flick, U. (2018). *An Introduction to Qualitative Research*. (6th Ed.). https://uk.sagepub.com/en-gb/eur/an-introduction-to-qualitative-research/book261109

Herrera, H. (2018). *Evaluation of the environmental impacts in the Jerónimo Martins' inbound supply chain*. Técnico Lisboa.

Júnior, J., Neto, F., Fensterseifer, J. (1989). *Considerações críticas sobre a evolução das filosofias de administração da produção: do "just-in case" ao "just-in-time"*. RAE-Revista De Administração De Empresas, 29(3), 49–64. https://bibliotecadigital.fgv.br/ojs/index.php/rae/article/view/38788

Ohno, T., & Bodek, N. (1978). *Toyota Production System: Beyond Large-Scale Production.*https://www.pdfdrive.com/toyota-production-system-beyond-large-scale-production-e158657696.html

Pinto, T. (2009). *Pensamento Lean A filosofia das organizações vencedoras*. (6th Ed.). Lidel. https://www.bertrand.pt/livro/pensamento-lean-joao-paulo-pinto/15700637

Romana, F. (2014). *O gestor Lean*. (1st Ed.) IPAM - Instituto Português de Administração de Marketing. https://bibliografia.bnportugal.gov.pt/bnp/bnp.exe/registo?1883117

Romana, F. (2016). *LEAN Aplicado ao Marketing e ao Consumo LEAN Marketing and Consumption*. (1st Ed.) Bubok - Madrid https://www.bubok.pt/livros/9873/LEAN-aplicado-ao-Marketing-e-ao-Consumo-LEAN-Marketing-and-Consumption