Universidad de Lima

Facultad de Ingeniería

Carrera de Ingeniería Industrial

PROPOSAL FOR IMPROVING INVENTORY REPLENISHMENT THROUGH LEAN TOOLS IN A PERUVIAN RETAIL COMPANY

Tesis para optar el Título Profesional de Ingeniero Industrial

Marysell Jiménez Loaiza

Código 20172252

Renato Andre Lino Robles

Código 20170836

Asesor

Marcos Fernando Ruiz Ruiz

Lima – Perú

Noviembre de 2024

Propuesta
Carrera Ingeniería Industrial

Título

Proposal for the Improvement in the Replenishment of Inventory in a Peruvian Retail Company Through Lean Tools

Autor(es)
20172252@aloe.ulima.edu.pe
20170836@aloe.ulima.edu.pe
Universidad de Lima

Resumen: El presente trabajo de investigación tiene como objetivo mejorar la reposición de inventarios en una empresa retail, debido a que es fundamental para cualquier empresa satisfacer la demanda del producto. Es por esto que a través del porcentaje de pedidos cancelados en la empresa minorista y mediante un diagrama de Ishikawa se determinó que el problema era que no contaban con centros de distribución por lo que el proceso logístico producía sobrecostos. A través de la metodología aplicada la propuesta de mejora se divide en tres etapas, las cuales consisten en el levantamiento de información y diagnóstico de los Hubs logísticos, el diseño y validación de la propuesta de mejora, y finalmente la viabilidad, riesgos y tiempos que tomaría ejecutar. la propuesta. Estas etapas determinan que la solución a tomar sería colocar un polo logístico que soportara la distribución como un almacén de bajo costo. Se concluye que es factible implementar el Hub, lo que permitiría aumentar la disponibilidad de mercancía, así como el surtido, y ahorrar en transporte desde el centro de distribución de Lima hasta el Hub ubicado en Tarapoto.
Palabras Clave: • Hubs • Retail • Lean tools • Inventario

Abstract: The purpose of this research work is to improve the replenishment of inventories in a retail company, due to is essential for any company to meet the demand for the product. This is why through the percentage of canceled orders in the retail company and by an Ishikawa diagram it was determined that the problem was that they did not have distribution centers so the logistics process produced cost overruns. Through the methodology applied the improvement proposal is divided into three stages, which consist of the collection of information and diagnosis of Hubs logistics, the design, and validation of the improvement proposal, and finally the viability, risks, and times it would take to execute the proposal. These stages determine that the solution to take would be to place a logistics hub that would support distribution as a low-cost warehouse. It is concluded that it is feasible to implement the Hub, which would increase the availability of merchandise, as well as the assortment, and save on transportation from the distribution center of Lima to the Hub located in Tarapoto.

Keywords: • Hubs • Retail • Lean tools • Inventory

Línea de investigación IDIC – ULIMA

Área y Sub-áreas de Investigación:
Managing Product Flow and Inventory control methodologies (see Operations Engineering & Management knowledge area)

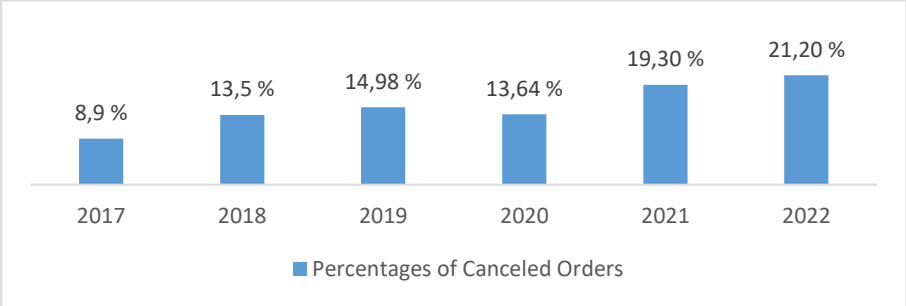
Objetivo (s) de Desarrollo Sostenible (ODS)

Goal 9: Build resilient infrastructure, promote sustainable industrialization and foster innovation

PLANTEAMIENTO DEL PROBLEMA

The company under study is dedicated to the commercialization of appliances and household items, with participation in several countries and in Peru, has managed to position itself as one of the leaders in distribution and logistics. During the last years, it has implemented a very powerful web platform that allows people from all over the country to buy products through the website and pick up in store or at home. However, with the implementation of this platform, the company began to present prolonged delays in the shipment of products to the jungle area. Likewise, direct shipments from the Distribution Center to this area generate cost overruns that do not guarantee the long-term economic viability of forest operations. Below are the percentages of orders canceled in the jungle area of the country historically.

1.1.1Percentages of Canceled Orders



Note. Self-made 2022

As shown in the previous figure, there is a considerable increase between 2020 and 2021, the main reason was the implementation of a web platform, which led to a greater number of requests for orders throughout the national territory. Thus, throughout 2021, the company increased 19% in the number of canceled orders in Jungle zone of the country and the reason that was most repeated in that percentage was that the orders took longer than established by the company's policy.

OBJETIVOS

The purpose of this research work is to improve the replenishment of inventories in a retail company, due to is essential for any company to meet the demand for the product.

JUSTIFICACIÓN

Economic growths are heavily dependent on investments in infrastructure, sustainable industrial development and technological progress. It is clue to get the most out of every single resource. The purpose of this research is to apply Lean tools to improve production and efficiency in retail companies in order to establish standards and finally, promote strategies to present a supply chain improvement project. The process of managing the flow of goods from a retail company is essential in order to get the most of each resource to increase profits and lower carbon emissions.

DISEÑO METODOLÓGICO

The methodological design of this research corresponds to a case study in which a new strategy was proposed for the improvement of order delivery and supply of stores in the jungle area of Peru. In the improvement proposal, the projection of flows based on the sales history was developed and the need for jungle in cubic meters of merchandise was considered to establish the size of the logistics Hub. In addition, there was the judgment of three experts in logistics improvements in the retail sector, who fulfill the roles of Manager of Supply Chain and Planning and Replenishment analysts in a Peruvian retail company and were of vital importance to verify the reliability of flows, projections and scenarios. It should be noted that the professionals mentioned have vast knowledge in the implementation of Hubs, since they have participated in similar projects in other regions of Peru, such as Ica and Cusco.

The methodological process of the research was structured in three consecutive stages in which engineering techniques will be applied and are of vital importance for the reliability of the improvement proposal:

Table 1: Stages of the improvement proposal

Stage	Scope	Techniques and/or Tools
1. Stage of information collection and diagnosis	Collection of information on Hub location alternatives	Documentary analysis
	Cost collection by location	Demand projection
2. Design and validation of the improvement proposal	Hub project total cost flow elaboration	Operating Utility 3 scenarios
	Development of tentative route after implementation of the Hub	Logiplan Software
3. Viability, risks and timing of the improvement proposal	Elaboration of project schedule and risk matrix	Irrigation matrix
	Preparation of conclusion on project feasibility	Gantt chart

In the first stage, all the necessary information was collected to complete the projection flows, i.e., rental costs of tentative locations, labor cost in the locality, security costs, maintenance, sales of past years, number of past orders, inventory replenishment policies. It should be noted that this information was obtained from the historical flows of the company under study. Under the comparison of costs with the historical ones of the company, the reliability of the data was validated

In the second stage, all the information obtained in the previous stage was used to elaborate the cost flows of the project with a horizon of no less than 4 years. Likewise, the economic projection was made based on three specific scenarios: optimistic, expected, and pessimistic. Based on these projections, an initial conclusion was established on the economic viability of the project, and times, costs, etc. were considered. The form of validation of the results at this stage was determined under the margins provided by the experts based on the projected sales.

Finally, in the third stage, a risk matrix was proposed for the project, this matrix is a management tool that allows to objectively determine which are the relevant risks for the safety and health of workers throughout the implementation of the Hub. Likewise, the contingency plan to be followed for each risk was detailed. In addition, a Gantt Chart was made that served to visualize the basic components of the project and to organize it into smaller and manageable tasks.

NOTAS

Agradecemos profundamente el apoyo de nuestros padres y asesor Marcos Ruiz Ruiz

BIBLIOGRAFIA

Arman Osnaider. 2017. Improvements in the logistics processes of the distribution center and food storage.

Ana Eleher. 2013. Global production chains in the fast fashion sector, transports and logistics: the case of the Spanish retailer Inditex

Cesar Osorio 2008. Models for inventory control in SMEs. Panorama, 2(6).

Eric Astuty and Armand Sinaga. 2021. 5S towards sustainable competitive advantage in franchise retail business.

Francesco Lolli. 2017. Single-hidden layer neural networks for forecasting intermittent demand. International Journal of Production Economics, 183, 116-128.

Jaden Praveen and Peter Kumar, J. 2020. Inventory Management using Machine Learning. International Journal of Engineering Research and Technology (IJERT), 9 (06). Available in https://www. ijert. org/research/inventory-managementusing-machine-learning-IJERTV9IS060661. PDF.

JF Antún. 2005. Logistics of physical distribution to retailers. UNAM.

Joaquin Mauricio Garcia. 2019. Design of a logistics model for the implementation of an international HUB for the acquisition and distribution of materials and spare parts: in association with COCESNA.

Michael Holweg and James Holmström. 2005.. Supply chain collaboration::Making sense of the strategy continuum. European management journal, 23(2), 170-181.

Reátegui Vásquez. 2017. Implementation of a Honda Spare Parts Logistics Hub in Latin America. Recurrdes, 8 (12).

Rivas Barba. 2012. Logistics and international physical distribution. Retrieved from: https://s3. amazonaws. com/academy. edu. documents/57831814/Transporte_Logisitca_Y_Distribucion_Internacional. .pdf

Teera Inprasit and Sansiri Tanachutiwat. 2018. Reordering Point Determination Using Machine Learning Technique for Inventory Management. In 2018 International Conference on Engineering, Applied Sciences, and Technology (ICEAST) (pp. 1-4). IEEE.

Sibel A, James F., Ivan C, Bahar Y, Vladimir M, Morton E 2020.Perspectives on Modeling Hub Location Problems

Stuart O, Alex F 2018,The Development of Brain Network Hubs

Silvana Allison and Sebastian Fernando. 2019. Optimized plant distribution and 5S model that allows SMEs to increase productivity in textiles

Vahid D, Mohsen S, Seyed S. 2018. Smart distribution system management considering electrical and thermal demand response of energy hubs

ANEXOS.

Datos del artículo publicado

- **Nombre del artículo:** Proposal for the Improvement in the Replenishment of Inventory in a Peruvian Retail Company Through Lean Tools
- Autores: Renato Andre Lino Robles y Marysell Jiménez Loaiza

Presentación en congreso

- **Nombre del congreso: II Congreso Internacional de Ingeniería Industrial**
- **Organizador: Universidad de Lima**
- **Sede: Lima**
- **Año: 2023**
- **Enlace web donde se encuentra publicado el artículo (identificador DOI, ISBN, ISSN o equivalentes): https://revistas.ulima.edu.pe/index.php/Ingenieria_industrial/issue/view/419/160**

Pub_Rev_Ing_Ind

INFORME DE ORIGINALIDAD

6%	6%	3%	5%
INDICE DE SIMILITUD	FUENTES DE INTERNET	PUBLICACIONES	TRABAJOS DEL ESTUDIANTE

FUENTES PRIMARIAS

1	mit.edu Fuente de Internet	2%
2	Submitted to Asia e University Trabajo del estudiante	2%
3	m.moam.info Fuente de Internet	1%
4	Submitted to Point Loma Nazarene University Trabajo del estudiante	1%
5	ageconsearch.umn.edu Fuente de Internet	1%

Excluir citas	Activo	Excluir coincidencias	< 20 words
Excluir bibliografía	Activo		