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Study of integrated logistics in an architectural furniture manufacturing company in Nacajuca, Tabasco, for the proposal of a logistics model

Estudio de la logística integral en una empresa manufacturera de mobiliario arquitectónico en Nacajuca, Tabasco, para la propuesta de un modelo logístico

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Abstract

For organizations, strategic logistics is an indispensable tool to perform efficiently in current scenarios, since it helps to understand, evaluate, control, optimize and develop operations with a comprehensive approach, taking into account all the factors that influence the organization internally and externally, increasing competitive advantages. This has a positive impact, generating an increase in the economic benefits obtained from the commercialization and production of goods and services, through the interaction of the activities of physical distribution, supply of raw materials, information management, inventory control, study of demand, customer service, among other aspects. The present work proposes a measurement instrument to evaluate logistic aspects in the processes of the company under study. The measurements will be made with the help of experts of the organization, evaluating their answers with the help of the Likert scale. This will result in a scenario that integrates the organization as a whole. Subsequently, with the results obtained, it is proposed to generate a model that will help to graphically propose strategies and routes to follow for the improvement of logistics.

Strategic logistics, integrated logistics, Measuring instrument

Resumen

Para las organizaciones, la logística estratégica es una herramienta indispensable para desempeñarse eficientemente en los escenarios actuales, ya que ayuda a comprender, evaluar, controlar, optimizar y desarrollar operaciones con un enfoque integral, tomando en cuenta todos los factores que influyen interna y externamente a la organización, aumentando las ventajas competitivas. Lo anterior, impacta positivamente generando un incremento en los beneficios económicos obtenidos por la comercialización y producción de los bienes y servicios, mediante la interacción de las actividades de distribución física, aprovisionamiento de materias primas, manejo de información, control de inventarios, estudio de la demanda, servicio al cliente, entre otros aspectos. El presente trabajo propone, un instrumento de medición que evalúe aspectos logísticos en los procesos de la empresa objeto de estudio. Las mediciones se harán con la ayuda de expertos de la organización, evaluando sus respuestas con la ayuda de la escala de Likert. Lo anterior, dará como resultado un escenario que integre a la organización en su totalidad. Posteriormente, con los resultados obtenidos, se plantea generar un modelo que ayude a plantear gráficamente estrategias y rutas a seguir para el mejoramiento de la logística.

Logística estratégica, Logística integral, Instrumento de medición

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Introduction

Throughout history there have been countless famous phrases of great impact, however, the one written by the British physicist and mathematician William Thomson Kelvin applies precisely to integral logistics, the central theme of this study:

> "What is not defined cannot be measured. What is not measured cannot be improved. What is not improved is always degraded".

This places special emphasis on measurement or evaluation, which, in the case of logistics in organisations, is a way of visualising its current state. This will provide a solid base from which to start the improvement process and identify the key points needed to generate strategies.

Given the above approach, the first step in analysing, proposing and implementing organisational improvement is measurement.

In this research work, an instrument is designed to evaluate the current logistical state. This measurement instrument will allow the detection of strategic points on which special attention will be paid in order to subsequently propose improvement alternatives.

The instrument will be answered based on a Likert scale. The Likert scale is a research method that uses a rating scale to determine people's level of agreement and disagreement on a subject, with the aim of evaluating people's opinions and attitudes.

Methodology

Given that the objective of applying the instrument is to evaluate the current logistics of the company, the procedure followed to achieve this objective is explained below.

1. The decision was taken to divide the company by areas or departments, and not by processes, as the latter were not clearly established. Questions were then asked, dividing the logistics process into three stages:

- Stage before logistics.
- Stage during logistics.
- Stage after logistics.

With the understanding that the first stage emphasises supply logistics, the second stage internal logistics and the third stage sales logistics.

Three questions were asked to evaluate the before, three for the during and three for the after, for each of the company's departments or areas. In total, nine questions were formulated to evaluate each department or area.

An instrument was then designed, consisting of the previously formulated questions. The Likert scale was added to the instrument as shown in figure 1, where:

- 1 = Not frequent at all
- 2 = Infrequent
- 3 = Regular
- 4 = Frequent
- 5 = Very frequent

INSTRUMENT TO ASSESS THE LOGISTICS OF THE BEFORE						
Stage assessed: BEFORE						
N°	Questions	1	2	3	4	5
TOP MANAGEMENT						
1	How often are meetings with other departments held?					
2	Do departments wait for orders from top management before carrying out an activity?					
3	Are the links and relationships between departments clear and communicated?					
ADMINISTRATION AND ACCOUNTING						
4	Is the name and objectives of the project made known by senior management?					
5	How often are staff trained?					
6	Before starting a new project, is the accounting for the past period up to date?					
PLANNING AND PROJECTS						
7	Is a master production plan in place?					
8	Is software used to assist in project control?					
9	Are product designs accepted by customers from the outset?					

STORE						
10	Is there an intelligent system in place for the storage of products, such as ABC, FIFO, LIFO, etc.?					
11	Are staff trained on the correct storage of chemicals?					
12	Is the most suitable storage space created before the material is brought into the warehouse?					
PRODUCTION						
13	Before starting any project, are specifications such as project objective, delivery date, target group, etc. communicated to them?					
14	Are tasks divided and assigned to staff prior to the start of production?					
15	Are materials and machinery available just before the start of production operations?					
INSTALLATION SERVICES						
16	Are measurements, dimensions of the area where the installation is to be carried out taken?					
17	Are adequate plans provided for proper installation?					
18	Does the material or product arrive on site in good condition?					
PURCHASING						
19	Is the purchase order well executed?					
20	At least 2 supplier alternatives are available					
21	The purchasing manager has full autonomy over the purchase orders					
TOTAL						
Percentage						

Table 1 Instrument to assess the logistics of the before
Source: Author's perception

INSTRUMENT TO ASSESS THE LOGISTICS OF THE DURING						
Stage assessed: DURING						
N°	Questions	1	2	3	4	5
TOP MANAGEMENT						
1	How often is production monitored when it is in process?					
2	Do you consider that the working day is used correctly?					
3	How often are meetings held with representatives from each area during the completion of a project?					
ADMINISTRATION AND ACCOUNTING						
4	How well are resources optimised? Be they material, human and/or IT?					
5	Are purchases invoiced and debts paid in a timely manner?					
6	How well are actions coordinated between departments?					
PLANNING AND PROJECTS						
7	Is the project monitored by means of IT tools?					
8	Are design modifications made during project implementation?					
9	Is the daily progress target met?					
STORE						
10	The correct material handling device is used.					
11	Inventory is updated as products enter the warehouse.					
12	The requested material is distributed to production well in advance.					
PRODUCTION						
13	Are there any manufacturing systems that help to create quality products such as Kanban, TPM, Lean Manufacturing, six sigma?					
14	They perform quality inspection during the process of their products.					
15	Do they follow the production plan that was set out beforehand?					
INSTALLATION SERVICES						
16	There are problems in the installation due to incorrect measurements of the furniture.					
17	The necessary material and tools are provided for the installation.					
18	How often is the installation supervised by an inspector.					
PURCHASING						
19	How much traceability is there on the purchase?					
20	Is the time to receive the purchase adequate?					
21	Is monitoring carried out to determine when it is correct to purchase material?					
TOTAL						
Percentage						

Table 2 Tool for assessing the logistics of during
Source: Author's perception

INSTRUMENT TO ASSESS THE LOGISTICS OF THE AFTER						
Stage assessed: AFTER						
N°	Questions	1	2	3	4	5
TOP MANAGEMENT						
1	How often are meetings held with other departments or areas to recognise the efforts of employees after the completion of a project?					
2	Is the project completed on time?					
3	Does the organisation provide feedback on the processes to make known possible points of improvement?					
ADMINISTRATION AND ACCOUNTING						
4	How likely is it that there are resources in excess of what was projected or forecast?					
5	The accounting at the end of the period is complied with in a timely manner.					
6	Feedback is given and possible improvements and processes are communicated.					
PLANNING AND PROJECTS						
7	Is the planning process fed back and improved after each project?					
8	Is the project timeframe adhered to?					
STORE						
9	Material is requested from the purchasing area in advance.					
10	Is feedback given to improve the warehousing process?					
11	New alternative material handling devices are analysed.					
PRODUCTION						
12	Is the product or project delivered on time?					
13	There is feedback to improve manufacturing processes.					
14	Final quality inspection is carried out.					
INSTALLATION SERVICES						
15	The service was obtained according to the schedule and timetable that was established.					
16	A customer survey is carried out to evaluate the service and its quality.					
17	Feedback is provided to improve installation service processes.					
PURCHASING						
18	Efficient purchasing is completed efficiently by the packaging used.					
19	Purchases are confirmed upon arrival at the plant.					
20	Is inventory control and purchase history in place?					
TOTAL						
Percentage						

Table 3 Instrument to assess the logistics of the aftermath
Source: Author's perception

1.We proceed to identify the experts of the organisation in the areas to be studied, which are:

- Senior management
- Administration and accounting
- Planning and projects
- Warehouse
- Production
- Installation services
- Purchasing

The experts in charge of each area are identified, as each one has the appropriate knowledge regarding the topic of study.

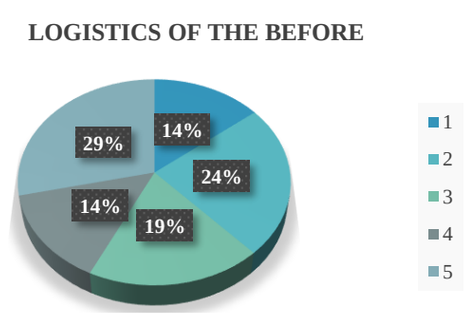
1. The answers go through a process of analysis and quantification, and are then plotted in Microsoft Excel.

2. Design of the logistic model, proposing strategies for its integral improvement.

Results and interpretation

After applying the instrument to the representatives of each of the areas and/or departments of the company, the responses are analysed using Microsoft Excel software and averages are obtained.

The rating for each of the areas was determined by averaging each rating on the Likert scale, dividing each result by stages, which were as follows:



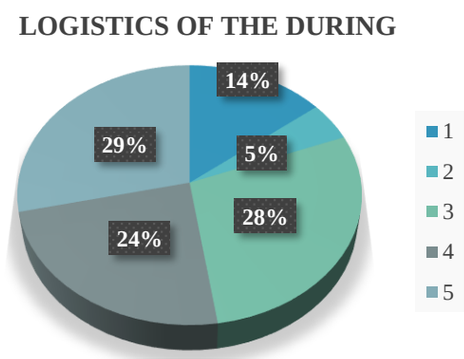
Graphic 1 Averages per question in the logistics of before
Source: Author's perception

Thanks to the graphical representation it was possible to better analyse and interpret the current state of the company's logistics. Graph 1 shows the scores obtained in the "before" stage.

It can be seen that although the value 5 (29%) dominates, which would mean that the activities mentioned in the questionnaires are carried out very well, the number 2 (24%) also shows a high percentage, which means that, according to the Likert scale, a large percentage of activities are not carried out "almost never", which is a clear warning to propose improvements in order to reduce or cancel this percentage.

Ratings 1, 3, and 4, obtained an average rating of approximately 15.6%, this does not mean that no actions are proposed to correct their low percentage, but rather that we act according to Pareto's law, where solving 20% of the most frequent problems would help to solve or reduce 80% of the rest of the problems.

It is also important to remember that the logistics before is one of the most important, as it is in charge of all those activities or actions that must be carried out before working, so attention must be paid to this stage in order to have a stable base and continue with the other stages.

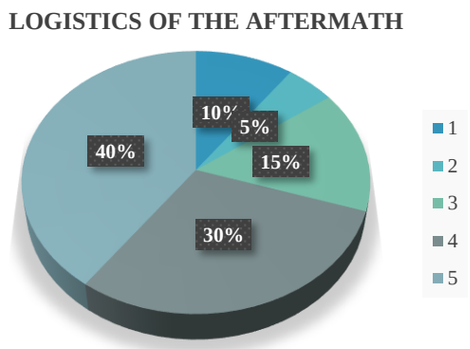


Graphic 2 Averages per question in the logistics of during
Source: Author's perception

In the case of during the course, it can be observed that a good overall rating was obtained, highlighting the values 5, 4, and 3, which, according to the Likert scale, indicate a positive degree of satisfaction or in this case means that the activities that were evaluated are mostly fulfilled.

Therefore, actions would be taken for those aspects that were evaluated with a rating of 1, as these still represent 14% of the ratings. In simpler terms, there is 14% of the logistics of the course that is not going well and needs to be corrected, as this stage is usually the one that generates the highest costs if it is not worked efficiently.

For example, if an activity is not carried out during this stage it can generate losses that probably cannot be solved without first paying a cost, the clear example of producing a batch of poor quality, this will be rejected and must be manufactured again, applies to any product.



Graphic 3 Averages per question in the logistics of the aftermath
Source: Author's perception

This last stage of logistics is interesting because of the data obtained, as it can clearly be seen that the company appears to have good outbound logistics.

These results will serve as a model to follow, so that the objective is to reach or even exceed a percentage like this in each of the previous stages (before and during).

This stage is dominated by scores 4 and 5, i.e. the activities and/or actions carried out in this stage are performed satisfactorily, with a good frequency.

Therefore, for this stage, probably not many improvement activities will be proposed, but rather activities that help to maintain and monitor these results. This will help the organisation to focus efforts on the previous two stages, without reducing the attention paid to this stage beforehand.

Proposals for improvement

Proposals for improvement in logistics help to put into context what is to be achieved with it, leading to improvement, which is why it is one of the most important parts of the proposal.

For this reason, in order to improve the logistics applied in the company under study, the implementation of the Deming continuous improvement model will be carried out.

Finally, once the current situation of the company has been evaluated, and the strategic points where improvements can be made have been analysed, a logistics improvement model is proposed in which the main objective is to create an integral, united logistics, where synergy in the work can be noticed, in this way the biggest problem of the company, which is the lack of communication, can be reduced.

It has been decided to apply the Deming Cycle as a strategy for the continuous improvement of the logistic processes, for the before stage, the cycle is as follows:

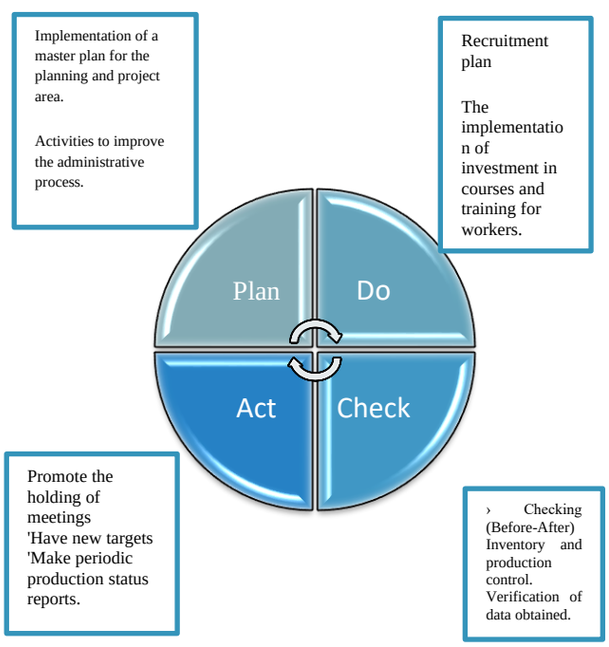


Figure 1 Improvement model for logistics before
Source: Author's perception

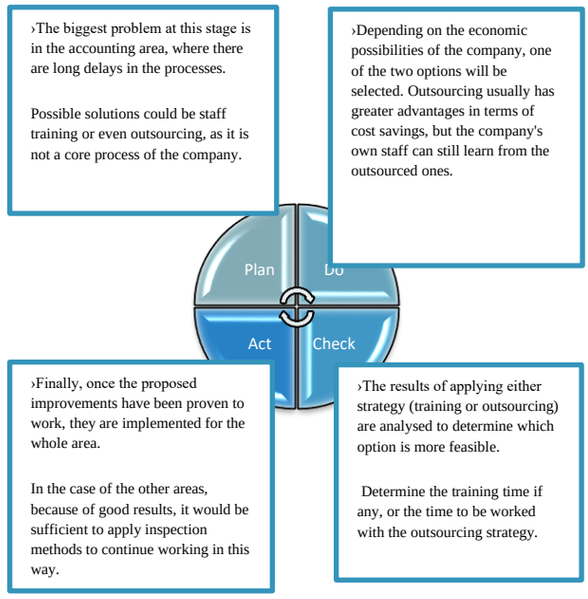


Figure 2 Improvement model for logistics during
Source: Author's perception

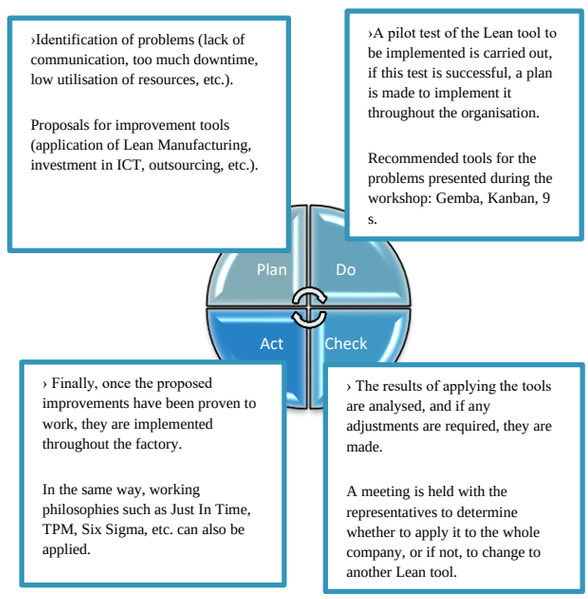


Figure 3 Improvement model for downstream logistics
Source: Author's perception

It is expected that the level of adaptation of the proposed models will be the most appropriate so that in further studies it would be proposed to annex the ERP system as a pillar for effective communication, addressing the main problem of the organisation (lack of communication), remember that an Enterprise Resource Planning (ERP) system is a business software that allows a company to manage the efficient and effective use of resources (materials, human resources, finance, etc.), by providing a comprehensive and total solution to the needs of corporate information processing.

It is also worth noting that ERP differs from other information technology systems because implementations include technological, operational, administrative, strategic and organisational components.

Among the most important attributes is its ability to automate and integrate business processes within the company, share common data and practices across the enterprise, and produce and access information in a real-time environment.

Conclusions

In conclusion, the following key points of the work can be highlighted.

1. Whenever you seek to improve something, in any field, you must first verify that it is measurable.

2. There are many ways to evaluate the state of logistics in a company, the elaboration of the questionnaire is one of the easiest to carry out, however, one must be very precise when formulating the questions, so that the data obtained are as close to reality as possible.

3. The use of data processing tools such as Microsoft Excel and Microsoft Forms greatly speeds up the process of developing a project.

4. Improving logistics can be a difficult task if you do not have a good team in your organisation.

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