

Proposal of a logistic model for companies that manufacture integral architectural systems**Propuesta de un modelo logístico para las empresas de manufactura integral de sistemas arquitectónicos**

PÉREZ-PÉREZ, Iris Cristel†*, ELISEO-DANTÉS, Hortensia and GARCÍA-REYES, David Antonio

Tecnológico Nacional de México campus Ciudad Madero, México.

Tecnológico Nacional de México campus Villahermosa, México.

Universidad Autónoma de Querétaro, México.

ID 1st Author: *Iris Cristel, Pérez-Pérez* / **ORC ID:** 0000-0003-3120-5597, **Researcher ID Thomson:** G-1891-2018, **PubMed ID:** 4153742f278c38045ef7e6c0e83c476d4208, **CVU CONACYT ID:** 843577

ID 1st Co-author: *Hortensia, Eliseo-Dantés* / **ORC ID:** 0000-0003-4006-4669, **Researcher ID Thomson:** F-6749-2018, - **PubMed ID:** 6eb3adfd69824484b018f668c2670f109f08, **CVU CONACYT ID:** 411079

ID 2nd Co-author: *David Antonio, García-Reyes* / **ORC ID:** 0000-0002-6083-079X, **Researcher ID Thomson:** D-4836-2018, **PubMed ID:** f210f5ebf4a27cfd142838f4b26e72a93e08, **CVU CONACYT ID:** 883868

DOI: 10.35429/JBDS.2022.22.8.28.34

Received July 20, 2022; Accepted December 30, 2022

Abstract

Considering the importance of strategic logistics given the support it is providing to the entire organization from a systemic and comprehensive point of view, this research addresses the issue related to the nine guideline of industry, innovation and infrastructure in companies of comprehensive manufacturing of architectural furniture, generating a logistics model for this sector. The results of measuring the level of efficiency and effectiveness of its current logistics are presented, this through the design of a tool that allows measuring the current state, which allows the detection of strategic points and being able to reach the model. The instrument also includes a Likert Scale, which allows us to measure the opinion and attitudes of people, this tool is applied to experts. It is important to mention that integral logistics is of great relevance since it gathers and orders all the actions related to information management and not only the movement or transportation of raw materials, supplies or finished products. It is vital to understand that each of the departments and processes of an organization must seek the same objectives.

Logistics, System, Integral

Resumen

Considerando la importancia de la logística estratégica dado el apoyo que está brinda a toda la organización desde un punto de vista sistémico e integral, en la presente investigación se aborda el tema relacionado con la directriz de nueve de industria, innovación e infraestructura en las empresas de manufactura integral de mobiliario arquitectónico, generando un modelo logístico a este sector. Se presentan los resultados de medir el nivel de eficiencia y eficacia de su logística actual, esto a través del diseño de una herramienta que permite medir el estado actual, el cual permite la detección de puntos estratégicos y poder llegar al modelo. El instrumento también incluye una Escala de Likert, la que nos permite medir la opinión y actitudes de las personas, dicha herramienta es aplicada a los expertos. Es importante mencionar que la logística integral es de gran relevancia ya que reúne y ordena todas las acciones relacionadas con la gestión de la información y no solo el movimiento o transportación de materias primas, insumos o productos terminados. Es vital comprender que cada uno de los departamentos y procesos de una organización deben buscar el mismo objetivo.

Logística, Sistema, Integral

Citation: PÉREZ-PÉREZ, Iris Cristel, ELISEO-DANTÉS, Hortensia and GARCÍA-REYES, David Antonio. Proposal of a logistic model for companies that manufacture integral architectural systems. *Journal of Business Development Strategies*. 2022. 8-22:28-34.

* Correspondence to the Author (Email: icristelp@hotmail.com)

† Researcher contributing first author.

Introduction

It is well known that strategic logistics helps us to understand, evaluate, control, optimise and develop operations with a comprehensive approach, taking into account all the factors that influence both internally and externally to the organisation and all this in order to increase competitive advantages, capturing and retaining customers and generating an increase in the economic benefits obtained by the marketing and production of goods and services, through the interaction of the activities of physical distribution, supply of raw materials, information management, response times, inventory level control, study of demand, customer service, etc.

Of course, the main objective of managing all these operations is to reduce costs, increasing the rate of return on investment and increasing profitability.

With the above we can ensure that strategic logistics is a powerful management tool used to achieve the achievements of any organisation and even the personal achievements of each of the collaborators of the same. In this research, a study is carried out in a company with the objective of measuring the level of efficiency and effectiveness of its current logistics, in order to subsequently interpret the results and be able to propose solutions, improvement projects or systems that improve the results obtained in the first evaluation.

Development

Sector measurement

Introduction

In the history of industrial engineering there is a very famous phrase, embodied by the 20th century philosopher Peter Drucker, which is:

"If you can't measure it, you can't improve it".

This means that if we intend to improve something, in this case the logistics of the organisation, we must start by measuring or evaluating the current state of the organisation, in order to have a solid base from which to start and identify the key points that need help to significantly improve it.

Therefore, the first step to analyse, propose and implement an improvement is to measure it. In this research, a questionnaire is designed to evaluate the current logistical state. This measurement instrument will allow us to detect strategic points on which we will pay more attention in order to subsequently propose improvement alternatives.

The instrument will be answered based on the Likert scale. The Likert scale is a measurement method used by researchers to assess people's opinions and attitudes.

Instrument to be used

The following questionnaire will be answered on the basis of a Likert scale, taking into account that

Answer	Meaning
1	Never
2	Hardly ever
3	Sometimes
4	Almost always
5	Always

Table 1 Scale used

Source: Authors' perception

SURVEY 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 orders.				
TOTAL					
Percentage					

Table 2 Before survey
Source: Authors' perception

As well as the before survey table, one was designed for the during and one for the after, for reasons of space, only the results obtained will be included,

Description of the measurement procedure

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

1. Questions are formulated for each stage of logistics, taking into account that there are 3 stages: logistics before, during and after.

Three questions were asked to evaluate the before, three for the during and three for the after, for each of the departments or areas. In conclusion, 9 questions were formulated to evaluate each department or area.

2. An instrument is designed that contains the questions and that can be easily answered.

In this case, a questionnaire is designed to evaluate the departments or areas in each of the 3 stages of logistics, which is answered on a Likert scale (rating from 1 to 5).

Nº	Questions	1	2	3	4	5
HIGH DIRECTION						
1	How often are meetings held with the other departments?			x		
2	Do departments wait for orders from senior management before carrying out an activity?				x	
3	Are the ties and relationships between departments clear and communicated?		x			
ADMINISTRATION AND ACCOUNTING						
4	Is the name and objectives of the project made known by senior management?		x			
5	How often are staff trained?	x				
6	Before starting a new project, is the accounting for the past period up to date?	x				
PLANNING AND PROJECTS						
7	Is there a master production plan?		x			
8	Is software used to help control projects?	x				
9	Are the product designs accepted by customers from the start?					x

Figure 1 Contested tool
Source: Authors' perception

3. It is applied to area or department representatives (top management, administration and accounting, planning and projects, warehouse, production, installation services and purchasing).

4. The answers are analysed by means of Microsoft Forms, and then graphed in Microsoft Excel.

Results

After applying the survey to the representatives of the areas and/or departments, the answers are analysed by means of Microsoft Excel software and the following averages are obtained.

In the case of the first question of the first questionnaire (logistics of the before), the results 3,3,3,3,2,4,3,2 were obtained, which gives a sum of 20, if we divide this between the people who answered the question, we will obtain its average. $20/7 = 2.9$, which we round to 3 as the final answer.

SURVEY TO ASSESS THE LOGISTICS OF THE DURING						
Stage assessed: DURING						
Nº	Questions	1	2	3	4	5
TOP MANAGEMENT						
1	How often is production monitored when it is in process?				x	
2	Do you consider that the working day is used correctly?			x		
3	How often are meetings held with representatives from each area during the completion of a project?		x			
ADMINISTRATION AND ACCOUNTING						
4	How well are resources optimised? Be they material, human and/or IT?			x		
5	Are purchases invoiced and debts paid in a timely manner?					x
6	How well are actions coordinated between departments?				x	
PLANNING AND PROJECTS						
7	Is the project controlled by means of IT tools?	x				
8	Are design modifications made during project implementation?			x		

9	Is the daily progress target met?			X		
STORE						
10	The correct material handling device is used.					X
11	Inventory is updated as products enter the warehouse.					X
12	The requested material is distributed to production well in advance.			X		
PRODUCTION						
13	Are there any manufacturing systems that help to create quality products such as Kanban, TPM, Lean Manufacturing, six sigma?	X				
14	They perform quality inspection during the process of their products.			X		
15	Do they follow the production plan that was set out beforehand?	X				
INSTALLATION SERVICES						
16	There are problems in the installation due to incorrect measurements of the furniture.				X	
17	The necessary material and tools are provided for the installation.					X
18	How often is the installation supervised by an inspector.			X		
PURCHASING						
19	How much traceability is there on the purchase?				X	
20	Is the time to receive the purchase adequate?					X
21	Is monitoring carried out to determine when it is correct to purchase material.					X
TOTAL		3	1	6	5	6
Percentage		14.2%	4.76%	28.5%	23.8%	28.5%

Table 3 Before survey
Source: Authors' perception

SURVEY 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?				X	
2	Do you consider that the working day is used correctly?			X		
3	How often are meetings held with representatives from each area during the completion of a project?		X			
ADMINISTRATION AND ACCOUNTING						
4	How well are resources optimised? Be they material, human and/or IT?			X		
5	Are purchases invoiced and debts paid in a timely manner?					X
6	How well are actions coordinated between departments?				X	
PLANNING AND PROJECTS						
7	Is the project controlled by means of IT tools?	X				
8	Are design modifications made during project implementation?			X		
9	Is the daily progress target met?			X		
STORE						
10	The correct material handling device is used.					X

11	Inventory is updated as products enter the warehouse.					X
12	The requested material is distributed to production well in advance.				X	
PRODUCTION						
13	Are there any manufacturing systems that help to create quality products such as Kanban, TPM, Lean Manufacturing, six sigma?	X				
14	They perform quality inspection during the process of their products.			X		
15	Do they follow the production plan that was set out beforehand?	X				
INSTALLATION SERVICES						
16	There are problems in the installation due to incorrect measurements of the furniture.				X	
17	The necessary material and tools are provided for the installation.					X
18	How often is the installation supervised by an inspector.			X		
PURCHASING						
19	How much traceability is there on the purchase?				X	
20	Is the time to receive the purchase adequate?					X
21	Is monitoring carried out to determine when it is correct to purchase material.					X
TOTAL		3	1	6	5	6
Percentage		14.2%	4.76%	28.5%	23.8%	28.5%

Table 4 During survey
Source: Authors' perception

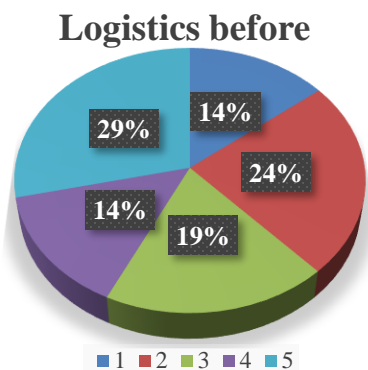
SURVEY TO ASSESS THE LOGISTICS OF THE AFTER						
Stage assessed: AFTER						
N°	Questions	1	2	3	4	5
TOP MANAGEMENT						
1	How often are meetings held with other departments or areas to recognise the efforts of employees after the completion of a project?	X				
2	Is the project completed on time?				X	
3	Does the organisation provide feedback on the processes to make known possible points of improvement?					X
ADMINISTRATION AND ACCOUNTING						
4	How likely is it that there are resources in excess of what was projected or forecast?			X		
5	The accounting at the end of the period is complied with in a timely manner.		X			
6	Feedback is given and possible improvements and processes are communicated.			X		
PLANNING AND PROJECTS						
7	Is the planning process fed back and improved after each project?				X	
8	Is the project timeframe adhered to?				X	
STORE						
9	Material is requested from the purchasing area in advance.					X

10	Is feedback given to improve the warehousing process?				X	
11	New alternative material handling devices are analysed.					X
PRODUCTION						
12	Is the product or project delivered on time?			X		
13	There is feedback to improve manufacturing processes.	X				
14	Final quality inspection is carried out.				X	
INSTALLATION SERVICES						
15	The service was provided according to the schedule and timetable that was established.				X	
16	A customer survey is carried out to evaluate the service and its quality.					X
17	Feedback is provided to improve installation service processes.					X
PURCHASING						
18	Efficient purchasing is completed efficiently by the packaging used.					X
19	Purchases are confirmed upon arrival at the plant.					X
20	Is inventory control and purchase history in place?					X
TOTAL		2	1	3	6	8
Percentage		10%	5%	15%	30%	40%

Table 5 After-survey
Source: Authors' perception

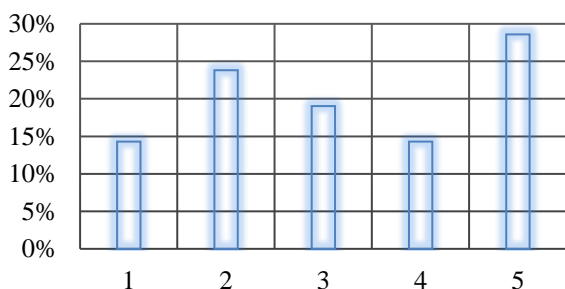
Interpretation

Before stage



Graphic 1 Logistics of the before
Source: authors' perception

Logistics before

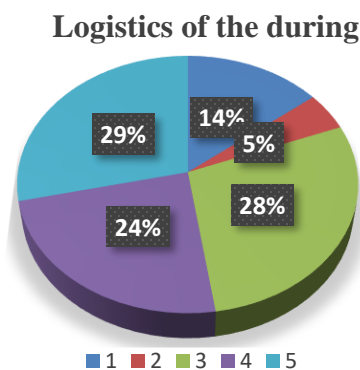


Graphic 2 Logistics of the before bars
Source: authors' perception

Thanks to the graphical representations, we can better analyse and interpret the current state of the company's logistics. This first graph

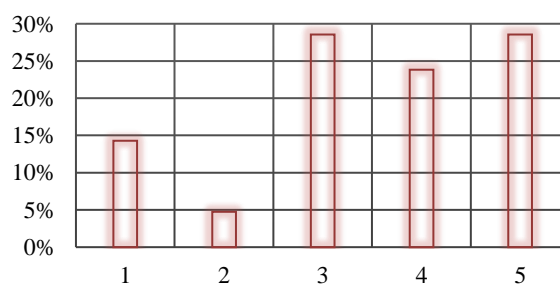
corresponds to the scores obtained in the before stage. We can see that although the value 5 (29%) dominates, which would mean that the activities mentioned in the questionnaires are carried out very well, the number 2 (24%) also shows a high percentage, which means that, according to the Likert scale, 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 15.6% approximately, this does not mean that no actions are proposed to correct their low percentage, but rather 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 we must focus on this stage so that we have a stable base and can continue with the other stages.

Durante stage



Graphic 3 During logistics
Source: authors' perception

Logistics of the during

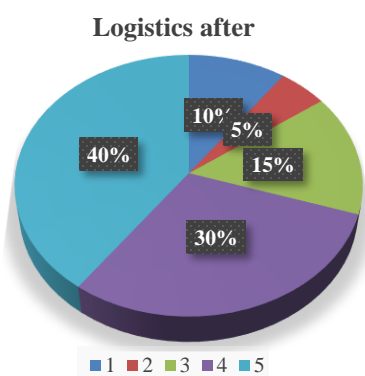


Graphic 4 During-bars logistics
Source: authors' perception

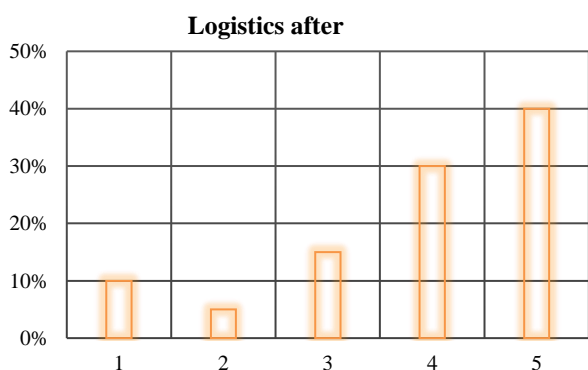
In the case of the during stage, it can be observed that a good overall rating was obtained, highlighting the values 5, 4, and 3,

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, we would take action for those aspects that were evaluated with a rating of 1, as these still represent 14% of the ratings. In simpler terms, there are 14% of the logistics of the course that are not going well and need to be corrected, as it is usually this stage that generates the highest costs if it is not worked efficiently. For example, if an activity is not carried out in the during stage, it can generate losses that probably cannot be solved without paying a cost, the clear example of producing a batch of poor quality, this will be rejected and will have to be manufactured again, applies to any product.

After-stage



Graphic 5 After-product logistics
Source: Authors' perception



Graphic 6 After-bar logistics
Source: authors' 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 for us to follow, so that our 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 we will probably not propose many improvement activities, but rather activities that help us to maintain and monitor these results. This will help the organisation to focus efforts on the two previous stages, without reducing the attention paid to this stage beforehand.

Proposal for improvement

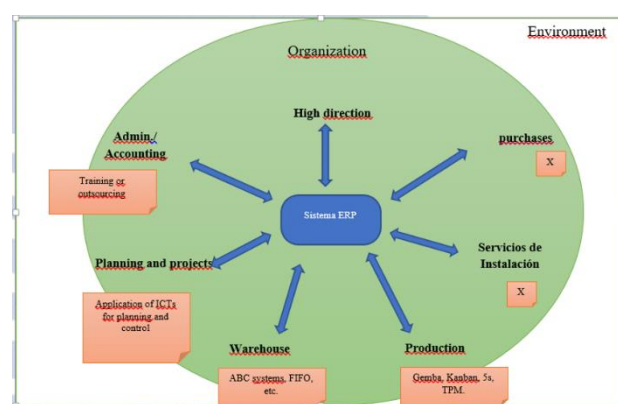


Figure 2 Logistics model
Source: Authors' perception

The following model shows the new logistics system, which has an 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 enterprises, share common data and practices across the organisation, and produce and access information in a real-time environment.

Conclusions

- We can highlight what we consider to be the key points of the work.
- Whenever we seek to improve something, in any field, we must first verify that it is measurable.
- 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, it is necessary to be very precise when formulating the questions, so that the data obtained are as close to reality as possible.
- The use of data processing tools such as Microsoft Excel and Microsoft Forms greatly speeds up the process of developing a project.
- Improving logistics can be a difficult task if you do not have a good team in your organisation.
- The implementation of Lean Manufacturing tools such as the 9s programme, Kanban system, Gemba and others would greatly help the improvement process.

Urzelai, I. (2006). Manual Básico de Logística Integral. Editorial Díaz de Santos.

References

Ballou, R. (2004). Logística: Administración de la cadena de Suministros. Pearson Educación.

Carrasco, J. (2000): Evolución de los enfoques y conceptos de la logística ¿Su impacto en la dirección y la gestión de las organizaciones?. Economía Industrial.

Chopra, S. y Meindl, P. (2013). Administración de la cadena de suministro: Estrategia, Planeación y Operación. Quinta Edición. Pearson Educación, México.

León M. Índices integrales para el control de gestión: consideraciones y fundamentación teórica. Ingeniería Industrial. 2014; XXXV(1):94-104. ISSN 1815-5936.

Porter, M. (2012), Ventaja Competitiva. Creación y sostenimiento de un desempeño superior. Grupo Patria. México.