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Maestría en Logística y Dirección de la Cadena de Suministro

Programación Lineal Para un Plan de Cargas

Presenta

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en Logística y Dirección de la Cadena de Suministro

Director

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Maestría en Logística y Dirección de la Cadena de Suministro


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Programación Lineal Para un Plan de Cargas

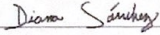
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I. ABSTRACT

Companies look for ways to improve their costs and to be efficient. Meeting both can prove to be a great challenge. In many occasions in the course of optimizing costs, quality is sacrificed, but this does not mean that companies look for new ways to optimize operations and the time that allows them to be competitive. One of the areas in which it is sought to optimize the expense and the operation is in the warehouse and in the transport. The expense of transport does not generate a direct value to the product, therefore it is necessary to find strategies that support the reduction of that cost. One of them is to use transports of opportunity, these transports are cheaper, but in many cases, they are not the most reliable. The punctuality and reliability of these transports depend on the efficiency of the previous warehouse, the traffic conditions and the weather. This document proposes a simple formula for daily use to carry out a load plan, as well as a way of assigning priority and loading order of the units. For this, the use of LINGO and linear programming is presented to optimize day-to-day loads. This paper studies the operations of a made-to-stock warehouse that attempts to optimize time in their loading docks. It focuses on scheduling outbound trucks at the outbound doors of a made to stock warehouse considering truck arrival time uncertainty. The arrival time of each outbound truck is known to arrive within a time window frame. Another important consideration is the need to look at the scheduling problem for multiple time windows for shifts of certain duration.

Keywords: Warehouse, loading plan, truck scheduling, optimizing, costs.

II. ACKNOWLEDGEMENTS

I would like to thank CONACYT for the financial aid that allowed me to embark on this academic journey to bettering myself, both professionally and personally. I would also like to thank UPAEP for the knowledge given to me through their professors. A special thanks to the company and team that opened the doors for me to conduct this paper and for their trust. In addition, I would like to thank my classmates and colleagues for their support and the shared experiences that have helped me grow. Of course, I would also like to thank the participants of the study for making this work possible. It is my hope that this work can be reached by the many professionals in our field with the purpose of contributing and finding ways to better the industry.

III. DEDICATION

I would like to thank God and my family for their guidance and support throughout my life. I dedicate this work to them. They have always led me towards the righteous path so that I could become someone who can make positive contributions to our community especially in these times filled with moral uncertainty.

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(Using) Lineal Programming for Cargo/Loading Plan

VI. CHAPTER 1. INTRODUCTION

1. Introduction and literature review

While cross docking has been accepted as a common practice to reduce warehouse and transportation costs, there are still companies that operate under different warehousing models. Cross docking presents many advantages, one is the reduced cost of holding inventory, transportation cost is reduced due to consolidation of various shipments to different destinations is achieved. Authors Agustina, Lee and Piplani (2010) identify cross docking operations to include production allocation, dock assignment, scheduling both inbound and outbound trucks.

Nevertheless, there are companies which operate under different inventory strategies such as a made-to-stock inventory. In addition, such operations focus on point to point deliveries without making stops to consolidate cargo. These companies must find other ways or strategies to reduce operational costs. There are many challenges involved under this inventory strategy, but operational difficulties are often the same ones found in a cross-dock warehouse. One strategy is to reduce transportation costs utilizing not so conventional providers. These providers include trucks that are unloading in a nearby location to the warehouse and return empty to their origin destination, we will call these opportunity transports. Companies looking to reduce transportation costs may look to these providers as they generally offer lower rates than dedicated outbound trucking companies would. This is possible if the destination is located on the same route or near to the route the truck takes to arrive to its origin destination and in this case, the final destination to where products must be delivered. (Bartholdi, 2000)

Truck scheduling problems are focused on warehouses that utilize cross-docking systems. In addition, most papers consider the exact arrival time of inbound and outbound trucks. They also do not have multiple time windows or consider truck arrival time uncertainty (Lin, Lu & Yu, 2011). Under the opportunity transports system, time arrival uncertainty is more relevant. The arrival time of these trucks depend not only on travel conditions from their previous destinations but also on the efficiency of the warehouses they are unloading products in. This work was carried out to help the company divide the loads between the shifts and optimize the time and work force. The company needs simple tools that employees of all backgrounds can become familiarized quickly within the warehouse. They would also

like to determine if all three shifts are truly necessary to meet the demands of their shipments on a daily basis. (Boysen & Fliedner, 2010)

This paper uses a modified version of a model proposed by Konur and Golias to solve a truck scheduling problem with truck arrival time uncertainty. For this particular problem, the multiple time windows or work shifts will also be considered as they have different durations. Ultimately, a simplified equation using linear programming is used so that the company is able to use on a day by day basis and to provide more flexibility, both of the equations are shown. Konur and Golias' proposed model may be able to be applied for long term planning in future operations as the arrival of the inbound trucks should become more reliable and stable.

VII. CHAPTER 2. LITERATURE REVIEW

2.1 Made to Stock Warehouse Operations

Make-to-stock (MTS) is a traditional production strategy that is used by businesses to match production and inventory with consumer demand forecasts. The (MTS) method requires an accurate forecast of demand in order to determine how much stock should be produced. If demand for the product can be accurately forecasted, the MTS strategy is an efficient choice for production. The company where the warehouse is located uses this particular production strategy. As it has already been established cross-dock warehouses are more cost effective due to the fact that they reduce holding inventory costs as well as transportation costs. This is why, warehouses that do not operate under a cross-dock operation scheme must find different ways to reduce operational cost. The warehouse must assure to operate efficiently. (Wild, 2018)

In the future, the total service time per OT at every OD will be reduced. This will be possible by using Konur and Golias' model. Therefore, it is important for the products stored in the warehouse to be easily accessible in order to reduce the travel time between its position and the outbound door of the outbound truck to which the products have been assigned. In order for this to be possible, products must be ordered according to an ABC inventory analysis. ABC analysis divides an inventory into three categories- "A items" with very tight control and accurate records, "B items" with less tightly controlled and good records, and "C items" with the simplest controls possible and minimal records (Toomey, 2003).

There is no fixed threshold for each class, different proportion can be applied based on objective and criteria. ABC Analysis is similar to the Pareto principle in that the 'A' items will typically account for a large proportion of the overall value but a small percentage of the number of items (Toomey, 2003).

Examples of ABC class are:

- 'A' items – 20% of the items accounts for 70% of the annual consumption value of the items.
- 'B' items - 30% of the items accounts for 25% of the annual consumption value of the items.
- 'C' items - 50% of the items accounts for 5% of the annual consumption value of the items.

The ABC analysis suggests that inventories of an organization are not of equal value. Thus, the inventory is grouped into three categories (**A, B, and C**) in order of their estimated importance. 'A' items are very important for an organization. Because of the high value of these 'A' items, frequent value analysis is required. In addition to that, an organization needs to choose an appropriate order pattern (e.g. 'Just- in- time') to avoid excess capacity. 'B' items are important, but of course less important than 'A' items and more important than 'C' items. Therefore, 'B' items are intergroup items. 'C' items are marginally important. It is important to consider the rotation frequency of the products so that products that are more popular or have a higher rotation rate are placed closer to the stack doors or outbound doors. There are also other factors considered in this analysis such as the capacity limits of each rack which include weight limits and height limits (Toomey, 2003).

Through the utilized model, we hope to optimize operational time for loads in each shift, this will leave time in one of the shifts for administrative activities as well as for maintenance. The shift with few loads to complete shall become responsible to ensure that the inventory is kept according to an ABC model and that there are no discrepancies between where the system says the product is located and where it actually is located.

2.2 Problem description

The company is a beverage bottler that produces under a made-to-order scheme. They produce their clients' brands, as well as produce their own brands. The company hires trucks for national distribution of their own brands. The brands they produce for other clients are both, national and international, but those companies send their own transports for the pick-up of the product.

At the beginning, it was considered to manage and to develop strategies for the load plan only considering the transports for which the company is directly responsible. However, when analyzing the transport of one year, the volume of the transports assigned by the clients was found to be sufficiently large and significant to consider the two segments in the analysis. Since the company hires their own transports for national distribution of the in-house brands, the cost of these transports impacts the operational cost of the company. This is why, companies have opted to use opportunity transports, to reduce costs as these providers are only looking to make a little more profit on an otherwise wasted trip back.

Since the company in the study uses transport of opportunity to reduce transportation costs, the availability of them often depends on the carrier's other customers and deliveries. They depend on the efficiency of the warehouse and the unloading personnel where the transporter must be before arriving at the evaluated company. In many occasions the transports take too long to arrive and suddenly several transports arrive at the same time. This can cause bottlenecks in the warehouse and generates inefficiencies. Currently trucks are assigned a loading ramp based on a first come- first serve basis which has proved to not always be the best way to go. The company's loads have assigned appointments and if they are not met financial repercussions may be applied through penalizations by their clients. In addition, by the same transport companies can, at times, charge overtime fees. Since trucks arrive on their own terms, there are shifts that do not load a single truck and then when they arrive all at once and they are assigned a dock on first come first serve policy, many shipments are passed over to the next shift and have the personnel of the last shifts scrambling to load trucks who have run behind to meet a delivery appointment.

The company also had at the beginning of last year a long list of transport providers, approximately over 60 of which not all were reliable but since the company had been looking to reduce cost the selection process consisted of choosing the cheapest and working their way down the list if their first choices weren't available. Through other methodologies utilized within the company, but primarily based on experience, the company has been able to reduce the list to about 20 providers who are more reliable and offer competitive pricing. In the data analyzed the providers have been available the day needed but the arrival times were still very varied and fluctuated. The information also showed that there were shifts where little or no loading activity occurred and then the following shifts were saturated. The company rolled over the outbound trucks to the following shifts without keeping in mind the priority of each transport based on their destination appointments. A very simple sheet in excel was provided to the company to establish priorities for loading each truck without basing it on a first-come first-serve basis.

VIII. CHAPTER THREE. METHODOLOGY

For this paper, a year and half of shipments have been accounted and the following information has been considered: date and time of arrival of the outbound trucks, time they were assigned a loading dock, number of pallets loaded, time to load the truck, date and time the truck was released from the dock. In this analysis, we found that some shifts were carrying the loads of unfinished shipments left by the previous shift. We also timed several shipments in different shifts to determine the time needed to load each pallet onto the truck as well as know the turnover time of each truck. This also helped us compare the time it took to load previous loads and found they were close to the average, we also determined for the equation in the proposed model.

20 shipments were timed in different time shifts. We averaged the time per pallet of each shipment to determine the average time to finish loading a truck and to have an average loading time per pallet. Reviewing the history of loading times, the company had performed in the 1.5 years, the average time was within range of the timed shipments.

Table 1: Average time in seconds per pallet per shipment

Shipment	Average time per pallet (secs.)
1	114.1
2	122.3
3	121.3
4	120.2
5	119.3
6	118.5
7	118.3
8	118.4
9	118.6
10	120.5
11	121.6
12	122.7
13	123.4
14	121.03
15	119.3
16	118.9
17	119.4
18	117.8
19	118.8
20	119.2

From table 1, we averaged the time per pallet for the 20 shipments and used that time for the model proposed and used for the day to day operations. It takes 119.7 seconds to load 1 pallet onto a truck we have rounded to 120 secs or 2 mins.

IX. CHAPTER FOUR. RESULTS

4.1 Konur and Golias's proposed model

Consider a made-to-stock warehouse where ready to load pallets are stored, this warehouse follows First in First Out or F.I.F.O inventory. However, this inventory method does not have dedicated storage allocation resolved yet. The company manages three work shifts and has limited loading equipment. They have a set number of stack doors or out bound doors (OD), which are designated to serve a set number of outbound trucks (OT). Let OD's be indexed by i such that $i \in I$, where $I = \{1,2,3 \dots m\}$ denotes set of OD's. Now let OT's be indexed by j such that $j \in J$, where $J = \{1,2,3 \dots n\}$ denotes set of OT's. The handling time of an OT considers the loading time at the OD and the travel time of the loading equipment from the lane, product location or staging area to the OT. This problem also considers a maximum handling time for each OT at every OD. As noted by Boysen and Flidner (2010), truck-specific handling times reflect practical characteristics of cross-dock operation and will be considered true for this outbound dock operation. Handling time of OT at OD i will be defined as C_{ij} . (Golias & Konur, 2013).

Utilizing opportunity transports it is safe to assume that the outbound dock operator does not know the time of arrival of the trucks. They do, however, know that it must arrive within a time window of the estimated time of arrival of each truck. With this, the operator must then assign an OD within one of the 3 time shifts available to the loading dock. For the time window in which the operator knows the truck will arrive in he considers it can arrive with in the lower bound or an early arrival or the upper bound or considered a late arrival. Let A_j denote the arrival time realization of OT j , then $A_j \in [A_j^l, A_j^u]$ where A_j^l is the lower bound or early arrival and A_j^u is the upper bound or late arrival (Golias & Konur, 2013). The dock operator's objective is to determine a schedule, i.e., an OD-to OT assignment that minimizes the total service time of the OTs at the ODs. The total service times include the total handling time of the OT's and the waiting times of the OT's to be served.

The following definition of the notation used for the model proposed and modified.

i index for OD, $i \in I = \{1,2,3, \dots m\}$

j index for OT, $j \in J = \{1,2,3, \dots n\}$

C_{ij} handling time of OT j at OD i

t_{ki} travel time between product position k and OD i

p_j number of products (pallet) that must be loaded to OT j

C_{pj} handling time of pallet p to OT j .

T truck changeover time

mw work shift

A_j^l lower bound or early arrival

A_j^u upper bound or late arrival

A_j OT j 's arrival time, $A_j \in [A_j^l, A_j^u]$

t_j service start time of OT j

x_{ij} $x_{ij}=1$ if OT j is served at OD I , $x_{ij}=0$ otherwise

y_{ab} $y_{ab}=1$ if OT a is served as OT b 's precursor at the same OD, $y_{ab}=0$ if otherwise

f_j $f_j=1$ if OT j is served as the first OT at the OD it is assigned to, $f_j=0$ otherwise otherwise

l_j $l_j=1$ if OT j is served as the first OT at the OD it is assigned to, $l_j=0$ otherwise

Let X be the $m \times n$ matrix of x_{ij} 's, and A denote the n -vector of A_j 's. Then the dock operator's total service time is:

Function (1):

$$F(\mathbf{X}, \mathbf{A}) = \sum_{i \in I} \sum_{j \in J} c_{ij} x_{ij} + \sum_{j \in J} (t_j - A_j),$$

SP (scheduling problem) function is:

$$\min_{\mathbf{X}} F(\mathbf{X}, \mathbf{A}) = \sum_{i \in I} \sum_{j \in J} c_{ij} x_{ij} + \sum_{j \in J} (t_j - A_j)$$

Subject to:

$$\sum_{i \in I} x_{ij} = 1, \forall j \in J \quad (2)$$

$$f_j + \sum_{a \in J: a \neq j} y_{aj} = 1, \forall j \in J \quad (3)$$

$$l_j + \sum_{a \in J: a \neq j} y_{ja} = 1, \forall j \in J \quad (4)$$

$$f_a + f_b \leq m - x_{ia} - x_{ib}, \forall i \in I, \forall a, b \in J, a \neq b \quad (5)$$

$$l_a + l_b \leq m - x_{ia} - x_{ib}, \forall i \in I, \forall a, b \in J, a \neq b \quad (6)$$

$$y_{ab} - 1 \leq x_{ia} - x_{ib} \leq 1 - y_{ab}, \forall i \in I, \forall a, b \in J, a \neq b \quad (7)$$

$$t_j \geq \sum_{a \in J: \#j} t_a y_{aj} + \sum_{i \in I} \sum_{a \in J: a \neq j} C_{ai} x_{ia} y_{aj} \quad \forall j \in J \quad (8)$$

$$t_j \geq A_j, \forall j \in J \quad (9)$$

$$X_{ij} \in \{0,1\}, \forall i \in I, \forall j \in J, y_{ab} \in \{0,1\}, \forall a, b \in J, a \neq b \quad (10)$$

The cross-dock operator's objective in SP is to minimize the total service time. Equation 2 ensures that each OT is only assigned to one OD. Eq 4 guarantees that each OT will either be served as the last OT at the OD it is assigned to or preceded by another OT, eq 3 restrict OT to be either served as the first OT at the OD it is assigned to or followed by another OT. Eq 5-7 ensure that only 1 OT is served as first and last OT at each OD. 8, 9 define the service start times of the OT's. 10 is the set of binary constraints. (Golias & Konur, 2013)

4.2 Proposed and utilized problem

Since the arrival of the trucks is currently 100% dependent on the availability of the transport provider and the time they are released, we have designed a simpler model using linear programming and to be resolved using Lingo. The model looks to optimize the time available per shift with the personnel, equipment and loading doors available. This will allow the warehouse operator or shift manager to determine how many pallets must be loaded within each shift. Since the company operates on a made-to-stock system they know ahead of time, how many pallets will be loaded for each day and know how many trucks are to be expected during the day.

JL= Actual operational time per shift
D= demand pallets loaded daily
V= trucks expected to arrive for load
T= turnover time
A= time needed to load each pallet
R= Outbound doors
Costo= operational cost per shift
Jor= Sum of operational time per shift

Let X_{ij} Pallets needed to be loaded in shift i for period j

$$\text{Max } \sum_{X_{ij}} * Jor_{ij} - Costo_{ij}$$

Function (2)

(1) $X_{ij} \geq D$

(2) $JL * R \geq (X * A + X / CAP_V * T)$

The first restriction ensures all the pallets are assigned shift to be loaded. The second ensures that the time needed to load the demand is within the time allotted for each shift and is within each truck's loading capacity.

We have also implemented new policies for the transportation providers to have more control of their arrival. We still do not have control of the time they arrive, but we can control during which shift they are allowed into the premises so that we can assign a loading door accordingly. Trucks that arrive before requested time will be queued depending on the schedule of that day. If there are doors available, then, they will be assigned a door but will have to leave the premises within 30 minutes to ensure no bottle necks are created at the loading doors or entry to the plant.

To supplement the first come first service policy we have designed a simple excel sheet to determine the order or priority in which the trucks should be loaded. This considers the number of pallets that need to be loaded and the date and time they must arrive for the delivery date as well as the transit time with an addition of a safety hour added to the transit time.

The formula is as follows:

Maximum time to start load = time of delivery appointment – (transit time + security time) – loading time

Loading time = (number of pallets *2)

This formula which is used by creating an excel can be utilized the day before to plan the following day's operations. It can be displayed on the loading dock for the operators to know, as well as each warehouse manager in shift to know which trucks must be loaded first.

X. CONCLUSIONS

Based on the loading history and the arrival times of each truck, we have compared the results that the model recommends. The model indicates how many pallets must be loaded within each shift optimizing the time available for each shift while meeting the demand of pallets to be loaded. Also, the third shift will have time allotted for administration and inventory control. We can also note this by comparing tables 2 and 3 that the second shift has been underperforming significantly.

Table 2: Pallets loaded per shift

Shift	Pallets loaded	Client/ purchase order
1	24	1
	30	2
	28	3
	24	4
	28	5
	24	6
	28	7
	26	8
	12	9
	30	10
	26	11
	28	12
	44	13
Total pallets	352	
2	40	14
	40	15
Total pallets	80	
3	40	16
	24	17
	21	18
	24	19
	40	20
	22	21
26	22	
Total pallets	197	
Total pallets to be loaded this day	629	

Table 3: Number of pallets to be loaded according to model

Shift	Pallets loaded	Client/purchase order
1	24	1
	30	2
	28	3
	24	4
	28	5
	24	6
	28	7
	26	8
	12	9
Total pallets	224	
2	30	10
	26	11
	28	12
	44	13
	40	14
	40	15
Total pallets	208	
3	40	16
	24	17
	21	18
	24	19
	40	20
	22	21
	26	22
Total pallets	197	
Total pallets to be loaded this day	629	

The company can now use the model to plan their loading schedule ahead of time and update it in between shifts if needed. With the excel format in order to assign priority based on the delivery appointment time, the warehouse manager and operators can plan the order of which trucks to load first

and pressure the trucks that must be loaded in the first two shifts. This information should help them to better negotiate the arrival times of each transport provider.

As stated previously, we look to use the model proposed by Konur and Golias to include the arrival time uncertainty within a specific time window. This will allow us to also consider the location of each pallet in relation to the distance of each outbound door for the assignment of a time slot and door to assign. Currently, we still need to align the transport providers and gain negotiation power in order for them to arrive closer to the time scheduled. We can now set up a truck scheduling plan according to the number of pallets per day, considering the number of trucks expected a particular day to load. This will help the loading crew to become more efficient and load the number of pallets optimizing the time available per shift.

XI. APPENDIX 1. Speaker Certificate



PONTIFICIA UNIVERSIDAD JAVERIANA
Facultad de Ciencias Económicas y Administrativas

Certificado

a:

Márquez Pérez, Yarivi

Por su participación en calidad de **PONENTE**,
con la presentación del trabajo titulado:

"Programación Lineal Para un Plan de Cargas"

En el "III Congreso Internacional en Supply Chain Management en una
Economía Global:

**Interdisciplinariedad en las Ciencias Económicas, Contables y de
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Bogotá, Colombia; octubre 29 y 30 de 2018

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Director Departamento de Ciencias
Contables – Facultad de Ciencias
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APPENDIX 2. Publication acceptance mail

The screenshot shows a Yahoo! Mail interface. The top navigation bar includes the Yahoo! logo, a search bar with the text "Busca mensajes, documentos, fotos o personas", and a user profile for "araceli". The left sidebar contains a list of folders: "Escribir", "Buzón" (4), "No leídos", "Destacado", "Borradores" (47), "Enviados", "Archivo", "Spam", "Papelería", "Menos", "Vistas" (Ocultar), "Fotos", "Documentos", "Suscripciones", "Ofertas", "Carpetas" (Ocultar), and "Carpeta nueva" (Cengage, david2010, documentos, Documentos (5), Drafts). The main content area displays an email from Fernando Salazar Arrieta to yarivi.marquez@upaep.edu.mx. The email subject is "Evaluación Comité Científico - Artículo In Extenso". The body text informs the recipient that their work has been accepted for presentation at a congress. It includes a link to a registration form and a closing note: "Please, Do not print this message unless it is necessary. Our environment is in our hands". A right sidebar contains an advertisement placeholder "Ad closed by Google" and a small URL "href='https://adserver.ad".

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Escribir

Para yarivi.marquez@upaep.edu.mx cc/ccco

Fw: Evaluación Comité Científico - Artículo In Extenso

From: **Fernando Salazar Arrieta** <fsalazar.network.com@gmail.com>
Date: Wed, Aug 22, 2018 at 5:00 PM

Subject: Evaluación Comité Científico - Artículo In Extenso
To: <yarivi.marquez@upaep.edu.mx>

Cordial saludo, estimados autores y ponentes.

Adjunto al presente estamos informando el resultado de la evaluación por parte del Comité Científico, doblemente ciego, el cual ha decidido que su trabajo es **ACEPTADO**, para ser presentado en el Congreso como PONENTIA y potencialmente publicado e indexado en los Proceedings del Congreso con ISSN.

Será un placer recibirles en Bogotá en la Pontificia Universidad Javeriana.
Ya se encuentra habilitado el link para diligenciar el formulario de inscripción, el cual deben completar para generar la orden de pago, que una vez se cumpla este paso les estaremos informando el procedimiento para pagar on-line.

http://coa.javeriana.edu.co/congreso_internal_supply_chain_management

Saludos cordiales (Best regards; Mit freundlichen Grüßen; Atenciosamente;)
COMITÉ CIENTÍFICO

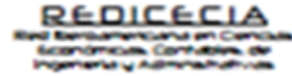
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Appendix 3. Article Evaluation



**III Congreso Internacional en Supply Chain Management en una Economía Global:
Interdisciplinariedad en las Ciencias Económicas, Contables y de Ingeniería, un
Diálogo entre Sostenibilidad y Sustentabilidad**

Comité Científico

INFORME DE EVALUACIÓN DEL ARTÍCULO IN EXTENSO O FULL PAPER

Título del trabajo:	
Programación Lineal Para un Plan de Cargas	
Código asignado:	
P-315	
Área Temática asignada / recomendada por el(los) autor(es):	Logística y Gestión de la Cadena de Suministro

FORMATO PARA EVALUACIÓN DE TRABAJOS EN EXTENSO

Gracias por su colaboración en este proceso de evaluación del formato en extenso de los trabajos propuestos para participar como ponencias libres en el evento. Una vez revisado el artículo, haga doble click sobre la tabla que se anexa, lo que activará el formulario, y marque con una equis (X) cada casilla de calificación, según su apreciación sobre el trabajo. Le agradecemos no dejar ningún ítem sin responder.

En la siguiente página sustente sus calificaciones con comentarios que ayuden a los autores a mejorar su artículo final, en caso de que este sea aceptado, o de lo contrario el por qué, de su rechazo. Su evaluación es valiosa, ya que de los resultados depende la aceptación o rechazo de los mismos, y será respondida por este comité.

	1	2	3	4	5	Total
	Pobre	Regular	Aceptable	Buena	Excelente	
(1) Ajuste a las temáticas del Congreso (10%)				X		0,4
(2) Correspondencia entre título, palabras clave y contenido (10%)				X		0,4
(3) Contribución original al área disciplinar en la que investiga (10%)				X		0,4
(4) Presenta adecuadamente Objetivos, Métodos, Resultados y Conclusiones (15%)				X		0,6
(5) Valoración de la Metodología (15%)				X		0,6
Apreciación Global (40%)				X		1,6
Total General:						4

Nota: El trabajo se considera aceptado para su presentación si las dos evaluaciones obtienen una puntuación total mayor o igual a 3,5 puntos

Comité Científico III Congreso Internacional en Supply Chain Management en una Economía Global:
Interdisciplinariedad en las Ciencias Económicas, Contables y de Ingeniería, un Diálogo entre
Sostenibilidad y Sustentabilidad

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