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UNIVERSIDAD DE LA SABANA
INSTITUTO DE POSTGRADOS- FORUM

RESUMEN ANALÍTICO DE INVESTIGACIÓN (R.A.I)

ORIENTACIONES PARA SU ELABORACIÓN:

El Resumen Analítico de Investigación (RAI) debe ser elaborado en Excel según el siguiente formato registrando la información exigida de acuerdo la descripción de cada variable. Debe ser revisado por el asesor(a) del proyecto. EL RAI se presenta (quema) en el mismo CD-Room del proyecto.

No.	VARIABLES	DESCRIPCIÓN DE LA VARIABLE
1	NOMBRE DEL POSTGRADO	Especialización en Gerencia Logística
2	TÍTULO DEL PROYECTO	Improve the delivery performance of newspapers
3	AUTOR(es)	Ronald Octavio Rojas Sánchez
4	AÑO Y MES	2.014 - Enero
5	NOMBRE DEL ASESOR(a)	Roberto Perez Franco
6	DESCRIPCIÓN O ABSTRACT	<ul style="list-style-type: none"> • Resumen: Un suscriptor de periódicos debe recibir su ejemplar antes de 6.30 am. En la zona cafetera colombiana, el periódico es entregado muy tarde a los suscriptores. La idea es que mediante una solución logística, se mejore la hora de arribo a la ciudad de Manizales, con un incremento razonable del costo. En el proceso se analizaron 11 alternativas y al final el resultado fué una mejora del 22% en el tiempo de llegada, usando imdo impresión conjunta en las plantas de producción de Medellín y Cali. • Abstract: A newspaper suscriptor must receive your Newspaper before 6:30 a.m.. In the Colombian Cafetal Zone, the newspaper is delivered too late to suscriptors. The idea is that using a logistic solution, improve the arrival time to the city of Manizales, with a reasonable increase in cost. In the process 11 alternatives were analyzed and the end result was an improvement of 22% in the time of arrival, use the production plants in Medellin and Cali.
7	PALABRAS CLAVES	Improve delivery performance newspapers logistic
8	SECTOR ECONÓMICO AL QUE PERTENECE EL PROYECTO	Transporte.
9	TIPO DE ESTUDIO	Capstone Project (MIT)
10	OBJETIVO GENERAL	Improve the delivery performance of newspapers.
11	OBJETIVOS ESPECÍFICOS	<ul style="list-style-type: none"> - Improve the arrival time. - the additional costs are very razonable - Only Logistic Solutions

12	RESUMEN GENERAL	<p>El Tiempo Newspaper is the main newspaper in Colombia. In its main markets has production plant. In fact there are 4 dispersed plants for the country. The fifth market is called, the cafetal zone, and is conformed for 3 cities. In the Cafetal Zone, the newspaper has no production plant, and attends the readers from the plant of the south of the country. But there are several situations to consider. The newspaper arrives late to customers. The newspaper today is printed in a city that is 200 miles away. And in Colombia, for the mountains and the quality of the roads, are five hours of travel.</p> <p>Normally a reader must be the newspaper in your hands before 7 am. It is ideal to have newspaper at 6 am. And in the coffee zone, the newspaper are delivered at 7.30 am. The challenge or problem to solve in this project is to improve the time of arrival of the newspaper customers in the coffee area, through solutions that are logistical. The option to build a production plant in the coffee area is not possible, because the cost of produce one newspaper is inefficient.</p> <p>Were analyzed eleven viable alternatives, which included sending exclusive vehicles, send combined vehicles, make printing in other production plants, crossdocking models. The final option, that is economically viable alternative, and get improve the arrival of the newspapers at the coffee region.</p> <p>The solution will be:</p> <ul style="list-style-type: none"> - From South plant (Cali) will be attend the markets of the South City and the Center City, using a single truck every night, which attends to the two cities - From the plant of the North serving the market of the City of the North with a truck making an exclusive trip, every night - The benefits of this project can be summarized as follows: <ul style="list-style-type: none"> o The time to arrive to the north city (Manizales) will be from 300 minutes to 235 minutes. Improvement of the travel time in 22%. o It means that the newspaper goes from 7.30 am to 6.25 am, with a spare of one hour, five minutes. o The clients and subscribers will be feel the difference. It is expected that the quantities of newspaper sold are higher.
13	CONCLUSIONES.	<p>With the previous results, the best option will be the options 6 - Single destination From Medellin to Manizales and 8 - Consolidated from Cali to Armenia, Pereira and Manizales.</p> <p>The printing of the newspapers to Armenia and Pereira should be in Cali, and must be delivered in a single truck. The printing of the newspapers to Manizales should be in Medellin.</p> <p>This scenario will have a reliability of 98.8%.</p> <p>The costs of this option will be the next: The distance of Manizales increases the fleet in \$25.000 per delivery. And the additional cost for the additional printing will be \$195.000 in plates of printing and 50.000 for wasting paper. Total \$270.000 / day.</p> <p>An the best improvement of this option is that the time to arrive to Manizales will be from 300 minutes to 235 minutes. It means that the newspaper goes from 5,15 am to 4.10 am, with a spare of one hour, five 5 minutes. The clients and subscribers will notice the difference.</p> <p>Improvement of the travel time to Manizales in a 22%. The time to arrive to Manizales will be from 300 minutes to 235 minutes.</p> <p>It means that the newspaper goes from 5,15 am to 4.10 am, with a spare of one hour, five 5 minutes.</p> <p>The clients and subscribers will notice the difference. It is expected that the quantities of newspaper sold are higher.</p>
14	FUENTES BIBLIOGRÁFICAS	<p>The theoretical model is based on the method showed in the chapter 5 (Network Design in the Supply Chain) and chapter 14 (Transportation in the Supply Chain), of the book Supply Chain Management of Sunil Chopra and Peter Meindl.</p>

IMPROVE THE DELIVERY PERFORMANCE OF NEWSPAPERS

RONALD OCTAVIO ROJAS SÁNCHEZ

Proyecto para optar al título de
Especialista en Gerencia Logística.

Director: Roberto Perez_Franco

UNIVERSIDAD DE LA SABANA
INSTITUTO DE POSTGRADOS FORUM
ESPECIALIZACIÓN EN GERENCIA LOGÍSTICA
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2014



Improve the delivery performance of newspapers

Ronald O. Rojas S.

Capstone Project – GCLOG Program 2014 – MIT Global SCALE Network

Abstract: The Colombian culture of reading of daily newspapers, shows that they must get to the subscribers before 7am, and it is even ideal to have most of the newspapers already delivered before to 6am.

On the other hand, in the Colombian Coffee Area the newspapers of El Tiempo are delivered much later to its subscribers. In Manizales the deliveries are done between 6am and 9 am. In Pereira it is done between 5.15 and 8.15 am, and in Armenia it is gotten there between 4:15 and 7:15 am.

The idea of the project is that taken from the base of the current infrastructure of production that already has “El Tiempo” Publishing house, (more nearby production plants are located in Cali and in Medellin), to do an analysis of possible alternatives, with a reasonable increase of the cost, allow to improve the time of delivery of the newspaper in these 3 cities.

Keywords: Newspapers, El Tiempo, deliveries, Cafetal Zone, Coffee Zone, Armenia, Pereira, Manizales.

About the author: Ronald O. Rojas S. received in 1.996 a BSE in Industrial Engineering, in 2005 an MBA from the Colombian External University, and in

2.013 a Logistic Specialization from Sabana University. He has experience in Imports, in transportation, in warehouse management, in Centers of Distribution Management, and in Editorials Products distribution. He has worked for Mc Donald's, Holderbank Cement, Port Colombia and El Tiempo Casa Editorial.

Introduction

The problem and its context

The author is the Logistic Director of El Tiempo Casa Editorial, and he knows the operation of the distribution of newspapers that is done in all Colombian cities.

On the other hand, the 5 more important markets of Colombia are located in the areas of influence of Bogota, Medellin, Cali, Barranquilla and the Cafetal Area. In the first 4 areas, El Tiempo Casa Editorial has production plants.

In the first 4 areas, the time of deliverance is in a 95% before 7am. In the Cafetal area, it is delivered before 7am, only 40 % of the newspapers.

The idea is to present an improvement plan to this situation, evaluating only alternative logistics. It is thought that if the arrival time of the newspaper is improved to this area, it should be possible to improve the level of sales of the region, and clearly the service for the current clients will be improved.

The capstone project

Making use of the technological hardware of optimization, the knowledge that the author has of the Colombian transport, and making use of the knowledge of the logistic theory, unified with mathematical facts, which will contain variables of time, distance, probability and cost, prompts that in the end one option which is valid with our targets can be chosen, with a reasonable cost.

Relevant Literature

Having to move materials between a place A and a place B, says the theory of Sunil Chopra, in which we have to keep in mind the following aspects.

- Definition of the mode of transportation to use. In this case the possible options would be air method, land transportation, package carriers or by trucks
- It is necessary to keep in mind the issue of the existing infrastructure. For that, it is necessary to evaluate in detail the topography of the routes which we want to attend. The reliability of the routes will have to be a variable with a predominant importance, since the dependence on them will be whether or not selected, we have to offers the reliability needed to be able to do daily distribution in 362 days a year. Factors as the landslides and even the fact that there are areas where strikes are frequent, the reliability of the network may be affected, and the decision to use it also can be changed.
- Analysis of options for the design of the transport network. The first thing that needs to be set will be the production plants and the buyer locations.
- Design of transport between cities: analyze the movement between the production plant and the destination city. Here are several options, depending on the plant's production to be tested.

Methodology to Design Options for a Transportation Network

In this part are considered the options of Direct Shipment Network To Single destination, as is the case today with the transport of the press that arrives in Manizales, traveling in a direct truck between the plant of Cali and Manizales.

The other option that must be evaluated is the direct shipping with Milk Runs.. This is the model with addressing the cities of Pereira and Armenia, in which a single cart takes the two cities.

The third option mentioned by Sunil Chopra (All Shipments via intermediate distribution center with storage), cannot be taken into account in this business model, because of the speed in which the product becomes perishable. This option involving storage, does not work for newspapers.

The fourth option All Shipments route intermediate transit point with cross-docking is a very interesting option for the model, since it is necessary to keep in mind that the route is common in a big portion of the trip, for three cities. Thinking about doing a cross docking on a strategic site, perhaps, could be the best option to achieve the cost lower.

The option Shipping Via DC Using Milk Runs will not be able to be applied given that the entire material is discharged from a single suppliers. The newspaper as it comes out of the production plant must be delivered where the subscriber is.

Tailored Network option is perhaps the definitive option for perhaps the best combination to align variables, distance, cost, delivery time, mix a little of each of the previous options of transportation.

When made all previous analyses of options, variables are put in a model of Excel and use an optimization model based on the modeling of the options.

This will be the model proposed by Chopra, Phase IV: Network Optimization Models of the book: Supply Chain Management..

Finally, we will have to analyze the chapter of Risk Management in Transportation, especially the topics related to these issues:

- The risk that the shipment is delayed

- The risk that the shipment does not reach its destination because intermediate nodes or links are disrupted by external forces.

I confirm that all this theoretical model is based on the method showed in the chapter 5 (Network Design in the Supply Chain) and chapter 14 (Transportation in the Supply Chain), of the book Supply Chain Management of Sunil Chopra and Peter Meindl.

Data Collection

Chart of Times, Costs and Reliability:

From	To	Minutes	Reliability	Cost
Cali	Armenia	188	99.5%	221,130
Cali	Pereira	210	99.5%	252,877
Cali	Manizales	300	99.5%	308,707
Medellín	Armenia	335	98.0%	444,753
Medellín	Pereira	285	98.0%	378,372
Medellín	Manizales	235	98.0%	311,991

This chart shows that the road from Cali to Cafetal area have a reliability of 99.5%. And the road from Medellín to Cafetal Area has a reliability of 98%. The difference is the type of way because it changes from highway of 4 lanes to a single road with 2 lanes. And the geographical configuration goes from valley to hard mountains to Central Cordillera and the risk of landslides of La Pintada Zone.

Data Analysis

Ways of transportation that are used:

- The air option is not possible due to the cost of shipment; The package carriers has a delivery time of 24 hours. The newspapers need a delivery time of 5 hours max; The rail is not efficient for small freights; water is not possible in the cafetal area;

- Trucks are the available option and it is possible with TL (Truckload) or LTL (less than truckload). This company has chosen to pay the delivery in a TL way but the supplier of transportation is the one who decides whether to use a small car or a bigger car and complement it with freights of other clients.

The options to analyze are the following:

A. Options of Direct Shipment Network to Single destination,

1. Single destination From Cali to Armenia:
2. Single destination From Cali to Pereira:
3. Single destination From Cali to Manizales:
4. Single destination From Medellín to Armenia:
5. Single destination From Medellín to Pereira:
6. Single destination From Medellín to Manizales:

B. The other option that must be evaluated is the direct shipping with Milk Runs..

This is the model that is addressed to the cities of Pereira and Armenia, in which a single cart takes the two cities.

The possible options are:

7. Consolidated from Cali to Armenia, Pereira and Manizales
8. Consolidated from Cali to Armenia, and Pereira.
9. Consolidated from Medellín to Armenia, Pereira and Manizales
10. Consolidated from Medellín to Manizales and Pereira.

Another transportation mode is all Shipments route intermediate transit point with cross-docking and it is a very interesting option for the model, since it is necessary to keep in mind that the route is the same in a big portion of the trip, for these three

cities. Thinking about doing a cross docking on a strategic site, perhaps, could be the best option to achieve the lower cost.

11. Option from Cali to Manizales and Pereira, with cross docking in La Paila to Armenia.

Tailored Network: The last possible option is all the possible combination or mentioned methods. To get the best logistic option, the model is solved using the Solver tool in Excel.

Weight of Variables

For the decision to use the importance of this variables, it is used the Fibonacci Model, whose rule is : $X_n = X_{n-1} + X_{n-2}$.

This model permits to give a value at any variable whit the next criteria:

- If it is not important the score is 3
- If the level is barely important, the score is 5
- If the level is somewhat importance, the score is 8
- If the level is fully important, the score is 13

The Variables of the Model are the next:

- TIME. The arrival time is of great Importance : 13 points
- COST is Somewhat Important : 8
- RELIABILITY of the route is somewhat Important : 8

RESULTS

The next chart is a spreadsheet of the Excel that contains the information.

INPUTS - Destination												
Option #	Mode	From	Destination			Time (min)			Objective Fun	Route Cost	Reliability	Production C
			Armen	Pereira	Maniza	Suma C	Armen	Pereira				
1	Single destination	Cali	1	0	0	1	188	0	0	221,130	99.5%	0
2	Single destination	Cali	0	1	0	1	0	210	0	252,877	99.5%	0
3	Single destination	Cali	0	0	1	1	0	0	300	308,707	99.5%	0
4	Single destination	Medellin	1	0	0	1	335	0	0	444,753	98.0%	0
5	Single destination	Medellin	0	1	0	1	0	285	0	378,372	98.0%	0
6	Single destination	Medellin	0	0	1	1	0	0	235	311,991	98.0%	0
7	Consolidated	Cali	1	1	1	3	188	268	348	308,707	99.5%	0
8	Consolidated	Cali	1	1	0	2	188	70	0	280,449	99.5%	0
9	Consolidated	Medellin	1	1	1	3	375	325	275	444,753	98.0%	0
10	Consolidated	Medellin	0	1	1	2	0	285	235	378,372	98.0%	0
11	Consolidated	Cali	1	1	0	2	188	315	0	280,449	99.5%	0

DECISION VARIABLES											
Option #	Mode	From	Destination			Time (min)			Route Cost	Reliability	
			Armen	Pereira	Maniza	Suma C	Armen	Pereira			Maniza
1	Single destination	Cali	0	0	0	0	0	0	0	-	0.0%
2	Single destination	Cali	0	0	0	0	0	0	0	-	0.0%
3	Single destination	Cali	0	0	0	0	0	0	0	-	0.0%
4	Single destination	Medellin	0	0	0	0	0	0	0	-	0.0%
5	Single destination	Medellin	0	0	0	0	0	0	0	-	0.0%
6	Single destination	Medellin	0	0	1	1	0	0	235	311,991	98.0%
7	Consolidated	Cali	0	0	0	0	0	0	0	-	0.0%
8	Consolidated	Cali	1	1	0	2	188	70	0	280,449	99.5%
9	Consolidated	Medellin	0	0	0	0	0	0	0	-	0.0%
10	Consolidated	Medellin	0	0	0	0	0	0	0	-	0.0%
11	Consolidated	Cali	0	0	0	0	0	0	0	-	0.0%

CONSTRAINTS												
	Suma Ciudad											
Limit	1	1	1	3					Suma Cost	592,440	98.8%	Average Reli

OBJETIVE FUNCTION										
	Answer	Freight Variable								
Suma TIME	Min	493	21							
Suma COST	Min	592	5							

MIN Points	1,085
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Solver Configuration

The image shows the Solver Parameters dialog box in Microsoft Excel. The objective is set to \$D\$41, which is minimized. The variable cells are \$K\$5:\$K\$15. The constraints are: \$C\$33:\$E\$33 <= \$C\$34:\$E\$34, \$F\$33 = \$F\$34, and \$K\$5:\$K\$15 = binario. The method of resolution is Simplex LP. The result is 1,083.

Conclusions/Recommendations

With the previous results, the best option will be the options 6 - Single destination From Medellín to Manizales and 8 - Consolidated from Cali to Armenia, Pereira and Manizales.

The printing of the newspapers to Armenia and Pereira should be in Cali, and must be delivered in a single truck.

The printing of the newspapers to Manizales should be in Medellín.

This scenario will have a reliability of 98.8%.

The costs of this option will be the next.: The distance of Manizales increases the fleet in \$25.000 per delivery. And the additional cost for the additional printing will be \$195.000 in plates of printing and 50.000 for wasting paper. Total \$270.000 / day.

An the best improvement of this option is that the time to arrive to Manizales will be from 300 minutes to 235 minutes. It means that the newspaper goes from 5,15 am to 4.10 am, with a spare of one hour, five 5 minutes. The clients and subscripts will notice the difference.

Improvement of the travel time to Manizales in a 22%. The time to arrive to Manizales will be from 300 minutes to 235 minutes.

It means that the newspaper goes from 5,15 am to 4.10 am, with a spare of one hour, five 5 minutes.

The clients and subscripts will notice the difference. It is expected that the quantities of newspaper sold are higher.