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DISPATCH PRIORITIZATION IN AN AGRICULTURAL FERTILIZER COMPANY USING AHP AND TOPSIS

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AHP/ANP: The Next Generation

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INTRODUCTION

Companies in competitive environments and markets seek to satisfy the customer with high levels of service on time and its entirety (Heskett, 1994) therefore, through a logistics strategy, tools that promote the minimization of costs and the reduction of work capital should be used to ensure the sustainability (Ballou, 2004).

According to research (DNP, 2018), 13,5% is the value of logistics costs over sales. In a small business, this value is 17,6%.

The use of MCDA provides solutions that increase productivity, reduce costs, and improve customer service (Vega de la Cruz et al, 2016).

Heskett, James L, Controlling customer logistics service, International journal of physical distribution & logistics management, Vol 24, Num 4, 1994

Ballou, Ronald H. Bussines logistics: Supply chain management, 2004

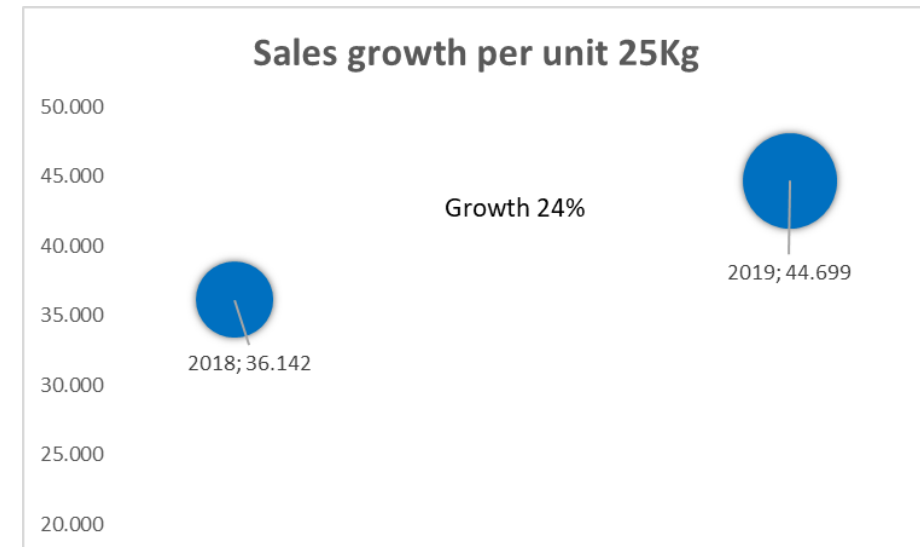
Dirección Nacional de Planeación, Encuesta Nacional Logística, 2018

Vega de la Cruz et al, MULTI-CRITERIA MODELING OF THE RESOURCES IN LOGISTIC SYSTEMS. IT IS A NECESSITY?, Avances en ciencia e ingeniería Vol 7, núm 4, 81-94, 2016

THE REASON

In the distribution process, one of the goals is to dispatch enough goods to satisfy commercial needs, avoiding out of stock or excess.

From one item that is among the five best sellers and has some special characteristics for the logistics operation of this company, one analysis work was made whose purpose is to prioritize dispatches to each distribution center around the country (Colombia).

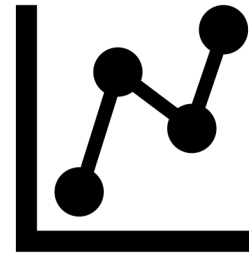
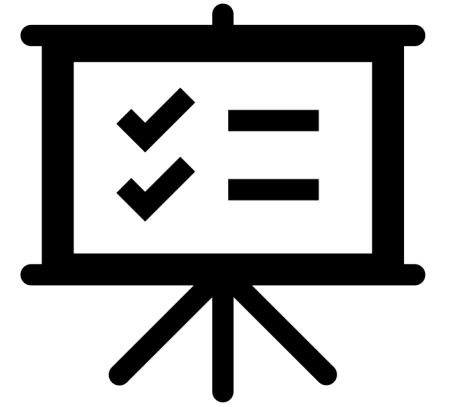


OBJECTIVES

Define criteria for planning dispatches for this company.

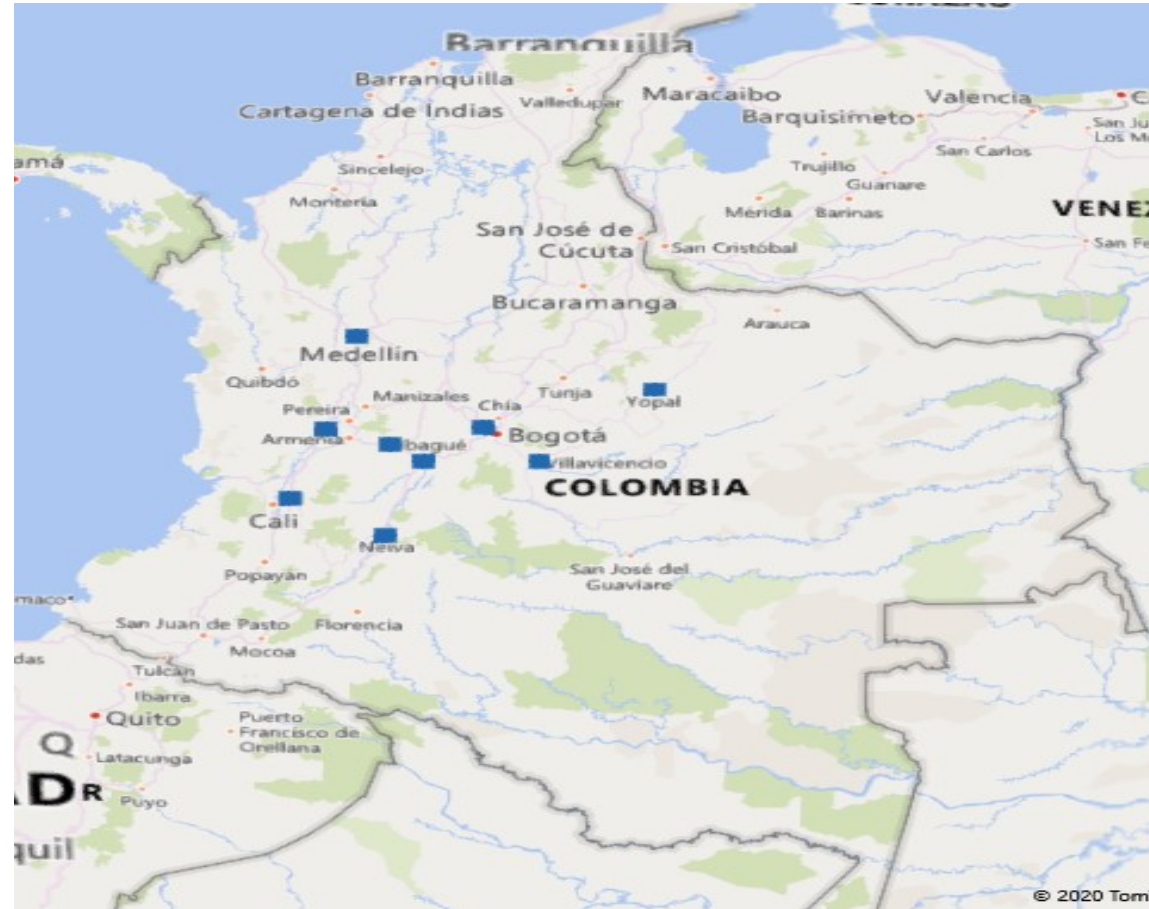
Through AHP obtain the weights for each defined criteria.

Rank the distribution centers (alternatives) to dispatch using TOPSIS.



Location of sites

This map indicates the geographic location of each distribution center around the country.



Selected criteria

- Lead time
- Average demand
- Effective stock
- Security stock
- Standard deviation
- Max stock

Stock unit coverage

Days coverage

Spent size

Order size

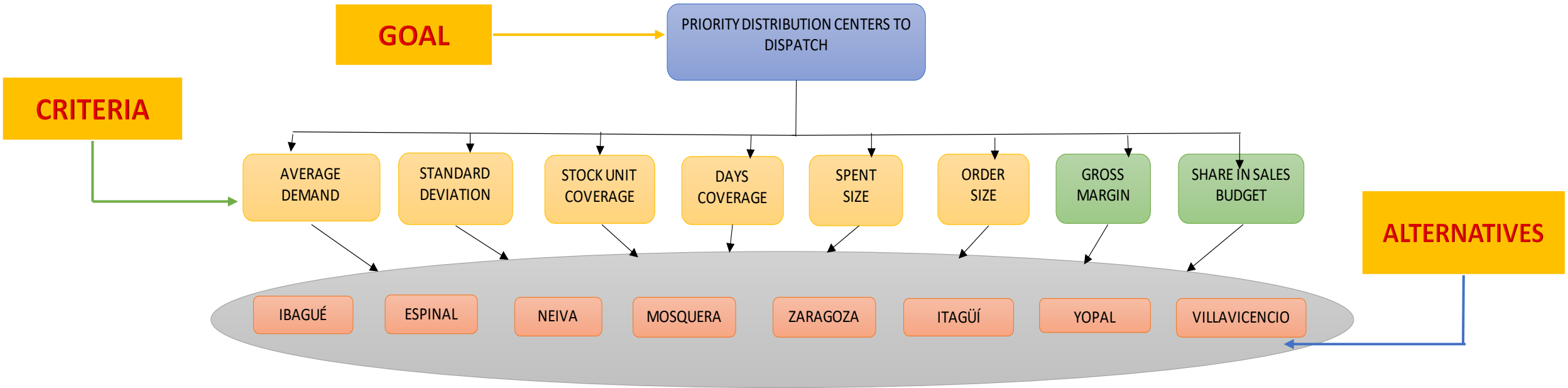
Gross margin

Share in sales



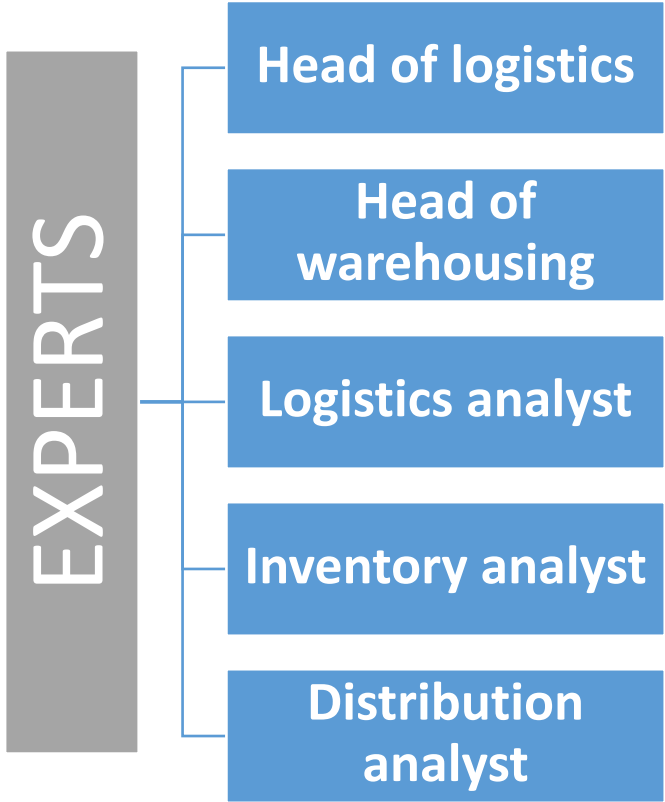
THE CRITERIA AND THE ALTERNATIVES

The following figure shows the criteria defined by the dispatch planning process and the distribution centers as the alternatives to prioritize.



THE AHP: EXPERTS

The group of experts who participated in the qualification of the criteria are part of the company's supply chain area. Their positions are these:



THE AHP: Priority vector and consistence

The criterion **spent size** is the one with the greatest weight with 21.52% followed by **share in sales** with 16.75%.

Criteria	Priority vector
Spent size	0,2152
Share in sales	0,1675
Stock unit coverage	0,1336
Order size	0,1189
Days coverage	0,1130
Standard deviation	0,1046
Gross margin	0,1006
Average demand	0,0467



Lambda max	8,79
n	8
IA	1,41

CC	0,08
It is consistence	

THE TOPSIS

Weighted normalized matrix

	BENEFIT	COST	BENEFIT	BENEFIT	BENEFIT	BENEFIT	BENEFIT	BENEFIT
Distribution centers	Average demand	Standard deviation	Stock unit coverage	Days coverage	Spent size	Order size	Gross margin	Share in sales
Ibagué	0,013	0,010	0,012	0,008	-0,009	0,052	0,035	0,077
Espinal	0,008	0,008	-0,028	-0,029	-0,025	0,043	0,035	0,048
Neiva	0,006	0,011	-0,066	-0,085	-0,046	0,025	0,035	0,036
Mosquera	0,005	0,018	-0,029	-0,052	-0,016	0,034	0,043	0,038
Medellín	0,013	0,011	0,005	0,003	-0,020	0,047	0,030	0,024
Zaragoza	0,003	0,005	-0,016	-0,038	-0,010	0,027	0,039	0,017
Villavicencio	0,009	0,100	0,052	0,005	-0,202	0,043	0,033	0,112
Yopal	0,041	0,013	0,094	0,019	-0,045	0,054	0,033	0,062
PIS	0,041	0,005	0,094	0,019	-0,009	0,054	0,043	0,112
NIS	0,003	0,100	-0,066	-0,085	-0,202	0,025	0,030	0,017
Weight	0,0467	0,1046	0,1336	0,1130	0,2152	0,1189	0,1006	0,1675

Distances

D+	D-
0,095	0,254
0,150	0,213
0,214	0,180
0,166	0,210
0,131	0,233
0,163	0,225
0,222	0,177
0,063	0,270

Proximity Ri
0,729
0,587
0,457
0,559
0,641
0,580
0,443
0,811

Final

This matrix shows the normalized and weighted data to calculate the distances and consequently obtain our ranking.

FINAL RANKING



ありがとう

Thanks

Merci

Obrigado

谢谢

Gracias

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