

Develop a Simulation Model to Identify the Most Profitable Customers to Deliver Goods

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Abstract— For any company which is product based or serviced based, the most important aspect is customer satisfaction. It is a well-known fact that key to success is customer satisfaction. Customer satisfaction is the best indicator of how likely a customer will make a purchase in the future. Moreover, one of the main objectives of an organization is to make profits as much as they can. Every business is struggling to become more profitable in the industry. Therefore if an organization try to satisfy their most profitable customers by prioritizing those customers; that will make the business more profitable and finally those customers will retain in the business as satisfied customers. Therefore the main objective is to model the current business scenario and identify the most profitable customers through simulation using Supply Chain Guru, which is a powerful tool for modeling and simulation.

I. INTRODUCTION

If the company is in a position to focus on the most valuable customers might sound like a luxury. But, many small businesses are grateful for customers of any kind and they try to fulfill every customer requirement to generate more profits. Mainly those small businesses are focus on new customer acquisition but not customer retention most of the time. But every business finds that some customers are more valuable than others. This can be for a range of reasons, from the size of their purchases that means the contribution to total profit to the relative ease of managing their account. Successful businesses are generally those that identify these customers, build relationships with them, and make them satisfied about the service and work to bring in new customers with a similar profile.

How to identify which customers are the most valuable to the business, is difficult to decide by face. But this problem will be discussed through this model using Supply Chain Guru. It also provides tips on selling more to them and attracting new high-value customers. Another important question that may arise about customers is what makes the customers valuable to a business? There can be many reasons for that, among them some of the reasons could be, buy high margin products, pay full price without negotiating discounts, place a small number

of large orders rather than many small orders, do not cancel or amend orders, pay on time, do not require extensive after-sales service.

Coldwell (2001) stated that it is more cost - effective, easy and much more beneficial in the long run for - companies to work toward preserving their customer base. Furthermore his “analysis of customer satisfaction data encompassing the findings of over 20,000 customer surveys conducted in 40 countries, conclude that,

- A Totally Satisfied Customer contributes 2.6 times as much revenue to a company as a Somewhat Satisfied Customer.
- A Totally Satisfied Customer contributes 17 times as much revenue as a Somewhat Dissatisfied Customer.
- A Totally Dissatisfied Customer decreases revenue at a rate equal to 1.8 times what a Totally Satisfied Customer contributes to a business” [8]

That research imply that customer satisfaction, loyalty and retention are directly influence to the profitability of the organization. However, Singh (2006) said that for building a loyal customer base, one of the strategic imperatives is focus on key customers. [4]

Therefore through this model finally a set of most profitable customers will be identified. And that may help for an organization to make future decisions about their customers. Furthermore it will help to enhance the service level of the identified customers which ultimately cause more customer retention. Moreover the model will be helpful to determine the suitable product mix for each customer and the business can face the future demand through forecasting

A. METHODOLOGY

Modelling and simulation of distribution networks is a prominent methodology used for network optimization, transportation optimization, optimal vehicle routing and so on. There are many areas where modelling and simulation

techniques been used for optimization in past literature. Such as for distribution network design of 3PLS, semiconductor supply network simulation etc...

The distribution network for this study has been formulated using past literature and real world distribution network data. [5] [6] [7]

No. of Manufacturers	1
No. of Distribution Centers	3
No. of Customers	8
No. of Products	2

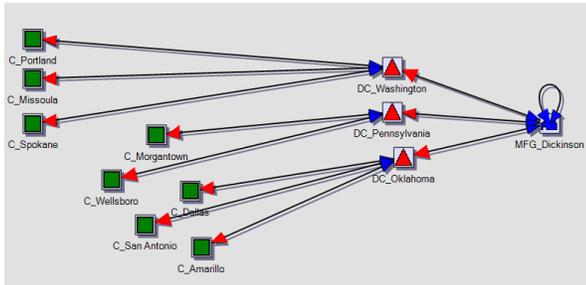


Fig. 1. Visual Modeler



Fig. 2. Map

As explained the main objective of this study is to identify most profitable customers in the distribution network. For that when modeling the network following aspects have been considered,

Model Development	Two products – To determine the product mix for customers
	Different selling prices for different customers, based on their loyalty, demand, frequency of purchases
	Normal distribution for the demand in the baseline
	Different lead times, operating costs, avg. transportation costs.

Create scenarios for each customer only changing the demand by the same amount to identify, how each customer would contribute to the total profit separately. In each scenario, demand is changed in one customer and others will have the same quantity as the base model. The model has been run optimally to maximize the profit.

By comparing these scenarios, we can identify how each customer generate profit for same increment.

$$\text{Incremented Profit} = \text{Total Profit} - \text{Baseline Profit}$$

Name	Table	Column	Value	Filter
1. Cus - Wellsboro (3 sub-scenarios)	Wellsboro_demand	Demand	Quantity	= 100000, 125000, 200000
2. Cus - Dallas (3 sub-scenarios)	Dallas_demand	Demand	Quantity	= 100000, 125000, 200000
3. Cus - Missoula (3 sub-scenarios)	Missoula_demand	Demand	Quantity	= 100000, 125000, 200000
4. Cus - Morgantown (3 sub-scenarios)	Morgantown_demand	Demand	Quantity	= 100000, 125000, 200000
5. Cus - Portland (3 sub-scenarios)	Portland_demand	Demand	Quantity	= 100000, 125000, 200000
6. Cus - San Antonio (3 sub-scenarios)	SanAntonio_demand	Demand	Quantity	= 100000, 125000, 200000
7. Cus - Spokane (3 sub-scenarios)	Spokane_demand	Demand	Quantity	= 100000, 125000, 200000
8. Cus - Amarillo (3 sub-scenarios)	Amarillo_demand	Demand	Quantity	= 100000, 125000, 200000

Fig. 3. Scenarios and Sub Scenarios

II. FIGURES

Figures of the Baseline model

	Profit	Revenue	Cost
Baseline	172,112,975.89	220,500,000.00	48,387,024.11

B. Network Optimization Output

Wellsboro	Profit	Revenue	Cost
Baseline	172,112,975.89	220,500,000.00	48,387,024.11
Sub Scenario I	200,979,330.15	253,000,000.00	52,020,669.85
Sub Scenario II	215,412,507.28	269,250,000.00	53,837,492.72
Sub Scenario III	255,628,384.79	318,000,000.00	62,371,615.21

Spokane	Profit	Revenue	Cost
Baseline	172,112,975.89	220,500,000.00	48,387,024.11
Sub Scenario I	190,819,139.52	245,000,000	54,180,860.48
Sub Scenario II	199,361,795.51	257,250,000	57,888,204.49
Sub Scenario III	224,989,763.49	294,000,000	69,010,236.51

The Output Summary shown above is for only two scenarios. The percentage of increment of profit of each customer has been calculated to compare customers one another.

Number	Customer	Percentage of the Increment
1.	Wellsboro	20%
2.	Dallas	0.22%
3.	Missoula	26%
4.	Morgantown	24%
5.	Portland	18%
6.	San Antonio	0.16%
7.	Spokane	14%
8.	Amarillo	6%

B. Network Optimization Output

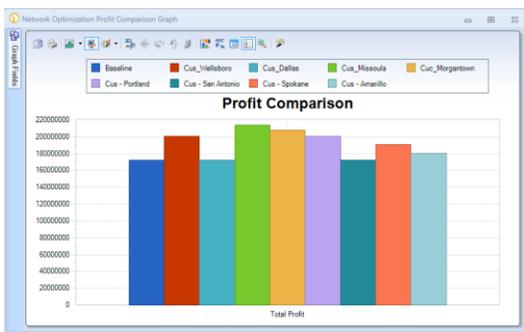


Fig. 4. Profit Comparison

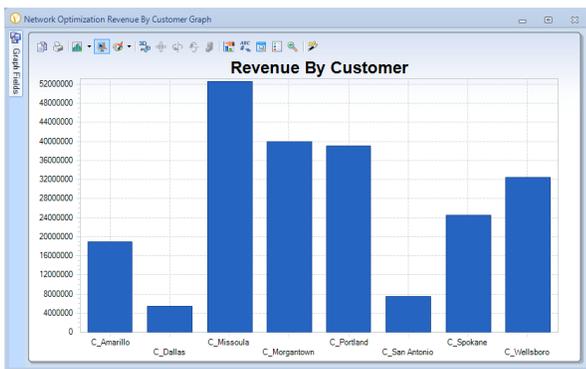


Fig. 5. Revenue by Customer

In the above diagram you can observe that the highest revenue is generated by Customer Missoula and from the table you can observe that the highest incremented profit also from Missoula. The unit costs in each warehouse is different though.

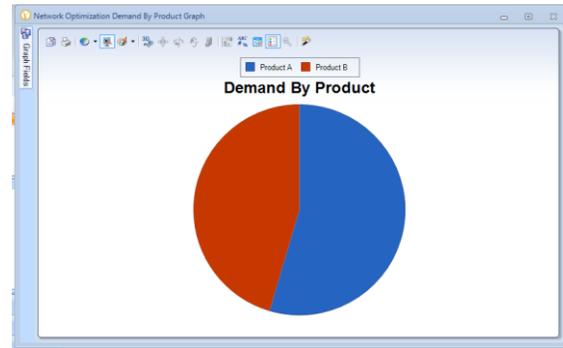


Fig. 6. Demand for each product

As shown in the above figure, demand for product A is 55% while demand for product B is 45%. From these figures the product mix for each customer can be calculated.

III. CITING PREVIOUS WORK

Many studies have been conducted related to distribution networks [1] [6] [7]. Among them it is not rare the studies which have considered modeling and simulation and optimization. [1] [2]. Furthermore researchers have been focused on customer satisfaction, how satisfaction of customer affect on customer retention and profitability and so on. [3] [4]

IV. CONCLUSION

From the results of this study we can identify a set of customers who considerably affect the profitability of the company. Therefore company can easily make decisions about maintaining a good relationship with those customers, preserving them and the ways to maximize the service level. Moreover By knowing the product mix of profitable customers, the serving party can make early decisions or can forecast the demand and can be prepared for the situation. Hence the company can reduce the lead time and that will directly enhance the customer satisfaction.

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