TOTAL COST MINIMIZATION TRANSPORTATION PROBLEM

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Abstract - Optimization models can be used to determine the lowest cost solution to ship products from the manufacturing origin to the end customer. This Caps tone developed a mixed integer linear programming model for Carlstar, a global leader in the specialty tire and wheel industry. The objective was to identify the optimal routing solution of problem to minimize total cost transportation and tariff costs for each of the company's five product market segments. The model provided for multiple possible routing options, including shipping direct to the customer from the manufacturer or through a distribution center. Multiple scenarios were run using different rates for transportation costs, tariffs, and customer demand. Model constraints included manufacturing location, demand, and flow balance through the distribution centers. Results indicate that Carlstar could save almost 20% on distribution costs by increasing the number of direct to customer shipments. The impacts of tariffs, demand fluctuations and handling costs were smaller than expected, indicating that once an updated transportation network is established, it would not have to be updated very often to maximize potential cost savings.
KEYWORD: Total cost, minimization, transportation, problems, solution

I. INTRODUCTION

Today's supply chains have become “a challenge as production and supply networks have expanded and serve an increasingly demanding series of customers in multiple markets. Coordinating the flow of product material and the flow of information across all levels of the supply chain is essential for effective management of these supply chain networks [1, 2]. Therefore, the extent to which manufacturing products can affect society depends on the efficiency of sector management in its supply chain and logistics services. The timely movement of the materials needed for production requires the development of a good distribution network. In previous studies it was concluded that although a good distribution network minimizes costs and maximizes profits in shipping finished products to customers and consumers [3, 4], poor distribution caused by an inefficient transportation system can disrupt the supply chain, leading to an unavailability of raw materials or finished products and, ultimately, affect the economy both nationally and individually [5]. This is probably due to the fact that a good transport system ensures high availability and low cost of transport services compared to the cost of inventory, thus encouraging fast and frequent deliveries through [6].” These keys argue that “an efficient transportation system (an aspect of logistics) is essential for economic development and growth [7], while achieving and sustaining development is

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impossible without economic and reliable infrastructure such as the road [7, 8]. In view of the distribution challenges (e.g. high distribution costs) encountered in the manufacturing sector and its impact on the economy in general," this study was determined optimize transportation modeling of manufacturing goods to customers at lowest transportation cost.

II. OBJECTIVES

- To survey of developed logistics low cost models and its impact
- To determining the optimal quantity of products ordered, the optimization of planning in the distribution system.
- To identify the optimal routing solution to minimize the transportation and tariff costs for each of the company's and its implementations
- To analyze the model, seeks to minimize the total cost for all transportation, tariff and handling costs etc. and its impact

III. RESEARCH METHOD

To create a network optimization model, using a Mixed Integer Linear Program (MILP) approach, that enables Carlstar to more dynamically make decisions and minimize costs with regard to selecting different transportation routes and methods of delivery. Them odel will serve as a decision-making tool that provides the optimal transportation route and mode solution that minimizes costs while still meeting demand and service level requirements, and operating within a given set of constraints. It will be run multiple times to analyze the sensitivity to changes in the transportation costs, tariff rates, and demand. In addition, the model will make recommendations as to whether specific modifications to the firm's distribution network should be evaluated as well. The model will be limited by its inputs and not capture all factors that influence business decisions, such as implementation costs and change management implications.

Data Collection and Analysis

In order to develop the model, we first needed to establish an understanding of Carlstar's current global network footprint and how its products flowed from manufacturing origin to the end customer destination. To complete this analysis, we focused on five primary sources of information provided by Carlstar. Each data source corresponded to specific pieces of the product flow path. Those pieces included manufacturing, ocean freight, drayage, shipments to DCs, and shipments from DCs to end customers.

Model Development

An Excel-based mixed integer linear program (MILP) model was developed to identify the optimal product flow for Carlstar's products, classified by market segment. The objective function of themodel seeks to minimize the total cost for all transportation, tariff and handling costs. The modelvariables are the potential flow paths the product could take from manufacturing origin to each customer:from manufacturer direct to customer or manufacturer to DC to customer. A demand constraint ensures that demand is met for each customer. A transshipment constraint, requiring that for each product delivered from a DC sufficient product was also sent to that DC from the applicable manufacturing facilities, was also included.

IV.VISION

A well "designed decision support system will help decision makers to extract useful information from raw data, documents and personal knowledge with the aim of identifying and solving problems and making decisions. The cost models of logistics as components of the decision-making support systems are constructed using different cost and mathematical methods, which is why they vary in terms of complexity, purpose and usability. Regardless, our analysis of the literature focuses on three elements that define its usability: the level of the decision-making process, the logistical costs examined and the transfer of knowledge."

V. MISSION

The scope of logistics optimization in companies and organizations has been expanded to address strategic, tactical and operational decision-making. "The characteristics of the different levels of the decision-making process derive from studies on space and time (the horizon and the period of the decision-making process) and from hierarchical analyzes, so it is important to determine how many of these characteristics can be found in each model. In the reviewed literature, the authors developed logistics cost models that address areas of a strategic nature, due to their field of study: construction of an optimal strategy for the delivery of goods, implementation of an adequate distribution network, determination of the optimal quantity of ordered products, optimization of planning in the distribution system, analysis of transport destinations, coordination of the logistics network and distribution of commercial flows, construction of a system to select the positions of distribution centers, coordinating processes in a two and three phase supply chain, inventory management and building a system to assign products in the warehouse. A model capable of combining customized solutions to reduce logistics costs into a single criterion for strategic, tactical and operational decision-making is not simply useful in general, but also systematically addresses all the logistics costs of a company."

The purpose of "our research was to create a generally applicable model that combines decision making into a single strategic, tactical and operational decision criterion. The systematic logistics decision model (SLDM) is easy to use and is available to employees at different hierarchical levels within organizations and for different business functions, with the aim of managing the company's total logistics costs."

VI. TOTAL COST MINIMIZATIONMODELS: LITERATURE REVIEW

The theoretical structure of "the logistic models is designed using different mathematical and cost methods, which is why the projects vary in terms of complexity, purpose and type of use. Blumenfeld et al. [9] conducted a study that identified optimal delivery strategies for goods on a freight transport network. They analyzed the relationship between transportation, storage and production set-up costs in order to minimize total costs. A decomposition method was presented to solve problems with few origins and shipping dimensions. A similar study has been published by Burns et al. [10], which explored the problem of reducing total inventory and freight costs from each supplier to more customers using the economic order quantity model (EOQ) structure. They derived formulas for inventory and transportation costs and determined the optimal compromise between these costs. Blumenfeld et al. [11] continued his scientific research in the case of General Motors. They examined the delivery of goods from suppliers to production plants with the aim of reducing total logistics costs, including transportation and storage costs. The correlation between inventory costs and transportation costs was also examined by Speranza and Ukovich [12] in order to optimize costs in the supply of various products."

Zhao et al. [13] "addressed the problem of determining the optimal order quantity and frequency for a supplier-dealer logistics system in which transport costs and multiple uses of vehicles are considered. Based on the traditional formula of the quantity of the economic orders, a modified EOQ model is set up and an algorithm for the model is presented. The purpose of the model is to reduce production, inventory and transportation costs."

Berman and Wang [14] have also "built a model that represents a good solution and can serve as a guide for the future planning and implementation of an adequate distribution network, where the total costs of transport and inventories are the lowest. Madadi et al. [15] formulated a multi-level inventory model that includes transportation costs for planning the refueling of a single product. They extend the traditional EOQ model in order to minimize the total cost of the inventory by considering a discrete transport cost, which determines the optimal warehouse strategy for deciding how often to place orders. They also developed a collective form of order from retailers and a plan to minimize the inventory costs of retailers and the warehouse jointly."

Wang and Cheng [16] "produced a logistics planning model in which the goal is to minimize the sum of work-in-process inventory costs and transportation costs, which includes both supply and supply. delivery. They demonstrated that if supplier, manufacturer, and buyer work orders take the same amount of time to process, inventory and transportation costs can be optimized at all levels. Ali and O'Connor [17] developed a model designed for effective operational planning in the distribution system and determine the number of trucks distributed, the positioning of the trucks, and inventories over time. The model optimizes the total fixed costs to transport a product and the total inventory transport costs in both sectors. Inventory costs in the model take into account both the cost of the item contained in the inventory and the granularity of the time period during which the inventory is maintained. The developed heuristic procedure addresses the compromise between the fixed transportation cost and the inventory transportation cost to determine the distributions at each point of demand, thus reducing the number of variables in the model."

Strack and Pochet [18] "presented a model that combines multiple tactical steps in the logistical decision-making process: completing inventory management decisions, assigning products in a company's storage system, and transferring products to warehouse locations in the warehouse management process. The merging of the decision-making phases reduces warehouse and inventory costs by optimizing the quantity of each product in the warehouse. The system is designed in such a way that it allows the supply process to customers to operate continuously, while at the same time the warehouse area is uniformly filled with the necessary inventory through simultaneous orders to suppliers. This model allows the optimization of external supplies with the level of safety stock necessary to guarantee adequate customer service. This warehouse and inventory management method reduces total operating costs and meets customer needs. Operating costs include purchase costs, costs of keeping goods in stock, and inventory costs, which are incurred when customer demand cannot be met (cost of lost sales)." Sajadieh et al. [19] used "the developed model to demonstrate the importance of coordination and cooperation between seller and buyer in a two-step supply chain. This relationship helps minimize inventory and storage costs. Tancrez et al. [20] developed a model that combines decisions regarding the choice of location of distribution centers, the distribution of flows of goods and the size of individual shipments. The objective of the model is to choose suitable distribution centers that effectively connect the position of the production plants with the positions of the final customers. The model focuses on optimizing inventory and transportation costs. A conflict arises between the two cost components, because if the goods are supplied directly from the factory to the end customers, the inventory and storage costs are reduced, but the transportation costs are increased. The opposite scenario occurs when distribution centers are used to provide customers with the optimal use of transportation capabilities, but there is also an increase in the cost of inventory and storage. The purpose of the model is to find solutions that allow for the optimal level of supply and the creation of an efficient supply chain network."

Bošnjaković [21] created"the multi-criteria inventory model to optimize spare parts costs. The proposed criteria for optimization are: use of value, criticality and frequency of demand. It is based on the classification and classification of spare parts in groups according to similar attributes. Each group of parts, depending on the attributes of the parts that belong to it, combines the appropriate inventory policy model and the expected demand model."

There is also "a strategic profit model [22, 23], which shows how asset and margin management affects the performance of assets and net assets. Logistics activities play an important role in the model, which are present in the activities of the company, so the model is also useful for management in determining the role of logistics in the business success of the company. The model focuses in particular on financial flows and identifies cash flow as the basis for a balance between the company and its environment. The model is specific to calculate the return on net assets, which takes into account all logistics costs (transport costs, storage costs, administrative costs, inventories, etc.), as well as the interactions between them. The model highlights the importance of optimizing inventories. A significant reduction in inventory quantities, regardless of the effects of other logistics costs, can significantly increase overall logistics costs. Therefore, it is important that the model focuses on efficiency and effectiveness to achieve the goals of the company as a system, rather than optimizing individual logistics subsystems (eg transportation, warehousing, etc.). Robinson [24] has developed a 'Logistics Cost Model', which compares and evaluates geographic areas based on different costs: labor, logistics, inventory, and tariffs. In order to ensure an efficient flow of goods in the transport process, Chow [25] has developed a model for the analysis of transport destinations, which includes various types of transport (air, sea, road). Based on a cost simulation, an annual comparison was made between destinations. Cost analysis takes into account not only the price of transportation services, but also the costs of inventory, warehousing, handling, and order processing. The simulations show how improvements in transit times and transportation reliability reduce overall logistics costs and, based on this, how one specific transportation route is more competitive than another route."

Consequently, Chiou [2] pointed out that "an effective SCM is a determining factor for the competitiveness and success of most production and retail organizations, since its implementation has a significant impact on costs, in the level of service and quality. Although the main objective of this study is to optimize a supply chain, it will focus more on logistics, a subset of supply chain management [26], which refers to the management of the flow of goods between the point of origin and point of consumption to meet the needs of customers or users [27]."

In the available literature, "the authors develop and review some logistics models with the aim of reducing total logistics costs, which include the following relationships: the link between inventory cost and transportation costs, the correlation between inventory cost and transportation costs. warehouse, an analysis of the relationship between transport installation, storage and production costs, the reduction of the total cost of stocks and transport with the use of the EOQ model structure, the management of transport costs in the selection of optimal order quantity and number of vehicles, minimizing the sum of work-in-process inventory costs and transportation costs, which includes both supply and delivery costs, reducing space costs of warehouse, optimization of warehouse and inventory costs, reduction of operating costs (purchase cost, costs of maintaining goods in storage and those of storage, which are incurred when it is not possible to satisfy customer demand (cost of lost sales) and the impact of the reduction in the amount of inventory on the level of logistics costs."

VII. OPTIMIZE TOTAL COST MINIMIZATION TRANSPORTATION: RESULTS AND DISCUSSION

The model was run with inputs across various scenarios. These model runs provided insight into the system's sensitivity to various changes, including changes to tariffs, transportation rates, demand fluctuations and handling costs variations. It was interesting to note that changes in tariffs andtransportation rates did not have as significant an effect on the optimal transportation flows as expected.For smaller changes in handling or demand, the optimal flow identified by the model was moresignificant.

The baselinemodel enables the identification of the potential savings between what is currently done and what couldbe done when compared to the optimal model.When the total calculated baseline cost is compared to the current actual costs incurred, the difference gives a good indication of how accurate the assumptions and model are as compared to currentexecution. For the purposes of this analysis, we focused on the comparison between the baseline costs,the optimal costs, and the various scenarios.

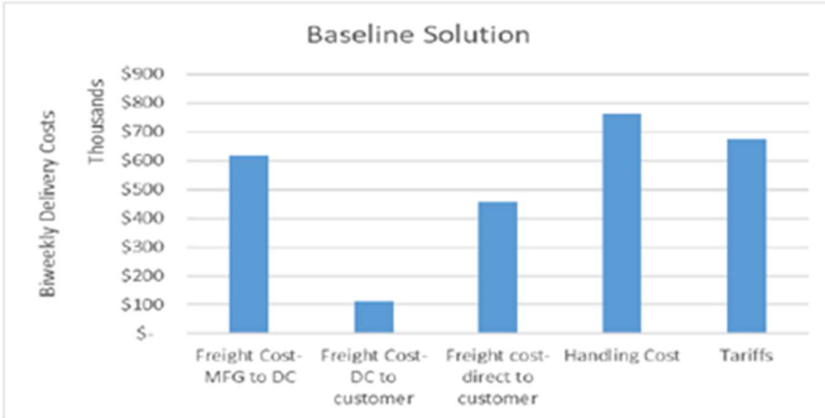

Figure 1 Baseline Distribution Cost

The optimal solution identified by the model includes significantly more shipments directly fromthe manufacturer to the customer. While the cost for to-customer transportation does increase, thehandling cost as well as the cost for shipments to the DC is much less, significantly reducing the cost ofthe overall distribution channel solution

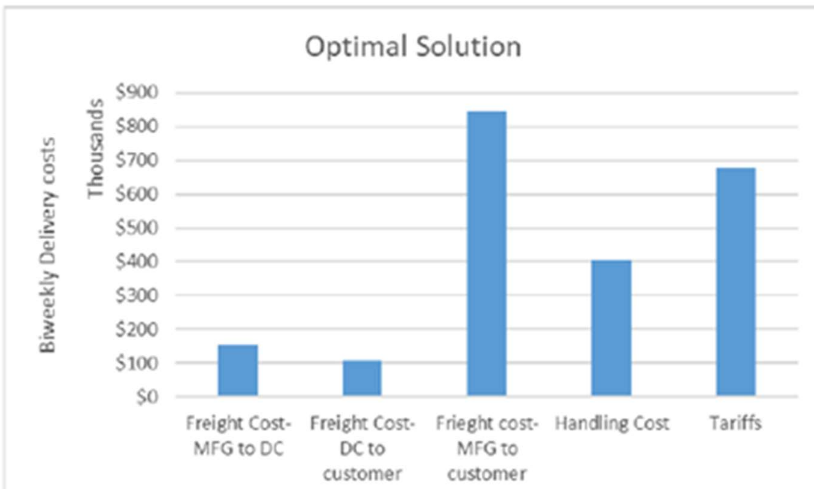

Figure 2 Optimal Makeup of Distribution costs

The optimal solution, as identified by the model, would save the company 17% of the current baseline,equivalent to over $400K for each biweekly delivery cycle, as displayed in Table 1. A visual of the buildup of an optimal solution as compares to the baseline can be seen in Figure 3.

Table 1 Scenario Costs

Estimated cost per Biweekly Shipment			
	Optimal	Baseline	% change
Freight Cost-MFG to DC	$ 151,785	$ 455,609	-67%
Freight Cost- DC to customer	$ 108,361	$ 619,331	-83%
Frieght cost-MFG to customer	$ 843,598	$ 110,939	660%
Handling Cost	$ 405,768	$ 763,494	-47%
Tariffs	$ 677,263	$ 671,936	1%
TOTAL	$2,186,775	$2,621,310	-17%

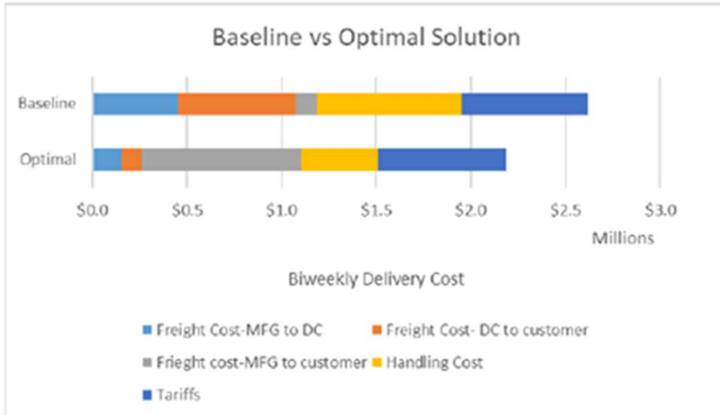

Figure 3 Baseline vs Optimal Solution Costs

Currently the majority of shipments to Carlstar's customers originate at a DC. The optimized solution identifies direct shipments from manufacturer to customer to be the most cost-effective shipment method for the majority of their demand by number of units, as seen in Table 2. Number of customers served by market segment and origin is significantly less, indicating that there are a few key customers that Carlstar should specifically evaluate for a cost saving change in transportation flow.

Table 2 Optimal Distribution of Flow

OPTIMAL SOLUTION		Delivery Period	Yearly Cost
Freight Cost	MFG to DC	$ 151,785	$ 3,946,407
	DC to Customer	$ 108,361	$ 2,817,394
	MFG to customer	$ 843,598	$ 21,933,546
Handling Cost		$ 405,768	$ 10,549,978
Tariffs		$ 677,263	$ 17,608,825
	TOTAL	**$ 2,186,775**	**$ 56,856,150**
		By MFG/ Customer	By Unit
#	MFG to Customer	240	353,909
	DC to Customer	2,107	126,072
%	Direct to Customer	10%	74%
	DC to Customer	90%	26%

Based upon multiple model runs with tariffs varying from 0% to 225% of unit cost, changes in the tariff rate did not materially change the cost of the optimal solution, as shown in Table 3. Optimal flow when tariffs went from 0% to 5% to 10%, but after 15%, any increase in the tariff rate did not change the optimal transportation flows.

Table 3 Sensitivity to Tariffs

TARIFFS		0%	5%	10%	20%	125%	225%
Freight Cost	MFG to DC	$ 150,920	$ 152,050	$ 151,785	$ 158,949	$ 158,949	$ 158,949
	DC to Customer	$ 110,057	$ 109,221	$ 108,361	$ 107,677	$ 107,677	$ 107,677
	MFG to customer	$ 839,570	$ 839,570	$ 843,598	$ 843,598	$ 843,598	$ 843,598
Handling Cost		$ 407,379	$ 407,379	$ 405,768	$ 405,768	$ 405,768	$ 405,768
Tariffs		$ -	$ 339,657	$ 677,263	$ 1,343,933	$ 8,399,580	$ 15,119,245
	TOTAL	$ 1,507,926	$ 1,847,877	$ 2,186,775	$ 2,859,925	$ 9,915,573	$ 16,635,237
By MFG/ Customer							
#	MFG to Customer	239	239	240	240	240	240
	DC to Customer	2,108	2,108	2,107	2,107	2,107	2,107
%	Direct to Customer	10%	10%	10%	10%	10%	10%
	DC to Customer	90%	90%	90%	90%	90%	90%
By Unit							
#	MFG to Customer	353,418	353,418	353,909	353,909	353,909	353,909
	DC to Customer	126,563	126,563	126,072	126,072	126,072	126,072
%	Direct to Customer	74%	74%	74%	74%	74%	74%
	DC to Customer	26%	26%	26%	26%	26%	26%

Transportation rate fluctuations had an effect on the total cost for transport, but did not materially change the optimal transportation flows. As transportation rates rise, the changes to the optimal transportation paths were not significant, as seen in Table 4.

Table 4 Distribution Path based on Transportation Costs

TRANSPORTATION SENSITIVITY		0.5	0.75	1	1.5	2	3
Freight Cost	MFG to DC	$ 98,237	$ 119,199	$ 151,785	$ 202,906	$ 263,690	$ 437,630
	DC to Customer	$ 66,803	$ 93,743	$ 108,361	$ 139,763	$ 197,709	$ 363,151
	MFG to customer	$ 678,491	$ 769,988	$ 843,598	$ 960,814	$ 987,892	$ 810,718
Handling Cost		$ 324,905	$ 367,835	$ 405,768	$ 479,872	$ 564,961	$ 776,806
Tariffs		$ 677,263	$ 677,263	$ 677,263	$ 676,984	$ 677,777	$ 677,749
	TOTAL	$ 1,845,698	$ 2,028,028	$ 2,186,775	$ 2,460,339	$ 2,692,028	$ 3,066,054
By MFG/Customer							
#	MFG to Customer	356	286	240	186	147	113
	DC to Customer	1,991	2,061	2,107	2,161	2,200	2,234
%	Direct to Customer	15%	12%	10%	8%	6%	5%
	DC to Customer	85%	88%	90%	92%	94%	95%
By Unit							
#	MFG to Customer	377,630	366,474	353,909	337,339	311,163	239,553
	DC to Customer	102,351	113,507	126,072	142,642	168,818	240,428
%	Direct to Customer	79%	76%	74%	70%	65%	50%
	DC to Customer	21%	24%	26%	30%	35%	50%

Demand fluctuation plays an important role in determining the optimal transportation flow.Interesting, seasonality was not as significant as expected. The greatest fluctuation in demand was seenwith the OPE market segment, as displayed in Figure 4.

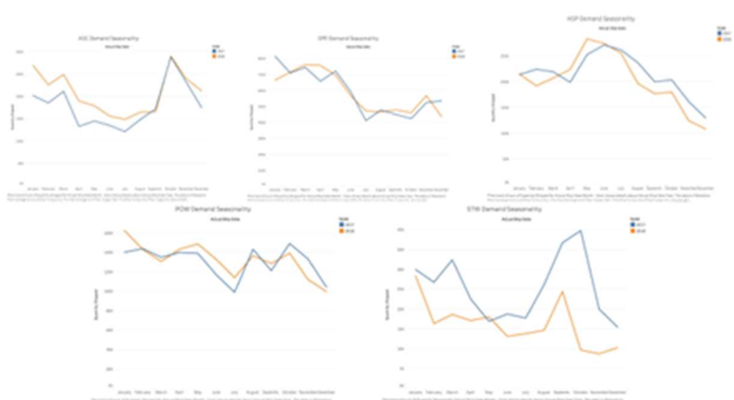

Figure 4 Demand Seasonality for each Market Segment

Generally, as demand increased, the number of customers who were served via direct shipments also increased

Table 5 Impacts of Demand Magnitude on Transportation cost efficiency

DEMAND SENSITIVITY		0.5	0.75	1	1.5	2	3
Freight	MFG to DC	$ 5,292,120	$ 4,704,579	$ 3,946,407	$ 3,449,584	$ 2,839,879	$ 2,097,536
	DC to Customer	$ 3,783,814	$ 3,249,608	$ 2,817,394	$ 2,380,562	$ 2,032,982	$ 1,523,520
	MFG to customer	$ 19,196,898	$20,422,766	$21,933,546	$22,603,569	$ 23,442,548	$24,777,700
Handling Cost		$ 14,978,111	$12,713,617	$10,549,978	$ 8,725,200	$ 7,432,516	$ 5,526,195
Tariffs		$ 17,690,497	$17,658,824	$17,608,825	$17,585,939	$ 17,529,685	$17,495,872
	TOTAL	$ 60,941,440	$58,749,395	$56,856,150	$54,744,855	$ 53,277,610	$51,420,823
By MFG/ Customer							
#	MFG to Customer	128	184	240	331	404	545
	DC to Customer	2,118	2,123	2,107	2,053	1,995	1,873
%	Direct to Customer	6%	8%	10%	14%	17%	23%
	DC to Customer	94%	92%	90%	86%	83%	77%
By Unit							
#	MFG to Customer	156,700	249,265	353,909	559,890	780,510	1,230,662
	DC to Customer	83,561	110,865	126,072	159,835	178,947	208,316
%	Direct to Customer	65%	69%	74%	78%	81%	86%
	DC to Customer	35%	31%	26%	22%	19%	14%

*Costs are provided as expenses incurred for the equivalent of 1 year of demand, so that they can be compaired

The optimal transportation flows identified by the model were very sensitive to changes in handling costs. When handling costs were set to zero, utilization of the DCs for the optimal solution were much greater. When the handling costs were increased to just 5%, optimal utilization of the DCs dropped by half.Changes in the handling costs modified the optimal solution, driving more direct deliveries to the customer as the handling cost increased. Interestingly, as the handling costs increase, the changes in optimal flows fluctuate.

Table 6 Handling Cost Influence on Distribution

HANDLING COSTS		0%	5%	10%	15%	20%
Freight Cost	MFG to DC	$ 449,696	$ 199,017	$ 151,785	$ 134,331	$ 123,383
	DC to Customer	$ 236,396	$ 150,867	$ 108,361	$ 93,265	$ 83,989
	MFG to customer	$ 200,110	$ 640,920	$ 843,598	$ 953,493	$ 1,040,090
Handling Cost		$ -	$ 277,895	$ 405,768	$ 513,338	$ 607,816
Tariffs		$ 673,279	$ 678,873	$ 677,263	$ 677,263	$ 677,263
#	MFG to Customer	51	156	240	311	363
	DC to Customer	2,296	2,191	2,107	2,036	1,984
%	Direct to Customer	2%	7%	10%	13%	15%
	DC to Customer	98%	93%	90%	87%	85%

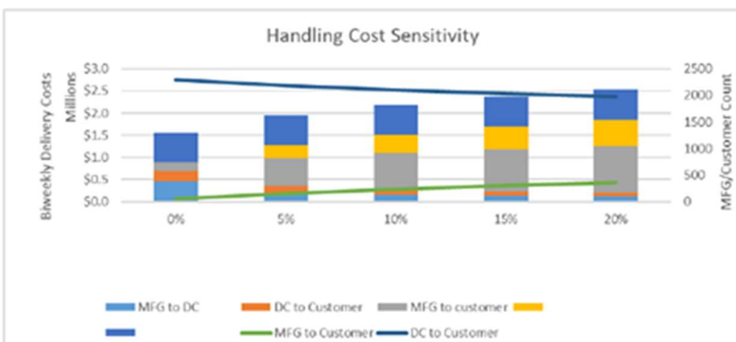

Figure 5 Handling Cost Sensitivity

The model does not consider holding costs nor does it include service level requirements for the customers. Inclusion of the holding costs would further increase the financial incentives of shipping direct to customer. However, if a customer requires tires or wheels with a short turn-around time, then that may preclude the option to ship direct from the manufacturer.

VIII. CONCLUSION

The document proposes "a new methodology to control logistics costs. Further testing at different companies and on different products is needed to obtain improvements in terms of calculating the types of logistics costs that have not been included in the verification of the applicability of the model in the hinge of the G9 product. The model is designed to calculate the logistics costs of a single product; therefore, future research should be oriented towards determining the possibilities of integrating the model into a single management information system that covers all the products that a company produces."

It can be concluded that "the models are not directed at all logistics costs, but at the individual relationship between transportation, storage and inventory costs. Scientific studies focus on these costs, since they represent the majority in the logistics cost structure. Other logistics costs are analyzed to a lesser extent, because different authors classify them differently and group them with the three types of logistics costs most commonly studied. Furthermore, logistics costs and the relationships between them are difficult to measure and even more difficult to transform into a cost model, since they can be influenced by so many exogenous factors and the fact that many of them are not stationary [28]. However, this should not discourage us from establishing a system that can be used to assess and measure all logistics costs and attempt to effectively translate changes in the environment into a cost model. This can be achieved if the logistics models are developed in such a way that they can be updated with new cost variables."

We did not see significant changes in "the optimal transportation flow in response to transportation rate fluctuations. This indicates there is more resilience in the transportation network design and does not require frequent adjustments once an optimal flow is identified. The transportation flows were also not very reactive to fluctuations in demand, so the optimal flow would serve Carlstar well for both their regular and high seasons. As demand increased, however, it did become more cost effective to ship direct to the customer.The model was, however, very reactive to changes in the handling costs. The optimal solution without handling costs utilized a transportation structure that was much more efficient than the flows that had to consider handling costs. It is recommended that Carlstar investigate the handling costs at each location and for each market segment. The newly calculated handling costs could then be entered into the model to gain greater clarity into the most cost-effective flow network. It can be concluded that out side influences did not materially change the optimal flows for Carlstar as much as influences under Carlstar's control. The largest levers, handling costs and demand, are functions that Carlstar has the most control over. Thus, Carlstar is in a great position to weather swings in both transportation and tariff rates."

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