A Study on Financial Impact of Supply Chain Decision of Confectionery Products in India

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***Abstract*:-Confectionery products were generating less profit compared to other food products.So,a study was undertaken in the supply chain function to analyze the reasons for low profit margin. The study undertaken examines the financial impact of supply chain decisions by taking into consideration different scenario with reference to reductions in the areas of transportation, warehousing and inventory carrying.**

***Keywords*--confectionery; supply chain; profitability; inventory; financial impact**

I. INTRODUCTION

In an organization supply chain network assumes a critical part in learning the profitability level. Supply chain challenges as a fast growing network possessing incredible complexities driven by globalization and product variety, competing in a fast changing environment. Under such conditions practices of supply chain management shows improvements in operational and financial performance. A supply chain should not only be efficient and lean but must also be dynamic and responsive.The productiveness of SCM influences the cost of fulfilling clients orders and transporting these requests to the clients, both of which effect the general landed cost of an item, this determine the financial outcomes of the firm. The study gives an overview on increasing the industries profitability by taking into consideration different scenario and it also gives in-depth understanding about the operations of supply chain and its effect on the aspects of finance.

II. OBJECTIVES

i. To understand the financial impact on basic supply chain alternatives, i.e. transportation cost, warehousing cost, inventory carrying costs.
ii. To analyze service failure in the areas of order fill rates.
iii. To estimate the lowest-cost reorder point under uncertainty of demand.

III. METHODOLOGY

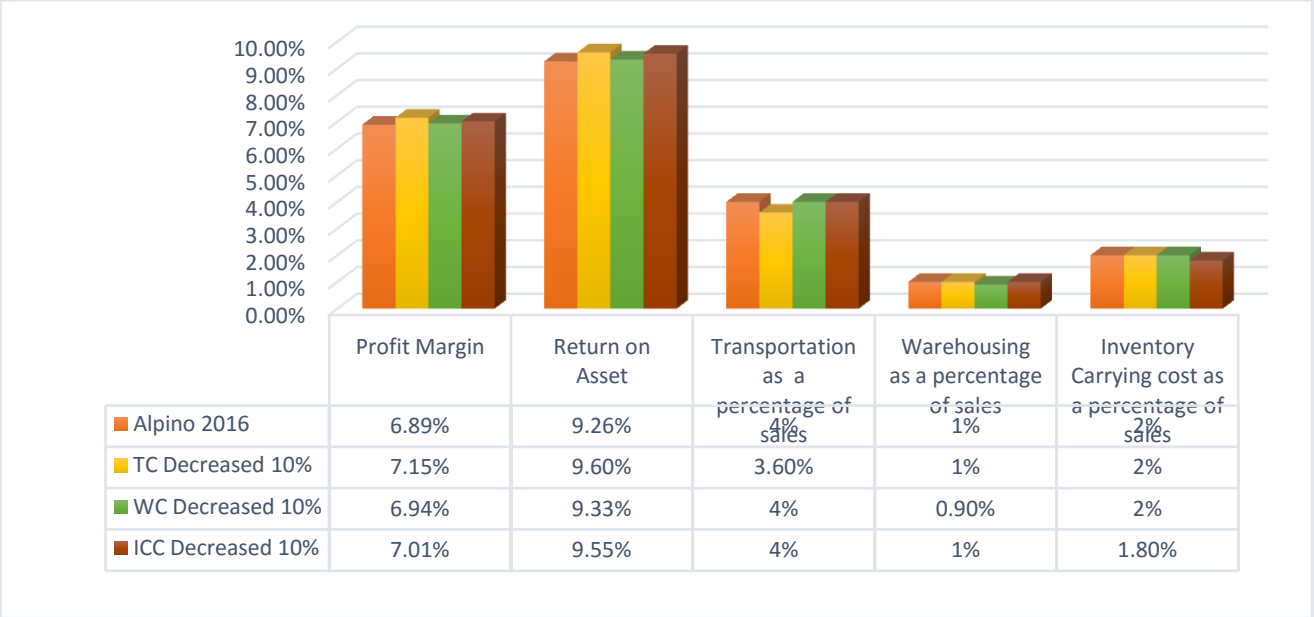
i. The data collection pertaining to the study involves secondary data collected from annual report and well established books, journals, and internet and does not include any primary data. The calculations are based on financial data of confectionery industries published in the annual report.
ii. Adopted methodology is to accumulate appropriate information pertaining to the relevant department, correspond the data obtained and to exhibit the material in an orderly and rational manner.
iii. MS Excel tool has been used for the purpose of analyzing the data.

IV. RESULTS

Comparison of Supply Chain Alternative

Table 4.1: Comparison of Supply Chain Alternative Decreased to 10 Percent

Ratio Analysis	**Actuals**	**Transportation cost decreased 10 Percent**	**Warehousing cost decreased 10 Percent**	**Inventory carrying cost decreased 10 Percent**
Profit Margin	6.89%	7.15%	6.94%	7.01%
Return On Assets	9.26%	9.60%	9.33%	9.55%
Inventory Turns/Year	6.5433	6.5433	6.5433	7.2704
Transportation as percentage of sales	4.00%	3.60%	4.00%	4.00%
Warehousing as a percentage of Sales	1.00%	1.00%	0.90%	1.00%
Inventory Carrying Cost as a percentage of Sales	2.00%	2.00%	2.00%	1.80%



	Profit Margin	Return on Asset	Transportation as a percentage of sales	Warehousing as a percentage of sales	Inventory Carrying cost as a percentage of sales
Alpino 2016	6.89%	9.26%	4%	1%	2%
TC Decreased 10%	7.15%	9.60%	3.60%	1%	2%
WC Decreased 10%	6.94%	9.33%	4%	0.90%	2%
ICC Decreased 10%	7.01%	9.55%	4%	1%	1.80%

Figure 4.1: Comparison of Decreased 10 per cent

Interpretation: Figure 4.1 shows that a reduction of 10 per cent in basic supply chain alternatives will generate more return on asset. Reduction in transportation cost and inventory carrying cost gives high return on asset as compared to reduction in warehousing cost; i.e. 9.60 per cent and 9.55 per cent respectively which is relatively higher than 9.33 per cent accounting for warehousing cost.

Table 4.2: Comparison of Supply Chain Alternative Increased to 10 Percent

Ratio Analysis	**Actuals**	**Transportation cost Increased 10 Percent**	**Warehousing cost Increased 10 Percent**	**Inventory carrying cost Increased 10 Percent**
Profit Margin	6.89%	6.60%	6.80%	6.73%
Return On Assets	9.26%	8.86%	9.14%	8.93%
Inventory Turns/Year	6.5433	6.5433	6.5433	5.9485
Transportation as percentage of Sales	4.00%	4.40%	4.00%	4.00%
Warehousing as a percentage of Sales	1.00%	1.00%	1.10%	1.00%
Inventory Carrying Cost as a percentage of Sales	2.00%	2.00%	2.00%	2.20%

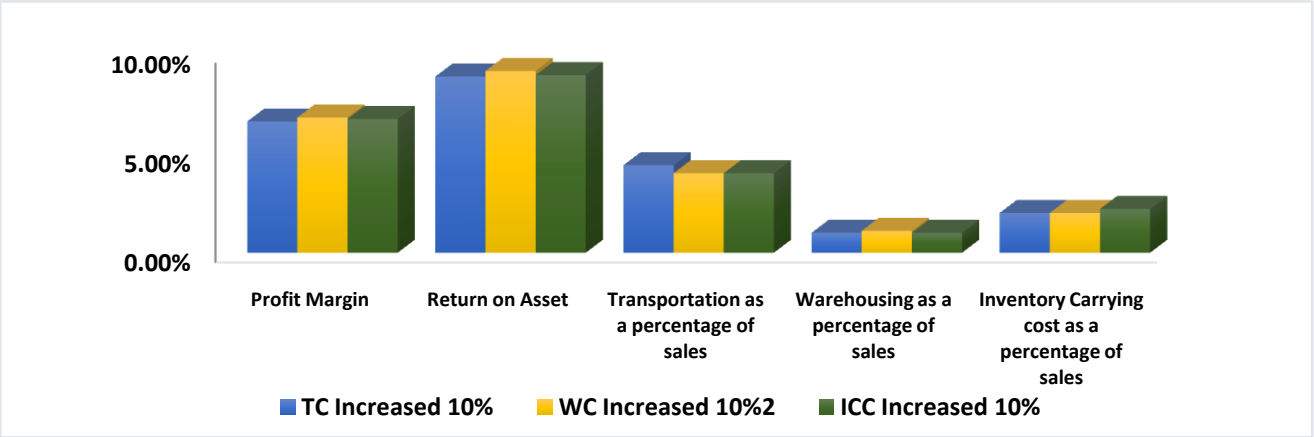


Figure 4.2: Comparison of Increased 10 per cent

Interpretation: Figure 4.2 shows that increase in 10 per cent in basic supply chain alternatives lead to decrease in profit margins, lowering the profits of the company. It is noticed that 10 per cent increase in transportation cost results in low profit margin i.e. 6.60 per cent compared to others.

Supply Chain Financial Implications

It is seen in the supply chain profile that confectionery industry has experienced service failure in the areas of order fill rates. The 97 percent of the orders are filled correctly. The alternative view of this service is that 3 percent of the orders are unfulfilled.

The result of this supply chain service failure are added to the cost to correct the problem and lost sales. When supply chain failure occurs, a portion of the customers experiencing the service failure will request that the orders be corrected and the others will refuse the orders. The refused orders represent lost sales revenue that must be deducted from the total sales. For rectified orders customers might request an invoice deduction to compensate them for any inconvenience or added costs. Finally the seller incurs a re-handling costs associated with the correcting the orders such as reshipping the correct items and returning the incorrect and refused items.

Table 4.3: Input data for Order fill rate

INPUT DATA	
% CF	97.12
Annual Orders	60000000 grms
SP= Revenue/Order	40
CG= Cost Of Goods/Order	26
Lost Sales Rate	10%
ROC= Rehandling Cost/Order	15
IDR= Invoice Deduction Rate	10
Transportation Cost	3039267
Warehousing Cost	759817
Interest Cost	4837116
Other Operating Cost	8310347
Inventory	7633533
Cash	4645815
Trade Receivable	729306
Fixed Assets	29096352
W= Inventory Carrying Cost	20%

Interpretation: Table 4.3 provides data which is required to analyse increase and decrease in profit for Confectionery Products. It shows that the correctly filled orders account for 97 per cent with 60000000 grams of orders annually having selling price of Rs. 40 for per order.

Table 4.4: Financial Impact of Reducing Order Fill Rate

FINANCIAL IMPACT OF REDUCING ORDER FILL RATE			
	On time rate 97%	**On time rate 95%**	**On time rate 96%**
Annual Orders	60000000	60000000	60000000
Orders Filled Correctly	58200000	57000000	57600000
Service Failure Orders	1800000	3000000	2400000
Lost Sales Orders	180000	300000	240000
Rectified Orders	1620000	2700000	2160000
Net Order Sold	59820000	59700000	59760000
Sales	2400000000	2400000000	2400000000
Less: Invoice Deduction	16200000	27000000	21600000
Lost Sales Revenue	7200000	12000000	9600000
Net Sales	2376600000	2361000000	2368800000
Cost Of Goods Sold	1555320000	1552200000	1553760000
Gross Margin (GM)	821280000	808800000	815040000
Re-handling Cost	27000000	45000000	36000000
Transportation	3039267	2431414	2735340
Warehousing	759817	759817	759817
Inventory Carrying	1519633	1519633	1519633
Other Operating Cost	8310347	8310347	8310347
Total Operating Cost	40629064	58021211	49325137
Earnings Before Interest and Taxes	780650936	750778789	765714863
Interest	4837116	4837117	4837116
Taxes (31% X (EBIT-INT)	240502284	231241918	235872102
Net Income	535311536	514699754	525005645
Profit Decreased/ Profit Increased		-20611782	-10305890

Interpretation: Table 4.4 shows 1 per cent decrease in order fill rate from 97 per cent to 96 per cent results in an decrease in net income by Rs.1,03,05,890 whereas, 2 percent decrease in order fill rate from 97 per cent to 95 per cent results in an reduction in net income of Rs.2,06,11,782.

Table 4.5: Financial Impact of Improving Order Fill Rate

FINANCIAL IMPACT OF IMPROVING ORDER FILL RATE			
	On time rate 97%	**On time rate 98%**	**On time rate 99%**
Annual Orders	60000000	60000000	60000000
Orders Filled Correctly	58200000	58800000	59400000
Service Failure Orders	1800000	1200000	600000
Lost Sales Orders	180000	120000	60000
Rectified Orders	1620000	1080000	540000
Net Order Sold	59820000	59880000	59940000
Sales	2400000000	2400000000	2400000000
Less: Invoice Deduction	16200000	10800000	5400000
Lost Sales Revenue	7200000	4800000	2400000
Net Sales	2376600000	2384400000	2392200000
Cost Of Goods Sold	1555320000	1556880000	1558440000
Gross Margin (GM)	821280000	827520000	833760000
Re-handling Cost	27000000	18000000	9000000
Transportation	3039267	3343194	3647120
Warehousing	759817	759817	759817
Inventory Carrying	1519633	1519633	1519633
Other Operating Cost	8310347	8310347	8310347
Total Operating Cost	40629064	31932991	23236917
Earnings Before Interest and Taxes	780650936	795587009	810523083
Interest	4837116	4837116	4837117
Taxes (31% X (EBIT-INT)	240502284	245132467	249762649
Net Income	535311536	545617426	555923317
Profit Decreased / Profit Increased		10305890	20611781

Interpretation: Table 4.5 shows that 1 per cent improvement in order fill rate from 97 per cent to 98 per cent results in an increase in net income of Rs.1,03,05,890 whereas, 2 percent improvement in order fill rate from 97 percent to 99 percent results in an increase in net income of Rs.2,06,11,781.

Uncertainty of demand

Assume that the confectionery products demand during the lead time ranges from 2,00,00,000 grams to 5,00,00,000 grams, with an average of 3,50,00,000 grams. Furthermore, assume that the demand has a discrete distribution varying in ten-gram block and that the firm has established probabilities for these demand levels as shown in the table 4.6 below.

In effect firm must consider seven different reorder points, each corresponding to a possible demand level in table 11. Using these reorder points we can develop a matrix that appears in the table 4.7.

Table 4.6: Probability distribution of demand during lead time

Demand (grams)	**Probability**
20000000	0.03
25000000	0.04
30000000	0.28
35000000	0.3
40000000	0.28
45000000	0.04
50000000	0.03

Interpretation: Table 4.6 shows demand of Confectionery Products in grams which ranges from 2,00,00,000 grams to 5,00,00,000 grams assuming probabilities at different level of demand, this will enable to find out the lowest reorder point under demand uncertainty.

Table 4.7: Possible grams of inventory short or in excess during lead time during with various reorder points

	REORDER POINTS						
Actual Demand	**20000000**	**25000000**	**30000000**	**35000000**	**40000000**	**45000000**	**50000000**
20000000	0	5000000	10000000	15000000	20000000	25000000	30000000
25000000	-5000000	0	5000000	10000000	15000000	20000000	25000000
30000000	-10000000	-5000000	0	5000000	10000000	15000000	20000000
35000000	-15000000	-10000000	-5000000	0	5000000	10000000	15000000
40000000	-20000000	-15000000	-10000000	-5000000	0	5000000	10000000
45000000	-25000000	-20000000	-15000000	-10000000	-5000000	0	5000000
50000000	-30000000	-25000000	-20000000	-15000000	-10000000	-5000000	0

Interpretation: Table 4.7 shows actual demand at various level wherein average demand is at 3,50,00,000 grams. It determines the possible grams of inventory short or in excess at seven levels of reorder points during uncertainty of demand which ranges from 2,00,00,000 grams to 5,00,00,000 grams.

Table 4.8: Expected number of grams short or in excess

		REORDER POINTS						
Actual Demand	**Probabilities**	**20000000**	**25000000**	**30000000**	**35000000**	**40000000**	**45000000**	**50000000**
20000000	0.03	0	150000	300000	450000	600000	750000	900000
25000000	0.04	-200000	0	200000	400000	600000	800000	1000000
30000000	0.28	-2800000	-1400000	0	1400000	2800000	4200000	5600000
35000000	0.30	-4500000	-3000000	-1500000	0	1500000	3000000	4500000
40000000	0.28	-5600000	-4200000	-2800000	-1400000	0	1400000	2800000
45000000	0.04	-1000000	-800000	-600000	-400000	-200000	0	200000
50000000	0.03	-900000	-750000	-600000	-450000	-300000	-150000	0

Interpretation: Table 4.8 shows that the expected grams short or in excess by multiplying the number of grams short or in excess by the probabilities associated with each demand level.

Table 4.9: Calculations of Lowest -Reorder Points

		20000000	**25000000**	**30000000**	**35000000**	**40000000**	**45000000**	**50000000**
1	Expected excess per cycle (of vales above diagonal line)	0	150000	500000	2250000	5500000	10150000	15000000
2	Expected carrying cost per year	0	87750	292500	1316250	3217500	5937750	8775000
3	Expected shorts per cycle (of values below diagonal line)	15000000	10150000	5500000	2250000	500000	150000	0
4	Expected stock out cost per cycle	3510000	2375100	1287000	526500	117000	35100	0
5	Expected stock out cost per year	10530000	5700240	2574000	895050	175500	45630	0
6	Expected total cost per year (2+5)	10530000	5787990	2866500	2211300	3393000	5983380	8775000

Interpretation: Table 14 shows the calculation the total cost for each of the seven reorder levels. In this instance, the lowest cost corresponds to the reorder point of 3,50,00,000 grams. In spite of the fact that this number does not ensure deficit or surplus in a specific period, generally it gives the

most minimal aggregate cost of Rs.22,11,300 grams for each year.

V. CONCLUSION

In this study, the focus of SCM is cost reduction of confectionery products to increase its profitability in the premium segment confectioneries to compete with other confectionery producing industries; in various areas such as improving on order fill rates, implementing lowest reorder point for inventory and minimizing the costs in the area of inventory carrying, warehousing and transportation. Therefore, new supply practices and process innovations are required for continuous improvement in performance and profitability.

To construct a productive model between organisational performance and supply chain decision, the firms supply chain organisation must understand how its decisions and actions are linked to the firm's financial component. It should then analyse the impact that its various components and actions have on the outcomes that affects the financial performance. This will help that supply chain organisation in implementing and making decisions which are valued by the firm's top management.

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