

Investigation of effect of Supply chain disruption on Customer Satisfaction

Mr Pratik Ranpara

Research Scholar,

Rai University, Ahmedabad; INDIA,

Prof (Dr) Himanshu Vaidya.

Abstract

Effect of Variable Supply chain disruption on customer satisfaction in supply chain has been tested in Gujarat Medical Service Corporation Limited. There are many variables affecting the customer satisfaction in supply chain, but in this paper one variable Supply chain disruption has been selected and tested. This paper is an attempt to understand the effect of Supply chain disruption on customer satisfaction related to GMSCL warehouses. And also attempt to understand and improve supply chain.

Key words - Supply chain Management, Supply chain disruption, Customer Satisfaction, Distribution Chain, and Variable

Introduction

A supply chain is a system of organizations, people, activities, information, and resources involved in moving a product or service from supplier to customer. Supply chain activities involve the transformation of natural resources, raw materials, and components into a finished product that is delivered to the end customer. In sophisticated supply chain systems, used products may re-enter the supply chain at any point where residual value is recyclable. Supply chains link value chains.

In this paper supply chain management with special reference to CMSO (which is now transferred to GMSCL), particularly with - Gujarat Medical Services Corporation Limited (GMSCL) ware house, dealing with drug supply to government hospitals has been studied.

Available Drug Warehouses

GMSCL Regional Warehouse Detail

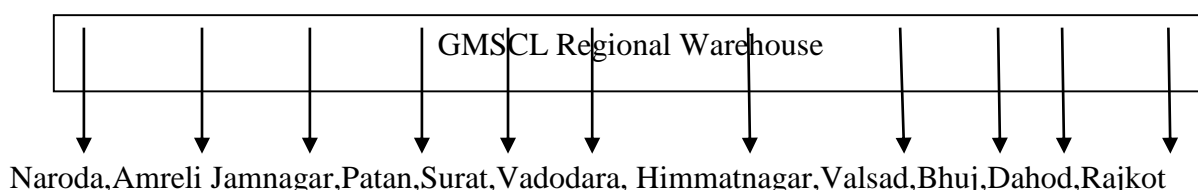


Figure 1.1 - GMSCL Regional Warehouse Detail

Table 1.1 – Supply Chain Variables for Results

Quality improvement	Enables SC to provide quality Products and better services to the customers	Christopher & Towill (2001), Naylor, Naim, & Berry (1999), Person & Olhager (2000).
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The Indian Pharmaceutical Industry has gained significant attention in the last decade and is all set to become a major market for pharmaceuticals in the next 5 years. The industry is expected to grow at a CAGR of 15% to 20% to grow to \$74 billion in the next decade. Several of the top pharma companies in India are partly foreign-owned. The major companies in India are Cipla, Lupine Ltd, Dr.Reddy's, and Sun Pharmaceuticals, Merck, Novartis, Glen mark and Cadila healthcare. Economic growth in India has also contributed to increase in purchasing power and higher spending on healthcare among middle class Indians.

A typical supply chain of any pharmaceutical company is shown below:

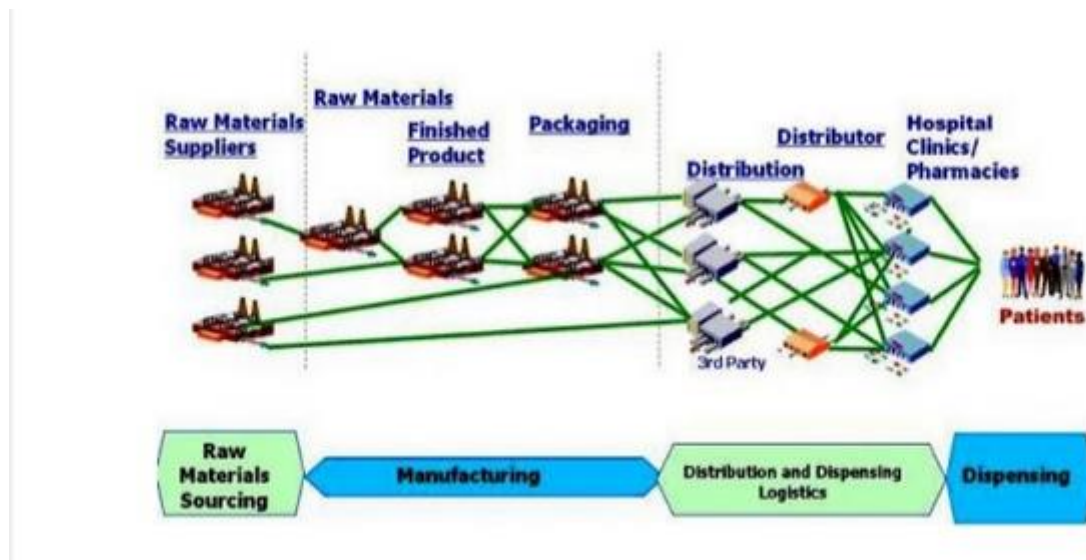


Figure 1.2- A typical supply chain of any pharmaceutical company

It can be broadly divided into four sections based on the type of material handled and the point of entry into the supply chain.

Raw material sourcing,

Manufacturing,

Distribution & dispensing logistics,

Dispensing

Purpose of the Study

1. To study the supply chain within the pharmaceutical industry.
2. To study the supply chain of GMSCL
3. To study the impact of Product Quality of GMSCL on customer satisfaction
4. To suggest strategies to improve the supply chain management for GMSCL.

Literature Review

The pharmaceutical industries are under severe pressure, all over the globe. R & D costs are increasing, product life cycle is reducing and consumers' awareness is increasing. Performance criteria are changing on day-to-day bases. According to Kim (2009), SCM seeks to enhance competitive performance by closely integrating the internal functions within a company and effectively linking them with the external operations of suppliers, customers and other channel members. There are numerous theoretical arguments describing the role of supply chain integration for the improvement of business performance and competitive capabilities (Powell, 1995; Johnson, 1999; Stank et al., 2001; Tracy, 2004; Koufteros et al., 2005; Sanders and Premus, 2005; Vachon and Klassen 2008). Narasimhan and Carter (1998) has noticed that supply chain strategies and operational resources can be used to support business strategies and help in improving the competitive capabilities of the firm. Dangayach and Deshmukh (2001) have observed that those firms that can manage their practical resources in a supply chain more efficiently are

likely to gain competitive capabilities. They also concluded that developing world-class SCM practices can help them achieve superior performance and increased competitiveness. Fleury and Fleury (2003) have emphasized that the definition of competitive capabilities should begin with a thorough understanding of the strategic activities characterized by physical, financial, organizational and human resources on a supply chain.

Research Methodology

The study was conducted to study the impact of Supply chain disruption of GMSCL on customer satisfaction. The determination of sample was 518. It was decided arbitrarily contain from different drug demanding organization of GMSCL. Research data was collected by administering questionnaire to the respondents. And collected data was analyzed and interpreted.

Questionnaire used are mentioned in annexure I. Total 4 questions are asked to respondents for testing customer satisfaction. Besides that for descriptive statistics and profile of the respondent personal of particulars, profession, under which location of warehouse supply, assets having etc. asked. Four question used are Continuity of supply of medicines without disruption in route plan, Justification provided for supply chain disruption, Efficiency of Counter supply of medicines on disruption in route plan. Last overall satisfaction with Supply chain disruption by GMSCL warehouses asked.

Data Analysis and Interpretation

The data has been collected with the help of questionnaire. It has been analyzed and interpreted with the help of tables along with relevant descriptions. Appropriate treatment has been done to the raw data and logical conclusions based on the findings.

Profile of Respondents

This section present the response rate acquired in the survey along with characteristics of the respondents. The questionnaires were circulated individually through Google form. The respondents are classified mainly based on associated GMSCL ware house, profession or educational status, their age and gender.

Classification based on associated GMSCL ware house

The distribution based on associated GMSCL ware house of the respondents was analyzed with the help of the following chart and table.

Chart 1.1: Classification of Respondents based on associated GMSCL ware house

Which GMSCL are you associated with?

517 responses

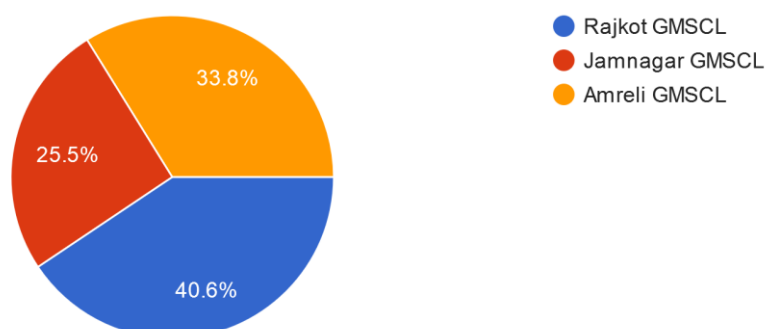


Table 1.2: Classification of Respondents based on associated GMSCL ware house

GMSCL	Frequency	Percentage
Rajkot GMSCL	210	40.6
Jamnagar GMSCL	132	25.5
Amreli GMSCL	175	33.8
Total	517	99.9

From the table 1.2 and chart 1.1, it is identified that out of the 518 respondents 40.6% respondents are associated with Rajkot GMSCL, 25.5% respondents are associated with Jamnagar GMSCL and 33.8% respondents are associated with Amreli GMSCL.

Classification based on Profession

The distribution based on Profession of the respondents was analyzed with the help of the following chart and table.

Chart 1.2: Classification of Respondents based on Profession

Please tick which profession you belong to.

513 responses

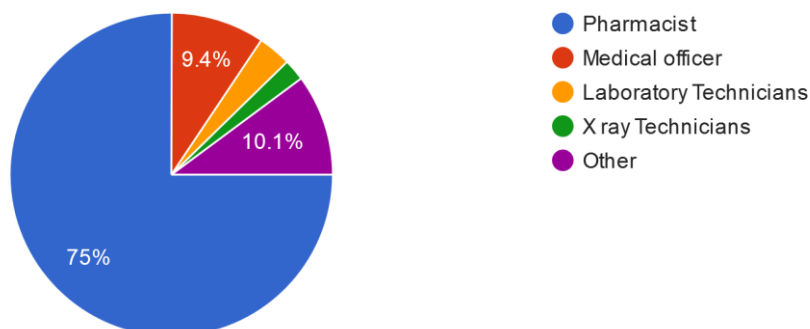


Table 1.3: Classification of Respondents based on Profession

Profession	Frequency	Percentage
Pharmacist	385	75
Medical Officer	48	9.4
Laboratory Technicians	17	3.3
X Ray Technicians	11	2.1
Other	52	10.1
Total	513	99.9

From the table 1.3 and chart 1.2 it is identified that out of the 518 respondents 75% are Pharmacist, 9.4% are Medical Officer, 3.3% are Laboratory Technicians, 2.1% are X Ray Technicians and 10.1% are of other different profession.

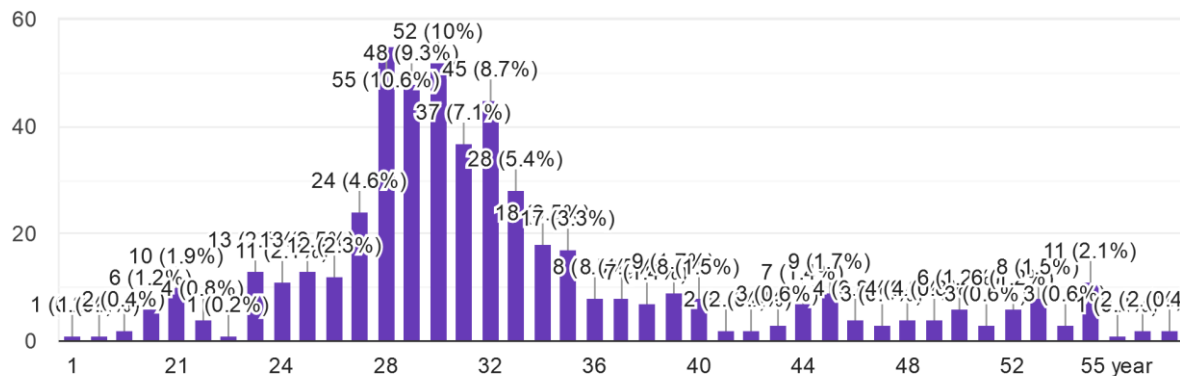
Classification based on Age

The distribution based on Age of the respondents was analyzed with the help of the following chart.

Chart 1.3: Classification of Respondents based on Age

Age

518 responses



From the chart 1.3 it is identified that out of the 518 respondents maximum are from age group between 23 to 36 years. Mostly young generation is associated with this department.

Classification based on Gender

The distribution based on Gender of the respondents was analyzed with the help of the following chart.

Chart 1.4: Classification of Respondents based on Gender

Gender

518 responses

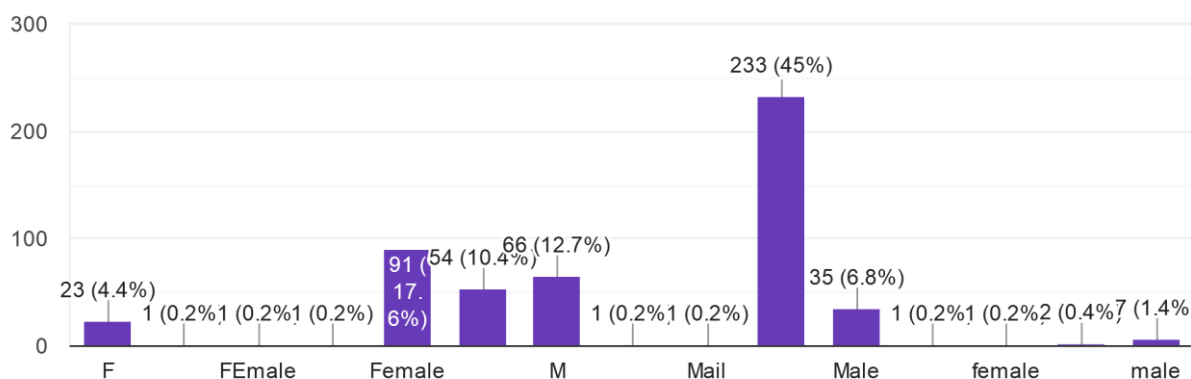


Chart 1.4 depicts the profile of respondent. It is evident from the chart that out of 518 respondents 343 are male and 175 are female. Male dominates the respondents in survey as 66.21% respondents are male.

Descriptive Statistics

Table 1.4: Descriptive Statistics for Supply chain disruption

Descriptive Statistics

	N	Maximum	Mean		Std. Deviation	Variance	Skewness		Kurtosis	
	Statistic	Statistic	Statistic	Std. Error	Statistic	Statistic	Statistic	Std. Error	Statistic	Std. Error
Q1.1	518	5	1.81	.033	.755	.570	1.527	.107	4.093	.214
Q1.2	518	5	1.78	.030	.675	.455	1.399	.107	4.820	.214
Q1.3	518	5	1.75	.032	.735	.540	1.371	.107	3.295	.214

Above Table 1.4 displays mean and standard deviation for each attribute of Supply chain disruption. Mean score of Continuity of supply of medicines without disruption in route plan 1.81 and std. deviation 0.755 which is highest among others attribute. This show Continuity of supply of medicines without disruption in route plan is important attribute to explain Supply chain disruption. Next is Justification provided for supply chain disruption having mean score 1.78 and std. deviation 0.675 which show that this is 2nd important to measure Justification provided for supply chain disruption. Mean score of Efficiency of Counter supply of medicines on disruption in route plan is 1.75 so we may conclude it as a least important attribute to explain Supply chain disruption.

Respondent’s opinion towards different Supply chain disruption attribute

To measure respondent’s feedback towards different Supply chain disruption attributes five point Likert’s scale described at either end ‘Very Satisfied’ or ‘Very Dissatisfied’ was used .

Respondent’s opinion on Continuity of supply of medicines without disruption in route plan

Chart 1.5 Respondent’s opinion on Continuity of supply of medicines without disruption in route plan

Continuity of supply of medicines without disruption in route plan

518 responses

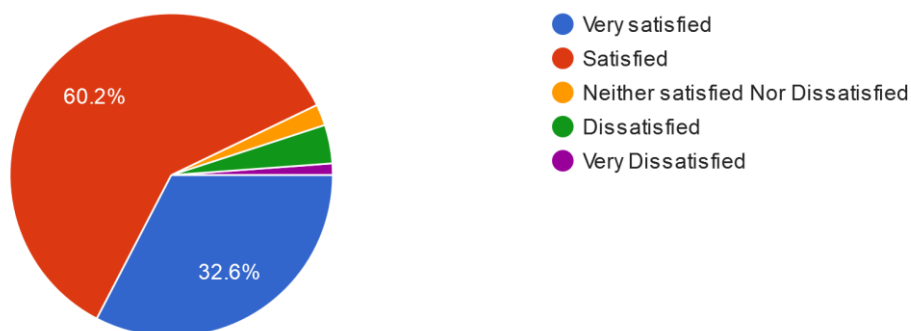


Table 1.5 Respondent's opinion on Continuity of supply of medicines without disruption in route plan

Response from Customer	Number of Respondent	Percentage
Very Satisfied	169	32.6
Satisfied	312	60.2
Neither Satisfied Nor Dissatisfied	11	2.1
Dissatisfied	20	3.9
Very Dissatisfied	6	1.2
Total	518	100

Table 1.5 and chart 1.5 shows that 92.8% are feeling satisfied so we may conclude that most of the respondents are satisfied with Continuity of supply of medicines without disruption in route plan of their Supply chain disruption. Only 5.1% respondents are dissatisfied with Continuity of supply of medicines without disruption in route plan and 2.1% are neither satisfied nor dissatisfied with Continuity of supply of medicines without disruption in route plan of their Supply chain disruption.

Respondent's opinion on Justification provided for supply chain disruption

Chart 1.6 Respondent's opinion on Justification provided for supply chain disruption

Justification provided for supply chain disruption

518 responses

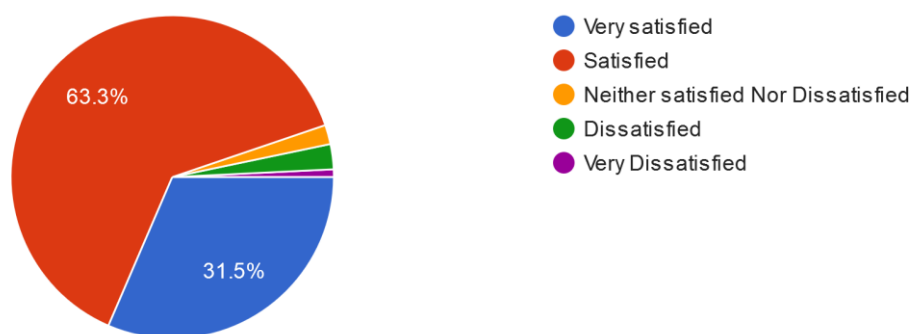


Table 1.6 Respondent's opinion on Justification provided for supply chain disruption

Response from Customer	Number of Respondent	Percentage
Very Satisfied	163	31.5
Satisfied	328	63.3
Neither Satisfied Nor Dissatisfied	10	1.9
Dissatisfied	13	2.5
Very Dissatisfied	4	0.8
Total	518	100

Table 1.6 and chart 1.6 shows that 94.8% are feeling satisfied so we may conclude that most of the respondents are satisfied with Justification provided for supply chain disruption of their Supply chain disruption. Only 3.3% respondents are dissatisfied with Justification provided for supply chain disruption and 1.9% are neither satisfied nor dissatisfied with Justification provided for supply chain disruption.

Respondent’s opinion on Efficiency of Counter supply of medicines on disruption in route plan

Chart 1.7 Respondent’s opinion on Efficiency of Counter supply of medicines on disruption in route plan

Efficiency of Counter supply of medicines on disruption in route plan

518 responses

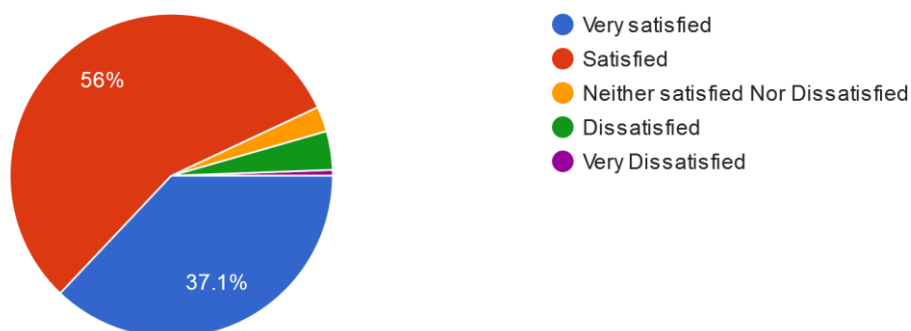


Table 1.7 Respondent’s opinion on Efficiency of Counter supply of medicines on disruption in route plan

Response from Customer	Number of Respondent	Percentage
Very Satisfied	192	37.1
Satisfied	290	56
Neither Satisfied Nor Dissatisfied	13	2.5
Dissatisfied	20	3.9
Very Dissatisfied	3	0.6
Total	518	100

Table 1.7 and chart 1.7 shows that 93.1% are feeling satisfied so we may conclude that most of the respondents are satisfied with Efficiency of Counter supply of medicines on disruption in route plan of their Supply chain disruption. Only 4.5% respondents are dissatisfied with Efficiency of Counter supply of medicines on disruption in route plan and 2.5% are neither satisfied nor dissatisfied with Efficiency of Counter supply of medicines on disruption in route plan of their Supply chain disruption.

Respondent’s opinion on Efficiency of Overall satisfaction with supply chian Disruptio

Chart 1.8 Respondent’s opinion on Overall satisfaction with supply chian Disruption

Overall satisfaction with supply Chain Disruption

518 responses

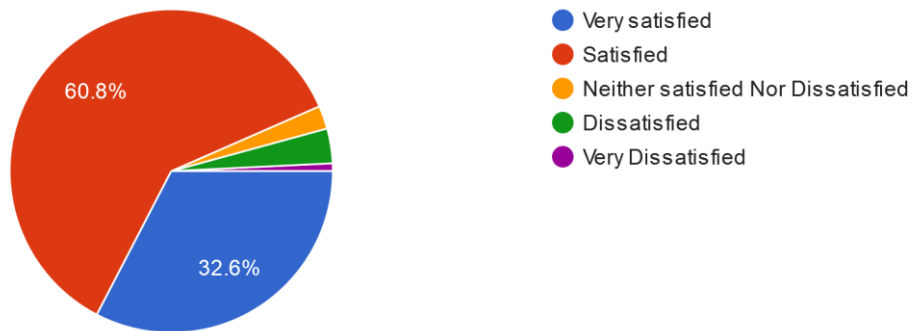


Table 1.8 Respondent’s opinion on Overall satisfaction with supply chian Disruption

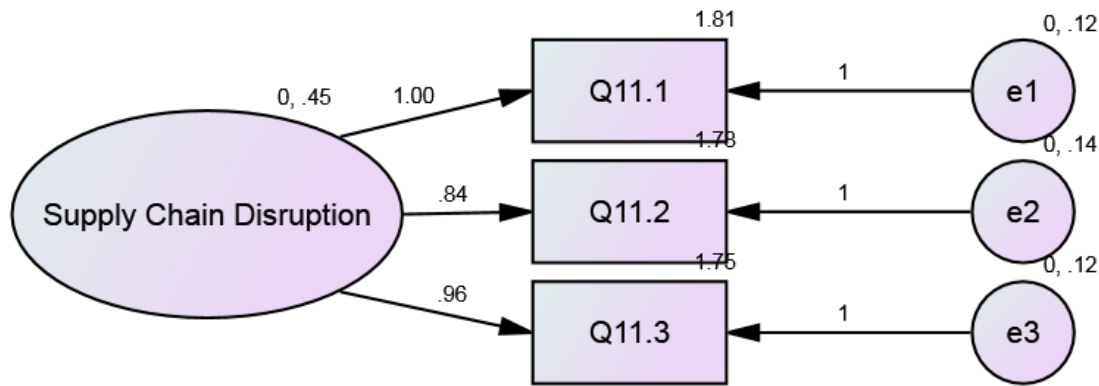
Response from Customer	Number of Respondent	Percentage
Very Satisfied	169	32.6
Satisfied	315	60.8
Neither Satisfied Nor Dissatisfied	12	2.3
Dissatisfied	18	3.5
Very Dissatisfied	4	0.8
Total	518	100

Table 1.8 and chart 1.8 shows that 93.4% are feeling satisfied so we may conclude that most of the respondents are overall satisfied with Supply chain disruption. Only 4.3% respondents are dissatisfied and 2.3% are neither satisfied nor dissatisfied overall with Supply chain disruption.

Confirmatory Factor Analysis (CFA)

Product Quality

Chart 1.9 SEM Supply Chain Disruption



Model Fit Summary

CMIN

Model	NPAR	CMIN	DF	P	CMIN/DF
Default model	9	.000	0		
Saturated model	9	.000	0		
Independence model	6	975.843	3	.000	325.281

Baseline Comparisons

Model	NFI Delta1	RFI rho1	IFI Delta2	TLI rho2	CFI
Default model	1.000		1.000		1.000
Saturated model	1.000		1.000		1.000
Independence model	.000	.000	.000	.000	.000

Parsimony-Adjusted Measures

Model	PRATIO	PNFI	PCFI
Default model	.000	.000	.000
Saturated model	.000	.000	.000
Independence model	1.000	.000	.000

NCP

Model	NCP	LO 90	HI 90
Default model	.000	.000	.000
Saturated model	.000	.000	.000
Independence model	972.843	873.809	1079.260

FMIN

Model	FMIN	F0	LO 90	HI 90
Default model	.000	.000	.000	.000
Saturated model	.000	.000	.000	.000
Independence model	1.888	1.882	1.690	2.088

RMSEA

Model	RMSEA	LO 90	HI 90	PCLOSE
Independence model	.792	.751	.834	.000

AIC

Model	AIC	BCC	BIC	CAIC
Default model	18.000	18.140		
Saturated model	18.000	18.140		
Independence model	987.843	987.937		

ECVI

Model	ECVI	LO 90	HI 90	MECVI
Default model	.035	.035	.035	.035
Saturated model	.035	.035	.035	.035
Independence model	1.911	1.719	2.117	1.911

HOELTER

Model	HOELTER	HOELTER
Default model	.05	.01
Independence model	5	7

Table 1.9 Reliability and Validity Analysis Supply Chain Disruption

Reliability Statistics

Cronbach's Alpha	Cronbach's Alpha Based on Standardized Items	N of Items
.900	.901	3

AVE

Standardized Regression Weights: (Group number 1 - Default model)

			Estimate	Square
Q1.1	<---	SCD	0.889	0.790321
Q1.2	<---	SCD	0.836	0.698896
Q1.3	<---	SCD	0.878	0.770884

AVE 0.753367

Confirmatory Factor Analysis was conducted to check the composite reliability and Average variance explained (AVE) for the variables of customer satisfaction. Customer Satisfaction is positively related with variable Supply chain disruption. The same were validated using CFA. Structural Equation Modeling (SEM) has been employed to find the interrelations among Supply chain disruption and customer satisfaction. SEM results highlight that the model is good fit. As findings of the study shows, CFI is 1 considered for the good fit for a complex model like the one being considered in this study. Table 1.9 shows Cronbach's alpha for Supply chain disruption 0.900 and Average variance extracted (AVE) is 0.753367. The results show that the values of Cronbach's alpha and composite reliability are above the 0.70 benchmark indicating strong internal reliability. AVE values of all the constructs, which are near or above 0.5 indicates strong convergent validity. AVE value 0.753367 shows 75% questionnaire explain customer satisfaction. Table 1.4 justifies importance frequency of attributes selected. Thus model fit have been established.

There is significant relationship between Supply chain disruption and customer satisfaction is validated using CFA and SEM. AVE value 0.753367 shows there is Strong relationship between Supply chain disruption and Customer Satisfaction. Strong significant impact of the Supply chain disruption of GMSCL on Customer Satisfaction is proved after study.

Conclusion

Result of the study shows there is strong relationship between Supply chain disruption and customer satisfaction. Thus to improve the supply chain of GMSCL, company has to improve Supply chain disruption. Study also explains supply chain of pharmaceutical industry and Gujarat Medical Service Corporation Limited (GMSCL). For qualitative supply chain, strategies needed related to the variable studied.

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Annexure I

Questionnaire

Dear Respondent,

This survey is being done as a part of academic research and the information shared shall be kept confidential and used for academic purposes only.

There is no right or wrong answer for any question; every opinion is an equal opinion

If you feel any question is too personal or sensitive and he wishes not to answer it, you may please feel free to do so

If you need more information/assistance, investigator would assist

Thank you for your time and co-operation.

Questionnaire

By Pratik Ranpara, Mo No. - 9033482971

- Which GMSCL are you associated with ?

Rajkot GMSCL
Jamnagar GMSCL
Amreli GMSCL

- Date :
- Please tick which profession you belong to.

Pharmacist
Medical Officer
Laboratory Technicians
Xray Technicians
Others

Questionnaire

- Q-1 .Please rate your satisfaction level related to the Supply chain disruption aspect concerning supplies from GMSCL. (Please tick the response at the given space)

ELEMENT OF SUPPLY CHAIN DISRUPTION	VERY SATISFIED	SATISFIED	NEITHER SATISFIED NOR DISSATISFIED	DISSATISFIED	VERY DISSATISFIED
	1	2	3	4	5
Continuity of supply of medicines					

without disruption in route plan					
Justification provided for supply chain disruption					
Efficiency of Counter supply of medicines on disruption in route plan					

Anything else you would like to share in the context,

Q-2. Please rate your OVERALL satisfaction level related to the Supply chain disruption aspect concerning supplies from GMSCL.
(Please tick the response at the given space)

VERY SATISFIED	SATIS FIED	NEITHER SATISFIED NOR DISSATIS FIED	DISSATI SFIED	VERY DISSATISFIED
1	2	3	4	5

Anything else you would like to share in the context,

Personal Particulars:

Name		Designation	
Age		Address	
Gender		Phone	
Education		Email	
Occupation		Monthly Family Income	

CWE Name _____ CWE Education _____

(The Chief Wage Earner (CWE) in the family)

Please **tick** the assets you own in the family,

Asset	Owned	Asset	Owned	Asset	Owned
Electricity Connection		Refrigerator		Air Conditioner	
Ceiling Fan		Washing Machine		Agricultural land	
LPG Stove		Personal Computer		Music System	
Two wheeler		Four Wheeler		Color Television	

We sincerely appreciate and thank you for sharing your time, opinion and reflections. **Thank you.**