

RANKING OF VARIABLES IMPACTING SUPPLY CHAIN NETWORK OF SMALL SCALE INDUSTRIES

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Abstract Supply chain is quoted as an association or link of business members or partners such as manufacturers, wholesalers, retailers who closely and jointly work together to achieve some common and predetermined well-to-do objectives. The present paper assesses the mean ranking of variables impacting supply chain network of 44 small scale industries operating in district Udhampur of J&K State. The industries are working under SIDCO and SICOP. Census method was applied to collect data from these industries. The data so collected were subjected to factor analysis for its purification and proper elucidation. The results of the ranking table and linear regression explored that the main factors/variables impacting supply chain network were “Clarity of goals”, “Customer satisfaction”, “Long term relationships”, “Clear accountabilities”, “Internal congruity”, and “Opportunities for self-engagement”. The efficacy of supply chain network is the result of gratifying customers’ needs, clarity of goals in relationships, and personal accountability to smoothen networks relationships. The results of linear regression revealed that effective supply chain network leads to customer satisfaction and supply chain relationships results in developing long term relationships.

Keywords: Supply Chain, Small Scale Industries (SSI’s), Customer Satisfaction

INTRODUCTION

Supply chain network portrays the periphery or jurisdiction of supply chain members and generally it designates the association between the business partners or business members. The members so associated are suppliers, manufacturers, wholesalers, dealers, agents, retailers, customers etc. The supply chain network starts from suppliers and ends up at customers. The APICS dictionary connotes supply chain as the “processes of basic raw materials to the final consumption of the finished product”. Sometimes it’s stated as the “functions in and out in a company that facilitate a chain known as supply chain to ensure products and services to the ultimate customers”. Supply chain management habitually is referred to the flow of goods within a bond which is generally quoted as supply activity of the firm. Supply chain is of contemporary issue as that of new terms such as pipeline management, network sourcing, demand management and value stream management which is prospering and gaining momentum on a wider scale and larger perspective (Christopher, 1992; Croom & Romano, 2000; Farmer & Amstel, 1991; Hines, Cousins, Lamming, Jones & Rich, 1999; Lamming, 1993).

The growth of supply chain management had led the organisations to bind up domestically as well as globally in order to cater the wide demand of globe.

Supply chain management and its network has been growing in importance since the early 1990’s, although the approach, as rather the concept, was introduced back in 1980’s (Oliver & Webber, 1982). The approach of supply chain management is derived from the fact that there are dependencies between levels in channels from the point of origin to the point of consumption (Lambert, García-Dastuque & Croxton, 2005; Hakansson & Snehota, 1995). Usually in SCM, the point of origin refers to suppliers or manufacturers (Carter, Ferrin & Carter, 1995; Ellram & Cooper, 1993; Novack & Simco, 1991) while the point of consumption refers to customers, consumers or the end users in a supply chain (Min & Mentzer, 2000).

The present study takes into preview the mean ranking of the variables that impacts or affects the supply chain network. The major variables identify that affects supply chain network are: clarity of goals, customer satisfaction, long term relationships, clear accountabilities, internal congruity, and opportunities for self-engagement.

REVIEW OF LITERATURE

Following reviews of the magnificent studies on supply chain management were done:

Halley and Nollet (2002) examined the extent of actual contribution of preferred suppliers well positioned to offer a standardised, simplified, uniform performance, coordinated with specific needs of its customers to supply chain integration in multibillion and multinational organisation. The data were collected from 164 suppliers sub-divided into 110 regular suppliers, 32 strategic partners (preferred suppliers), by circulating an eight section questionnaire with 68 questions. The response rate was found to be 53.8 percent. The study highlighted two key elements. First, a supplier's involvement results in the assimilation of a large order-giver's supply chain and provide the basis or formulation of supply chain network. Second, the expansion of unique competencies and the erudition of a supplier's logistics system are assisting a lot to the large order giver which are openly correlated to the type of control used by the supply chain originator. The study concluded that the preferred status should be given to large order giver and the organisation should provide a supplier's logistics autonomy through decentralisation and preferred managerial & financial support.

Dean (2002) explored current supply chain management (SCM) issues & practices and organisational competitiveness across 1500 randomly selected US organisations from manufacturing, wholesaling and retailing, oil, banking, information technologies, and insurance. The response rate was found to be 26 percent. 78 percent of the sample organisations reported that they were familiar with the supply chain management and the duration of their supply chain management programs ranged to be "less than one year (130 firms)", "less than two years (50 firms)" and "three or more years (20 firms)". The main reasons acknowledged for undertaking supply chain projects were: reduced costs and frequent inventory turnovers, improve in the quality of goods & services which in lieu leads to the enhancement of the customer service, perk up delivery and optional steadfastness, reduction in the cycle time which speeds up the production and leads to immediate demand fulfillment, augment productivity and profitability of the supply chain members, employment of human resource efficiently on the basis of historical cost approach, make capital funds obtainable for expansions, diversifications and more profitable operations, spotlight on the nucleus competencies of the cooperation, coordination, trust, confidence and competitive advantage over competition. The top activities involved in the supply chain management were inventory, transportation, facilities, and information technology. The results of linear regression analysis revealed 24% of the variance in quality and its management, 20% of inconsistency in adaptability and 30% of the disagreement in performance explained on the

supply chain management magnitude. Unsuccessful firms have identified lack of cooperation within the supply chain management activities, lack of information sharing at all levels and the supply chain, lack of integrated behaviour between both the customers & suppliers and, lack of trust & relationships with the people that work throughout the supply chain activities as major constraints contributing to the failure of supply chain management strategies. The existing study however outlined various organisational tactics such as strategies to boost the assimilation of activities, information sharing and communication through the Internet technologies & others, cooperation, collaboration, trust building, confidence throughout the supply chain channel and establishing partnerships with key suppliers to make SCM meaningful and successful.

Sloan, Landers and Brewer (2002) described the use of Intelligent Tracking Technologies (ITT) which includes Global Positioning Systems (GPS), Geographic Information System (GIS), wireless telecommunication and Radio Frequency Identification (RFID) in improving manufacturing & integrating the entire supply chain. They suggested that introduction of RFID, bar-code or data matrix into real world situation should aim at reduction of waste, production cycle time and other non-value added time or inventory.

Sahay, Gupta and Gupta (2002) focused on the issue of bringing about a change in the organisational thinking process as a precursor to improve supply chain management. They found that people generally resist change due to fear of losing their power, authority, remuneration, responsibility and position in the organisation. The solution to the problem lies in uniting people through a shared vision across the organisation, imbibing organisation culture, transforming the mindsets of employees from resistance to the new pattern by leaders and realigning measurement & rewards to the co-created vision of the organisation for achieving competitive advantages.

HYPOTHESES OF THE STUDY

The present research outlined the following hypotheses:

Hyp 1: Effective supply chain network leads to customer satisfaction.

Hyp 2: Supply chain relationships results in developing long term relationships.

RESEARCH DESIGN AND METHODOLOGY

Research methodology stands as core of empirical research. The research methodology of the present empirical study is portrayed below:

Sampling and Data Collection

The nature of study is empirical which encompasses primary data which in the present study were collected from the small scale industries operating in District Udhampur under registered under SIDCO & SICOP in Jammu & Kashmir State. The number of firms identified operating under these areas were 49. Five units were found to be non-functional. These small scale industries were sub-divided into ten lines of operation in order to make the study interesting and magnificent. The ten lines of operations identified were: cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3) and miscellaneous (11). Those falling under miscellaneous category included 12 firms which were identified as M/s Supertech Industry, M/s Luxmi Electronics Works, ShajNath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, and M/s Ajay Ice Factory. Census method was applied in order to gather response or data from owners/managers of these small scale industries.

The Data Construction form or Survey Instrument

Data construction form is the form on which information is collected from the respondents. The Information/data in the present research were collected by preparing and administering a self-developed questionnaire. The questionnaire was prepared after taking into preview and rigorously considering/consulting experts, academicians, industrialists and broadly the review of literature. The questionnaire for the present research comprised of general information, ranking questions and some statements related to supply chain networks in small scale industries. The questionnaire outlay was designed in the nature of descriptive form, ranking, dichotomous, open ended and five-point Likert scale statements, where 1 stands for strongly disagree and 5 for strongly agree.

Data Collection

The primary data for the study were collected by meeting the respective respondents and visiting them time and again until and unless it led to the satisfactory circumstances. Three to four visits were kept as criteria for gaining response from the respondents. The response was collected under the orbit of Census method from the respective respondents. As far as secondary information was concerned, it was collected by visiting various libraries and journals like American Journal of Marketing Management, International Journal

of Supply Chain Management, Journal of Production and Operations Research etc. An assortment of multivariate tools was applied such as mean, standard deviation, ranking tables which in lieu were used for obtaining momentous inferences that really decorated the research platform.

DATA ANALYSIS AND INTERPRETATION

Table 1 outlays mean ranking of variables that impacts supply chain network of small manufacturing firms operating in District Udhampur of J&K State. There are 44 small manufacturing firms operating under SIDCO & SICOP. These 44 small manufacturing firms have been divided into ten lines of operations i.e. the total number of small firms manufacturing alike products are considered and categorised into single heading which are named as: cement (8), pesticide (3), steel (3), battery/lead/alloy (5), menthol (2), guns (2), conduit pipes (2), gates/grills/varnish (5), maize/atta/dal mills (3), and miscellaneous (11). The unit-wise mean rank of six variables impacting supply chain networks in small manufacturing firms is portrayed in Table 1. The variables identified are “Clarity of goals”, “Customer satisfaction”, “Long term relationships”, “Clear accountabilities”, “Internal congruity”, and “Opportunities for self-engagement”. The ranks assigned on the basis of mean arrived are: Customer satisfaction (I), Clarity of goals (II), Long term relationships (III), Clear accountabilities (IV), Internal congruity (V) and Opportunities for self-engagement (IV). The efficacy of Supply chain network is the result of gratifying customers’ needs, clarity of goals in relationships and personal accountability to smoothen networks relationships.

The ranking categorisation is done as follows:

Cements

The total number of small scale firms operating under this head was found to be eight under SIDCO. The units operating under the head were: M/s Associated Cements, Zenith Cement Industry, Shivalik Cements, M/s Continental Cement Industry, Wullar Cements, M/s Shri Nath Industry, and Uma Cement Industry. As far as ranking related to the variables impacting supply chain network by these firms is concerned most of the firms accorded rank one to “Customer satisfaction”. “Clarity of goals” was given rank two by most of the small units operating there. “Long term relationships” was consigned rank three. “Clear accountabilities” was accorded rank four. “Internal congruity”, and “Opportunities for self-engagement” was given rank fifth and six respectively. This ranking made it clear that the variable “Customer satisfaction” is the main variable that affects supply chain network.

Battery/Lead/Alloy

The next main group identified under SIDCO and SICOP was battery/lead/alloy. Total number of five small firms were found to be operating under this category contributing a major portion to the total small industries. The firms operating were Radha Industries, Pilot Batteries, Durga Batteries, Suraksha Batteries, and Avtar Batteries. Again, “Customer satisfaction” was accorded rank one by all the units operating under this group as it was found to be the main focus of all the small firms operating there. “Clarity of goals” was given rank two by these small firms and “Long term relationships” was downgraded with rank three. Accordingly, “Clear accountabilities” was accorded rank four as represented in the table 1. Accordingly, “Internal congruity”, and “Opportunities for self-engagement” was given rank fifth and six respectively.

Pesticides/Insecticides

Three main units which were found operating under this heading or category were M/s Dhanuva Agritech Ltd., Safex Chemicals Ltd., and M/s Modern Insecticides. As far as mean ranking of variables that impacts supply chain network is entrusted, “Clarity of goals” was accorded rank one by all the units operating under this group. “Customer satisfaction” was given rank two by these firms and “Long term relationships” was assigned rank three. “Internal congruity” was accorded rank four. “Clear accountabilities” was assigned rank five. “Opportunities for self-engagement” was consigned the last rank i.e. sixth rank. It was clear that this industry group also concentrates on clarity on goals as the main factor in impacting supply chain network.

Conduit Pipes

M/s Pee Kay Products and Rukhmani Plastics were the two main units found to be operating under this era. As far as mean ranking of variables enhancing supply chain performance is entrusted “Customer satisfaction” was accorded rank one by both the units operating under this group. “Clarity of goals” was given rank two by conduit pipes and “Long term relationships” was consigned rank three. “Internal congruity” was accorded rank four. “Clear accountabilities” was assigned rank five. “Opportunities for self-engagement” was consigned the last rank i.e. sixth rank. It was clear that the conduit pipes industry also focus on customer satisfaction as the main variable that impacts supply chain network.

Menthol

M/s Harikripa Perfumes Pvt. Ltd. and M/s Mahadurga Industries were found to be operating under this category

of industries. “Customer satisfaction” was accorded rank one by both the units operating under this group as it was found as the factor that impacts their supply chain network. “Clear accountabilities” was given rank two by these small firms and “Long term relationships” was consigned rank three. “Clarity of goals” was accorded rank four. “Internal congruity” was relegated rank five and “Opportunities for self-engagement” was consigned rank six.

Guns

Two extreme competitors namely M/s Gulab Gun Factory and M/s Hunter Gun Factory accorded rank one to “Customer satisfaction” and “Clarity of goals” was given rank two by both the units. “Long term relationships” was accorded rank three by both the units. “Clear accountabilities” was accorded rank four. “Internal congruity” was demoted rank five and “Opportunities for self-engagement” was assigned rank six.

Steel

The prominent three small firms operating under this category were identified as M/s MahaLuxmi Steel Fabricators, M/s Faqir Chand Sanak Raj, and M/s Gupta Furniture. Rank one was assigned to “Customer satisfaction” as it was found to be their main variable for promoting supply chain effectiveness, “Long term relationships” ranked two, “Clarity of goals” ranked three, “Clear accountabilities” ranked four, “Internal congruity” rank five and “Opportunities for self-engagement” rank six.

Gates/Grills/Varnish/Paint

This category was also found to be contributing a lot to the well-being of DIC (District Industries Centre) as five units are operating under this category namely M/s Balaji Industries, M/s Wazir Engineering Works, ISRO Products, Shakti Engineering Works, and M/s Everest Paints. These small scale units assigned rank one to “Clarity of goals”. “Customer satisfaction” was given rank two by these units, “Long term relationships” was allotted rank three, “Clear accountabilities” was aligned rank four, “Internal congruity” was given rank five and “Opportunities for self-engagement” was accorded rank six by most of the firms.

Atta/Maize/Dal Mills

The three main astonishing units operating under this head were Shalimar Floor Mills, M/s Udhampur Dal Mills, and M/s Sharda Enterprises. As far as ranking related to variables that impacts supply chain network is concerned

“Clarity of goals” was accorded rank one by all the units operating under this group. “Long term relationships” was given rank two by this industry. “Customer satisfaction” was consigned rank three. “Clear accountabilities” was allotted rank four. “Internal congruity” was given rank five and “Opportunities for self-engagement” was accorded rank six. It implies that atta/maize/dal mills are mainly hovered with Clarity of goals as the main variable that impacts supply chain network.

Others (Miscellaneous)

The number of small units operating under this category were twelve in number namely: M/s Supertech Industry, M/s Luxmi Electronics Works, ShajNath Vanaspati Ltd., M/s Aditiya Cables, Poles and Transformers, Shankar Lime Industry, M/s Unique Carbon Industries, M/s B.S Traders, M/s Vijay Candles, Everest Health Care Products, M/s J.K Petro Chemicals, and M/s Ajay Ice Factory. As far as ranking related to mean variables that impacts supply chain network is concerned, “Customer satisfaction” was accorded rank one by most of the units and “Clarity of goals” was given rank two by almost all the units operating, “Long term relationships” was appropriated rank three, “Clear accountabilities” was allotted rank four, accordingly, “Internal congruity” was given rank five and “Opportunities for self-engagement” was accorded rank six representing the actual figure of variables that impacts supply chain network.

Overall, all the firms operating under DIC mainly focuses on customer satisfaction as the main variable that is indulged in affecting supply chain network, followed by clarity of goals, then by Long term relationships, than after clear accountabilities, subsequently after that internal congruity and at the end by opportunities for self-engagement (Table 1).

Regression Analysis

For measuring the impact of supply chain network (dependent) on customer satisfaction (independent) regression was applied. The linear regression model summary table (Table 2) disclosed the values of R to be .730 that ensured 73% strong positive association between dependent and independent variable i.e. between supply chain network and customer satisfaction, R^2 value of .647 portrayed that 64% of variation in supply chain network (dependent) can be explained from the independent variable (customer satisfaction). Adjusted R^2 value .601 justifies that if anytime another independent variable is added to the existing independent variable the value of R^2 will increase. Further beta value reveals significant relationship of independent variable with

dependent variable as depicted by its value. Change in R square is also found to be significant with F-values significant at 5% confidence level. Thus the hypothesis “Effective supply chain network leads to customer satisfaction” is accepted as represented by its significance level $p < .05$.

The second hypothesis also got proved as revealed by the p value .027 ($p < .05$) which was “Supply chain relationships results in developing long term relationships”. The Regression results simplified the position and portrayed 68% relationship or association between supply chain network and long term relationships (Table 3). The value of R^2 .591 connotes the variation between the dependent and independent variable and the regression table signified that 59% of variation in supply chain network can be explained from the independent variable long term relationships.

CONCLUSION

Supply chain network as portrayed repels the business from any of the hazardous things. The paper divulges the strength of supply chain network and states how some of the variables strengthens supply chain network. The paper portrays fresh findings in terms of various variables that impacts supply chain network. The results of ranking tables revealed that the utmost variable that impacts supply chain network is customer satisfaction (I). Clarity of goals (II) was declared to be the second important variable impacting supply chain network. Long term relationships (III) ranked third in these small scale industries. Clear accountabilities (IV) was accorded rank fourth aggregately. Internal congruity (V) was given rank fifth by these small industries and opportunities for engagement (IV) was accredited rank sixth. Further, the results of linear regression revealed that effective supply chain network leads to customer satisfaction and supply chain relationships results in developing long term relationships.

Practically talking and visualising, the government support is highly desirable and recognised for enhancing the competitiveness of supply chain network. For this the stated functionaries should emphasize on organising meetings, frequent workshops, trade shows, seminars, conferences with all the supply chain members so as to strengthen supply chain linkages by assimilating patchy Supply chain members/intermediaries and duly recognizing them. Secondly, managers should be departed and encouraged for training and development programmes in order to attain broader knowledge & perspective to handle smoothly trodden supply chain management network and to make them capable to formulate distinguished strategies for profitable network management so that efficient management decisions can be taken in order to brace supply chain network.

LIMITATIONS OF THE STUDY

- i. The study is conducted in a specific area i.e. Udhampur. The results could vary if the same research would be conducted in other parts of the world having dissimilar environmental business conditions.
- ii. The response was gathered with due care and considering all research ethics, even the questions were made understood to the respondents in their local dialect. Therefore, paramount concern was dispensed to collect correct information, but an element of

subjectivity cannot be ruled out as it made little difference in the originality of ideas obtained in the field survey and final interpretation.

DIRECTIONS FOR FUTURE RESEARCH

Future research can be done on the other important varied dimensions of supply chain management systems. Future researches can also be undertaken from the perspective of wholesalers and retailers for medium & large scale industries.

Table 1: Unit-wise Ranking of Variables Impacting Supply Chain Network

Manufacturing Units/ Variables	Clarity of goals	Customer satisfaction	Long term relationships	Clear accountabilities	Internal congruity	Opportunities for engagement
Cement	1.87 (II)	1.62 (I)	3 (III)	4 (IV)	4.75 (V)	5.66 (VI)
Battery/Lead/Alloy	2.2 (II)	1.6 (I)	3 (III)	3.6 (IV)	5.2 (V)	5.4 (VI)
Pesticides/Insecticides	1 (I)	2.66 (II)	2.66 (III)	5.33 (V)	3.66 (IV)	5.66 (VI)
Conduit pipes	3 (II)	1 (I)	3.5 (III)	4 (V)	3.5 (IV)	6 (VI)
Menthol	4 (IV)	1 (I)	3 (III)	2 (II)	5 (V)	6 (VI)
Guns	2 (II)	1.5 (I)	2.5 (III)	4.5 (IV)	4.5 (V)	6 (VI)
Steel	3 (III)	1.33 (I)	2.66 (II)	3.33 (IV)	4.66 (V)	6 (VI)
Gates/Grills/Varnish/Paint	1.8 (I)	2 (II)	2.6 (III)	3.8 (IV)	4.8 (V)	6 (VI)
Atta/Maize/Dal mills	1.66 (I)	2.33 (III)	2 (II)	4 (IV)	5 (V)	6 (VI)
Others	1.72 (II)	1.45 (I)	3.63 (III)	4 (IV)	4.45 (V)	5.72 (VI)
Mean & Rank	2.22 (II)	1.64 (I)	2.95 (III)	3.85 (IV)	4.55 (V)	5.84 (VI)

Note: Where 1 denotes “highest rank” and 6 denotes “lowest rank”

Table 2: Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of Estimate	F value ANOVA	Sig. level	β	T	Sig. level
1.	.730	.647	.601	.3112	48.476	.000	.476	9.437	.007

a. Predictors: (Constant), Customer Satisfaction

b. Dependent Variable: Supply Chain Network

Table 3: Regression Model Summary

Model	R	R ²	Adjusted R ²	Std. Error of Estimate	F value ANOVA	Sig. level	β	t	Sig. level
1.	.687	.591	.510	.5432	35.286	.000	.465	8.484	.027

a. Predictors: (Constant), Long term relationships

b. Dependent Variable: Supply Chain Network

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