

Study of Supply Chain Management Variables in Micro, Small and Medium Enterprises - A Survey

¹V. R. Sirsath*, ²Dr. R. S. Dalu

¹Ministry of MSME, GoI

²Mechanical Engineering Dept., Govt. College of Engineering,
Amravati, Maharashtra, India

Abstract—

Supply Chain Management (SCM) has been a major component of competitive strategy to enhance organizational productivity and profitability. There has been increasing attention placed on the design, analysis and performance evaluation of the supply chain as a whole. This attention is largely a result of the rising costs of manufacturing, shrinking resources, shortened product life cycles and globalization of market economics. In this paper, an attempt has been made to identify Supply Chain Management variables, their status and importance for development of Supply Chain (SC) performance evaluation framework for Micro, Small and Medium Enterprises (MSME). Two structured questionnaires were designed and responses from 32 Micro, Small and Medium Enterprises (MSME) from Vidarbha region of Maharashtra were collected. Data was analyzed and percentage presence of SCM performance variables and their level of importance in MSME have been identified.

Keywords— Framework, MSME, Performance Evaluation, Supply Chain

I. INTRODUCTION

A Supply Chain is a network of suppliers, manufacturing, assembly, distribution, and logistic facilities that performs the functions of procurement of materials, transformation of these materials into intermediate and finished products, and the distribution of these finished products to customers. Supply chains are now at the centre stage of business performance of manufacturing and service enterprises. The supply chain process is complex, composite business process comprising a hierarchy of different levels of value delivering business processes. Designing a high performance supply chain is a very challenging task due to the complex structure of the supply chains and ever changing business. Some of the important reasons for the complexity of the decision making process are large scale nature of the supply chain networks, hierarchical structure of decision, randomness of various inputs and operations and dynamic nature of interactions among supply chain elements.

Because of inherent complexity of decision making in supply chains, there is a growing need for modeling methodologies that can help identifying and innovate strategies for designing high performance supply chain networks. A large number of manufacturing and service organizations are therefore seeking modeling systems that can help identify and implement strategies for designing and improving their supply chain networks [1].

II. PERFORMANCE MEASUREMENT OF SCM

Most of the performance measures modeling of supply chain issues originated in the industrial dynamics area. Most models are based on a closed system where the number of variables is limited. Stevens (1998) suggests performance measurement in terms of inventory investment, service level, throughput efficiency, and supplier performance and cost [8]. For the performance measure of SCM, it is essential to identify the comprehensive metrics of parameters that can affect the performance. Supply Chain Council (SCC) developed Supply Chain Operation Reference (SCOR) Model. The SCOR model is founded on five distinct management processes, namely, **Plan, Sources, Make, Deliver and Return**. Since its introduction in 1996, the SCOR model has grown significantly both in terms of acceptance and usage. The latest version of the SCOR model was SCOR 8 that has been released on 2007 by Supply Chain Council [2]. Kaplan and Norton introduced Balanced Score Card (BSC); Traditional business performance metrics are only financial. The BSC however distinguished into the four different types of performance matrix: finance, Customer, Internal Business and Training. For each type of matrix, Kaplan and Norton distinguished five to six control variables [3]. In 2001, based on literature survey an attempt has been made by A. Gunasekaran, to develop a framework for measuring the strategic, tactical and operational level performance in SC. In developing the matrix, an effort has been made to align and relate them to customer satisfaction [4]. In the year 2004; A. Gunasekaran prepared seven page questionnaires for collecting data. This Questioner was divided into four basic sections: Plan; Source; Make; Deliver and developed a framework based on the available literature and an empirical analysis. He identified variables (Strategic level, Tactical Level and Operational Level) and its sub variables [5]. A. Gunasekaran (2004) identified supply chain performance variables, percentage presence of those supply chain variables in MSME in vidarbha is assessed by survey method which is presented in paper.

III. MSMEs AND SUPPLY CHAIN MANAGEMENT

As per MSME Development Act 2006, MSMEs are classified as per their investment in plant and machinery. Manufacturing and Service sectors enterprises having investment in plant and machinery up to 10 cores and 5 cores respect comes under MSME [6]. MSME sector is the second largest sector after agriculture sector which provides employment in India, India's 40% of total export comes from MSME sector.

According to independent research studies, Supply Chain inefficiencies can consumes as much as 25 per cent of a company's operating costs. Even 5 percent reductions in supply chain waste can double a company's profitability. Even small gained percents on enormous volumes lead to very significant financial earnings. Effective SC contributes for more productivity by optimum utilization of resources. As MSME is the second biggest sector and even a small performance improvement in SC will benefit MSMEs profitability in good percentage, it's vital to assess status of SC performance variables and SC performance measurement in MSMEs.

IV. DATA ANALYSIS

(A) ABOUT MSMEs IN THE SAMPLE

To find out the status of SCM performance variables and their importance in MSMEs in Vidarbha region Maharashtra, two structured questionnaires were designed and responses were obtained from 32 MSME of Vidarbha region of Maharashtra. The brief explanation of Supply Chain performance variables has been given in Table 5

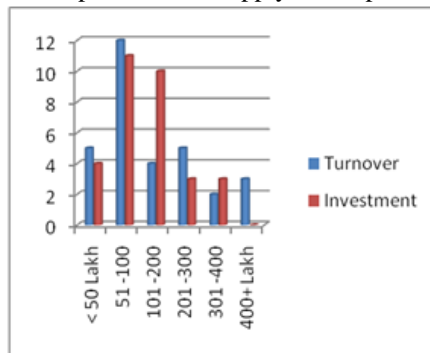


Fig.1 Turnover and Investment

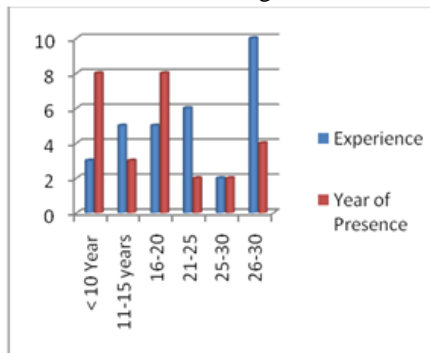


Fig. 2 Experience and year of presence

The data was collected, analyzed and result has been presented below. The details of the MSMEs in the survey related to turnover, investment, year of presence, experience and qualification of managers are given below in fig 1, 2, 3.

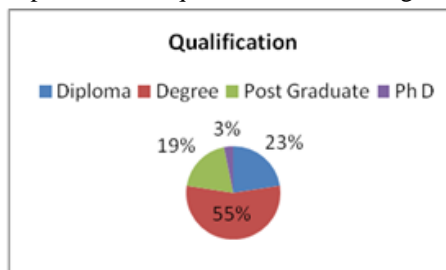


Fig. 3 Qualification of Managers

(B) STATUS SCM PERFORMANCE VARIABLES

Table 1, shows percentage presence SCM performance variables in MSMEs

TABLE1. % PRESENCE OF SCM PERFORMANCE VARIABLES

Sr. No	SCM Performance Variable	% Presence
1	Variety of products	100
2	Buyer supplier partnership	96.77
3	Percentage defect level	96.77
4	Order Lead Time	90.32
5	Record of Product Development	90.32
6	Total Cycle Time for New Product	87.10
7	Cash Flow Time	83.87
8	Productivity	83.87
9	Flexibility in Schedule to meet particular customer need	83.87
10	Order entry method	80.65
11	Forecast sales volume	77.42
12	Rate of Return on Investment	77.41
13	Record of customer query Time	77.41
14	Total transportation cost	70.97

15	Distribution planning schedule	64.52
16	Cost / operation hour	64.52
17	Annual inventory cost	64.52
18	Maintain information processing cost	45.16
19	Percentage capacity utilization	41.94
20	Human resource productivity index	38.71

(C) IMPORTANCE OF SCM PERFORMANCE VARIABLES

After assessing presence of SC performance variables in MSMEs, second questionnaire was prepared with a objective to find out importance (Highly / Moderately / Important) of these variables in MSMEs .Responses received in questionnaire- II, has been shown in “Table 2” , “Table 3” and “table 4” for strategic, Tactical and Operational level variables respectively.

TABLE2 IMPORTANCE OF SCM PERFORMANCE VARIABLES AT STRATEGIC LEVEL

Sr. No	SCM Performance variables at strategic level	Score	Importance
1	Total cash flow time	82	Highly Important
2	Total cycle time	81	Highly Important
3	Rate of return on investment	79	Highly Important
4	Order lead time	77	Highly Important
5	Effectiveness of distribution planning schedule	75	Highly Important
6	Net profit Vs productivity ratio	73	Highly Important
7	Flexibility to meet particular customer need	73	Highly Important
8	Range of product & services	72	Highly Important
9	Product development cycle time	69	Highly Important

TABLE 3 IMPORTANCE OF SCM PERFORMANCE VARIABLES AT TACTICAL LEVEL

Sr. No	SCM Performance variables at tactical level	Score	Importance
1	Customer query time	80	Highly Important
2	Capacity utilization	77	Highly Important
3	Extent of Buyer Supplier partnership level	75	Highly Important
4	Efficiency of order entry method	68	Highly Important
5	Accuracy of forecasting techniques	66	Highly Important
6	Total transportation cost	59	Moderately Important

TABLE 4 IMPORTANCE OF SCM PERFORMANCE VARIABLES AT OPERATIONAL LEVEL

Sr. No	SCM Performance variables at operational level	Score	Importance
1	% of Defects	84	Highly Important
2	Cost per operation hour	63	Moderately Important
3	Manufacturing cost	60	important
4	Human resource productivity index	53	Important
5	Information processing cost	52	Important
6	Annual inventory cost	50	important

TABLE 5 EXPLANATION OF SUPPLY CHAIN PERFORMANCE VARIABLES

Sr. No	SCM Performance Variables	Explanation
A.	Strategic level	Top managerial level of an enterprise at which strategic and policy decisions are taken
A-1	Order lead time	Refers to the time elapsed in between the receipt of customer order until the delivery of finished goods to the customer
A-2	Total cycle time	Time spent from start of first operation to finish of last operation to produce a product
A-3	Total cash flow time	The time spent from money invested for executing an order to payment received of that order
A-4	Product development cycle time	The time span required from concept to market, to develop and produce a new product or improved product
A-5	Flexibility to meet	This refers to flexibility in meeting a particular customer

	particular customer need	delivery requirement at an agreed place, agreed mode of delivery and with agreed upon customized packaging
A-6	Effectiveness of distribution planning schedule	Refers to the time or date on or by which distribution activities are to be undertaken which satisfy customer delivery needs
A-7	Net profit Vs productivity ratio	Net profit gain by optimum utilization of available resources
A-8	Range of product & services	Variety of products / services provided by an enterprise
A-9	Rate of return on investment	An average days required to turn cash invested in assets employed into cash collected from a customer
B.	Tactical Level	Middle managerial level of an enterprise at which administrative process of selecting among appropriate ways and means of achieving a strategic plan is executed
B-1	Customer query time	Customer query time relates to the time it takes for a firm to respond to a customer query with the required information
B-2	Accuracy of forecasting techniques	The accuracy of forecast is the degree of closeness of the statement of quantity (Demand & Supply) to that quantity's actual value
B-3	Efficiency of order entry method	The way and extent to which customer specifications are converted into information exchanged along the supply chain
B-4	Total transportation cost	Costs involved for transportation of items with in enterprise and for delivery of goods to customer
B-5	Capacity utilization	Percentage utilization of available resources
B-6	Extent of Buyer Supplier partnership level	Kind of relationship between buyer and seller (Supplier)
C.	Operational Level	Operational level mainly deals with creating a staffing plan at the shop floor and working to meet project deadlines.
C-1	% of Defects	Amount of defects observed during inspection of 100 items which needs rectification or item rejected
C-2	Cost per operation hour	Cost required for one hour operation
C-3	Manufacturing cost	Cost involved in manufacturing (Providing service) excluding raw material cost
C-4	Information processing cost	This includes costs such as those associated with order entry, order follow/updating, discounts, and invoicing
C-5	Human resource productivity index	Ability of employed human resource to perform assigned tasks at desired output

V. OBSERVATIONS

- i) About 80% respondents (managers) were having more than degree level education
- ii) 32% of the respondents(managers) were having more than 30 years of experience
- iii) Average turnover, investment and year of presence of MSMEs in the sample were 200 lakhs, 191 lakhs and 20 years respectively
- iv) All Supply Chain performance variables have been observed in MSMEs and their presence varies from 38.71% to 100%
- v) All nine variables at strategic level has been observed to be highly important
- vi) At tactical Level , all sub- variables have been observed to be highly important except “total transportation cost”, which is moderately important
- vii) At operational Level, % of defects is highly important, cost /operation hour is moderately important, and other variables have been observed to be important

VI. CONCLUSION

It is very much necessary for MSMEs to give emphasis on design, development and performance evaluation of its Supply Chain. Implementation of principles of SCM and performance assessment of SCM variables will reduce the waste in Supply chain and leads to rise in productivity. The finding of the survey report has been presented above. It may be concluded that all the Supply Chain performance variables (given in table 1) have been observed in MSMEs in Vidarbha region and their presence varies from 38.71% to 100%. Out of the 20 sub- variables, 75% are highly important, 10% are moderately important, and 15% are important.

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