CHAPTER 4

OBSERVATIONS FROM DESCRIPTIVE ANALYSIS

4.1 Introduction

To survive in global market, Indian SMEs have to synchronize their operations and strategies with their bigger partners in the supply chain. For this it is essential that they should continuously improve their coordination and responsiveness skills. In this chapter responses received from two hundred and fifty one Indian SMEs on various issues of coordination and responsiveness have been analyzed with the help of SPSS (version 17.0) software. Objectives of the study have been already identified in Chapter 1, but for clarity these objectives are once again reproduced below:

1. To identify major priorities while forming supply chain strategy for SMEs.
2. To identify the problems faced by SMEs during implementation of SCM.
3. To identify the Risks, SMEs feel while working in supply chain.
4. To identify the importance of different factors for improving coordination in supply chain of SMEs.
5. To identify the importance given by SMEs while selecting & evaluating the key/preferred suppliers.
6. To identify the level of involvement of key suppliers in decision making on different issues.
7. To identify the level of involvement of key customers in decision making on different issues.
8. To identify the different issues, which lead to distortion of actual demand in supply chain of SMEs.
9. To identify the level of IT applications in different functions of supply chain of SMEs.
10. To identify the level of use of Modern technologies /tools used by SMEs.

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3 Part of this chapter is published in Competitiveness Review: An International Business Journal (Forthcoming) and International Journal of Business Information Systems (IJBIS) (Forthcoming).
11. To identify the critical success factors (CSF) for implementation of SCM in SMEs.
12. To analyze the effect of different SCM issues on performance of Indian SMEs from different perspective of Balance Score card model.
13. To analyze coordination and responsiveness issues of SCM in Indian SMEs through select case studies.
14. To develop a structural relationship model for critical success factors of coordination and responsiveness.

The result of analysis related to first twelve objectives will be discussed in this chapter and result related to last two objectives will be discussed separately in next two chapters i.e. Development of case studies (Chapter 5) and Interpretive Structural Modeling (Chapter 6). In this chapter results have been derived through statistical tests such as reliability analysis, t-test and correlation and regression analysis. For conducting the statistical tests, SPSS (version 17.0) software is used. In this study, attempt has been made following the principles given by Miles and Huberman (1984), which state that analysis of data requires three kinds of activity:

1. Data reduction-The process of organizing, selecting and transforming raw data in such a way that inference may be drawn and corrobated.
2. Data display-A methodological and organized marshalling together of information which then makes itself amenable to the drawing of conclusions.
3. Conclusion drawing-Taking cognizance of regularities and patterns and the particular configuration of dimension, on the basis of which meaningful theories and propositions can be postulated.

4.2 Descriptive analysis

Descriptive analysis is done to find mean, standard deviation, standard error etc. This is used to find overall statistics for various issues of supply chain coordination and responsiveness. Before doing this analysis reliability analysis is performed for each scale/question used in the questionnaire. Inter item analysis is used to check the scales for
internal consistency or reliability. Cronbach’s coefficient analysis alpha is calculated for each scale, as recommended for empirical research by Flynn et al. (1990) and Malhotra and Grover (1998). It is an integral part of any survey research. Reliability analysis of data shows that Cronbach’s alpha value for all variables is more than minimum acceptable value of 0.5 (Nunnally, 1978), which indicates high level of internal consistency among items. In the following sections, descriptive analysis and correlation analysis of different issues such as strategy formation, problems, risks, coordination improvement, supplier selection and evaluation, involvement of suppliers and customers in decision making, use of IT, type of IT tools used and performance analysis on different criterions will be done.

4.2.1. SMEs priorities while forming supply chain strategies

On the basis of literature review and pilot survey thirteen priorities have been identified. These are forecasting accuracy, flexibility of manufacturing system, better management of transportation system, location of suppliers/customers, innovativeness, environmental issues/green production, integrated data-base, reducing lot size, delivery on time, quality improvement and cost reduction. Respondents were asked to rate the importance of these priorities in likert scale of five (1– very low, 5–very high). Results are shown in Figure 4.1.

It is observed that quality improvement (mean=4.3347) has highest importance followed by delivery on time (mean=4.1753) and cost reduction (mean=3.9761). Singh et al. (2008a) have also observed that for SMEs in auto component sector, cost reduction, product quality, and delivery in time are major priorities for improving competitiveness. It has to be noted here that product cost has not emerged as a top ranking priority as observed in previous studies. It may be due to the reason that most of the SMEs are working as vendors to larger organizations where product quality and timely delivery are essential to stay in supply chain. Another reason for product cost not emerging as a top priority may be that presently organizations consider product cost as a qualifying criterion. It means organizations themselves try to add different features on their product at competitive price only for the delight of customers. For example, Indian SMEs are
facing competition from countries like China, Taiwan and Korea as low cost manufacturing destination. Other major priorities for strategy development are quality of information available (mean=3.8167), better management of transportation system (mean=3.5697) and innovativeness (mean=3.5538). To face challenges of global and open markets, SMEs should have business strategy to give innovative products with better managed transportation and delivery system. This all can be managed by availability of quality information at right time to take timely decisions. Other major priorities are flexibility of manufacturing system (mean=3.5060), location of suppliers/customer (mean=3.3705), forecasting accuracy (mean=3.2789) followed by inventory reduction (mean=3.2669), green production/environmental issues (mean=3.1992), reducing lot size (mean=3.0242) and integrated data base (mean=3.0120). These findings imply that SMEs have also changed their orientation for green supply chain and other operational issues for improving coordination in supply chain.

Figure 4.1. Priorities for supply chain Strategies
4.2.2. Problems faced by Indian SMEs during implementation of SCM

On the basis of intense literature review and pilot survey thirteen problems are identified, which Indian SMEs face during implementation of supply chain management (SCM). These problems are uncertainty of customer orders/demand, reducing product life cycle, difficulties in measuring the performance of supply chain, lack of support from vendor, resistance to change traditional practices, non-availability of right information at right time, shortage of technical man power and experts, lack of trust among supply chain members, lack of competency in using modern technologies, overdependence on bigger supply chain partners, insufficient knowledge of SCM, involvement of middlemen in supply chain and lack of committed resources. The results of this study for various problems being faced by Indian SMEs on a Likert scale of five (1 – lowest, 5 – highest) are shown in Figure 4.2.

![Figure 4.2. Problems faced by SMEs in supply chain](image-url)
It is observed that the biggest problem is of uncertainty of customer order/demand (mean=4.0199). It is followed by problem of insufficient knowledge of SCM (mean=3.7530) and involvement of middlemen in supply chain (mean=3.7450). Huin et al. (2002) also found that the frequent change of orders by OEM or first and second tier buyers is biggest challenge for SMEs. SMEs do not have the time, knowledge or resources to conduct detailed analysis about benefits of SCM. Sometimes in absence of realization of long-term growth, SMEs do not understand the full implications of SCM to their firms. Indian SMEs are working in isolation and have involved middlemen in their supply chain. Middlemen take away lots of benefits from SMEs. SMEs are paid very less for their services. If they become aware about their rights and open to global market environment they can avail lots of benefits. Next major problem faced by SMEs is overdependence on bigger supply chain partner(s) (mean=3.6813). Due to poor knowledge of IT and fear about information sharing, SMEs depend on bigger supply chain partners.

Next problem faced by SMEs is of lack of committed resources (mean=3.6574). As SMEs are always in scarcity of resources, they fear to devote resources for SCM implementation, as they find no short term gain from SCM applications. Therefore SMEs need to be made aware of long term gains from SCM implementation. Resource scarcity can impact on the ability of SMEs to enter export markets. SMEs are facing the pressures to produce the ‘‘best’’ product, at the cheapest price, and with the shortest manufacturing lead time but due to non availability of right information at right time (mean=3.5697) they are not able to do so. To meet customers’ orders at shorter lead time, SMEs need to carry extra inventory as safety stock. This problem is mainly due to communication gap between supply chain partners or due to fear of information sharing.

Lack of trust among supply chain members (mean=3.4263) is next big problem. Due to lack of security feeling, SMEs have lack of trust on their supply chain partners. Supply uncertainty or lack of support from vendors is the eighth major problem that SMEs faces. Resistance to change traditional practices (mean=3.2510) is the ninth major problem that SMEs face. This problem is mainly due inadequate technologies as well as inadequate in-house human expertise and poor financial resources. Other problems faced by SMEs are
lack of competency in using modern technologies (mean=3.2351), shortage of technical man power & experts (mean=3.1394), reducing product life cycle (mean=3.116) and difficulties in measuring the performance of supply chain (mean=2.9234). SMEs may have constraints due to the scarcity of resources, flat organizational structure, lack of technical expertise, paucity of innovation, occurrence of knowledge loss, etc. The flat structure of SMEs can often leave employees frustrated because they are often unable to realize their short and mid-term career goals. That is why SMEs may find it difficult to employ high-caliber staff and even harder to retain them.

4.2.3. Risk faced by SMEs in Supply chain

On the basis of literature review and pilot survey, eleven risks have been identified which Indian SMEs faces while working in supply chain. These are sharing of sensitive information, over dependence on outsourcing, seasonality of demand, changing global/domestic market, transportation delay, currency fluctuations, volatile fuel prices, terrorist attacks, interstate policy differences, fluctuating prices of raw material and political instability. Respondents were asked to rate the risk in likert scale of five (1–very low, 5–very high). Results are shown in Figure 4.3. It is observed that highest risk is of fluctuating prices of raw material (mean=3.9163) followed by sharing of sensitive information (mean=3.8725) and seasonality of demand (mean=3.7251). SMEs are always under pressure to produce high quality low cost items. In this atmosphere SMEs faces the biggest risk of fluctuating prices of raw material. Raw material prices are directly link to cost of items produced. Second risk faced by SMEs is sharing of sensitive information. SMEs are under constant threats of business loss due to leak of information related to technology used, customer’s orders and product design. Therefore they always fear in sharing any sensitive information and use of modern information technology (IT) tools. Seasonality of demand is the third main risk which SMEs faces. Seasonality of demand on one hand give golden chance to earn profit and business, on other hand put extra pressure on resources of SMEs. SMEs find it difficult to handle this fluctuating demand of market with limited resources. Fourth main risk faced by SMEs is currency
fluctuations (mean=2.1873). In case of export/imports of items, currency fluctuation may play a major role. It will act as major risk for SMEs having global partners.

Next major risk faced by SMEs is transport delay (mean=3.5697). Supply risk is the uncertainty associated with supplier activities and general supplier relationships. Sometimes delay in transportation leads to lost business. Timely delivery of services is the demand of modern global competition. These days’ customers’ demands are changing very fast. Due to open global market options available to customers are very vast. Technologies are changing very rapidly all over the globe. So markets have become very volatile. SMEs find changing global/domestic market (mean=3.5498) a risk to survival. SMEs are finding that the new markets and commercial opportunities also generate a new dimension of uncertainties and risks in the supply chains. Next major risk to SMEs is volatile fuel prices (mean=3.2789). As resources of petroleum products are limited and their prices are controlled by some of oil producing country group. Fluctuating prices of these product put direct pressure on economy of small firms. With limited resources it is not possible for SMEs to provide all services by their own and to gain cost advantage and market share, many firms implemented various initiatives such as outsourced manufacturing. These initiatives are effective in a stable environment, but in cut throat competition, they could make a supply chain more vulnerable to various types of disruptions caused by uncertain economic cycles, consumer demands. They may lead to order loss or technology loss. So SMEs find overdependence on outsourcing (mean=2.0199) as a risk. This situation can be handled by developing trust among different partners of supply chain. Other risks faced by SMEs are political instability (mean=1.8406), interstate policy differences (mean=1.0239) and terrorist attacks (mean=1.0199). These risks are not very significant. However they can happen occasionally. Therefore sometimes these kinds of risks also disturb the coordination in supply chain.
4.2.4. Factors for coordination improvement

A key issue in SCM is to develop mechanisms that can align the objectives of independent supply chain members and coordinate their decisions and activities so as to optimize system performance. Coordinated strategic planning could increase integration between various departments of an organization through information retrieval and sharing. In present study, thirteen strategic factors have been identified. Respondents were asked to mention the level of priority on these factors in their organization on a Likert scale of five (1–very low, 5–very high). Results are shown in Figure 4.4. It is observed that follow-up with customers for feedback (mean=3.7251) has highest importance for improving coordination in supply chain followed by networking with suppliers and customers (mean=3.6853) and periodic interdepartmental meetings (mean=3.5697). It may be due to fact that timely and accurate feedback from customer about product and services helps in making services better. This factor has been given highest preference here.
Second most important strategy is networking with suppliers and customers (mean=3.6853). Through establishing close partnerships with suppliers, product, process and technology innovations could be better achieved, e.g. joint development of a new product, joint effort in reducing purchased lead-time, cross training workforce, etc. Increase in coordination with customers could be achieved through forming close partnerships with customers. This may help to reduce late design changes and/or order changes, which subsequently affect the delivery performance of the company. This partnership will not only benefit the supplier and the customer, but will also improve the coordination with the suppliers due to a closer “control” of the supply chain of SMEs.

Third most important factor is periodic interdepartmental meetings (mean=3.3586). This implies that to improve coordination in supply chain, organization should not ignore coordination in internal operations such as procurement, manufacturing, storage, dispatch, interdepartmental meeting etc. Fourth most important factor is reliable logistic system (mean=3.3267). It will help SMEs in optimizing their transportation & warehousing cost etc. Reliable logistic system helps in coordination of activities of supply chain. Customer’s orders and services of organization can only be connected by a good logistic system. For increasing coordination and responsiveness of supply chain, information sharing with all members of chain (mean=3.6853) is very important. Supply-chain coordination relies on the availability of prompt and accurate information that is visible to all actors in the supply chain. Use of modern technologies such as internet, electronic data interchanges (EDI), web sites, radio frequency identification (RFID) technologies and ERP helps in better management of information. Accurate, timely and easily accessible information can improve decisions making in supply chain. In the context of SCM, a supplier is able to better match inventory supply with demand when information is available on the buyer’s inventory status.
Next important factor is development of flexible production system (mean=3.0478). Flexible production system helps in mapping up with untimely change of product design and demands of customers. Next important factor is development of reliable suppliers (mean=3.0279) followed by data integration among internal functions through networking (mean=2.9442). The practice of using few suppliers helps to build more effective supplier relationships. Next important factor is integrated inventory management (mean=2.8247). Inventory management at a single location consists of two fundamental decisions: how much to order and when to order. Inventory management in a supply chain, however, consists of replenishment decisions at different firms. Agreed vision & goals of members (mean=2.6454) is next important factor followed by implementation of joint replenishment & forecasting decisions (mean=2.4781). A coherent decision making helps in resolving conflicts among supply chain members and in exceptions handling in case of any future uncertainty. Collaborative working for joint planning, joint product development, mutual exchange information and integrated information systems, cross coordination on several levels in the companies on the network, long term cooperation and fair sharing of risks and benefits. Next important
factors are supply chain contracts with members (mean=2.3705) and supply chain risk/reward sharing (mean=2.1873). The dependencies between the supply chain members can be managed with the help of coordination mechanisms such as invoking supply chain contracts. SC members coordinate by using contracts for better management of supplier–buyer relationship and risk management. The contracts specify the parameters (like quantity, price, time and quality) within which a buyer places orders and a supplier fulfills them. The objectives of supply chain contracts are: to increase the total supply chain profit, to reduce overstock/under stock costs and to share the risks among the supply chain partners. Factors having mean values less than moderate values are not prompt although they are important for supply chain coordination.

Better coordination among members of supply chain leads to better business performance of SMEs. To analysis this authors studied the correlation among the coordination factors and business performance. Coordination factors like networking with suppliers and customers, reliable logistic system, follow up with customer for feedback has significant correlation with business performance of SMEs. Results are shown in Table 4.1. Coordination factors like information sharing with all members, agreed vision and goals of members, development of flexible production system, development of reliable suppliers; data integration among internal functions through networking, integrated inventory management and periodic interdepartmental meetings has positive correlation with business performance of SMEs. These finding implies that coordination factors are having positive impact on business performance of SMEs. SMEs have to pay more attention toward coordination factors like supply chain risk/reward sharing, implementation of joint replenishment and forecasting decisions and supply chain contracts with members. As these factors have negative correlation with business performance of SMEs. SMEs may take help of experts to tackle this type of problem.

4.2.5. Supplier selection and evaluation

A good supplier selection process is very important for efficient purchasing and manufacturing. The decision-making process of evaluating and selecting a supplier is
complicated for two reasons. First, suppliers can be evaluated by more than one criterion. Second, each supplier has a different specialty and thus a different criterion. On the basis of intense literature review and pilot survey eleven factors are identified, which the study found important for selection and evaluation of suppliers for Indian SMEs. The results of this study for various factors of supplier selection and evaluation for Indian SMEs are studied on a Likert scale of five (1 – lowest, 5 – highest). Results are shown in Figure 4.5. It is observed that the most important factor for supplier selection and evaluation is cost effectiveness (mean=4.6335). It is followed by commitment to quality (mean=4.3307) and on time delivery capability (mean=4.2151). In modern time SMEs are under constant pressure to reduce price and improve quality. To achieve all these targets SMEs prefer those suppliers which are cost effective and quality committed. So factors such as cost effectiveness and commitment to quality are first two factors of supplier selection and evaluation. To meet commitments of timely delivery of orders SMEs prefer those suppliers which are capable of on time delivery. So on time delivery capability is the third most important factor. Fourth important factor is transportation flexibility (mean=3.8327). Fifth and sixth important factors are proximity to plant (mean=3.7251), investment in plant & machines (mean=3.7211). For meeting fluctuating demands of customers on time, suppliers should have transportation flexibility, location as near to customer as possible and better investment in plant and machines. To get benefits of rationalization and set long-term relation with customers suppliers should have certain capability like: capability to change product mix (mean=3.615), capability of product design & development (mean=3.4980), use of modern technology (mean=3.4303), willingness to share information (mean=3.0359) and internal lean practices(mean=2.5378).
4.2.6. Involvement of suppliers in decision making

SMEs are always under pressure to produce quality products and deliver them to other members of supply chain/market on time. If SMEs are having collaborated suppliers they can handle risks of fluctuating market demands. Successful collaboration requires a certain changes from traditional business practices. Involvement of key suppliers in decision making is one of them. On the basis of literature review and pilot survey of market, six key areas have been identified where supplier can be involved in decision making in an organization. These are inventory management, logistic management, application of new technologies/IT tools, design of supply chain, manufacturing and planning and product design and development. Respondents were asked to rate key areas on likert scale of five (1-very low, 5-very high). Results are shown in Figure 4.6. It is observed that inventory management (mean=2.4661) has highest importance followed by logistic management (mean=2.3705) and application of new technology/IT tools (mean=2.2351). Suppliers are the key members of any supply chain. If suppliers are quick responding supply chain become responding. From study it is found that inventory management is the most important area where supplier involvement is required.
Collaborated suppliers can reduce the inventory and hence the inventory carrying cost. For timely delivery of goods better logistic management is required. Logistic management is the second most important area of supplier involvement. To face global competition SMEs should have well technologically upgraded network of supplier and customers. Application of new technology/IT tools is the third most important area. In modern global scenario SMEs are having very few key suppliers well connected in the supply chain. They also help in manufacturing planning and research and development of new and existing products. This study also supports these opinions. Fourth important area of supplier involvement is design of supply chain (mean=2.0996) followed by manufacturing and planning (mean=1.9761) and product design and development (mean=1.8645).

![Figure 4.6. Factors of supplier involvement in decision making](image)

### 4.2.7. Involvement of customer in decision making

Customers are market movers in modern time. No organization can progress by ignoring customer’s demands. SMEs are also involving their customer’s opinion in their decision making. In present study for involvement of key customer in decision making seven key areas have been identified. These are product design and development, marketing and sale decision, customer relationship management, logistic management, application of new technology/IT tools, design of supply chain and inventory management decisions.
Respondents were asked to rate the factors on a likert scale of five (1-very low, 5-very high). Results are shown in Figure 4.7. It is observed that product design and development (mean=3.4024) has highest importance followed by marketing and sale decision (mean=3.3665) and customer relationship management (mean=3.1554). In any supply chain customers sit on the top of priorities. They also have no of options. So to survive in cut throat competition of market, customer’s opinion should be given highest importance by SMEs. This study also suggests involving of customers in different key areas such as product design and development, marketing and sales decisions, etc. Fourth most important area is logistic management (mean=3.0279). Customer should be made integrated part of supply chain in technology implementation and inventory decision making. Next important areas suggested by study are application of new technology/IT tools (mean=2.9761), design of supply chain (mean=2.8247) and inventory management decisions (mean=2.6295).

![Figure 4.7.Factors of customer involvement in decision making](image)

**4.2.8. Factors responsible for distortion of actual demand (Bullwhip effect)**

On the basis of intense literature review and pilot survey, ten factors were identified, which are responsible for distortion of actual demand for Indian SMEs. The results of this study for various factors responsible for distortion of actual demand for Indian SMEs are studied on a Likert scale of five (1 – lowest, 5 – highest). Results are shown in Figure 4.8.
It is observed that the top four responsible factors for distortion of actual demand are information delay & distortion (mean=3.7371), followed by Supply shortages & price fluctuations (mean=3.7171), commitment to quality (mean=4.3307) and Conflicting objective of each stage (each stage has own profit plan) (mean=3.1315).

![Figure 4.8. Factors of demand distortion](image)

4.2.9. Use of IT tools for different SCM functions

In modern time, information technology (IT) plays a vital role in the sustained growth of business organizations. For application of IT different areas have been identified. Different areas are interacting with customers, product design and development, interacting with suppliers, sales and services, logistics operations, forecasting and planning, manufacturing scheduling, inventory tracking at supply chain linkages, order fulfillment time reduction and capacity planning. Respondents were asked to rate the level of IT application in likert scale of five (1-very low, 5-very high). Results are shown in Figure 4.9. From study it is observed that interacting with customers (mean=3.4661) is the highest preferred area of IT use. Followed by product design and development (mean=3.3904) and interacting with suppliers (mean=3.3187). SMEs are working in
extremely volatile and unpredictable business environment and availability of right kind of information at right time has become a prerequisite for successful operations. Observations from this study also support that application of IT can help SMEs in beating cut throat competition. Interaction with Customers, suppliers and product design and development are most preferred areas of IT application. Fourth most important area of IT application is sales and services (mean=3.2709). Technology application in market research and sales analysis can give upper hand to SMEs in leading business. Fifth important area of IT application is logistics operations (mean=3.1355). Timely delivery of order can be made possible by taking help of different new IT techniques such as POS data, ASN, RFID and automatic replenishment of basic goods, etc. Next important areas of IT application are forecasting and planning (mean=3.0000), manufacturing scheduling (mean=2.9522), inventory tracking at supply chain linkages (mean=2.8845), order fulfillment time reduction (mean=2.8805) and capacity planning (mean=2.7610). IT application helps in linking different supply chain operations in better way.

**Figure 4.9. Different areas of IT application**
4.2.10. Type of IT tools/modern technologies

Information technology these days are judged not only on terms of precision, processing speed and a set of programme functions but their ability to help employees and management improve the performance of any given business. Different type of IT tools identified from literature review and pilot survey are bar-coding, electronic data interchange (EDI), intranet/extranet, electronic payment, advanced ship notice (ASNs), own web sites, enterprise resource planning (ERP)/SCM software, automatic replenishment of basic goods, radio frequency identification (RFID) technologies and E-commerce. Respondents were asked to rate the different issues in likert scale of five (1-very low, 5-very high). Results are shown in Figure 4.10.

![Figure 4.10.Type of IT tools/modern technologies](image)

It is observed that E-commerce (mean=2.8247) is most preferred IT tool by SMEs. SMEs lack resources to invest in costly IT tools. They prefer to go for short term investment in IT tools. IT tools directly linked to finance (E-commerce) is highly preferred. Other IT tools/techniques used by Indian SMEs are own web sites (mean=2.5060), enterprise
resource planning (ERP)/SCM software (mean=2.3825), intranet/Extranet (mean=2.2590), electronic payment (mean=1.9402), electronic data interchange (EDI) (mean=1.8964), advanced ship notice (ASNs) (mean=1.8287), bar-coding(mean=1.7689), automatic replenishment of basic goods (mean=1.6534) and radio frequency identification (RFID) technologies (mean=1.4104). Overall it is observed that level of application of different IT tools is less than moderate value. It may be due to scarcity of resources. Therefore Indian SMEs need to pay attention in this regards.

4.2.11. Critical success factors SCM implementation

On the basis of intense literature review and pilot survey thirteen critical success factors (CSFs) were identified, on which Indian SMEs should focus during implementation of supply chain management (SCM).These CSFs are top management commitment, development of effective SCM strategy, devoted resources for supply chain, logistics synchronization, use of modern technologies, information sharing with supply chain members, forecasting of demand based on point of sales (POS), trust development in supply chain partners, developing JIT capabilities in system, development of reliable suppliers, higher flexibility in production system, focus on core strengths and long-term vision for survival and growth. The results of this study for various CSFs for SCM implementation by Indian SMEs on a Likert scale of five (1 – lowest, 5 – highest) are shown in Figure 4.11.

It is observed that the most important factor is top management commitment with mean values of (mean=4.2430). It is followed by long term vision for survival and growth (mean=4.1355), focus on core strengths (mean=3.9960) and devoted resources for supply chain (mean=3.9402). In SMEs, all major decisions are taken by top management. Sandberg and Abrahamsson (2010) also stated that top management commitment is a key enabler for effective supply chain management. Implementation of SCM for long term survival proves to be very useful. But SCM implementation requires committed management and devoted resources. Usually it is observed that SMEs do not have the time, knowledge or resources to conduct detailed analysis for implementing SCM.
Sometimes in absence of realization of long-term growth, SMEs does not understand the full implications of SCM to themselves. During further analysis authors observed that other important CSFs are development of effective SCM strategy (mean=3.8606), development of reliable suppliers (mean=3.6414), information sharing with supply chain members (mean=3.4343) and logistics synchronization (mean=3.3745). Usually SMEs work in isolation and involve middlemen in their supply chain. Middlemen take away lots of benefits from SMEs. If they become aware about their rights and make effective strategies to implement SCM and to face global competition, they can avail lots of benefits. By establishing close partnerships with its suppliers and customers, product, process and technology innovations could be better achieved. For improving coordination and responsiveness of supply chain, information sharing with all members of supply chain is very important. Supply chain coordination relies on the availability of prompt and accurate information that is visible to all actors in the supply chain. Coordination improves by close partnership with customers and suppliers and helps in joint development of new products, joint effort in reducing purchased lead-time and cross training of workforces. Coordination also helps in reducing late change of design and orders, which subsequently affect the delivery /logistics performance of the companies. Coordination and responsiveness will not only benefit the suppliers and the customers, but will improve the profits of overall supply chain.

Logistics synchronization will help SMEs in optimizing their transportation & warehousing cost. Customer’s orders and services of organization can be effectively connected by a good logistic system. Further observations state that other main CSFs are use of modern technologies (mean=3.3108), higher flexibility in production system (mean=3.2789), forecasting of demand based on point of sales data (mean=3.1520), trust development in supply chain partners (mean=3.1275) and developing JIT capabilities in system (mean=3.1116). Use of modern technologies such as internet, electronic data interchanges (EDI), web sites, radio frequency identification (RFID) technologies and ERP helps in better management of information.
Accurate, timely and easily accessible information can improve decision making and forecasting in supply chain. Forecasting of demand based on point of sales data help in making practically more accurate forecasting of customers requirement. In the context of SCM, a supplier is able to better match inventory with demand when accurate information is available about the buyer’s inventory status. Flexibility in production system (mean=3.2789) helps in making up with changing products design and demand of customers. On coordination point of view trust development in supply chain partners (mean=3.1275) is also very important. Due to lack of security feeling, SMEs lose trust among partners. Developing JIT capabilities in system ensures better utilization of resources or help in reducing waste in different forms.

![Figure 4.11. CSFs for SCM implementation in SMEs](image)

4.3. Performance measurement

Performance measurement can be defined as the process of quantifying the effectiveness of various processes being followed by the organization. Performance measurement
provides the information necessary for decision makers to plan, control, and directs the activities of the organization. They also allow managers to measure performance, to signal and educate employees (and suppliers) on the important dimensions of performance, and to direct improvement activities by identifying deviations from standards. In this study performance has been analysed from different perspective of Balance Score Card Model as discussed in following sections.

4.3.1. Performance in terms of customer service and satisfaction

On the basis of intense literature review and expert opinion, ten parameters of customer service and satisfaction are identified. These parameters are ability to resolve customer complaints, ability to deliver product on time, ability to follow up customer inquiries, ability to determine future expectations of customer, improvement of order fill rate, ability to reduce customer response time, ability to reduce shipping error, ability to reduce cost continuously, ability to customize the product and application of ethical standards. The effect of SCM initiatives on performance of Indian SMEs in terms of customer service and satisfaction have been observed on a Likert scale of five (1 – lowest, 5 – highest) and are shown in Figure 4.12.

From analysis of surveyed data, it is observed that the most improved area is the ability to resolve customer complaints (mean=3.7052). It is followed by ability to deliver product on time (mean=3.6295), ability to follow up customer inquiries (mean=3.6016), and ability to determine future expectations of customer (mean=3.4382). In modern time market is customer centric and for customer’s satisfaction it is very important to resolve their complaints, follow inquiries and prediction of future demands. During further analysis it is observed that performance of Indian SMEs has improved in terms of order fill rate (mean=3.4343), ability to reduce customer response time (mean=3.3386), ability to reduce shipping error (mean=3.1155), ability to reduce cost continuously (mean=3.0916), ability to customize the product (mean=3.0797) and application of ethical standards (mean=2.7769). Responsiveness of supply chain is the demand of modern time. To make a supply chain responsive it should have higher order fill rate with
quick response to customer orders. Coordinated and responsive supply chain delivers the right product to right customer at right time. SMEs have to reduce shipping error for smooth going of process of supply chain. For customization of products, production system of the organization should be flexible enough. On other hand there is continuous pressure of cost reduction on SMEs by other members of supply chain. All these improvement can be possible by implementing SCM initiatives in Indian SMEs.

Figure 4.12. Parameters of customer service and satisfaction

4.3.2. Performance in term of innovation and growth parameters

In present study, eight innovation and growth parameters have been identified. Respondents were asked to mention the level of performance on these factors for their respective organization on a Likert scale of five (1 – very low, 5–very high). Results are shown in Figure 4.13. By implementing SCM initiatives, performance of Indian SMEs on parameters of innovation and growth has showed highest improvement in implement new technology (mean=4.2430) followed by ability to respond well to customer demand for new features (mean=3.9402) and ability to compete based on quality (mean=3.8606).
While working in supply chain Indian SMEs have realized the importance of implementing new technologies. To beat cut throat competition from global competitors, implement new technology has given an edge to Indian SMEs in all fields. Responsiveness of Indian SMEs has also improved. Further abilities of Indian SMEs have also improved in terms of offering quality products.

Further Indian SMEs have also shown improvement in terms of ability to offer less prices than competitors (mean=3.4343), ability to offer reliable product (mean=3.3745), reduce product design and development cycle time (mean=3.3108), identify new customers (mean=3.1520) and ability to introduce new facility (mean=3.1275). Changing facilities with time and adopting new technology is going to help SMEs in adopting changing business environment. Offering new products with improved design at cheaper cost will also help them to sustain global competition.

Figure 4.13. Performance parameters of innovation & growth

Further Indian SMEs have also shown improvement in terms of ability to offer less prices than competitors (mean=3.4343), ability to offer reliable product (mean=3.3745), reduce product design and development cycle time (mean=3.3108), identify new customers (mean=3.1520) and ability to introduce new facility (mean=3.1275). Changing facilities with time and adopting new technology is going to help SMEs in adopting changing business environment. Offering new products with improved design at cheaper cost will also help them to sustain global competition.
4.3.3. Performance in term of financial parameters

Financial parameters were measured in terms of average percentage change in past three years on market share, sales turn over, reduction of inventory cost, export and return on investment on a Likert scale of five (1 – lowest, 5 – highest). This scale took care of decreasing, constant as well as increasing percentage changes (Singh et al., 2006). In current study, nine financial parameters have been identified. Results are shown in Figure 4.14. By implementing SCM initiatives Indian SMEs have shown highest improvement in terms of net profit (mean=3.9004) followed by return on investment (mean=3.8845) and revenue growth (mean=3.8765). Improvement in terms of export share (mean=3.1037) of Indian SMEs is lowest among all measures. This finding indicates towards poor performance of Indian SMEs in global market in term of exports. It may be due to various constraints mentioned in the literature as well as in this study.

![Figure 4.14 Financial parameters](image)

**Figure 4.14 Financial parameters**

Without sufficient resources, trained and qualified manpower, and state-of-the-art technology, Indian SMEs could not compete with their counterparts in developed
countries or especially emerging and newly industrializing economies such as Singapore, Hong Kong, South Korea, Taiwan, Mexico and Malaysia. These challenges have forced majority of the SMEs to focus on local market and made them unable to compete successfully in global market. Therefore, major challenge for them is to broaden their product range and make their quality world class.

4.3.4. Performance in terms of internal business parameters
On the basis of literature review and pilot survey, eight internal business parameters have been identified. These parameters were measured in terms of average percentage change in past three years on a Likert scale of five (1 – lowest, 5 – highest). These are level of teamwork and coordination among internal departments, use of modern quality control techniques, development of cross functional team, ability to reduce the product cycle time, improvement in labour productivity, ability to reduce the wastage, ability to reduce the inventory and reduction in breakdown of machines. Results are shown in Figure 4.15.

![Figure 4.15.Parameters of internal business performance](image-url)
To face challenges of global competition, SMEs should have internally and externally coordinated supply chain. This study observed that implementation of SCM initiatives has highest impact on teamwork and coordination among departments (with mean value of 3.4781) followed by modern quality control techniques (3.3386) and development of cross functional team (3.3068). Forming cross functional teams with members from different departments and of different fields makes problem solving easy and more effective. Further in this study it is observed that Indian SMEs have average performance in terms of ability to reduce the product cycle time (3.1833), improvement in labour productivity (3.1673), reducing the wastage (3.1673), reduce the inventory (3.1514) and reduction in breakdown of machines (3.0199). These finding imply that SMEs have to make concentrated efforts for improvement in areas of inventory management, maintenance and productivity.

4.4. Development and testing of research propositions

In present scenario of globalization, level of competition and market condition may change with category of organizations. In general, smaller firms experience greater market and customer uncertainty. On the basis of literature review, it was observed that in Indian context, sufficient research has not been carried out for finding effects of coordination and responsiveness on performance of SMEs. Keeping in view these gaps from literature an attempt will be made to find effect of problems, risks on strategy formation for improving coordination and effect of different collaboration and information sharing practices on performance of Indian SMEs by developing different research propositions in this section.

4.4.1. Development of research propositions

SMEs feel intense pressure when they expose them self for business in a global market. Major issues considered for study of effect of coordination and responsiveness practices on performance of SMEs are problems, risks, priorities for supply chain strategies, coordination and responsiveness strategies formation. Following on gaps from literature
and feedback from industry professional’s fourteen research propositions are developed on these issues in the following sections.

4.4.1.1. Strategy formation
SMEs face different problems and risks. They have to make certain strategic changes to cope up with new business challenges. Present study being an empirical study for Indian SMEs has its own importance in enhancing the knowledge of strategy development for improving coordination in a supply chain. Study endeavors to address issues related to problems, risk, priorities for supply chain strategies, coordination strategies and their effects on business performance of Indian SMEs. A framework has been developed as shown in Figure 4.16. Under problem section, study will try to identify major problems faced by SMEs while implementing supply chain management. Under risk section, it will try to identify major risks which SMEs feel while working in supply chain. In coordination strategy development section, study has tried to identify new strategic changes which SMEs have to make for improving their coordination in supply chain. In business performance section mainly financial business parameters have been explored in the present study. This study has tried to test the following propositions:

P1. There is a significant relationship between problems and priorities of supply chain strategies.

P2. There is a significant relationship between risks and priorities of supply chain strategies.

P3. There is a significant relationship between priorities of supply chain strategies and coordination strategies.

P4. Coordination strategies will be positively correlated with business performance.
4.4.1.2. Collaboration and information sharing

Present study investigates how the use of collaboration and information sharing practices by Indian SMEs with key suppliers and customers in supply chain, impact Indian SMEs performance. Under collaboration section, it will try to study importance of supplier selection and evaluation and involvement of supplier and customers in decision making on different issues related to SCM. Under information technology (IT) section study will try to check the level of IT use for different functions within organizations and different IT tools used in different organization. In business performance section mainly financial business parameters have been explored in the present study. Five research propositions are made for this study, derived from model illustrated in Figure 4.17. In first research proposition authors examine that the adoption of supplier selection and evaluation practices have significant impact on business performance. Other propositions examine the impact of involvement of key suppliers and customers in decision making, use of IT tools for different functions within organization and use of any particular type of IT tool on business performance.

**P5. Supplier selection and evaluation practices have significant impact on business performance.**

**P6. Involvement of key suppliers in decision making have significant impact on business performance.**

**P7. Involvement of key customers in decision making have significant impact on business performance.**
Use of IT tools for different functions within organization have significant impact on business performance.

Use of any particular type of IT tool has significant impact on business performance.

Supply chain management (SCM) is the need of modern time for SMEs to cope up with intense pressure of global competition. SCM is also the way out for SMEs to get higher quality and low cost products for their customers. So SMEs have to do serious efforts to implement SCM. Present study is an empirical study for identification of critical success factors (CSF) for implementation of SCM and to study their effects on performance of Indian SMEs. Thirteen CSFs are identified form extensive literature review and experts opinion and their effect has been studied on different categories of performance measures.
such as customer service and satisfaction, Innovation and growth, financial and internal business of Indian SMEs. This study has tried to test the following research propositions:

\textit{P10: There is a significant relationship between CSFs and SMEs performance in terms of customer service and satisfaction.}

\textit{P11: There is a significant relationship between CSFs and SMEs performance in terms of innovation and growth criterion.}

\textit{P12: There is a significant relationship between CSFs and SMEs performance in terms of financial performance.}

\textit{P13: There is a significant relationship between CSFs and SMEs performance in terms of internal business parameters.}

To study effect of different CSFs on performance of Indian SMEs, study has developed a framework as shown in Figure 4.18. According to this framework, CSFs of SCM implementation leads to better performance of Indian SMEs on different categories such as customer service and satisfaction, Innovation and growth, financial and internal business.

\textbf{4.4.1.4. Factors responsible for distortion of actual demand (Bullwhip effect)}

Present study being an empirical study on effect of bullwhip effect on the performance of Indian SMEs. In this section, study will try to find and analyze different factors responsible for distortion of actual demand (Bullwhip effect) in supply chain of Indian small and medium enterprises (SMEs). In business performance section, mainly financial business parameters have been explored. One research propositions has been made i.e.

\textit{P14: Factors responsible for bullwhip effect has significant negative impact on business performance of SMEs.}
4.4.2. Testing of research propositions

Survey responses will be analyzed in this section to test the research propositions developed for SMEs. Different issues for testing of research proposition are strategy formation, collaboration and information sharing; CSFs for implementation of SCM in SMEs, factors responsible for distortion of actual demand (Bullwhip effect). For testing these research propositions, independent sample t-test, correlation and regression are performed by using SPSS (version 17.0) software.

4.4.2.1. Strategy formation

In this section following research propositions are tested:

\( P1. \) There is a significant relationship between problems and priorities of supply chain strategies.

\( P2. \) There is a significant relationship between risks and priorities of supply chain strategies.

\( P3. \) There is a significant relationship between priorities of supply chain strategies and

![Figure 4.18. Framework of CSFs for Implementation of SCM](image-url)
coordination strategies.

P4. Coordination strategies will be positively correlated with business performance.

Based on literature and discussion from experts, factors of problems, risks, priorities of SC strategies, coordination strategies and business performance were identified for this study. In this study, executives were asked to rate the intensity of each attribute for their respective organization on a five-point Likert scale (1 – lowest, 5 – highest). For testing above research propositions independent sample t-test and correlation analysis have been applied for overall value of different strategic areas. Results are given in Table 4.1.

Table 4.1. Correlation analysis of Coordination factors with Business Performance

<table>
<thead>
<tr>
<th>Issues</th>
<th>Problems</th>
<th>Risks</th>
<th>Priority</th>
<th>Coordination</th>
<th>B. Perform.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Problems</td>
<td>1</td>
<td>.708**</td>
<td>.099</td>
<td>-.534**</td>
<td>.272**</td>
</tr>
<tr>
<td>Risks</td>
<td>.708**</td>
<td>1</td>
<td>.315**</td>
<td>-.251**</td>
<td>.472**</td>
</tr>
<tr>
<td>Priorities for SC strategies</td>
<td>.099</td>
<td>.315**</td>
<td>1</td>
<td>.454**</td>
<td>.498**</td>
</tr>
<tr>
<td>Coordination strategies</td>
<td>-.534**</td>
<td>-.251**</td>
<td>.454**</td>
<td>1</td>
<td>.190</td>
</tr>
<tr>
<td>Business Performance</td>
<td>.272**</td>
<td>.472**</td>
<td>.498**</td>
<td>.190</td>
<td>1</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed)

- It is observed that problems faced by SMEs during implementation of SCM have positive correlation with priorities for supply chain strategies. But they are not significantly correlated. There by not supporting the first proposition. The reason for this is that priorities for supply chain strategies will depend on requirement of markets and problems may change from organization to organization.
Supply chain risks felt by SMEs are significantly correlated with priorities for supply chain strategies. Thereby supporting the second proposition. It means risks directly affect priorities of SMEs for developing supply chain strategies.

Priorities for supply chain strategies are significantly correlated with coordination strategies. Thereby supporting the third proposition. It implies that SMEs should carefully select priorities and focus on those areas as it will directly affect coordination in supply chain.

Coordination strategies are positively correlated with business performances. SMEs have started realizing the long term benefits of supply chain coordination. So coordination strategies are preferred by SMEs as long term priorities of SCM. But they are not significantly correlated. Less significant correlation between coordination strategies and business performance may be due to fear of SMEs towards open global markets and fear to make long term commitments. But in addition to coordination strategies, SMEs have to focus on other competencies such as quality improvement, on time delivery, reduction of costs, developing new products and use of appropriate information for identifying market changes.

4.4.2.2. Collaboration and information sharing

In this section related with collaboration and information sharing propositions are tested. These are as follows:

P5. Supplier selection and evaluation practices have significant impact on business performance.

P6. Involvement of key suppliers in decision making have significant impact on business performance.

P7. Involvement of key customers in decision making have significant impact on business performance.

P8. Use of IT tools for different functions within organization have significant impact on business performance.

P9. Use of any particular type of IT tool has significant impact on business performance.
Based on literature review and discussion with expert’s, different factors of supplier selection and evaluation, suppliers and customers involvement in decision making, use of IT and type of IT were identified for this study. In this study, executives were asked to rate the intensity of each attribute for their respective organization on a five-point Likert scale (1 – lowest, 5 – highest). For testing above research propositions independent sample t-test and correlation and regression analysis have been applied for overall values of different strategic areas. Results are shown in Table 4.2.

Table 4.2. Correlation analysis of collaboration and information sharing with business performance

<table>
<thead>
<tr>
<th>Issues</th>
<th>Supplier selection &amp; Evaluation</th>
<th>Suppliers Involvement in decision making</th>
<th>Customers Involvement in decision making</th>
<th>Use of IT</th>
<th>Type of IT/ modern technologies</th>
<th>B. Perform.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Supplier selection &amp; Evaluation</td>
<td>1</td>
<td>.341**</td>
<td>.496**</td>
<td>.558**</td>
<td>.346**</td>
<td>.355**</td>
</tr>
<tr>
<td>Suppliers Involvement in decision making</td>
<td>.341**</td>
<td>1</td>
<td>.688**</td>
<td>.696**</td>
<td>.725**</td>
<td>-.164**</td>
</tr>
<tr>
<td>Customers Involvement in decision making</td>
<td>.496**</td>
<td>.688**</td>
<td>1</td>
<td>.770**</td>
<td>.593**</td>
<td>.147**</td>
</tr>
<tr>
<td>Use of IT</td>
<td>.558**</td>
<td>.696**</td>
<td>.770**</td>
<td>1</td>
<td>.743**</td>
<td>.183**</td>
</tr>
<tr>
<td>Type of IT/ modern technologies</td>
<td>.346**</td>
<td>.725**</td>
<td>.593**</td>
<td>.743**</td>
<td>1</td>
<td>-.037</td>
</tr>
</tbody>
</table>

** Correlation is significant at the 0.01 level (2-tailed), *. Correlation is significant at the 0.05 level (2-tailed).

- Supplier selection and evaluation practices have significant correlation with business performance. There by supporting the first proposition. This implies that if SMEs follow the practices of supplier selection and evaluation effectively, they can improve their business performance.
- Involvement of key suppliers in decision making have significant correlation with business performance. There by supporting the second proposition. It implies that involvement of suppliers in decision making can improve the performance of Indian SMEs.
• Involvement of key customers in decision making have significant correlation with business performance. It supports the third proposition. It states that involvement of key customers for decision making on different issues results in better business performance of SMEs. It also implies that if SMEs involve their customers in decision making it will help in forming long term relation.

• Use of IT tools for different functions within organization have significant correlation with business performance. Thereby supporting the fourth proposition. Use of IT tools in key areas such as forecasting and planning, sales and services, interacting with supplier, interacting with customers, capacity planning and logistics operations can improve the business performance of SMEs. It also implies that SMEs should use modern IT tools for different functions to excel in global competition.

• Use of any particular type of IT tool has no significant correlation with business performance. Thereby rejecting the fifth propositions. This implies that Indian SMEs have yet to develop competencies for effective IT applications.

4.4.2.3. Critical success factors (CSF) for implementation of SCM in SMEs

In this section following research propositions are tested.

P10. There is a significant relationship between CSFs and SMEs performance in terms of customer service and satisfaction.

P11. There is a significant relationship between CSFs and SMEs performance in terms of innovation and growth criterion.

P12. There is a significant relationship between CSFs and SMEs performance in terms of financial performance.

P13. There is a significant relationship between CSFs and SMEs performance in terms of internal business parameters.
<table>
<thead>
<tr>
<th>S.No.</th>
<th>CSFs</th>
<th>Correlation coefficient for Perf.1</th>
<th>Correlation coefficient for Perf.2</th>
<th>Correlation coefficient for Perf.3</th>
<th>Correlation coefficient for Perf. 4</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Top management commitment</td>
<td>0.353**</td>
<td>0.483**</td>
<td>0.607**</td>
<td>0.264**</td>
</tr>
<tr>
<td>2</td>
<td>Development of effective SCM strategy</td>
<td>0.296**</td>
<td>0.461**</td>
<td>0.564**</td>
<td>0.051</td>
</tr>
<tr>
<td>3</td>
<td>Devoted resources for supply chain</td>
<td>0.294**</td>
<td>0.490**</td>
<td>0.591**</td>
<td>0.113</td>
</tr>
<tr>
<td>4</td>
<td>Logistics synchronization</td>
<td>0.326**</td>
<td>0.536**</td>
<td>0.579**</td>
<td>0.184**</td>
</tr>
<tr>
<td>5</td>
<td>Use of modern technologies</td>
<td>0.419**</td>
<td>0.441**</td>
<td>0.456**</td>
<td>0.480**</td>
</tr>
<tr>
<td>6</td>
<td>Information sharing with SC members</td>
<td>0.484**</td>
<td>0.418**</td>
<td>0.395**</td>
<td>0.363**</td>
</tr>
<tr>
<td>7</td>
<td>Forecasting of demand on Point of sale (POS)</td>
<td>0.544**</td>
<td>0.380**</td>
<td>0.320**</td>
<td>0.429**</td>
</tr>
<tr>
<td>8</td>
<td>Trust development in SC partners</td>
<td>0.480**</td>
<td>0.363**</td>
<td>0.253**</td>
<td>0.453**</td>
</tr>
<tr>
<td>9</td>
<td>Developing JIT capabilities in system</td>
<td>0.455**</td>
<td>0.415**</td>
<td>0.279**</td>
<td>0.454**</td>
</tr>
<tr>
<td>10</td>
<td>Development of reliable suppliers</td>
<td>0.389**</td>
<td>0.343**</td>
<td>0.231**</td>
<td>0.265**</td>
</tr>
<tr>
<td>11</td>
<td>Higher Flexibility in production system</td>
<td>0.402**</td>
<td>0.428**</td>
<td>0.414**</td>
<td>0.304**</td>
</tr>
<tr>
<td>12</td>
<td>Focus on core strengths</td>
<td>0.298**</td>
<td>0.597**</td>
<td>0.556**</td>
<td>0.173**</td>
</tr>
<tr>
<td>13</td>
<td>Long-term vision for survival and growth</td>
<td>0.460**</td>
<td>0.617**</td>
<td>0.543**</td>
<td>0.195**</td>
</tr>
<tr>
<td>14</td>
<td>Average/overall value of CSFs</td>
<td>0.591**</td>
<td>0.693**</td>
<td>0.680**</td>
<td>0.418**</td>
</tr>
</tbody>
</table>

**Notes:** Correlation is significant at the 0.01 level (2-tailed); CSFs-Critical success factors; Perf.1-Performance in terms of customer service and satisfaction; Perf.2- Performance in terms of innovation and growth criterion; Perf.3- Performance in terms of financial performance; Perf.4- Performance in terms of internal business parameters.

**Table 4.3. Correlation analysis of CSFs with performance issues**
Based on literature review and discussion with experts, different critical success factors for implementation of SCM in SMEs and different performance criterion were identified for this study. In this study, executives were asked to rate the intensity of each attribute for their respective organization on a five-point Likert scale (1 – lowest, 5 – highest). For testing of research propositions, independent sample t-test and correlation and regression analysis have been applied for overall values of different issues. Results are shown in Table 4.3. Some of the observations on the basis of this analysis are as follows:

- Critical success factors (CSFs) for supply chain implementation have significant correlation with performance in term of customer service and satisfaction. Thereby supporting the first proposition. This implies that CSFs for supply chain if taken in consideration while implementing SCM can significantly improve performance of Indian SMEs.
- Critical success factors (CSFs) for supply chain implementation have significant correlation with performance in term of innovation and growth. Thereby supporting the second proposition. It means CSFs helps in performance improvement in terms of innovation and growth.
- Critical success factors (CSFs) are significantly correlated with financial performance. Thereby supporting the third proposition. It means CSFs play important role in improving financial performance of SMEs.
- Critical success factors (CSFs) for supply chain implementation has significant correlation with performance in term of internal business. Thereby supporting fourth proposition.
- Detailed analysis of correlation of different CSFs with different performance issues is shown in Table 4.3. Top management commitment has significant correlation with all issues related to performance. While CSFs such as development of effective SCM strategy and devoted resources for supply chain don’t have significant correlation with performance parameters of internal business. It implies that performance of Indian SMEs can be improved on all issues such as customer service and satisfaction, innovation and growth, financial
and internal business parameters if management commits to implement SCM. On other hand serious attention should be paid by management to strategy development for SCM and enough resources should be devoted for it.

4.4.2.4. **Factors responsible for distortion of actual demand (Bullwhip effect)**

In this section following research proposition is tested:

**P14. Factors responsible for bullwhip effect has significant negative impact on business performance of SMEs.**

Based on literature and discussion with expert’s different factors responsible for demand distortion were identified for this study. In this study, executives were asked to rate the intensity of each attribute for their respective organization on a five-point Likert scale (1 – lowest, 5 – highest). For testing above research propositions correlation analysis has been done as shown in Table 4.4.

Some of the observations on the basis of this analysis are as follows:

- Factors responsible for bullwhip effect have significant negative impact on business performance of Indian SMEs. There by supporting the first proposition. This implies that supply chain of SMEs should be coordinated and responsive to avoid effect of bullwhip effect on its business performance.

- The results revealed that information delay and distortion, supply shortage and price fluctuation and conflicting objective of each stage (each stage has own profit plan) has significant negative impact on business performance of Indian SMEs.

- Above findings imply that SMEs should focus on improving information flow, optimizing order size and price fluctuation to reduce the bullwhip effect thereby improving the performance.
Table 4.4. Correlation analysis of factors responsible for distortion of actual demand (Bullwhip effect) and financial performance

<table>
<thead>
<tr>
<th>S. No.</th>
<th>Factors responsible for distortion of actual demand (Bullwhip effect)</th>
<th>Correlation coefficient</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>Information delay &amp; distortion</td>
<td>-0.441**</td>
</tr>
<tr>
<td>2.</td>
<td>Supply shortages &amp; price fluctuations</td>
<td>-0.300**</td>
</tr>
<tr>
<td>3.</td>
<td>Conflicting objective of each stage (each stage has own profit plan)</td>
<td>-0.272**</td>
</tr>
<tr>
<td>4.</td>
<td>Lack of IT application</td>
<td>0.085</td>
</tr>
<tr>
<td>5.</td>
<td>Fear of stock out or lost sale</td>
<td>-0.126*</td>
</tr>
<tr>
<td>6.</td>
<td>Ordering in large lots (saving of ordering cost, transportation cost etc.)</td>
<td>0.023</td>
</tr>
<tr>
<td>7.</td>
<td>Lot-size based quantity discounts</td>
<td>0.084</td>
</tr>
<tr>
<td>8.</td>
<td>Large lead time</td>
<td>-0.161*</td>
</tr>
<tr>
<td>9.</td>
<td>Trade promotions &amp; short-term discounts</td>
<td>-0.153*</td>
</tr>
<tr>
<td>10.</td>
<td>Lack of trust in SC partners</td>
<td>0.095</td>
</tr>
</tbody>
</table>

**Correlation is significant at the 0.01 level (2-tailed), *Correlation is significant at the 0.05 level (2-tailed).

4.5 Concluding remarks

In this chapter, survey responses were analyzed for various issues related to coordination, responsiveness, and performance analysis. Major issues considered in this chapter include priorities while forming supply chain strategy, problems faced during implementation of supply chain management, risks while working in supply chain, factors for improving coordination, supplier selection and evaluation, involvement of key suppliers and customers in decision making, factors responsible for demand distortion, level of IT application, use of modern technologies, CSF for implementation of SCM. Based on survey, performance has been analyzed in terms of customer service and
satisfaction, innovation and growth, financial parameters and on internal business parameters. Major finding of study are summarized in Table 4.5.

Table 4.5. Major findings of the study

<table>
<thead>
<tr>
<th>Issues</th>
<th>Key Findings</th>
</tr>
</thead>
<tbody>
<tr>
<td>Priorities for strategy</td>
<td>Quality improvement, delivery on time, cost reduction</td>
</tr>
<tr>
<td>Problems</td>
<td>Uncertainty of customer orders /demand, insufficient knowledge of SCM, involvement of middlemen in supply chain</td>
</tr>
<tr>
<td>Risks</td>
<td>Fluctuating prices of raw material, sharing of sensitive information, seasonality of demand</td>
</tr>
<tr>
<td>Factors of improving coordination</td>
<td>Follow-up with customers for feedback, networking with suppliers &amp; customers, periodic interdepartmental meetings</td>
</tr>
<tr>
<td>Supplier selection &amp; evaluation</td>
<td>Cost effectiveness, commitment to quality, on time delivery capability</td>
</tr>
<tr>
<td>Involvement of key suppliers</td>
<td>Inventory management, logistic management, application of new technologies/IT tools</td>
</tr>
<tr>
<td>Involvement of key customers</td>
<td>Product design &amp; development, marketing &amp; sales decisions, customer relationship management (CRM)</td>
</tr>
<tr>
<td>Factors of demand distortion</td>
<td>Information delay &amp; distortion, supply shortages &amp; price fluctuations, conflicting objective of each stage (each stage has own profit plan)</td>
</tr>
<tr>
<td>Level of IT application</td>
<td>Interacting with customers, product design &amp; development, interacting with suppliers</td>
</tr>
<tr>
<td>Use of modern technologies</td>
<td>E-commerce, own web sites, enterprise resource planning (ERP)/SCM software</td>
</tr>
<tr>
<td>CSF for implementation of SCM</td>
<td>Top management commitment, long-term view for survival and growth, focus on core strengths</td>
</tr>
<tr>
<td>Performance in terms of customer service and satisfaction</td>
<td>Ability to resolve customer complaints, ability to deliver product on time, ability to follow up customer inquiries</td>
</tr>
<tr>
<td>Innovation and growth</td>
<td>Ability to implement new technology, ability to respond well to customer demand for new features, ability to compete based on</td>
</tr>
</tbody>
</table>
Finally in this chapter research proposition formation and testing is done. Total of fourteen research propositions were developed. The results of research propositions testing are summarized in Table 4.6 below.

**Table 4.6 Summary of research propositions testing**

<table>
<thead>
<tr>
<th>S.No.</th>
<th>Research Propositions</th>
<th>Test applied</th>
<th>Results</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.</td>
<td>There is a significant relationship between problems and priorities of supply chain strategies.</td>
<td>Correlation</td>
<td>Rejected</td>
</tr>
<tr>
<td>2.</td>
<td>There is a significant relationship between risks and priorities of supply chain strategies.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>3.</td>
<td>There is a significant relationship between priorities of supply chain strategies and coordination strategies.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>4.</td>
<td>Coordination strategies will be positively correlated with business performance.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>5.</td>
<td>Supplier selection and evaluation practices have significant impact on business performance.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>6.</td>
<td>Involvement of key suppliers in decision making have significant impact on business performance.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>7.</td>
<td>Involvement of key customers in decision making have significant impact on business performance</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
<tr>
<td>8.</td>
<td>Use of IT tools for different functions within organization have significant impact on business performance.</td>
<td>Correlation</td>
<td>Accepted</td>
</tr>
</tbody>
</table>
9. Use of any particular type of IT tool has significant impact on business performance.  
Correlation | Rejected
--- | ---
10. There is a significant relationship between CSFs and SMEs performance in terms of customer service and satisfaction.  
Correlation | Accepted
11. There is a significant relationship between CSFs and SMEs performance in terms of innovation and growth criterion.  
Correlation | Accepted
12. There is a significant relationship between CSFs and SMEs performance in terms of financial performance.  
Correlation | Accepted
13. There is a significant relationship between CSFs and SMEs performance in terms of internal business parameters.  
Correlation | Accepted
14. Factors responsible for bullwhip effect have significant negative impact on business performance of SMEs.  
Correlation | Accepted

In this chapter descriptive analysis of data received from survey has been done. Further in chapter research propositions were developed and tested. Out of total fourteen research propositions twelve were accepted and two were rejected. From research propositions testing it is observed that collaboration and information sharing practices of Indian SMEs significantly affect their business performance. Summary of research proposition testing has been summarized in Table 4.6. The next chapter (Chapter 5) will discuss the case study of two SMEs using SAP-LAP methodology. Further in chapter 6, ISM modeling of factors of coordination and responsiveness will done.