

A STUDY OF AWARENESS AND CHALLENGES OF SUPPLY CHAIN INTEGRATION, EXPLORING CHALLENGES AND SCOPE IN THE SMALL AND MEDIUM ENTERPRISES IN PUNE

S.Nande*
Prof. Dr. B. S. Vhankate**
Nitin Athavle***

ABSTRACT

Small and Medium Enterprises (SMEs) play a major role to shape a country's economy. With digital transformation of businesses, SMEs will have to adapt to these technologies for betterment. SC Integration is an integrative framework for information and communication exchange of all the stakeholders related to a product. SMEs face integration issues within the Supply Chain that leads to poor visibility and logistics issues. This concept can prove to be a great solution to the visibility problems of these companies and make them more efficient. The present paper can illustrate that SMEs face numerous challenges due to uncertainty in demand and other visibility issues like tracking deliveries, returns management and monitoring inventory levels, thus suggesting a huge scope of SC Integration in SMEs.

Keywords: SMEs, Supply Chain Management, Supply Chain Integration, Challenges and Scope.

Introduction

Supply Chain Management (SCM) is an integrative philosophy to control the entire distribution channel, starting from the supplier to the end customers (Croom et al., 2000). It is a combination of various activities like sourcing, receiving, storing, manufacturing, and distributing various goods and services to the customers (Council of Supply Chain Management Professionals (CSCMP), 2013). It is a process of integration of different functions like marketing, planning, purchase, stores, finance, manufacturing, warehousing and logistics with one common Enterprise Resource Planning (ERP) solution. It is an integrated activity of transforming raw material into finished products with a support system. It is a chain of activities which involves different people, agencies, suppliers, contractors, manufacturers, customers, and business entities like warehouses, distribution houses, integrated to a common software (Stonebraker et al., n.d.). The purpose of carrying out all the activities in the supply chain is to maximize profits and satisfy customer requirements. It controls the flow of information, products, and finance across the entire value chain (Council of Supply Chain Management Professionals (CSCMP), 2013). Supply chain also focuses upon the study of demand management and supply management through detailed analysis of customer requirement, buying behaviour trends, purchasing trends (P. J. Singh & Power, 2014). Supply chain management explicitly involves major activities of coordination, communication, integration amongst various functions like purchasing, marketing, transport, warehousing and logistics (Bakker & Donk, 2012). Transportation mainly involves movement of goods

* Coordinator BBA-IB, MES Garware College of Commerce, Pune, Maharashtra, India.
** Vice-Principal, MES Garware College of Commerce, Pune, Maharashtra, India.
*** General Manager, Rachana Lifestyles, Pune, Maharashtra, India.

and services, whereas Logistics covers a broader area of storing, packing, loading, unloading, warehousing, transportation and shipping. The prime objective of supply chain involves cost reduction and optimizing the resources while meeting the increasing customer requirements (Ataseven et al., 2017). It is usually observed that the demand and supply functions are synchronized with integrated ERP solutions. The supply chain performance shall be improved by increasing the adaptability and developing the capability of the supply chain (Cooper & Tracey, 2005). The entire chain concentrates mainly upon fulfilling the customer requirements, as well monitors the future needs of the customer by bringing in more flexibility in customer relationship management. The group of people, software, and business together contribute success to the supply chains (Ganbold et al., 2021).

Micro, Small and Medium Industries Defined (msme.gov.in / 1st July'2020)

Table 1

Composite Criteria: Investment in Plant & Machinery/equipment and Annual Turnover			
Classification	Micro	Small	Medium
Manufacturing Enterprises and Enterprises rendering Services	Investment in Plant and Machinery or Equipment: Not more than Rs.1 crore and Annual Turnover; not more than Rs. 5 crore (Ministry of Micro, Small & Medium Enterprises, n.d.)	Investment in Plant and Machinery or Equipment: Not more than Rs.10 crore and Annual Turnover; not more than Rs. 50 crore (Ministry of Micro, Small & Medium Enterprises, n.d.)	Investment in Plant and Machinery or Equipment: Not more than Rs.50 crore and Annual Turnover; not more than Rs. 250 crore (Ministry of Micro, Small & Medium Enterprises, n.d.)

Source: msme.gov.in / 1st July'2020

As mentioned in Table-1, the entire supply chain comprises of all business entities, varying with their business volumes, may be the micro, small, or medium enterprises. Every enterprise involved in the supply chain is equally important and contributes in its own way to improvise the supply chain performance. These small and medium scale enterprises contribute by forming a largest group of manufacturers who supply to the large-scale companies or multinational companies. They also play a dominant role in redefining the market supply-demand strategies.

The Small and Medium Enterprises (SME) sector in India provides employment opportunities after agriculture and nurtures the entrepreneurs and innovators of the country. Pune, in Maharashtra state happens to be one of the major hubs of SMEs which is around 3000 (*Office of Development Commissioner (MSME) Ministry of Micro, Small and Medium Enterprises Analysis of Udyam Registration Data, n.d.*). SMEs have gained importance because they act as a catalyst for the socio-economic development of the country. SMEs account to around 45% of the manufacturing output and also employs 40% of the work force of the country. Currently, SMEs contribute to 6.11% of the manufacturing GDP and 24.63% of the service sector GDP (*Ministry of Micro, Small & Medium Enterprises, n.d.*). Considering the untapped potential of these SMEs, there is a huge scope for technological advancement and realizing the dream of achieving the \$5 trillion economy target by 2025.

Covid-19 has not only dented the large enterprises, but also immensely impacted the smaller ones. The disruption due to the pandemic has exposed the vulnerability of supply chains across the world (*Managing the Impact of COVID-19 on India's Supply Chains-Now, Next and Beyond, n.d.*). Adding to further problems, the world experienced geo-political issues like the US-China trade war and other challenges like severe recession in the economy, migrant issues, extended lockdown, restrictions on the inter- state and inter country movements, container shortages (*Supply Chains and Geopolitics | Business Standard News, n.d.*)

Scope of Integration in SCM

The rapid development in the field of information and technology has urged the globe to bring and adapt changes in their existing systems, processes, activities, and performances (Closs & Savitskie, 2003). The set of activities involved in the entire supply chain are little complex in nature. Here the timely delivery of goods and services is more important, so considering this speed it becomes more essential to make use of information and technology together to improve the delivery performance. Information and technology is a combination of various system software, application software, maintenance software, hardware, ERP solutions, data integration, data analysis, system integration and data retrieval when needed. Data is collected from different sources or departments and is stored in centralized storage

house, and further analyzed and then again is forwarded to the user departments. On the basis of this information the organizations shall take the appropriate decisions. So to make this convert into valuable information and technology is needed. This enables to synchronize the data and put forward into a presentable format to the management. Information and technology put together through integration can bring more transparency, visibility about the transactions in the entire supply chain. Integration of data systems enables the organization to consider one uniform data across all the vertices (Cooper & Tracey, 2005). Companies nowadays work more closely on the integration process, which ultimately improves the supply chain performance. Integration is knowing and understanding the various processes involved and the inter relationship between them in the entire supply chain. The effective integration of data and systems helps the organizations to optimize the resources and reduce the costs, finally aiming for improved profits. The integration enables the decision makers to grow the business by seeking more business opportunities by seeking insights of potential customers and their requirements. Integration also helps to improve the productivity. SC integration has become an important factor in gaining both service and cost advantage and anticipated to play a central role in planning (Tarifa Fernández et al., 2021)

Concept of Supply Chain Integration

Integration of supply chain is how everyone in the team and company and its trading partners work in sync to achieve the same business objectives via integrated business process and information sharing" (*Supply Chain Process Integration|Supply Chain Process Mapping|Supply Chain Process Map|Supply Chain Integration|SCM Process Integration*, n.d.)

While we all are clear about the integration and its elements, it becomes more essential for us to understand the purpose of integration of various systems, people, software under one common technological platform. Here the objective shall be made clear to all the concerned in the supply chain, enabling everybody to have better clarity of the purpose, and ultimate aim of integration of the systems.

- There is a need to understand the level of awareness about the system integration. This shall get reflected from the know-how about the basic concepts of supply chain and the ideas that exist in the minds of the people involved.
- The people engaged in the entire supply chain need to identify the present challenges and how do they overcome them. Now more focus shall be on the level of implementation of system integration aiming towards moving further for effective implementation.
- If some system already exists, while integrating the new systems against the legacy system, the supply chain team needs to identify the scope for upgrading the existing level of system integration for effective performance.
- During the process of system integration the experts in supply chain need to be prepared with the solutions for the initial issues that crop up during its implementation.
- The entire purpose of the research is to understand how supply chain integration positively impacts the operations of enterprises falling which are categories under unorganized sector. How the small, and medium enterprises react to the changing era of digital transformation.
- The purpose is also to analyze how these small organized and unorganized groups strategically react to the new phase of technological developments, as well to understand in detail the correlation amongst those channel partners involved considering impact-effect theory.
- The present need is forcing these unorganized sections of supply chains to gear up by adapting new technologies, new tools, smart solutions and implement the same in their operations for effective and positive performance.
- The integration enables these entrepreneurs to transform the entire business operations into smart operations which are more cost effective, with optimum utilization of available resources against minimal operating expenses.

Literature Review

SC Integration enables firms to improve on their operational and financial performance (Ataseven et al., 2017) . Supplier Integration plays a major role in New Product Development, coordinating process and SC design. Companies that consider the supply chain as one entity would have an advantage over the others. Graham C. Stevens (*What Is Supply Chain Integration?*, n.d.) suggested a 4-stage integration model or framework as below (Figure 1) -

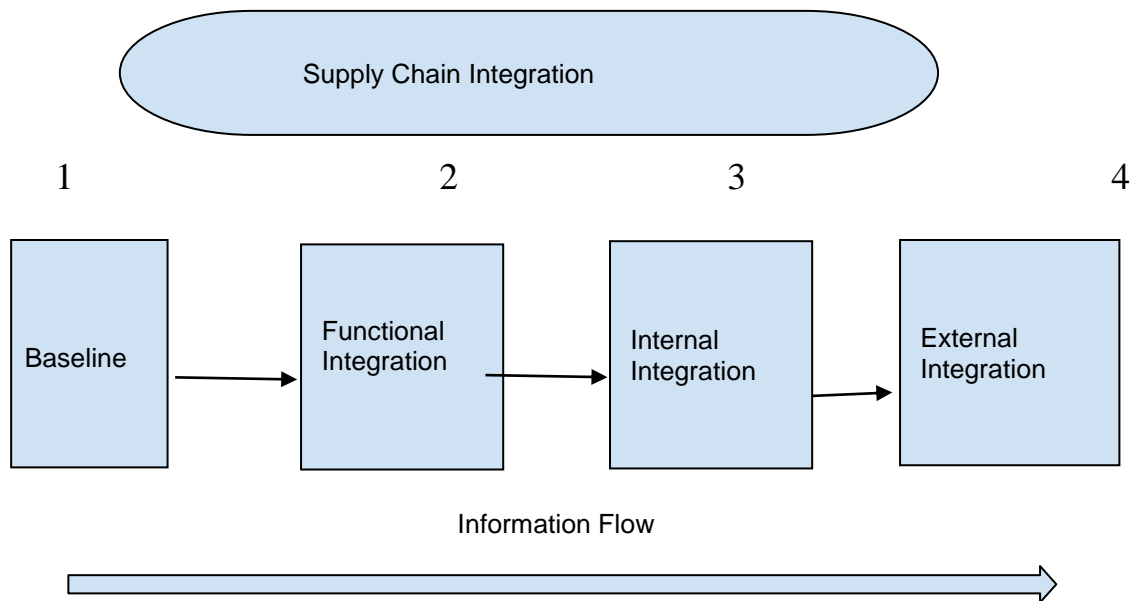


Figure 1: SC Integration Model (G.C. Stevens, 1989)

Source: (Stevens Integration Model and the Seamless Supply Chain | Download Table, n.d.)

Companies that manage the supply chain as one entity would get ahead of the ones who don't. (G.C. Stevens, 1989). Graham C. Stevens suggested a 4-stage integration model or framework as shown in Figure-1.

- **Baseline:** Each department in an organization manages supply chain issues separately and work on its own objectives.
- **Functional Integration:** Every department in an organization works together to achieve a common goal of cost reduction.
- **Internal Integration:** Every department is connected to the same IT system / infrastructure and works towards efficiency.
- **External Integration:** Each organization in the supply chain work together for the common goals of customer satisfaction, cost reduction and increased efficiency.

Information sharing like inventory data, demand data, Quality data, etc. play a major role in integration (Gallego & Özer, 2003). Similarly, POS data is responsible for a responsive supply chain (Michelino et al., 2008). Supply chains can be effective through product optimization, waste reduction, housekeeping and IT applications to reduce time lags in the process (Kumar et al., 2012). SC operations are also changing from EDI and ERP to internet or intranet based applications (Pant, Sethi and Bhandari, 2003 *Supply Chain Management - Google Scholar*, n.d.). There is an emphasis on the knowledge coordination of SC integration between firms (Simatupang & Sridharan, 2005). Emerging technologies like cloud based SC Integration has also been found to have a positive impact on the firm's sustainability ((Himanshu Shee et Al 2017 *Supply Chain Integration - Google Search*, n.d.) Considering the dynamic environmental challenges, cross-functional application of Informational Technology and the SC Integration enabler can work on the key deliverables of any organization in terms of time, cost, quality and performance (Ganbold et al., 2021)

However, there are several challenges of SC Integration that impact the performance of SMEs. Sometimes it is difficult to survive and sustain in the global market. SMEs are not able to completely implement SC Management (R. Singh et al., 2012). There has to be cross-functional training, integration of departments within the organization and vendor development (Kannabiran & Bhaumik, 2005). Successful implementation of web-based SCM required for integration often requires more investments (Ngai et al., 2004). There is an increasing demand for sourcing techniques using ICT based applications to be globally competitive (Tony Cragg and Tom Mcnamara 2014 *Supply Chain Management - Google Search*, n.d.). This is a main difference with respect to the larger organizations in terms of adoption to tools, electronic interface options and other modern methods (Wagner et al., 2003).

Objectives of the Study

- To study and understand the awareness of SC Integration in SMEs.
- To understand the level of implementation and challenges of SC integration.
- To explore the scope of upgrading the existing level of integration.
- To suggest probable solutions to the challenges in SC Integration.

Hypotheses

H₁: There is a significant awareness about Supply Chain Integration in SMEs.

H₀: There is no significant awareness about Supply Chain Integration in SMEs.

H₂: There is a significant level of implementation of Supply Chain Integration in SMEs

H₀: There is no significant level of implementation of Supply Chain Integration in SMEs.

H₃: There is a significant scope of improvement of Supply Chain Integration in SMEs

H₀: There is no significant scope of improvement of Supply Chain Integration in SMEs.

Research Methodology

The research method is quantitative where the researchers aimed to understand the SC Integration practices and the problems faced by the SMEs in Pune.

Research Design

The primary data was collected from the SMEs in Pune. The secondary data was collected from the following sources:

- Government websites like MSME
- Articles from Ernst and Young, MCCIA, CII
- Websites of CSCMP and Udyam registration.
- Journal Articles from Google Scholar, Research gate, Taylor and Francis, Elsevier
- Conference proceedings

Sample

The total population of operational SMEs in Pune is approximately 3000 (Source: Udyam registration data, 31st December 2020). This comprises of automotive industry, pharmaceutical industries, tools making, fabricating, agriculture based processing industries, printing industry, etc.

The researchers targeted 350 respondents based on the sample size calculator available on surveymonkey.com. Simple random sampling method was used. The Google form link was sent to the emails and personal numbers. Some of the emails bounced and some of the respondents did not respond. Hence a data of 100 responses were considered for the study.

Data Collection Tools

The data was collected through a survey conducted by using Google form questionnaire that was sent to the respondents personally through email.

- **Data Analysis:** Descriptive statistics was used for data analysis. MS-Excel was used to analyze the responses. The data was received from 68 Small enterprises and 32 Medium enterprises.

Findings

Segment Size

The small and medium-sized enterprises (SMEs) play an essential role in the economy of a country. They represent a source of entrepreneurship abilities, innovation and creation of new work profiles. Their capacity to apply, adapt and disseminate new technology is unique.

Table 2: Small and Medium Enterprises respondents

Size of the Enterprise	% of Response	Response Collected
Small	68	68
Medium	32	32
Total	100	100

Table 3: Management of the enterprise

Enterprise	Managed by owner	With help from family members	By outsourcing some activities	Partially with the help of staff
Small	49	26	10	15
Medium	23	33	23	21

49% of the small enterprises are managed by the owner himself, 26% with the help of family members, 10% activities are outsourced to some firms and 15% are managed partially with the help of staff.

29% Medium enterprises are managed by the owner himself, 33% with the help of family members, 23% activities are outsourced to some firms and 21% are managed partially with the help of staff.

Awareness of Supply Chain Concept

When asked about and the supply chain activities involved 69% of the respondents were found to be aware of the concept. It was also revealed that 31% of them were not aware about different activities involved in supply chain, highlighting a wide scope and potential for further growth in these numbers.

The Level of Implementation and Challenges of SC Integration

Both the sectors feel that they still need more visibility on the transactions of supply chains.

The small and medium scale entrepreneurs have clearly expressed more concern about late deliveries from the supplier. 54 /100 responses have clearly indicated that late deliveries from the supplier is a common challenge faced by them.

Also one more challenge which shows a major concern is about the uncertainty in supply – demand patterns. 41 responses out of 100 indicated this area of concern.

73% small scale entrepreneurs agreed that in the present infrastructure tracking deliveries, tracking stock levels, and tracking customers' returns is still a challenge. Even 63% of medium enterprises also have agreed to this point.

Table 4: SC Integration assessment of SMEs

Response	Small Enterprises %	Medium Enterprises %
Need to upgrade the existing system to a more integrated one	92	96
Does ERP improves the operational performance of your organization?	87	96
Does software improves the productivity of your firm?	63	66
Can operational risks can be minimized using better coordination through Supply chain integration?	86	93

Above table shows that more than 90% Small and Medium Enterprises have expressed the need for upgradation of the existing system. Around 90% of these Enterprises agreed that ERP improves the operational performance and also more than 60% have agreed that Software can improve the productivity of the firms. They also have responded that operational risks can be minimized using SC Integration.

SC Integration Software Used by SMES

Table 5: Use of SC Integration software in SMEs

Response	Small Enterprises %	Medium Enterprises %
Use of Barcoding software	15.7	27.4
Use of ERP software	25	36
Use of POS software	20	25
Inventory management software	24	37
Web-based software	10.5	23.2

Challenges Faced by SMES

43% of the small-scale entrepreneurs and 53% of the entrepreneurs in the medium scale sector strongly feel that with proper integration in supply chain the level of visibility in the transactions can be improved.

Table 6: Visibility issues of the SMEs

Supply Chain Integration Issues	Small Enterprises %	Medium Enterprises %
Tracking the deliveries, stock levels and customer returns efficiently	52	40
Need more visibility in the transactions	49	53

The Scope of Upgrading the Existing Level of Integration

Many of them have expressed their view and opinion about the transformation journey that is needed in this present scenario to bring effective changes in the productivity.

Out of the total respondent's 92% of Small scale Entrepreneur's and 97% of the Medium scale Entrepreneur's feel that there is a need to upgrade the existing system to new integrated one.

Owners from both the groups like small and medium scale business have realized that with the help of ERP the operational performance and productivity will definitely improve from the present level.

Also 86% entrepreneurs from the small scale and 93% entrepreneurs have an opinion that effective supply chain and its integration will have a wider scope to mitigate the risks involved in the supply chain.

Results and Discussions

The results of the survey that was conducted for both the small & medium enterprises in Pune region, indicate that there exists a huge quantum of scope to explore in the areas of integration in supply chain activities. The potential areas are as follows: - tracking delivery, returns management, visibility and monitoring inventory levels. There is awareness of supply chain management, but SC Integration can be further strengthened to solve the visibility and tracking issues. The survey therefore shows that SC Integration can definitely improve the operational performance.

The data obtained thus proves that H1 (There is a significant awareness of Supply Chain Concept), H2 (There is a significant level of implementation of SC Integration), and H3 (There is a significant scope of improvement in SC Integration) are acceptable. A quantitative analysis can further strengthen the research.

Conclusion & Scope for Further Study

The purpose of the research was to understand the level of awareness of the Supply chain management concept, the level of SC Integration in SMEs, their challenges and scope of Improvement.

After going through the analysis, conclusions or scope of further study the researchers recommend that the suppliers involved in the supply chain activities should definitely improve their productivity, and distribution performances with better integration of supply chain activities.

- The supply chain activities needs to be integrated, considering procurement, receiving, storing, manufacturing, and distribution processes.
- Also integration through a common software or ERP shall be a helpful tool to run the business smoothly for improved traceability, and visibility in the transaction.
- Moreover that with proper integration all the customer returns, rejections, order cancellations, defectives, etc. shall be addressed through the new software and shall help the businesses to reduce the same in future.
- The present format and the scope of the software in the market needs to be customized to make it more user friendly to the small and medium entrepreneurs. The present ERPs shall need to be aligned with the current level of expectations.
- Tracking inventories was a major challenge and still exists in the businesses. To overcome this the researchers highly recommend to switch on the improved version of software or ERP which will enhance better clarity in the stock levels of inventory.

Limitations of the Study

The research was carried out in a period of 3 months. The sample size was 100 and did not cover all the types of sectors evenly although simple random sampling was followed. Some of the industries did not respond within the given time. Also, a quantitative analysis using the Likert scale questions can be used to conduct detailed analysis using larger number of samples.

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