

The Role of Supply Chain Management Practices (SCMPs) on Supply Chain Operational Performance (SCOPer) in Automobile Industry in India

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Abstract

In the modern era of competition and varying business conditions in the twenty first century, automobile OEMs are facing issues such as shift of BSI-IV engines to BSI-VI engines, demand crisis, economic slowdown, and global covid-19 pandemic and at the same time, consumer's expectations are increasing. These things have put a lot of pressure on automobile industry to cater the fast and changing needs of the consumers at competitive price. In the automobile industry, normally vehicles are designed & build to keep in mind the global demand as well to avoid creating a brand new setup for global demand and hence its supply chains have become more complex. The recent economic slowdown in India has put pressure on automobile industry OEM's as well as supplier's top leadership to make right decisions about their supply chains for improved performance. During the exploration of the literature, it was also found that using the various supply chain management (SCM) practices improves supply chain operational performance (SCOPer) and hence supply chain's productivity, profitability, reliability, visibility and efficiency etc. Hence, best SCM practices implementation is essential for the organization to grow & sustain with competition. Few gaps were found during the literature review such as lack and effectiveness of existing SCM practices and continuous monitoring. The objective of the research was to check whether supply chain management practices (SCMPs) improve the supply chain's operational performance (SCOPer) or not. To achieve the objective, the role of Information and Communication Technologies (ICTs) is vital as it is associated directly or indirectly throughout the supply chain pipeline.

The research found that the companies which were carefully monitoring and implementing the SCMPs effectively had improved their supply chain operational performances. This research could further be explored in other sectors/industries.

Keywords: Automobile, SCMPs, SCOPer, OEM, SCM, SCM Practices, Supply Chain, Supply Chain Management

Introduction

It is well known that SCM has evolved as a new dimension in the field of management. In the modern era of competitive world, companies are trying to achieve strategic competitiveness over their competitors through accomplishment of Modern SCM Practices (MSCMPs).

It is well known that SCM has evolved as a new dimension in the field of management. In the modern era of competitive world, companies are trying to achieve strategic competitiveness over their competitors through accomplishment of Modern SCM Practices (MSCMPs). Supply chain management (SCM) is "the systemic, strategic coordination of the traditional business functions and the tactics across these business functions within a particular company and across businesses within the supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole." It has also been defined as the "design, planning, execution, control, and monitoring of supply chain activities with the objective of creating net value, building a competitive infrastructure, leveraging worldwide logistics, synchronizing supply with demand and measuring performance globally." The goal of SCM is to achieve greater profitability by value addition and creating efficiencies, thereby increasing customer satisfaction" (Chopra, et. al., 2016). Successful supply chain management requires many decisions relating to the flow of product, funds and related information. Within a firm, all supply chain activities belong to one of three macro processes: CRM, ISCM, and SRM. Integration among the three macro processes is crucial for successful supply chain management (Chopra, et. al., 2016). Fluctuating market demands, competition, and growing customer expectations & requirements have led to pressure on supply chains. Normally, SCM involves in managing the inflow and outflow of goods, services and related information from producers, to consumers (Christopher, 2005). Many earlier studies show positive relationship between operational performance attributes (Larson and Sinha, 1995). (Koh et al., 2006) found that SCM practices controls operational performance as well as SCM related organizational performance. It was also found that the higher the level of operational performance, the higher the level of SCM related organizational performance. York and Miree (2004) stated that 'non financial' performances like improved quality, innovativeness and resource planning should actually reduce costs, and hence have a direct

positive effect on measures of financial performance. Increased quality helps to retain current customers and create greater customer loyalty which in return could increase market share and organizational performance (Rust et al., 1994). It imperative that Increase in operational performance will lead to enhanced organizational performance

The significant role of supply chain management (SCM) in enhancing the automotive performance cannot be diminished. Many research companies like IBM and individual researchers like Gunasekaran and Ngai, Hugo etc. have acknowledged the role of supply chains as foundation of competitive advantage to the automotive industry. Today, SCM is an integrated part of the businesses to enhance the end customer satisfaction and hence firm's success. Efficient & effective supply chain management ensures that the right data is in place, for right forecast, at right resources, to produce right product, in right condition, in right quantity, are delivered to the right place, at the right time, at right cost. In supply chain management, these rights can be called the nine rights (9Rs) (Singh, et al., 2019).

Normally, the automobile industry has been acknowledged as a key driver of growth of a nation's economy and is a significant contributor to the global economy. The automobile has been described as 'both a form and function' based product involving high level of engineering as well as being positioned as a fashion product. The industry has appropriately been called as the industry of industries as it uses outputs of nearly all manufacturing industries mining, steel etc. till after market, insurance, finance, etc.

The main objective of the research was "to understand the impact of SCM practices on supply chain operational performance of automobile companies in India".

What Is Automobile OEM Supply Chain (AOSC)?

A typical automobile OEM supply chain may include supplier's suppliers, suppliers, manufacturers or focal firms, dealers and end customers which are shown as below (Singh, J. et al., 2019):

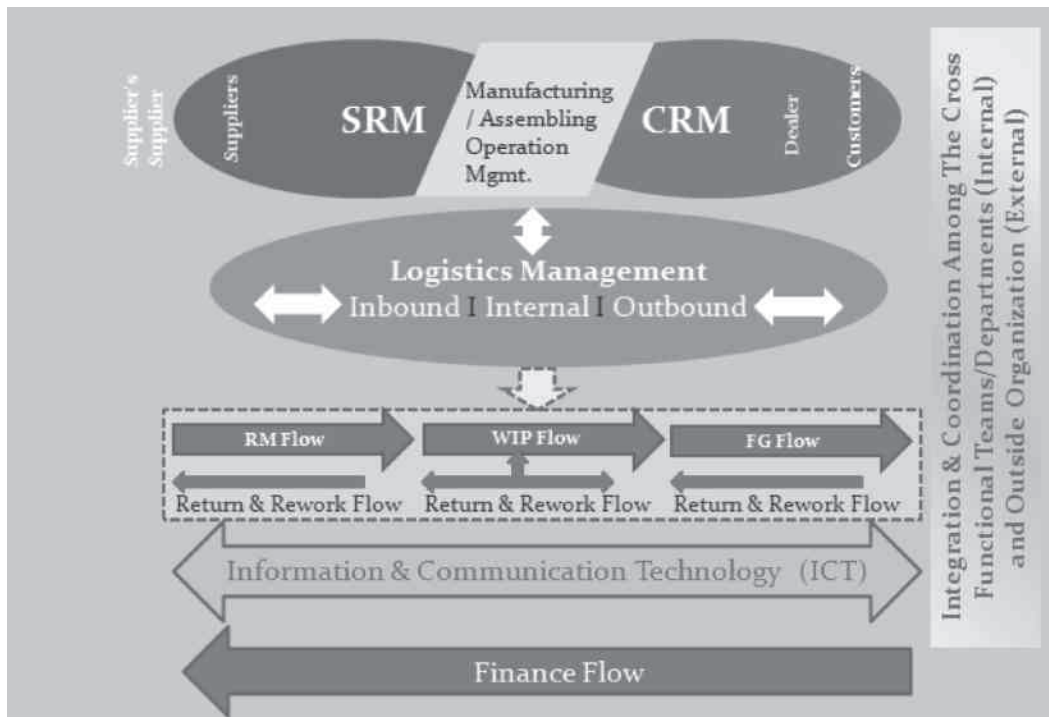


Figure-1: Framework of Automobile Supply Chain Management

Figure-1 is a framework of automobile SCM and the framework states that there are two kinds of activities involved; first one is system supply chain flow while other one is physical supply chain flow. A system refers to virtual which does not have physical presence (but acts & helps as integral part of physical supply chain execution) such as information flow (e-documents such as invoice, packing list, any other documents), finance flow (payments), and any other information which are desired to execute seamless supply chain practices while other one physical supply chain refers to the actual movement of physical products, material or documents such as parts/components flow, invoice copy, airway bill/ bill of lading, packing list and many other documents required throughout the SCM pipeline.

There are three basic principles in developing strategies in supply chain that could assemble the flavor of the customer expectations & needs (Taylor, 2004; Fawcett et al., 2007; Chopra et al., 2010). These include: understanding the customer and degree of uncertainty; understanding the supply chain capabilities; and evaluating the options and selecting the design.

Research Methodology

We conducted a survey with well established questionnaire on various variables in the sub-area of SCM which are supplier relationship management (SRM), customer

relationship management (CRM), logistics management (LM). It was examined the roll of individual SCM practices on Supply chain operational performance (SCOPer). The advancements of information technology have significantly contributed to the development of sharing information throughout the Supply Chain pipeline. Continuous exchanges of information enable Supply Chain practicenors to perform as a single body (Stein & Sweat, 1998). To achieve the finest results, shared information has to be adequate, accurate, credible, and timely (Li et al., 2004). Information sharing affects performance in terms of improved customer responsiveness, decreased costs, enhanced service levels, and reduced levels of complexity (Zhao et al., 2002).

This research was developed to investigate the impact of SCM practices on the SCM operational performance of auto companies.

A total of 110 manufacturing locations of auto companies were targeted, a total of 80 responses were obtained after a rigorous follow-up via F2F, online and over phone. The overall response rate was 72.72 percent (80/110), which could be considered as very good for subsequent analysis.

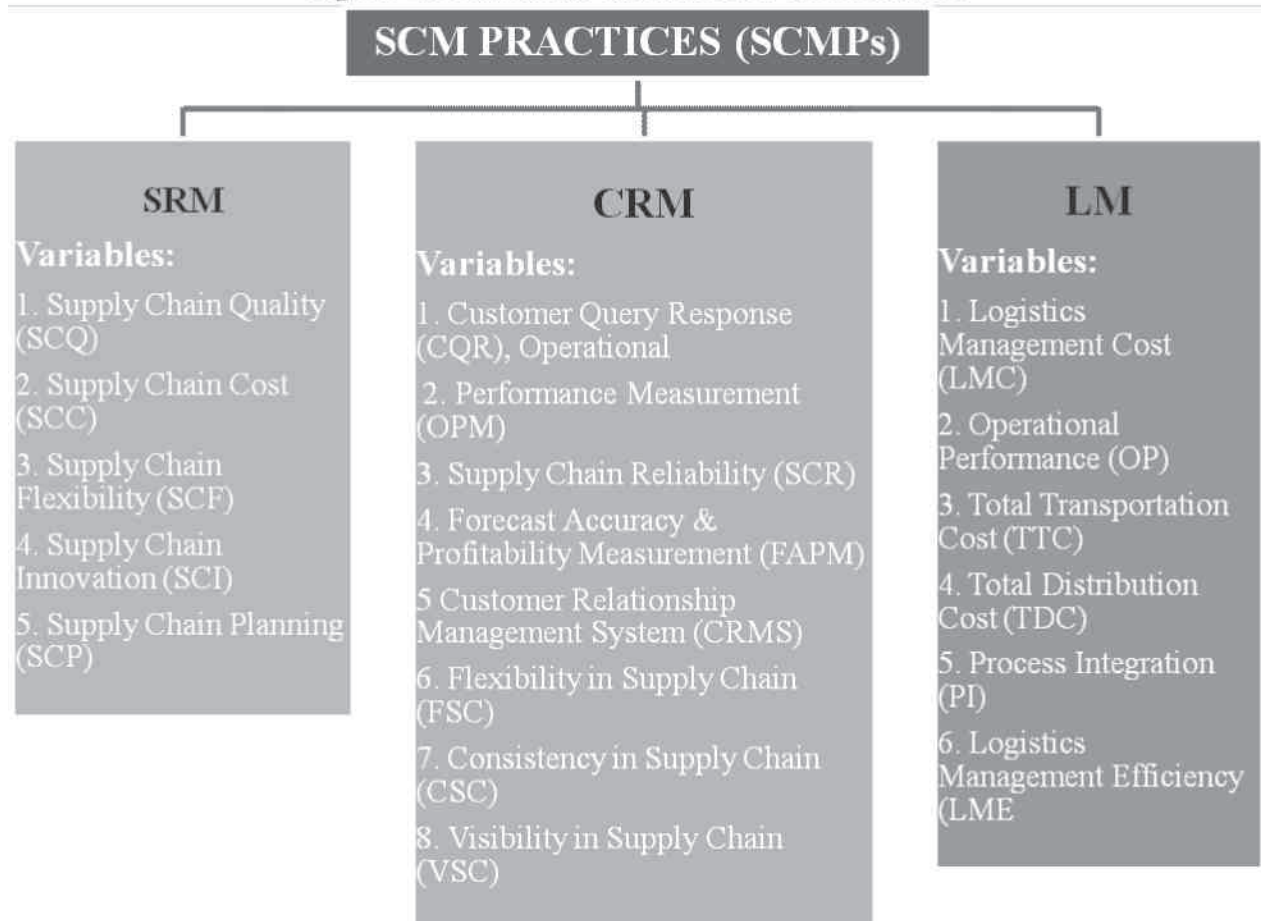
Measurement of variables based on the questionnaire & data collected, divided in 19 sub-categories as explained below in figure-2. Respondents were asked questions under three sub-categories of SCM practices – SRM, CRM

and LM. The scale chosen was likert's five-point scale which was ranging from 1 (least favorable) to 5 (most favorable). According to the research paper, supply chain management (SCM) practices are considered in three verticals of supply chain as supplier relationship management (SRM), customer relationship management (CRM) and Logistics Management (LM). These all

practices have their own individual variables which may affect the outcomes of SCM performance.

Figure-2 below has explained the supply chain management practices variables in details. These are further explained individually as below:

Figure-2: Individual Variables of SCM Practices



Supplier Relationship Management (SRM)

Supplier relationship management has 5 variables namely Supply Chain Quality (SCQ), Supply Chain Cost (SCC), Supply Chain Flexibility (SCF), Supply Chain Innovation (SCI), Supply Chain Planning (SCP). These all variables are directly related to SRM and impact its performance.

The contributions of SRM in manufacturing systems are numerous and difficult to summarize so easy. The supply chain flexibility, quality, cost, planning and innovation as operational factors impacting upon a manufacturing system's performance yet with the increasing complexity in today's supply chains it is argued that these sub-variables of

manufacturing systems in a supply chain should be regarded as a variables contributing to a supply chain's responsiveness & profitability.

Customer Relationship Management (CRM)

Customer relationship management has 8 variables namely Customer Query Response (CQR), Operational Performance Measurement (OPM), Supply Chain Reliability (SCR), Forecast Accuracy & Profitability Measurement (FAPM), Customer Relationship Management System (CRMS), Flexibility in Supply Chain (FSC), Consistency in Supply Chain (CSC), Visibility in Supply Chain (VSC). These all variables are directly

related to CRM and impact its performance.

All above sub-variables are desired to be monitored & tracked to enhance the satisfaction, trust and the relationship across all levels.

Logistics Management

Logistics management has 6 variables namely Logistics Management Cost (LMC), Operational Performance (OP), Total Transportation Cost (TTC), Total Distribution Cost (TDC), Process Integration (PI), Logistics Management Efficiency (LME). These all variables are directly related to LM and impact its performance.

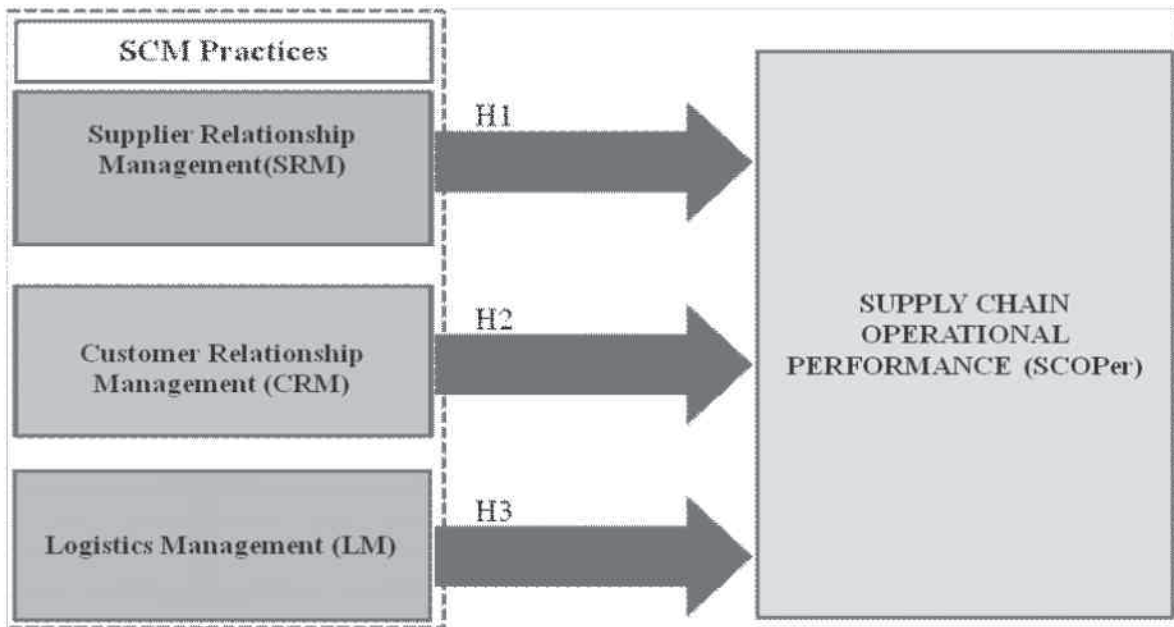
All above sub-variables are desired to be monitored & tracked to enhance the efficiency, improvement in various costs and process improvements among all stake holders. Ultimately, it will improve the profitability to all stake holders.

Research Model And Hypothesis

The Research Model – There are two models created from the research as follows:

Model: Impact of SCM Practices on Supply Chain Operational Performance

Figure-3: A Model of the Roll of Supply Chain Management Practices (SCMPs) on Supply Chain Operational Performance (SCOPer)



The Research Hypothesis

A research hypothesis is a specific, clear, and testable proposition or predictive statement about the possible outcome of a scientific research study based on a particular property of a population, such as presumed differences between groups on a particular variable or relationships between variables. There were 3 hypotheses to be tested as below:

Hypothesis 1 (H01): There is no difference in the mean opinion about supplier relationship management (SRM) of 'agreement and adoption continuum.

Hypothesis 2 (H02): There is no difference in mean opinion

about customer relationship management (CRM) of 'agreement and adoption continuum.

Hypothesis 3 (H03): There is no difference in the opinion about logistics management (LM) of 'agreement and adoption continuum.

B.) Correlation Test

Correlation of Supply Chain Management Practices (SCMPs) to be tested on Supply Chain Operational Performance (SCOPer)

Results And Discussion

The SCM practices with the highest level of usage by the

sample firms included Supplier relationship management which is factored in further such as Supply Chain Quality (SCQ), Supply Chain Cost (SCC), Supply Chain Flexibility (SCF), Supply Chain Innovation (SCI), Supply Chain Planning (SCP), customer relationship management factored as Customer Query Response (CQR), Operational Performance Measurement (OPM), Supply Chain Reliability (SCR), Forecast Accuracy & Profitability Measurement (FAPM), Customer Relationship Management System (CRMS), Flexibility in Supply Chain (FSC), Consistency in Supply Chain (CSC), Visibility in Supply Chain (VSC), and finally Logistics management which is factored as Logistics Management Cost (LMC),

Operational Performance (OP), Total Transportation Cost (TTC), Total Distribution Cost (TDC), Process Integration (PI), Logistics Management Efficiency (LME). Sub factors are grouped together and representing in 3 categories as SRM, CRM and LM.

There are two tests were conducted as below:

P.) T-Test

Q.) Coefficient of Correlation

P.) T-Test

Table-1: Hypotheses – t-test Results

Results of hypothesis testing are given below:

T-Test	H ₀ (Null Hypo.)	H ₁ (Alternate Hypo.)
There is no difference in mean opinion about SRM of agreement and adoption	0.000000000	Accepted
There is no difference in mean opinion about CRM of agreement and adoption	0.000000000	Accepted
There is no difference in mean opinion about LM of agreement and adoption	0.000000000	Accepted

Table-1 is showing the results of the t-test and the interpretation of the table-1 is given below:

Hypothesis 1 (H01): There is no difference in the mean opinion about supplier relationship management (SRM) of 'agreement and adoption continuum. Hence null hypothesis is rejected.

Hypothesis 1 (Ha1): There is a significant difference in the opinion about supplier relationship management (SRM) of 'agreement and adoption continuum. Hence alternate hypothesis is accepted.

Hypothesis 2 (H02): There is no difference in mean opinion about customer relationship management (CRM) of 'agreement and adoption continuum. Hence null hypothesis is rejected.

Hypothesis 2 (Ha2): There is a significant difference in the opinion about customer relationship management (CRM) of 'agreement and adoption continuum. Hence alternate hypothesis is accepted.

Hypothesis 3 (H03): There is no difference in the opinion about logistics management (LM) of 'agreement and

adoption continuum. Hence null hypothesis is rejected.

Hypothesis 3 (Ha3): There is a significant difference in mean opinion about logistics management (LM) of 'agreement and adoption continuum. Hence alternate hypothesis is accepted.

In all three cases (SRM, CRM, and LM), the null hypothesis (H0) was rejected which implies that alternate hypothesis (H1) was accepted. This relationship shows that there is a close relation between the population and the sample, that is, there is a positive relationship between the supply chain management practices (SRM, CRM, and LM) and the supply chain operational performance (SCOPer)

Q.) Coefficient of Correlation

The dictionary meaning of correlation is 'a mutual relationship' or 'connection between two or more things. The coefficient of correlation results are as below in table-2.

Table -2: Correlation of Supply Chain Management Practices (SCMPs) on Supply Chain Operational Performance (SCOPer)

CORRELATION OF SCMPs ON SCOPer	
Correlation of Supplier Relationship Management (SRM) on Supply Chain Operation Performance (SCOPer)	0.60
Correlation of Customer Relationship Management (CRM) on Supply Chain Operation Performance (SCOPer)	0.68
Correlation of Logistics Management (LM) on Supply Chain Operation Performance (SCOPer)	0.77

Table-2 shows the results of the coefficient of correlation and the interpretation is as below:

- There is a high correlation between Supplier Relationship Management (SRM) and Supply Chain Performance.
- There is a high correlation between Customer Relationship Management (CRM) and Supply Chain Performance.
- There is a high correlation between Logistics Management (LM) and Supply Chain Performance.

Again, In all three cases (SRM, CRM, and LM), there is a high correlation between SCM practices and supply chain operational performance (SCOPer). It implies that high level of SCM practices improves high level of Supply Chain Operational Performance.

Conclusion

This research provides observed explanation for a framework that identifies three groups of SCM practices and elaborates the relationship between SCMPs and SCOPer in the context of auto companies in India. The required answer to the research objective was as “Auto companies with high level of SCM practices have a high level of operational performance”. The model was tested using t-test and correlation methods. SCM practices were assembled in 3 main factors: SRM, CRM and LM. The results signify that all three factors of SRM, CRM and LM have direct positive and significant impact on supply chain operational performance. This research offers a few executive implications such as

- developing, monitoring and controlling a group of SCMPs and by demonstrating its value in improving SCOPer of auto companies.
- the investigation of the relationship between SCMPs

and SCOPer indicates that SCMPs are directly proportional to SCOPer of Auto companies.

c.) the findings of this research tend to support the view that the implementation of SCM practices has a significant impact on the operational performance of Auto companies in India. Researchers can use the findings herein to generate ideas for future studies, and top managers can glean important knowledge about how effective SCM impacts organizational performance.

Limitations

Limitation of the research was its limited focus on Indian auto companies. The data was collected from single respondents from individual factory which might lead to a response bias. This study is conducted for automobile industry (includes two wheelers – scooter & motor cycle, 3 wheelers – auto rickshaw & loader, four wheelers – passenger vehicle, loaders/light commercial vehicle and tractor, Bus and truck) which includes automobile factories operating in India. Study does not include construction vehicles etc. This study may not be useful for other industries such as paint, FMCG etc. however validity could be further explored in other industries.

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