Impact Assessment of SRM Practices on SCM Performance in Indian Automobile Industry

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Abstract

SRM has emerged as a key function in supply chain management (SCM). Currently, businesses are struggling to optimize their supply quality & cost, supply flexibility, supplier innovation, and supplies planning. Since the complexity of the supply chain is high in automobile sector as compared to other manufacturing sectors and hence it demands high level of relationship with the suppliers. The purpose of the study was to understand the impacts of supplier relationship management (SRM) practices on SCM performance and the results imply that SRM practices have high correlation &direct impact on SCM performance. The research concluded that maximum use and optimisation of SRM practices result improved supply chain performance which is desired for each business as it increases the overall profitability and customer satisfaction.

Keywords: SRM Practices, SCM, Supply Chain Management, SCM Performance, Automobile Industry

Paper Type: Research Paper

Introduction

Indian automobile industry has come up at a level where it is giving a tough competition to the global automobile players however this sector is lagging behind in commercial vehicle (CV) production. Industry leaders should think on how to increase demand of commercial vehicles and the increase of production accordingly. This leg (CV) of the automobile requires much more attention, investment and collaborations so that it could increase its global market share. India has reached at fourth position globally in overall automobile production and this journey may continue though there are multiple challenges such as stagnant demand or decrease in demand. The contribution of supply chain management (SCM) to overall value creation for any organization is unprecedented. Considering this, global organizations are focusing on strengthening their supply chains more efficient and competitive and hence developing supplier base and uninterrupted supplies. Automobile companies are seeking a good relationship with suppliers. Based on the

literature reviews and the physical observations (during 2015-2020)by the researcher, there were multiple gaps found in the supply, quality of supply, supplier flexibility and flexibility on the supply side, lack in innovation and robust supply planning. These gaps are considered as part of SRM practices. These SRM practices are critical to supply chain management and its performance. Considering the gaps the aim of the study was set as "Impact Assessment of SRM Practices on SCM Performance in Indian Automobile Industry"

Supply Chain Management

At the organizational level, all supply chain activities belong to one of four macro processes: supplier relationship management (SRM), logistics management (LM), internal supply chain management (ISCM), and the customer relationship management (CRM) (Chopra, Meindl, & Kalra, 2016). Efficient & effective supply chain management ensures that the right data is in place, for right forecast, at right resources, to produce the right product, in the right quantity, in the right condition, are delivered to the right place, at the right time, and the right cost. In supply chain management, these rights can be called the nine rights – 9R's (Singh J. , Sarupria, Kushwaha, & Kumari, 2019). The research tried to highlight the importance of effective logistics management practices which might help in identifying and nullifying the interruptions in the Indian automotive industry(Kottala & Herbert, 2019). (Mentzer, et al., 2001)defined supply chain as "a set of three or more entities (organizations or individuals) directly involved in the upstream and downstream flows of products, services, finances, and/or information from source to customer" while SCM is the "strategic and the systematic coordination of the traditional business functions and the tactics across these business functions within a particular firm and across businesses within a supply chain, for the purposes of improving the long-term performance of the individual companies and the supply chain as a whole. As per literature review on supply chain management (Chopra, Meindl, & Kalra, 2016); (Christopher & Ryals, 1999); (Gunasekaran, et al., 2001); (Lambert, et al., 1998); (Lee H. , 2002); (McCormack & Lockamy, 2004), it can be inferred that management practices can offer superior performance to

any firm. The spirit of the SCM was to integrate and coordinate throughout the supply chain pipeline. The SCM concept had been advanced mainly from two bodies of knowledge (1) supplier and purchase management (2) logistics and transport management. In respect of supplier and purchase management, SCM was identical with rationalization of supply base and integration of suppliers into new product design & development and production activities(Krause, 1997).(Levary, 2000) suggested the benefits of supply chain integration such as reducing the inventory levels, minimizing the bullwhip effect, reducing the cycle time, improving the efficiency & effectiveness, enhancing & improving the quality on the acceptable level and beyond throughout the supply chains.(Li S. , Rao, Ragu-Nathan, & Ragu-Nathan, 2005); (Li S. , Ragu-Nathan, Ragu-Nathan, & Rao, 2006);(Thatte A. , Competitive Advantage of a Firm through supply chain responsiveness and SCM Practices, 2007)defined SCM practices in the form of customer relationships, supplier partnerships and information sharing at all levels and the objective of SCM is to improve efficiency and hence bring the competitive advantage to the organization which improves operational performance.. According to (Rice, Sharon, 2015) Supply chain management is defined as "the design, planning, execution, control, and monitoring of supply chain activities with the aim of crafting net worth, making a viable road and rail network, influence global logistics, matching supply and demand, and evaluate performance internationally.

Research Methodology

The proposed plan of study was divided into following parts:
• Research design
• Locale of the study
• Data collection
• Data analysis

Research Design

The brief research design is shown in the Figure-1 below:

The study on supplier relationship management practices in Indian automobile industry was a explanatory cum analytical investigation that requires a logical specification

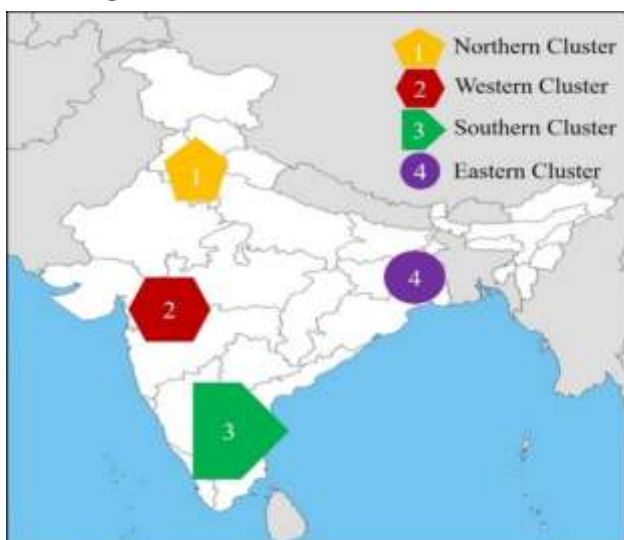of who (Indian automobile factories & companies), what (supply chain management practices), when (2015-2020), why (found gaps) and way (prepared a questionnaire & collected the primary data through face to face & mobile interviews and also through email communications) of the research.

Figure-1: Research Design
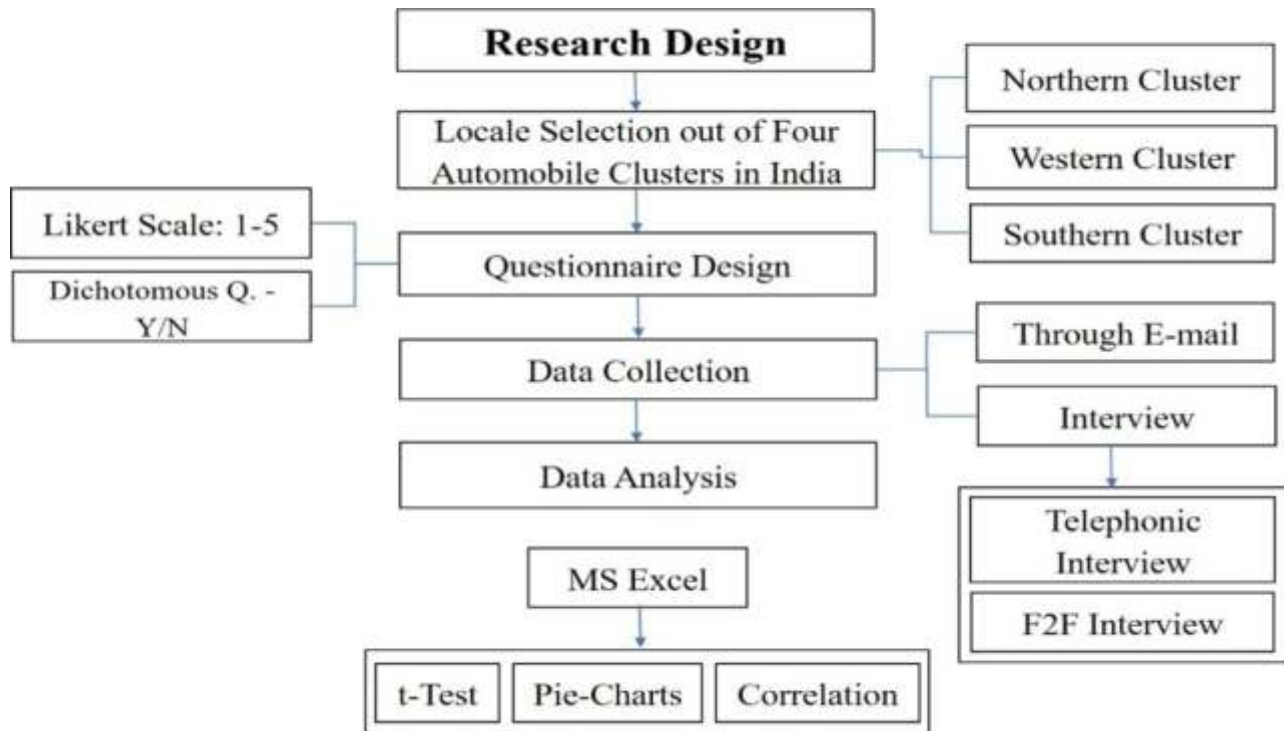
Locale of the Study

Figure-2: Automobile Clusters in India

The locale of the study selected based on the secondary data from Wikipedia and analysed it. The whole India was divided into 4 clusters as shown in Figure-2. Three clusters were selected from automobile production units in India namely western, southern and northern region's clusters for the purpose of research as coverage of these clusters was more than 95% of the total production in terms of vehicles as shown in figure-3 and Figure-4.

Pre-Data Collection Analysis

In all the three selected clusters of Indian automobile companies/factories, there were a total of 137 production/assembly units however there were only 119 units found suitable and considered under the research's scope. Automobile factories comprised of two wheeler (motorcycles and scooters), three wheeler (loaders and auto

rickshaw), HCVs & PVs (buses & trucks only), 4wheeler (passenger car (PC), loaders, tractors, LCVs), and producers. Bar-Chart and Pie-Chart below are showing the manufacturing units under the scope and cluster wise distribution of manufacturing units respectively.
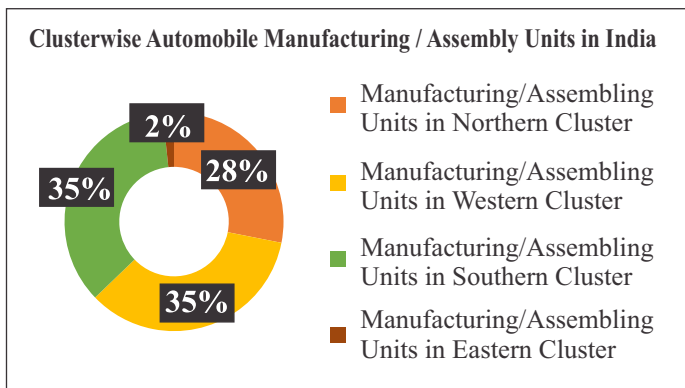
Figure-3: Total Automobile Manufacturing / Assembly Units, Under Scope, and Out of Scope
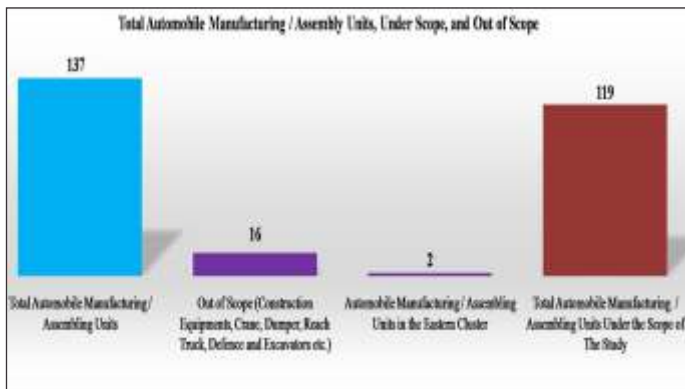
(Source: Secondary Data Analysis, Data Source was Wikipedia)

Figure-3 shows the total 137 manufacturing units in all four clusters, whereas only 119 companies were under the scope of the research. Out of 119 units, 100 units were targeted, however only 80 units responded.

Figure-4: Cluster wise Automobile Manufacturing / Assembly Units in India

(Source: Secondary Data Analysis, Data Source was Wikipedia)

Figure-4 shows the cluster wise automobile manufacturing units' population, which were under the scope of the study. It shows that almost 98% population was scattered in the three clusters and hence fourth cluster was left under the financial and other resource constraints. Hence, the study focused on northern, western and southern clusters only.

Data Collection

Sampling Technique

Sampling technique used for this study was random sampling and it was chosen based on the data analysis (as shown in bar-chart) and also as per the convenience as majority of companies based on three clusters and hence avoided cluster four.

Data Collection

Primary data collection was done through a well-designed research questionnaire via face-to-face interviews & telephonic interviews, and email communications. After a rigorous effort and utilizing personal relationships, 92 respondents out of 119, convinced & shared the information on private basis. Usable responses were 80 out of 92. Figure-5 shows that there was a good response rate in general.

Figure-5: Target vs. Responses Obtained
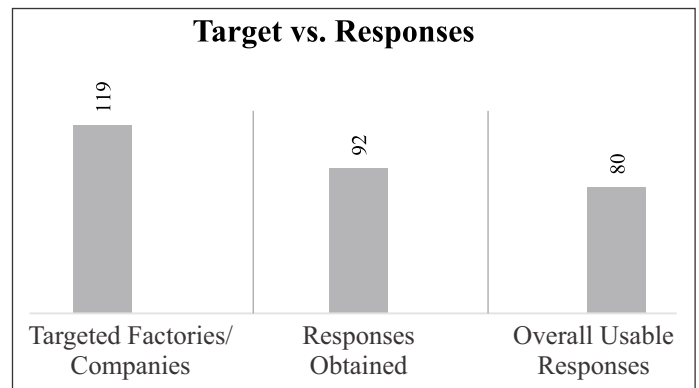
(Source: Primary Data Analysis)

Figure-6 shows that overall responses obtained were 77 percent and out of the obtained responses, 87 percent responses were usable and analyzed further.

Figure-6: Responses Obtained VS. Usable Responses

(Source: Primary Data Analysis)

Data Analysis

The data were analyzed using Microsoft Excel. The analysis was done to check the supplier relationship management (SRM) practices on SCM performance.

Results Discussion

The analysis part of any data set is very crucial for any decision-making process and the ultimate goal of the analysis is to reach on the results. The result discussion is the central part of the technical report. The aim of this chapter is to sum-up the collected data through statistical actions and to present the data into graphical representation, table form and/or any other suitab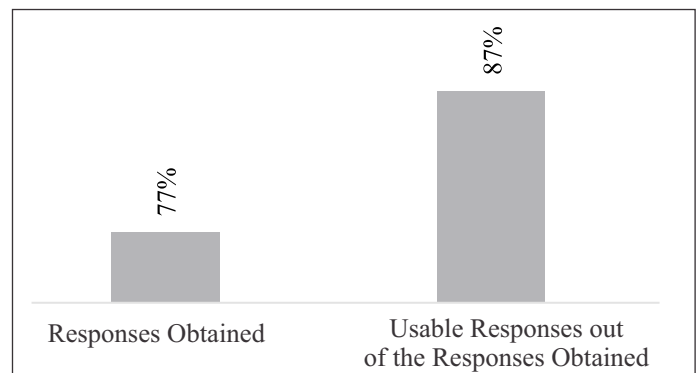le forms. The present study was carried out to analyze the gaps in expectations (agreement) and perception (adoption) in SRM practices and how do these impact the SCM performance. SRM practices have taken five variables namely Supply Quality (SQ), Supply Cost(SC), Supply Flexibility (SF), Supplier Innovation (SI), and Supplies Planning (SP). These all variables are directly related to supply chain management performance. The findings illustrate under the following heads:

1. Analysis of dichotomous questions
2. Research Model
3. Testing of Hypotheses
4. Data Analysis: Reliability Test, T-Test, and Correlation

Analysis of Dichotomous Questions With Respect To SRM

According to graph figure-7, it explains that majority automobile company's supply chain professionals agree that their company use SRM Software in some form or other.

Figure – 7
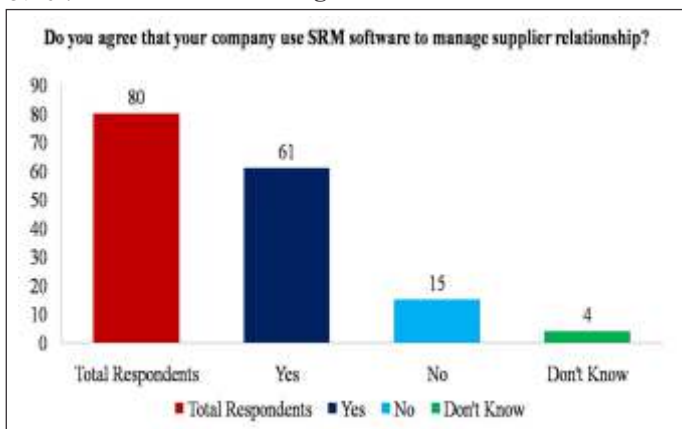
According to figure-8, it explains that majority automobile company's supply chain professionals agree that their company finds reduction in coordination time by using SRM Software and SRM Methodology.

Figure – 8
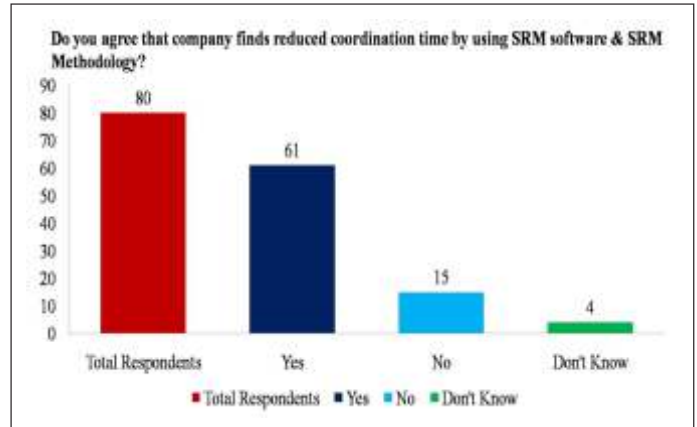
Research Model

The research model in the figure-9 shows the relationship of supplier relationship management (SRM) practices and Supply Chain Management performance. This model wasstatistically tested based on the correlation. The variables taken for SRM practices are supply quality, supply cost, supply flexibility, supplier innovation, and supplies planning.It was to be tested whether these practices directly impacts SCM performance or not.Many researchers have also supported and conferred the SRM practices and their impacts on supply chain management performance as below:

Managers and senior leaderships are continuously scrutinizing to redefine their established supplier relationships (Ginder Kai, 2014). SRM is one of the important approaches to unite the suppliers &supply chains for the planned & progressive benefits of a firm. The SRM is the best approach to find out & establish the latent opportunities. According to (Narges, Mehdi, & Nasrin, 2012), SRM is an essential field of study in supply chain management as there are many gaps found between agreement and adoption among SCM professionals such as new technologies, processes implementation,

collaborations and integrations. Many other researchers found multiple gaps in supplier side quality & the quality of supplies (Dickson, 1966); (Ozgen, Onut, Gulsun, Tuzkaya, & Tuzkaya, 2008); (Saqib, Saqib, & Ou, 2019), components & other supply cost (Weber, Current, & Benton, 1991), supplier flexibility (Ozgen, Onut, Gulsun, Tuzkaya, & Tuzkaya, 2008) in terms of material & component supply in Just in time (JIT), vendor managed inventory (VMI) etc., innovation (Saqib, Saqib, & Ou, 2019)& new technologies & procedure adoption, and gaps from planning side of supplies (Anaplan, 2019); (DemandCaster, 2007)."The study was done using Svenson's model to categorize buyer and supplier relationship throughout the supply chain management of the auto industry in Iran and proposed an SRM framework. Framework defines the supplier and buyer relationship, strategic objectives & relationships among stakeholders." (Abeer, Noor, & Aiman, 2015) Concluded in his research that effectively managing suppliers & relationship with them helps to improve quality of supply, cost control, risks & changes management, and achieves overall operational excellence and this study was conducted in Pakistan however it stands fit to Indian automobile industry as well. (Govindan, Kannan, & Hag, Analysing Supplier Development Criteria for an Automobile Industry, 2010) Concluded that the implementation of appropriate actions and effective management might improve responsiveness of the supply chain and resultantly the improved efficiency & profitability of the firm. In the globalization era, most of the businesses and companies are competing with each other in terms of innovation, product features, quality, cost, inventory management and effective planning and hence organizations are putting extra efforts to strengthen their supply chains by collaborations, integrations and implementations of effective information & communication tools and techniques, and procedural changes, etc. (Alaez-Aller & Longas-Garcia, 2010)Advocated for multiple sourcing instead of single sourcing as there will be a cost savings in multiple sourcing due to competitive pricing strategies to capture the business by the supplier however in long term perspective, the

relationship would matter for both the sides. (M. Barneto, Winter-2003-2004)An analytical model was proposed that assist to describe and evaluate the current relationships between automakers and the suppliers and finally concluded that the model fits ok in establishing a healthy relationship. Many other authors have also contributed on supply quality, cost, flexibility, supplier innovation, and supply planning as below:

(Lamprecht, 2000) described the necessity of supply quality, (Lapinskaite & Kuckailyte, 2014); (Chopra, Meindl, & Kalra, 2016); (Cokins, 2003); and (Kern, 2011) have discussed the various aspects of supply & supply chain costs and its importance at organisational level,(Stevenson & Spring, 2007); (Shukla, Deshmukh, & Kanda, 2017); and (Javier, Luciano, & Fernando, 2011) have discussed the supply flexibility & how it is important to improve supply chain performance,(Stefan, Dagmar, & Stephan, 2018); and (Holger, 2012) descried the aspects of supplier innovations & benefits in SCM, (Florian & Raisa, 2019); and (Dong, Zheng, & Li, 2011) explained how strong planning is backbone of every supply chain and it helps at all levels and all stake holders.

Figure-9 has shown the research model of SRM practices on SCM Performance.

Figure-9: Model of Impact of SRM Practices on SCM Performance
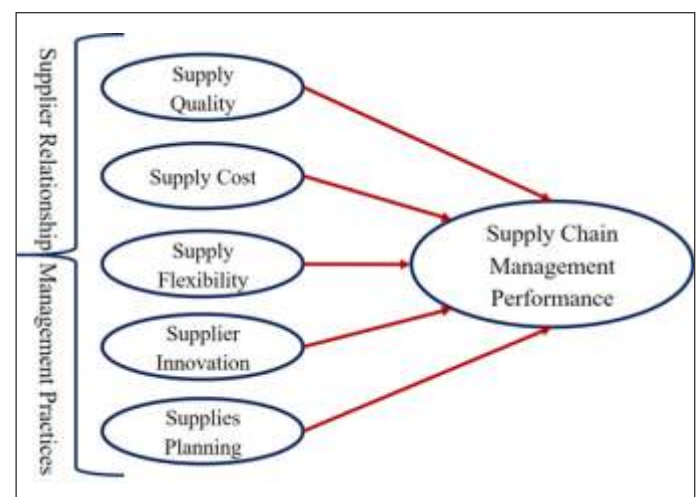
Testing of Hypothesis

Proposed Research Hypotheses of the Study

Table- 1: Proposed Research Hypotheses of the Study
Null Hypothesis (H_0a): There is no impact of supply quality (SQ)on SCM performance.
Alternate Hypothesis (H_1a): There is impact of supply quality (SQ)on SCM performance.
Null Hypothesis (H_0b): There is no impact of supply cost (SC)on SCM performance.
Alternate Hypothesis (H_1b): There is impact of supply cost (SC)on SCM performance.
Null Hypothesis (H_0c): There is no impact of supply Flexibility (SF)on SCM performance.
Alternate Hypothesis (H_1c): There is impact of supply Flexibility (SF)on SCM performance.
Null Hypothesis (H_0d): There is no impact of supplier innovation (SI)on SCM performance.
Alternate Hypothesis (H_1d): There is impact of supplier innovation (SI) on SCM performance.
Null Hypothesis (H_0e): There is no impact of supplies planning (SP) on SCM performance.
Alternate Hypothesis (H_1e): There is impact of supplies planning (SP) on SCM performance.

Table-1 has shown the research hypotheses of the research study.

Data Analysis–Reliability Test, T-Test, and Correlation

Reliability Test

(Lavrakas, 2008) Cronbach's alpha (or coefficient alpha) is a measure of reliability or internal consistency established by Lee Cronbach in 1951. Consistency is also known as "reliability." Cronbach's alpha tests are used to determine the reliability of multiple-question Likert scale surveys.

Cronbach's alpha tests are used to determine the reliability of multiple-question Likert scale surveys. These questions assess latent variables, or variables that are unseen or unobservable, such as a person's conscientiousness, neurosis, or transparency. In real life, these are extremely difficult to quantify. Cronbach's alpha determines how closely a group of test items are associated. The formula for cronbach 's is as below:

$$\alpha = \frac{N \cdot \bar{c}}{\bar{v} + (N-1) \cdot \bar{c}}$$

Where:

N = the number of items

$\bar{c}$ = average covariance between item-pairs

$\bar{v}$ = average variance

For dichotomous questions (i.e., questions with two possible answers) or Likert scale questions, a general rule of thumb is shown in table-2 below:

Table-2: Cronbach's alpha value and the data reliability (internal consistency) level

Cronbach's alpha	Internal Consistency (Reliability)
$\alpha > 0.9$	Excellent
$0.9 > \alpha > 0.8$	Good
$0.8 > \alpha > 0.7$	Acceptable
$0.7 > \alpha > 0.6$	Questionable
$0.6 > \alpha > 0.5$	Poor
$0.5 > \alpha$	Unacceptable

The final calculated value of α is 0.872, which is between 0.9 & 0.8, i.e., the reliability or internal consistency of data is good as per table-2. Hence, the data collected was consistent for further analysis.

T-Test

The P value is as low as it goes beyond 4 decimal points and hence it shown 0.0000 in all cases in the table-2 as below.

Table-3: Results of t-test: This table shows the final results of t-test based on hypothesis

Predictor (Ind. Variable)	p – Value (Four Decimal Places)	Significance Level ($\alpha = 0.01$)	Null Hypothesis (H_0) - Accepted or Rejected?	Final Results and conclusion of Hypothesis
SQ	0	0.01	Reject Null Hypothesis (H_0a)	Accepted the Alternate Hypothesis (H_0a)which says that there is impact of supply quality (SQ) on SCM performance.
SC	0	0.01	Reject Null Hypothesis (H_0b)	Accepted the Alternate Hypothesis (H_1b)which says that there is impact of supply cost (SC) on SCM performance.

Predictor (Ind. Variable)	p – Value (Four Decimal Places)	Significance Level (α =0.01)	Null Hypothesis (H_0) - Accepted or Rejected?	Final Results and conclusion of Hypothesis
SF	0	0.01	Reject Null Hypothesis (H_0c)	Accepted the Alternate Hypothesis (H_1c)which says that there is impact of supply flexibility (SF) on SCM performance.
SI	0	0.01	Reject Null Hypothesis (H_0d)	Accepted the Alternate Hypothesis (H_1d)which says that there is impact of supplier innovation (SI) on SCM performance.
SP	0	0.01	Reject Null Hypothesis (H_0e)	Accepted the Alternate Hypothesis (H_1e)which says that there is impact of supplies planning (SP) on SCM performance.

Note:Decision at 95% and 99% - level of significance, p value < 0.05, and/or p value < 0.01, then, Reject the null hypothesis (H0) and accept the alternate hypothesis (H1)

According to Table-3, In all the cases of supplier relationship management (SRM) practices, the null hypotheses (H0a, H0b, H0c, H0d, H0e) were rejected and alternate hypotheses (H1a, H1b, H1c, H1d, H1e) were accepted which shows that there is a close relation between the population and the sample. That is, there is postive relationship between the SRM practices (SQ, SC, SF, SI, SP) and the supply chain management performance.

Correlation

Table-4: Correlation Results as per Research Model

CORRELATION OF VARIOUS SRM PRACTICES ON SCM PERFORMANCE	
Correlation of Supply Quality (SQ) on Supply Chain Management Performance	0.87
Correlation of Supply Cost (SC) on Supply Chain Management Performance	0.84
Correlation of Supply Flexibility (SF) on Supply Chain Management Performance	0.64
Correlation of Supplier Innovation (SI) on SCM Performance	0.68
Correlation of Supplies Planning (SP) on SCM Performance	0.71

Table-4 shows that there is a high (strong) correlation between supplier relationship management (SRM) practices (SQ, SC, SF, SI, SP) and supply chain management Performance. The result states that there will be a change in output if it changes in any input variables. If all kind of supplier relationship management practices were properly used and optimised, the performance of the supply chain would be high. Now, the model says that using SRM practices improve supply chain performance, since the correlation is strongly positive.

Conclusion

Automobile Industry has realized the potential of SCM &supplier relationship management practices which helps to improve the profitability of any firm. Scope & role of supply chain management has been gradually broadening today and it is not limited to manufacturing but also to support procurement, logistics handling, delivering the expected product to the final consumers, maintaining the relationships across the partners & stakeholders along with to satisfy of the customers. The data were collected through

a well-designed & structured questionnaire through F2F interviews and email communications. The data were analyzed in different heads such as dichotomous questions, t-test, and correlation through MS Excel.

- The final results of t-tests show that the alternate hypotheses (H1a, H1b, H1c, H1d, H1e) were accepted in all the five variables of supplier relationship management (SRM) practices which imply that SRM practices were directly associated with SCM performance. If, there is any change in input variable, output is likely to change.

- The correlation between SRM practices and supply chain management performance is relatively very high in all five variables. Therefore, it can be inferred that SCM performance in automobile is dependent on the SRM practices, i.e., changes in input variables would change the output. If all the SRM practices were used and optimized properly, the SCM performance would be high.

The results imply that SRM practices are highly & positively correlated with SCM performance and resulted that SRM practices directly impact the SCM performance. The model has proven correct from the results. It also infers that the SRM activities are crucial to the supply chain performance in automobile industry. Since the SRM practices are almost similar to other manufacturing companies and hence the same results may apply.It was clear from the research that there is a high impact of supplier relationship management practices on supply chain management performance. Supply quality should be at optimal level followed by supply cost as they impact overall margins of the firm. OEM to work jointly with their suppliers to make an understanding on managing extra inventory (all kind of inventory) and the risks associated with inventory must be shared by the OEM so that supplier should prepare themselves & improve the flexibility. Supplier to be innovative, process driven, and continual improvement mindset so that it could bring efficiency by cost saving through product innovation which helps both OEM as well as supplier. OEM to share current and future planning to their suppliers so that they could prepare themselves for support as it avoids last minute rush.

Research shows that better SRM practices result better supply chain performance and better SCM performance is the bottom line for each firm as it increases the overall profitability and customer satisfaction.

Recommendation

The recommendation is always an important aspect of any research project, and the stakeholders should take it carefully. Potential stakeholders in this study include managers and decision-makers in automobile OEMs and suppliers. This research recommends to all supply chain managers to monitor the SRM practices, i.e., supply quality, supply cost, supply flexibility, supplier innovation, and supplies planning regularly to obtain optimized results. This study relates to automobile companies however, it might be useful to other industries as well and hence the future research scholars may choose some other industries for the similar research.

Limitation

The limitation of the research was the dependency on the unpaid cooperation of the respondents and the same SCM person responded the full questionnaire.

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