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Impact Assessment of CRM Practices on Supply Chain Management Performance in Indian Automobile Industry

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Abstract: ***Indian automotive industry (Both automobile & components) contributes almost 7.5% of total GDP and one of the biggest job creator sectors directly or indirectly. India is lagging behind in terms of commercial vehicle production while comparing it globally and hence it needed more focus, investment and collaborations to catch up the market share at global space. However, automobile sector has reached at fourth position globally in overall production and the journey continued though there were multiple challenges. Supply chain management (SCM) is one of the biggest contributors to overall value creation for any organization. Considering this, organizations are focusing on strengthen their supply chains more efficient and competitive. Since opportunities always invite challenges and hence supply chain is not an exception. Currently, SCM is facing multiple challenges such as visibility, cost reduction, innovation, relationship among the stakeholders. The research objective was set to be "Impact assessment of CRM practices on supply chain management performance in Indian automobile industry". The study found few gaps between expectations (agreement) and perception (adoption) of CRM practices. The study was conducted in major three automobile clusters namely northern, western and the southern clusters in India. For the purpose of data collection, a well-designed & structured questionnaire cum interview methods were used. The research has used quantitative method to collect data through a well-defined questionnaire. Questionnaire has asked two types of questions, first one is rating questions based on the Likert scale (1-5) and the second one is dichotomous (Yes/No). The analysis is done using MS Excel as well as IBM's SPSS. The results imply that industry has high level of expectations but industry is either unable to implement the best CRM practices or industry is unable to utilize benefits of CRM practices at most, hence this research has recommended monitoring operational functions carefully to improve the perception. The limitation of the research was the dependence on the unpaid cooperation of the respondents. This study is related to automobile companies however it may provide a direction to other industries.***

Keywords: CRM, SCM, CRM Practices, Customer Relationship Management, Supply Chain, Supply Chain Management, SCM Performance

I. INTRODUCTION

A. *Supply Chain Management*

"Supply Chain Management" is the process of managing -

1) Product, services or information flows with improving all kind of supply chain costs
2) Quality of services including after sales
3) Inventory levels across the supply chain pipeline

"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." This requires the coordination of data flow from the customer through to production, to then manage the outgoing flow of products. Efficient & effective supply chain management ensures that the right data is in place, for right forecast, at right resources, to produce 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 - 9Rs (Singh Jagdeep, 2019). The research tried to highlight the importance of effective SCM practices which might help in identifying and nullifying the interruptions in Indian Automotive Industry (S. Kottala, 2019). (J.T. Mentzer, 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 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.

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The focus of SCM is to integrate 3 key and important supply chain functions such as customer relationship management, Internal SCM and supplier relationship management in the understanding the smooth flow management of funds, information and most importantly goods/products among the SCM collaborators & associates for ensuring & delivering best values to the end consumers however there are gaps in agreement and adoption level of the practices and required much focus on integration (Chopra Sunil, 2016). The spirit of the SCM was to integration 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 at the acceptable level and beyond throughout the supply chains. (S. Li S. R.-N.-N., 2005); (S. Li B. R.-N.-N., 2006); (Thatte, 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.

A big challenge in today's supply chain is to accumulate the customer's activities data and process it in useful information so that it could be catered and supported their needs on time and hence CRM plays a vital role in maintenance of end to end marketing chains in the supply chain pipeline which is key to success for any organization. CRM will maintain data at all levels taking from dealership to end consumers and it also helps to support customers queries at instant. It does not only help in above things but also helps in marketing & sales & in cross selling, promotions etc. Let's understand the customer relationship management life cycle which is crucial to the automobile and other manufacturing businesses. A typical CRM cycle consists of 6 main legs namely- Forecast & planning, Strategic Decision, Support, Order, Sales & Marketing and Feedback.

B. Customer Relationship Management (CRM)

(E. Thompson, 2004) produced "a research notes on Audi on the topic "what is a CRM strategy, and how does it relate to and integrate with other enterprise business strategies, processes and operations?" The research illustrates3 steps like reactive, proactive and selective tactics for CRM. Audi's CRM strategy stands out strong displays that elementary levels of customer service must be met first before up-selling or cross-selling." According to (Jasmine, 2016), critical challenge today is to serve and maintain good relationship with customers due to expansion of different sources of supply by the economic liberalization, increasing consumer demands and hence increasing competition, informed customers, quality products in demand, instant feedback mechanisms, and value for money. These aspects have changed the way of thinking of the organizations and shifted from traditional approach to contemporary approach to cater their consumers & maintain a strong relationship with them. The approach to maintain the relationship is known as customer relationship management. Indian automobile industry found gaps in terms of CRM approach. It is also found that the companies are required to implement CRM software as well to gain the benefits from the technology perspective however there is a gap due to initial fixed cost. It is expected that automobile companies have to accept it sooner or letter to implement the CRM approach for long term relationships and benefits.

According to (Borah, 2013), "CRM has identified as powerful tool to maintain customer loyalty across the globe. The preference of the today's world is to retain loyal customers instead of searching new ones as it requires a lot of efforts and money. This concept is becoming very much popular in automobile industry as well. (Borah, 2013) proposed the impacts of CRM advantages on customer's retention and loyalty. It obviously brings benefits to the focal firm and the customers itself. Now adays, customers are demanding and the speed of service has been increased in almost all the sectors and hence companies have to take care their respective loyal customers on priority. (Dibeesh, 2016) communicated that company should focus on timely delivery, rapid patch-up management, effectiveness, replacement and overall commitment towards the loyal customers. (Y. Jomphe, 2013) proposed crucial factors which help in the success of the CRM software. These are formation (Implementation) and operators (Users). The CRM implementation success depends on its operators/employees who handles the system. If they are unwilling to accept the change, it might create difficulties to the firm.

C. Automobile Industry

The automobile industry (automobile and auto-components) is one of the principal industries in India. A well-developed transportation system is must for the sustainable growth and hence India has to focus on its infrastructure building activities so that growth should be sustainable. Automobile is one of the largest industries in the global market. It has a very strong correlation with several key segments of the economy.

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Automobile Sector dwell in a prominent place in the fabric of Indian Economy. India has projected itself as one of the key markets for Global Manufacturers for hybrid and electronic vehicles and it is reality now. It is the new development in automobile sector. The automobile industry is classified as per Figure-1 below:

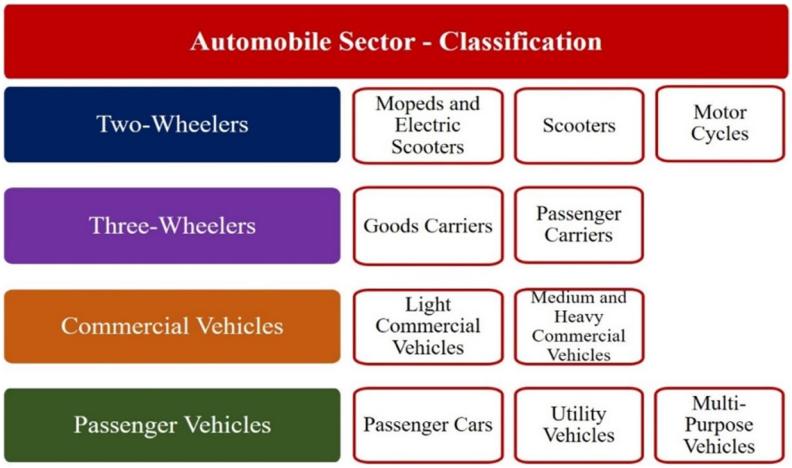


Figure-1: Diagram of Automobile Sector – Classification

India's automobile market sales have increased at 6.7% CAGR from 2013 to 2019 where vehicle have been sold more than 26 million. Production has increased close to 7% CAGR in the same period and the vehicles manufactures more than 30 million in the financial year 2019. The growth in commercial vehicles is recorded as more than 17% year on year including more than 10% growth in three-wheeler sales. Indian auto-industry is one of the largest in the world. It became the 4th largest in the world with sales increasing 9.5% year on year to more than 4.0 mn. units (excluding two wheelers) in 2017. It was the seventh largest manufacturer of commercial vehicles in 2018. The Two Wheelers segment dominates the market in terms of volume owing to a growing middle class and a young population.

II. RESEARCH METHODOLOGY

The proposed plan of study was divided into following parts:

A. Research Design

The brief research design is shown in the figure-2 below:

In this research, CRM practices in automobile industry in India were a descriptive cum analytical research. It needs a comprehensible specification of who (automobile companies in India), what (CRM practices, when, why (found gaps) and way (survey- questionnaire, F2F Interview, through email) of the research.

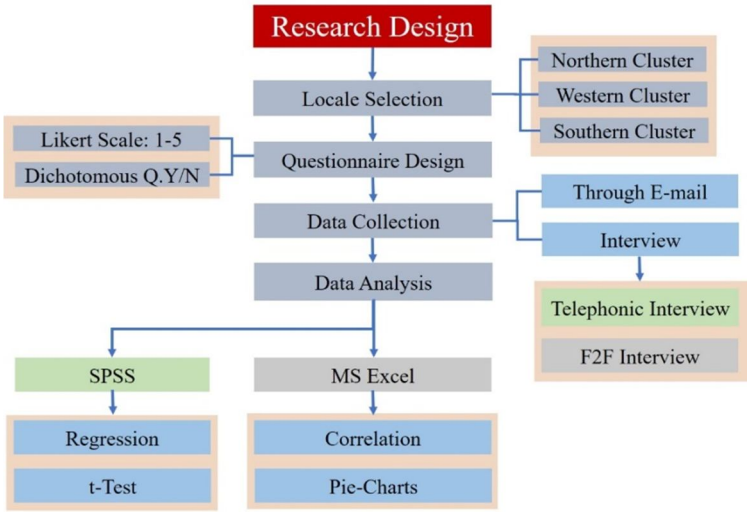


Figure-2: Research Design

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B. Locale Of The Study

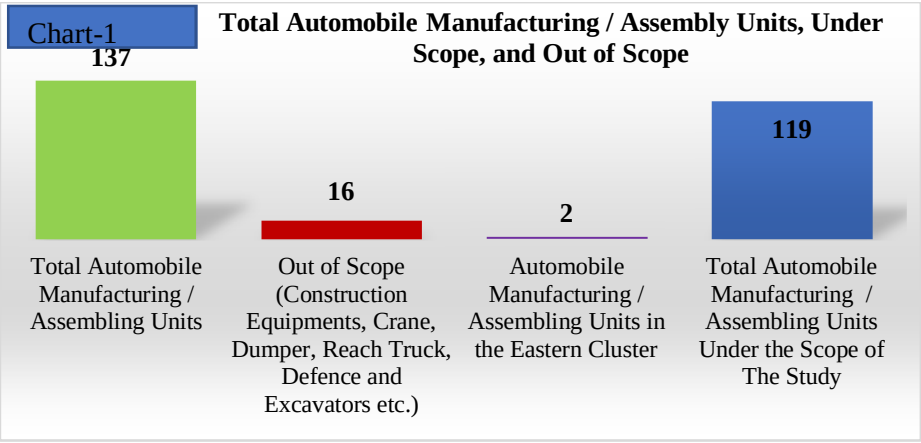
The study was conducted for the automobile OEM Companies/Factories in India. Three clusters were selected namely Southern, Western and Northern Cluster because it covers more than 90% of the production in terms of vehicles and value both.

C. Data Collection

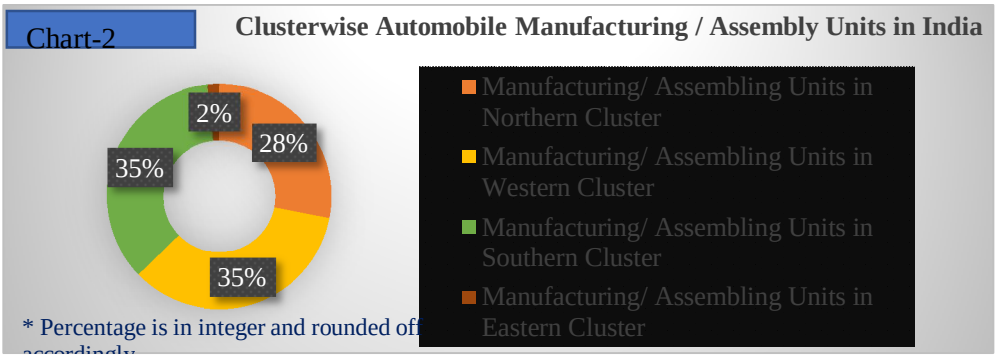
Tools and Techniques

1) Sample Size: In 3 major clusters of automobile sectors, there were a total of 137 manufacturing units as per the clusters however there are only 119 units belong to study's scope. It was selected 100 manufacturing units for data collection based on the researcher's convenience. After a rigorous effort and utilizing personal relationships, 80 respondents only convinced & shared the information on private basis. Automobile factories comprised of two-wheeler (only scooters and motorcycles), Three-wheeler (auto-rickshaw and loaders), four-wheeler (passenger cars, loaders, light commercial vehicles, and tractors), and heavy passenger & commercial vehicles (buses & trucks but does not include construction vehicles) manufacturers. Bar-Chart and Pie-Chart below are showing the manufacturing units under scope and cluster wise distribution of manufacturing units respectively.

a) Chart-1 (Bar-chart) in left side 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 it received responses from 80 units which is an extremely good response. This could be possible due to the rigorous follow-ups, F2F meetings etc. along with the help of a good professional network. (https://:www.linkedin.com/in/jagdeepscm)



b) Chart-2 (Pie-Chart) in left side 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, study focused on northern, western and southern clusters only.



D. Data Analysis

The data was analyzed using MS Excel 2010 and IBM's Statistical Package for the Social Sciences (SPSS-V18). The analysis was done to check the CRM practices on SCM performance.

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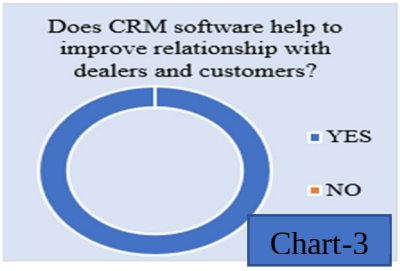
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III. RESULTS AND DISCUSSION

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. Also, to present the analyzed data into graphical representation, table form and/or any other suitable forms. The present study was carried out to analyze the gaps in expectations (agreement) and perception (adoption) in CRM practices and how does this impact the SCM performance. 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. The findings are illustrated under the following heads:

A. Analysis of Dichotomous Questions with Respect to CRM

According to Chart-3 (Pie-Chart) in left, explains that majority automobile companies using CRM due to direct or indirect benefits it seems however benefits of CRM says that it improves relationship with dealers and customers as studied earlier.



According to Chart-4 (Pie-Chart) in left, the result shows that the majority professionals agree that there should be a good & healthy relationship to all customers.



B. Research Model

1) *The Research Model:* There was a research model created from the research which has shown in the figure-3. It has shown the relationship of CRM Practices on Supply Chain Management performance (SCMPer). This model was statistically tested based on the correlation.

Research Model: Impact Of Crm Practices On Scm Performance

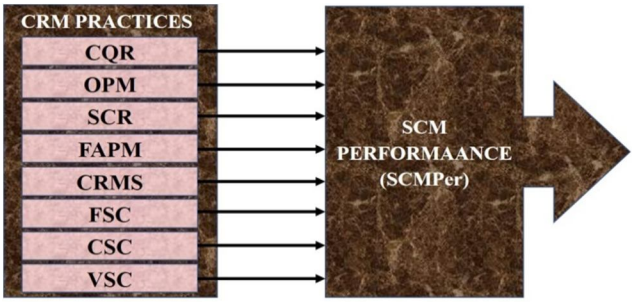


Figure-3: Model of Impact of CRM Practices on SCM Performance

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C. Testing Of Hypothesis

Proposed Research Hypotheses of the Study

Table- 1: Proposed Research Hypotheses of the Study
Null Hypothesis (H_0a): There is no difference in mean opinion about CQR of agreement and adoption
Null Hypothesis (H_0b): There is no difference in mean opinion about OPM of agreement and adoption
Null Hypothesis (H_0c): There is no difference in mean opinion about SCR of agreement and adoption
Null Hypothesis (H_0d): There is no difference in mean opinion about FAPM of agreement and adoption
Null Hypothesis (H_0e): There is no difference in mean opinion about CRMS of agreement and adoption
Null Hypothesis (H_0f): There is no difference in mean opinion about FSC of agreement and adoption
Null Hypothesis (H_0g): There is no difference in mean opinion about CSC of agreement and adoption
Null Hypothesis (H_0h): There is no difference in mean opinion about VSC of agreement and adoption

Table-1 shows the research hypotheses of the research study.

D. Data Analysis – T-Test, Correlation And Regression

1) T-TEST

Table-2:Result of t-test: This table shows the final results of t-test based on hypothesis

Predictor (Inde. Variable)	p - Value	Significance Level (0.01)	Null Hypothesis (Accepted or Rejected)	Hypothesis
CQR	0.000	0.01	Reject H_0a	Null Hypothesis (H_0a): There is no difference in mean opinion about CQR of agreement and adoption
				Alternate Hypothesis (H_1a): There is difference in mean opinion about CQR of agreement and adoption
OPM	0.000	0.01	Reject H_0b	Null Hypothesis (H_0b): There is no difference in mean opinion about OPM of agreement and adoption
				Alternate Hypothesis (H_1b): There is difference in mean opinion about OPM of agreement and adoption
SCR	0.000	0.01	Reject H_0c	Null Hypothesis (H_0c): There is no difference in mean opinion about SCR of agreement and adoption
				Alternate Hypothesis (H_1c): There is difference in mean opinion about SCR of agreement and adoption
FAPM	0.000	0.01	Reject H_0d	Null Hypothesis (H_0d): There is no difference in mean opinion about FAPM of agreement and adoption
				Alternate Hypothesis (H_1d): There is difference in mean opinion about FAPM of agreement and adopt.
CRMS	0.000	0.01	Reject H_0e	Null Hypothesis (H_0e): There is no difference in mean opinion about CRMS of agreement and adoption
				Alternate Hypothesis (H_1e): There is difference in mean opinion about CRMS of agreement and adopt.
FSC	0.000	0.01	Reject H_0f	Null Hypothesis (H_0f): There is no difference in mean opinion about FSC of agreement and adoption
				Alternate Hypothesis (H_1f): There is difference in mean opinion about FSC of agreement and adoption
CSC	0.000	0.01	Reject H_0g	Null Hypothesis (H_0g): There is no difference in mean opinion about CSC of agreement and adoption
				Alternate Hypothesis (H_1g): There is difference in mean opinion about CSC of agreement and adoption
VSC	0.000	0.01	Reject H_0h	Null Hypothesis (H_0h): There is no difference in mean opinion about VSC of agreement and adoption
				Alternate Hypothesis (H_1h): There is difference in mean opinion about VSC of agreement and adoption
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)				

In all cases of CRM Practices, the null hypothesis (H_0) rejected and alternate hypothesis (H_1) accepted which shows that there is a close relation between the population and the sample. That is, there is postive relationship between the CRM practices (CQR, OPM, SCR, FAPM, CRMS, FSC, CSC, VSC) and the supply chain management performance (SCMPer)

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2) Correlation

Table-3: Correlation Results as per Research Model

CORRELATION OF VARIOUS CRM PRACTICES ON SCM PERFORMANCE (SCMPer)	
Correlation of Customer Query Response (CQR) on Supply Chain Management Performance	0.91
Correlation of Operational Performance Measurement (OPM) on Supply Chain Management Performance	0.47
Correlation of Supply Chain Reliability (SCR) on Supply Chain Management Performance	0.73
Correlation of Forecast Accuracy & Profitability Measurement (FAPM) on SCM Performance	0.59
Correlation of Customer Relationship Management System (CRMS) on SCM Performance	0.78
Correlation of Flexibility in Supply Chain (FSC) on Supply Chain Management Performance	0.38
Correlation of Consistency in Supply Chain (CSC) on Supply Chain Management Performance	0.83
Correlation of Visibility in Supply Chain (VSC) on Supply Chain Management Performance	0.81

Table-3 has shown the final results of the correlation which are explained as below:

a) Table-3 shows that there is a high (strong) correlation between CRM Practices (CQR, SCR, FAPM, CRMS, CSC, VSC) and Supply Chain Management Performance (SCMPer).

b) Table-3 shows that there is a medium (moderate) correlation between CRM Practices (OPM, FSC) and Supply Chain Management Performance (SCMPer).

The result states that there will be a change in output if it changes in any input variable. If all kind of customer relationship management practices were used, the performance of the supply chain will be high. Now, the model says that using CRM Practices improves supply chain performance since the correlation is strongly positive.

3) Regression Analysis: Please refer the table-4, which states that p-value (Significance F) is less than the 95% level of significance value (0.05), that is, 0.000 < 0.05, hence, null hypothesis rejected in all cases which says that "CRM Practices has No correlation with SCMPer". It means that alternate hypothesis accepted, that is, "CRM Practices has correlation with SCMPer". It implies that the regression model is significant.

Table-4: Results of the Null Hypotheses for the Research Model (or Model Fitting) – Regression

Predictor (Indep. Variable)	P Value (Sig. F)	Significance Level (0.05)	Null Hypothesis (Accepted or Rejected)	Explanation
CQR	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
OPM	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
SCR	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
FAPM	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
CRMS	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
FSC	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
CSC	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
VSC	0.000	0.05	Reject H_0	0.0000 <0.05, Hence H_0 Rejected& H_1 accepted, it means that CRM has correlation with SCMPer
Decision at an $\alpha = 0.05$ level of significance if p value < 0.05, then, Reject the null hypothesis and accept the alternate hypothesis				

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IV. SUMMARY & CONCLUSION

A. *Summary*

Automobile sector has grown quickly after liberalization in 1990s and the world's few top players had setup their manufacturing units in India to grab the potential market.

This has created an environment of competitiveness and technological enhancement in manufacturing processes which helped to support the automobile industry in India. Automobile sector has realized the potential of supply chain management which helps to improve the profitability of any firm. SCM's role is not limited to manufacturing but also to support sourcing/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 research found gaps between agreement and adoption in CRM practices which impacts SCM performance and hence the purpose of the research was set to be as "study on impact assessment of CRM practices on supply chain management performance (SCMPer) in automobile industry in India".

The CRM practices were considered as Customer Query Response, Operational Performance Measurement, Supply Chain Reliability, Forecast Accuracy & Profitability Measurement, Customer Relationship Management System, Flexibility in Supply Chain, Consistency in Supply Chain, Visibility in Supply Chain based on the challenges and gaps found. The study was carried out in major three automobile clusters namely northern, western and the southern clusters in India. The data was collected through the questionnaire cum interview methods.

The analysis was completed in different heads such as Analysis of dichotomous questions, research model, testing of hypothesis, and finally data investigation through t-Test, Correlation and Regression using MS Excel & IBM's SPSS.

The core of the results shows that in the t-test, p-values are 0.000 in all the case in CRM practices and which are less than 0.01 (at 99% level of significance), therefore, the decision comes out to be the null hypothesis (H_0) was rejected in all the cases and hence alternate hypothesis (H_1) was accepted in all cases, the correlation between CRM practices and SCMPer is relatively very high in 6 variables (> 0.5, Min. 0.59, Max. 0.91 and average is 0.78) and moderate in 2 variables (>0.30 and < 0.5 , Min. 0.38, Max. 0.47 and average is 0.43).

Therefore, it can infer that SCM performance is dependent on the CRM practices. Similarly, regression analysis found that null hypothesis (H_0: CRM practices have no correlation with SCMPer) were rejected in all the case and the alternate hypothesis (H_1: CRM practices have correlation with SCMPer) were accepted for all the cases for the research model. The overall results suggested and confirmed that there is a close relation between CRM practice and SCM performance. The model is proved true from the results.

V. CONCLUSION

Results shows that industry has high level of expectations but industry is either unable to implement the best CRM practices or industry is unable to utilize benefits of CRM practices at most, hence this research has recommended the monitoring of CRM functions carefully to improve the perception.

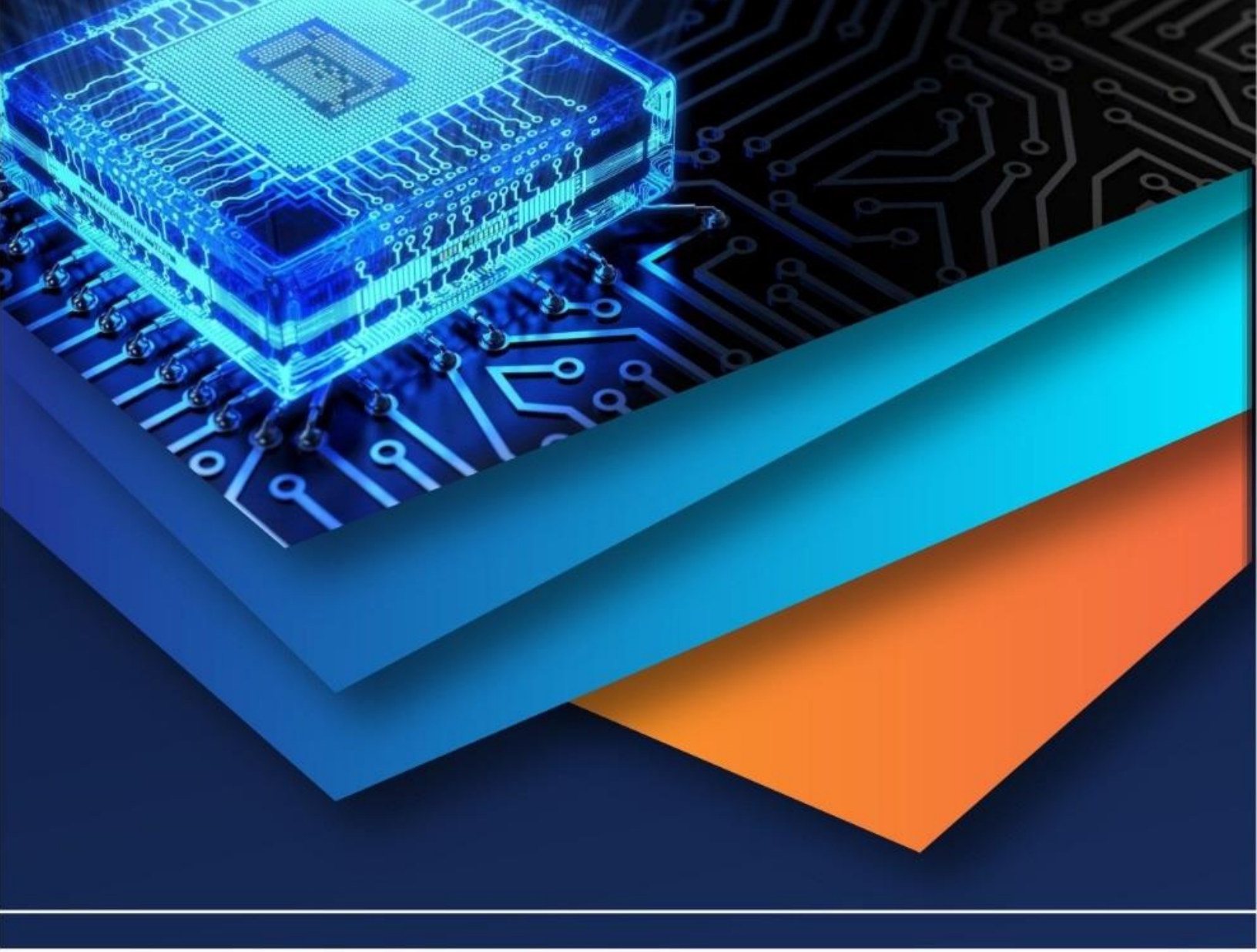
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