

Impact of E-Business on Supply Chain Performance: In Context of Indian Automobile Industries

¹Sumit Chandak, ²Dr. Neeraj Kumar

¹Research Scholar, ²Professor, ^{1,2}Department of Mechanical Engineering, Suresh Gyan Vihar University, Jaipur, India. ¹amit_2269@yahoo.com, ²neeraj.kumar1@mygyanvihar.com

Abstract: With the drastic changes in E-Business processes and development of internet-based technologies, Supply Chain Managers realized that their adoption of these technologies could provide them with strong competitive tools in the fight for more revenues and more profits. In order to gain a competitive advantage in the automobile industry, it is essential to make Supply Chain network in such a way that automobile manufacturer can provide their products in affordable price with tagged quality. The idea of implementing E-Business Processes in the supply chain is to increase a competitive benefit by improving overall performance in the context of the Indian Automobile Industry. Organizations can avail information easily throughout the supply chain due to the latest development in technologies. Due to this latest development in information technology coordination activities among the supply chain become easy. This development in technology decreases the cost of information in the entire supply chain. Therefore this research seeks to study Impact of E-Business process on the performance of Supply Chain Management of Indian Automobile Industries. Two important parameters Cost reduction and Customer satisfaction are taken to justify performance improvement. Increase in Operational Efficiency, Inventory Management, Logistics performance, Supply Chain Flexibility, and Supply Chain Integration are tested as an independent variable. The result shows that Supply Chain performance is affected by using E-Business Process; there is an Impact of E-Business process on the performance of Supply Chain (Operational Efficiency, Inventory Management, Logistics performance, Supply Chain Flexibility, and Supply Chain Integration) of Indian Automobile Industries. This research also pointed out that the use of Information Technology tools and E-Business processes creates value in Supply Chain. In order to validate the survey is conducted on a target size of 172. Data is collected from the top and middle Supply Chain managers of selected Automobile companies of India. The study recommends that the objective of Supply Chain Management is to enhance operational efficiency, to achieve higher- order goals, better coordination among the entities of Supply Chain, to achieve better customer satisfaction and to gain competitive advantage in order to increase performance and enhance profit and this objective can be achieved by investigating the impact of Supply Chain management capabilities on performance of Supply Chain and assessing impact of E-Business process in performance on Supply Chain.

Keywords: *Supply Chain Management, E-Business, Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, Supply Chain Integration and Supply Chain Performance.*

I. INTRODUCTION

In the last 2 decades, India has more involved in the global economy. After 1991 there is great transformation has seen in automotive industries of India due to trade liberalization and large investments by global companies. Even with these positive changes, the integration of local firms into the global economy has created a revolution in this sector. Due to this Developing country and their companies faces major challenges in the growth of their human and institutional capacities to take advantage of trade and investment opportunities (OECD, 2004).

Humphrey and Schmitz (2002) acknowledge that all firms everywhere are under constant pressure to improve their performance and increase their competitiveness. For the firms of developing countries, this is yet more complex as they are trying to enter and compete in the global automotive market. However, the sub-optimal practice of supply chain management practices creates challenges to automakers in their expedition for achieving a competitive global advantage, especially in budding markets like India. The 21st century has created significant opportunities in automotive industry round across the globe, and at the same time, put pressure on companies to enhance quality, styling,

organizational efficiencies and drive innovative features into their products in an effort to attract customers and expand into new markets. In the last few decades the entire world was witnessing a huge revolution in computing and telecommunications and Information Technology, and there are no predictions that this revolution will stop in a while, this rapid changes motivate leaders among companies to think of establishing best policies to adopt change in technology in an efficient and effective manner in order to enhance the performance of organization. (Moayyad 2013). It is widely recognized that E-business process and Information Technology is the most significant building block for most organizations to survive and compete with other organizations. Information is the heartbeat of every organization, every organization needs accurate and immediate and comprehensive information. Getting the right information at the right time in order to improve the decision-making process is important at all levels within the organizational context (Beynon-Davies 2009). Supply Chain Management is combined with selecting the most suitable and cost-efficient logistic means and network, while using E-business process and Information Technology IT in supply chain management is considered an significant tool to improve overall organizational performance as it guide the organization to construct a collective knowledge about customers, suppliers, distributors, and main network (Fasanghari et al. , 2008). According to Sambamurthy et al. (2003), the creative Information Technology design and solutions were the main abilities that build companies such as Dell, GE, and Wal-Mart to create an integrated system among their organizations that includes upstream and downstream activities.

In the recent scenario, automobile companies are facing the most demanding phase due to recent development Suppliers and manufacturers are facing fierce competition and due to this mergers or acquisitions or ultimately existing the business will be the result.

1.1 STATEMENT OF PROBLEM

Using E-business process and Information Technology it was accepted to have a high significance in Management of Supply Chain and a new concept between Supply Chain Management pears to adopt more powerful and digitized Supply Chain Management which means transforms the conventional supply management activities into a highly integrated IT-based operations that include all upstream and downstream SC activities (Zhu, 2004). To build vehicles globally the automobile industry have to manufacturer more complex and latest design, therefore their supply chains become more and more difficult with challenges. Management of Supply Chin required more challenges in the way of profitability and higher shareholder value. Long order-to-delivery lead times, variable production schedules, surplus inventory across the supply chain, lengthy demand

planning cycles and lack of visibility of suppliers required more and more attention and new direction to manage the things. There is a drastic shift in supply chain relationship due to changes in technology, change in way of doing business due to the adoption of E-business processes. The economy will become knowledge intensive. There is a tremendous change in the design of product and services. Therefore economy will depend more on knowledge, technology, adoption of the new design, invention in the product, customized product and services, value addition and goods and services, aggressive marketing, smart strategies, and flexibility. Automobile manufacturer requires raw material and components form many other industries so they have a direct impact on manufacturers of the machine, raw material suppliers. Automobile companies have a direct impact on R and D firms, retailers; vehicle repairing shops various schools of driving and financial firms. In the management of supply chain E-business process and use of information technologies has shown the enormous impact on the performance of the supply chain and build a strong network of relationship. E-business process and information technology used ERP, RFID, MIS, Mobile Technology, customized applications, supply chain management system (SCMS) in order to perform supply chain activities.

II. AIM OF RESEARCH

The objective to work on this research project was initiated Due interest in surrounding E-business. The subjective point of view suggested by researchers and practitioners highlighted that E-business and Information Technology tool can restructure Supply Chain practice and operations through improved communication means. The rising significance of E-business practices is manifest by a large number of books titled by E-Supply Chain Management, research papers related to E-business in contrast to Supply Chain practices which focusing on areas like E-procurement, E-logistics, E-commerce, E-financial tools, E-sourcing etc.

Indian Automobile Industries is a major contributor to the economy of India as well as the world to some extent. Indian Automobile Industries are facing day by day challenges from International market especially form US and European automobile competitors entering in the Indian market. Domestic manufacturer are facing genuine and severe competition from global players. International automotive companies manufacturing in India and domestic automotive companies together will lead the global automotive market in the future. Automobile companies required raw materials and components from various industries. Technology-based Supply Chain Management practices can be adopted to get better operational efficiency in order to improve performance and profit.

1.2 PRIMARY OBJECTIVE

The Research aims to determine the impact of E-Business Process on Supply Chain Performance of Indian Automobile Industries.

1.2.2 Precise Objectives–

To determine the Impact of following parameters on the performance of Supply Chain of Indian Automobile Industries (Cost Reduction and Customer Satisfaction)

- To determine the impact of E-Business process on Operational Efficiency of Supply Chain.
- To determine the impact of E-Business process on Inventory Management of Supply Chain.
- To determine the impact of E-Business process on Logistics Performance of Supply Chain.
- To determine the impact of E-Business process on Supply Chain Flexibility.
- To determine the impact of E-Business process on Supply Chain Integration.

III. LITERATURE REVIEW

In this literature review, key concepts and approaches used in the study are examined. This study examines impacts of business on the performance of supply chain for the automobile sector, including the dimension of supply chain performance, benchmarking for supply chain performance and also a suggestion of improvements on supply chain performance, in context of the Indian automobile industry. Management of supply chain and information technology tools facilitates industries to grow their market share in emerging countries and to enter international markets and increase their international competitiveness. E-business provides an opportunity for industries to compete effectively in the international market. Due to advancement in the internet technology movement of data becomes faster at very low cost which leads to improvement in the performance of the supply chain. Consequently, the manufacturing sectors showing eagerness in developing the concept of e-Business. Research from authors such as Auramo et al (2002), Golicic et al (2002), Gubi et al (2003) and Croom (2005) this dissertation aims to empirically study and investigate the impact of e-Business on supply chain management in context to Indian automobile industries. The research will be conducted in the context of the Indian automobile industry. In light of this, in the last 2 decades has seen SCM practices developed toward more lean process approaches, in order to increase supply chain efficiency (minimizing costs and eliminating inefficiencies), Concepts such as JIT; supplier base rationalization; outsourcing; virtual inventory; personalized

and global networks; minimization of buffers in material, capacity and time; and minimization in the number of distribution facilities have led to improvements in performance of supply chain particularly in reducing costs lead to increase in profit. (I. M. Ambe and J. A. Badenhorst-Weiss, 2011) .Supply chain management (SCM) has been noted as an increasingly important management field to help enterprises improve supply chain operations (Markus 2000). SCM involves the flows of material, information, and finance in a network consisting of suppliers, manufacturers, distributors, and customers. In the past decade, we have witnessed a shift in inter-organizational relationships away from traditional market-based arms-length relationships to strategic partnership-like relationships (Bensaou 1997; Scott 2000). SCM viewed as a case of transformative and growing improvement, which can be explained as an inward project intended to improve by and large efficiency (Saad et al., 2002). In addition to improving the inside effectiveness of the company, the focus is on reducing waste and addition of value across the SC (Harland et al., 1999).

Tan (2001) contends that, during the 1970s, directors ended up mindful of the tremendous WIP on production cost, new item advancement, quality, and conveyance time. Gentjan Mehmeti argued that one of the components of this expanded mindfulness was the presentation of Manufacturing Resource Planning (MRP). Introduction of Information Technology justifies this. Amid of 1990s evolution of Supply Chain boosted due to the invention of new tool ERP which will increase customer and supplier relationship. Movahediet al (2009) argues, "While EDI - Electronic Data Interchange systems were concerned mainly with inter-organizational integration, ERP systems were a concern mainly with intro - organizational integration ". According to Gentjan Mehmeti "evolution continues in the 21st century with the development of more sophisticated IT systems (internet - based solution systems), which are concerned for both inter-organizational integration and intra-organizational integration. Moreover, the relationship buyer-supplier in this period has gone one-step forward, from normal partnership to long-term relationship and strategic alliances". At the beginning of 20th-century concept processes and sequencing of assembly was started which leads to the concept of mass production. This reduces vehicle assembly time. As engineering and technological advancement progresses worker time and time of goods movement reduces considerably. The concept of lean manufacturing, MRP (Material Requirement Planning), ERP (Enterprise Resource Planning), JIT (Just in time) plays a major role in managing supply chain around at the ending of 19th Century. Proper Control of Inventory reduces the amount of capital investment and flexibility in supply chain increase performance (Womack, et al 1990.)

Due to the emergence of Technology Automobile companies are facing high competition in the current era.

Due to this situation, many companies are adopting mergers and acquisitions policies for their survival. To remain in market Auto manufacture has to concentrate on some objectives. These objectives are mainly cutting of cost, improvement in quality, customer satisfaction, timely delivery, and improvement of after-sales service, use of technology, use of communication system, improvement in productivity, and improvement in quality. “Supply Chain Management (SCM)” remarkable role to achieve such goals in order to meet sever competition faced by manufacturer and suppliers.

IV. RESEARCH MODEL

Today's market is changing from domestic market to the global market. Due to the entry of the major youth population in market companies are forced to manufacture products with a short life cycle because technologies are changing continuously. Therefore attention in Management of supply chain plays a major role in order to achieve objectives of the company. In order to survive in market “Supply Chain Management” is become a challenging job for most of the organizations. To become a global player and to achieve so competitive advantages restructuring of “Supply Chain strategy and operations” becomes necessary [Christopher, 1998] in the current scenario. It becomes necessary to design processes of manufacturing which will lead to higher production with improved productivity with lower cost and better quality of products. Due to the increase in youth population in the market, it is necessary to design the product as per demand. Companies have to increase more focus on modern features of the vehicle. Some modern features are as follows.

1. Color of Vehicle and Quality of Color.
2. The body design of the Vehicle.
3. Inbuilt Safety features .(i.e ABS).
4. Interior of Vehicle.
5. Audio and Video systems.
6. Power window system.
7. Inbuilt GPS Technology.
8. More comfort in Suspension System.
9. Hydraulically mounted engine to reduce engine sound.
10. Hydrographic windows.
11. Rear camera for reverse and easy parking.
12. Mileage indicator.
13. Auto Lane keeping.
14. Parking Sensors etc.

All these features required more and more complexity in Management of Supply Chain because Supply chain process has to deal with many auto ancillary suppliers. Before purchasing a vehicle customer is doing lots of

research and analysis. Therefore companies are trying to match most of the demand of customer by giving most of the necessary features in minimum price as per segment of vehicle. For an Automobile thousand of parts are required. Figure 1 shows the generalized supply chain

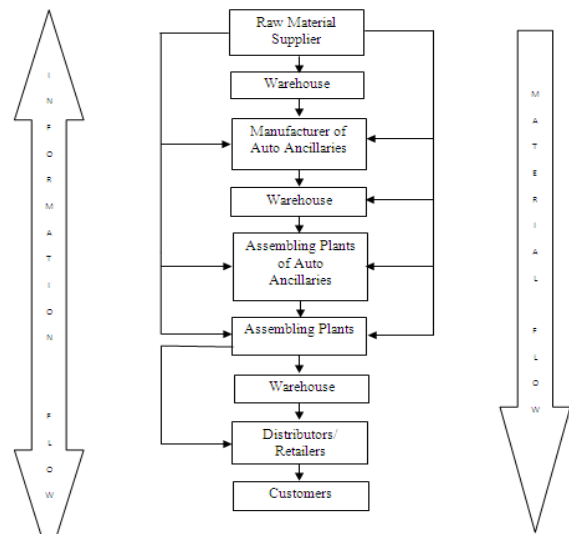


Figure 1: Generalized Supply Chain of Automobile Industry

Figure 2 shows conceptual model which contents Supply Chain Performance as the dependent variable (Cost Reduction and Customer Satisfaction) and independent variables consist of 5 parameters (Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, Supply Chain Integration) in order to validate research. This model gives a clear structure of performance measurement through a novel system using best practices. This framework is used to analyze the impact of E-Business process on the performance of Supply Chain in the context of Indian Automobile Industries. Cost Reduction and Customer Satisfaction are taken as a parameter to measure Supply Chain Performance. This model will help in restructuring in the process of Supply Chain and provides a solution in the improvement of the process of Supply Chain. Fundamentally this research aims to investigate the operational performance of E-business processes, information technology tools by comparing E-business and pre-e-Business tools practices in supply chain management (SCM) in Indian Automobile sector through a systematic approach.

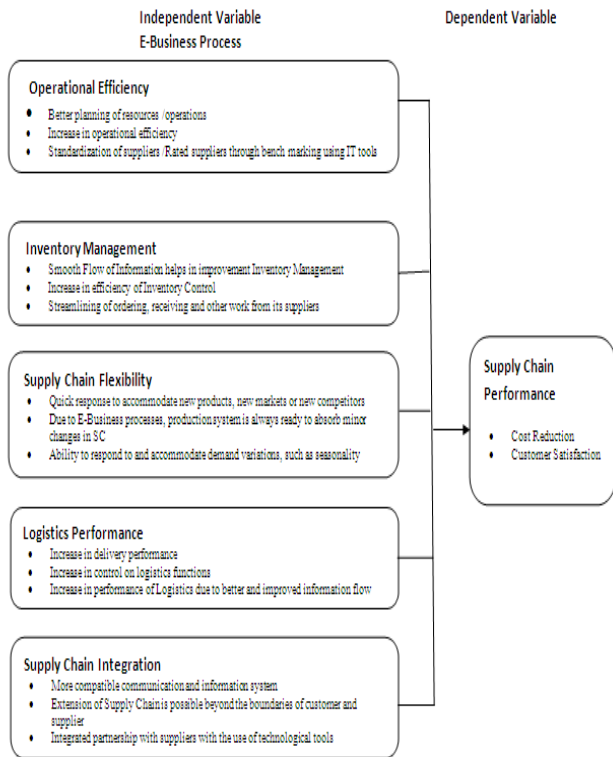


Figure 2: Conceptual Frame Work

4.1. Research Questions

- (i) What is the impact of Inventory Management on Supply Chain Performance using E-Business Process?
- (ii) What is the impact of Supply Chain Flexibility on Supply Chain Performance using E-Business Process?
- (iii) What is the impact of Logistics Performance on Supply Chain Performance using E-Business Process?
- (iv) What is the impact of Supply Chain Integration on Supply Chain Performance using E-Business Process?

V. METHODOLOGY

In this study investigate and organize the influence of E-Business Process on Supply Chain Performance in the context of Indian Automobile Industry using descriptive research design. This research is based on analysis of data collected from a survey which is based on the questionnaire as a tool of data collection in order to show the impact of E-Business Process on Supply Chain Performance in context of Indian Automobile Industries. This is upheld by (Gall et al, 2003) who state that this sort of plan empowers one to get data with adequate exactness so speculation can be tested in an appropriate manner.

5.1 Population and Sample

On the basis of the literature survey, discussion with experts, interviewing with Supply Chain experts and Information Technology experts validation survey questionnaire is done. Data are collected from Supply Chain Managers and their subordinates (Total 115) working as middle-level managers of Selected Indian Automobile

Industries. Out of a population size of 172, we received a total of 115 responses with the response rate of around 66.86%. Responses are collected from a particular target group of respondents; therefore, the sampling method used is purposive.

5.2 Measures

Five-point Likert scales were used to measure all parameters.

Likert Scale:

Strongly disagree	Disagree	Neutral	Agree	Strongly agree
1	2	3	4	5

5.3 Statistical Methods

In order to accomplish the objectives of research analysis of descriptive statistics are carried out (SPSS 23) for the survey data collected through structured questionnaire. This descriptive statistics mainly contents mean, standard deviation and frequency distribution. In order to predict the relationship between variable and expectations among factors under the examination Regression models is used. In this study, five independent variables (Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, and Supply Chain Integration) are used and their relationship with the dependent variable (Supply Chain Performance) is analyzed by multiple regression analysis.

Following regression model is used for this analysis.

$$Y = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \epsilon$$

Where: X1 = Operational Efficiency; X2= Inventory Management; X3 = Logistics Performance; X4 = Supply Chain Flexibility; X5 = Supply Chain Integration; e = Error term; β_0 = Constant; $\beta_1 - \beta_5$ = Regression coefficients (change induced in Y by each X).

VI. RESULTS AND DISCUSSION

6.1 Correlation Analysis

Inferential statistics Pearson's product moment correlation analysis was used for the investigation of research variables. In order to investigate the relationship between research variables, Pearson's product moment correlation is used because in the questionnaire a rating scale was used. The research analyzed through correlation analysis that there is a strong relationship between Operational Efficiency and Supply Chain Performance, where the correlation coefficient was 0.931 and p-value of 0.000. Research also established that there is a positive relationship between Inventory Management and Supply Chain Performance with the correlation coefficient of 0.890 and p-value of 0.003. Research also investigate that there is

a positive relationship between Logistics Performance and Supply Chain Performance with the correlation coefficient of 0.805 and p-value of 0.000. Research further investigate that there is a positive relationship between Supply Chain Flexibility and Supply Chain Performance with a correlation coefficient of 0.933 and p-value of 0.000. In the end, the research found that there is a positive relationship between Supply Chain Integration and Supply Chain Performance with a correlation coefficient of 0.893 and p-value of 0.000.

Table 1: Correlation of the study variables

		Supply Chain performance	Operational Efficiency	Inventory Management	Logistics Performance	Supply Chain Flexibility	Supply Chain Integration
Supply Chain Performance	Pearson Correlation	1					
	Sig. (2-tailed)						
Operational Efficiency	Pearson Correlation	.931**	1				
	Sig. (2-tailed)	0					
Inventory Management	Pearson Correlation	.890**	.913**	1			
	Sig. (2-tailed)	0.003	0				
Logistics Performance	Pearson Correlation	.805**	.730**	.927**	1		
	Sig. (2-tailed)	0	0	0			
Supply Chain Flexibility	Pearson Correlation	.933**	.832**	.911**	.855**	1	
	Sig. (2-tailed)	0	0	0	0.001		
Supply Chain Integration	Pearson Correlation	.893**	.832**	.911**	.855**	.9021**	1
	Sig. (2-tailed)	0	0	0	0.001	0	

6.2 Regression Analysis

In order to determine the relationship between Supply Chain Performance and five independent variables, a multiple regression analysis is conducted. The regression model used for analysis was;

The regression model was;

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon.$$

Where:

β_0 = Constant;

$\beta_1 - \beta_5$ = Regression coefficients (change induced in Y by each X);

Y is the dependent variable (Supply Chain Performance);

X1 = Operational Efficiency;

X2= Inventory Management;

X3 = Logistics Performance;

X4 = Supply Chain Flexibility;

X5 = Supply Chain Integration;

e = Error term.

A statistical package is used for the measurement of multiple regressions (SPSS 23) for the research. The changes in the independent variable will affect the dependent variable up to which degree or percentage of variation will be explained by the coefficient of determination. Five independent variables used for research explained that 90.9 % of Supply Chain Performance in the context of Indian Automobile Industries as represented by adjusted R square. This indicates that other variable or parameters which are not studied by this research contribute 9.1 % of E-Business Process on Supply Chain Performance in the context of Indian Automobile Industries.

Table 2: Model Summary

Model	R	R Square	Adjusted R Square	Std. The error of the Estimate
1	.901 ^a	.812	.803	.36078

a. Predictors: (Constant), Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, Supply Chain Integration

On the basis of table 5 which is generated by SPSS tool.

The equation

$$Y = \beta_0 + \beta_1X_1 + \beta_2X_2 + \beta_3X_3 + \beta_4X_4 + \beta_5X_5 + \epsilon$$

Becomes

$$Y = 0.029X_1 + 0.056X_2 + 0.005 X_3 + 0.351 X_4 + 0.0.24 X_5 + 17.669$$

Table 3: Regression Coefficients

Model		Unstandardize Coefficients		Standardized Coefficients	t	Sig.
		B	Std. Error	Beta		
1	(Constant)	17.669	9.741		1.814	.072
	Operational Efficiency	.029	.028	.056	1.061	.030
	Inventory Management	.056	.031	.120	1.788	.076
	Logistics Performance	.005	.225	.001	.021	.098
	Supply Chain Flexibility	.351	.025	.793	14.163	.000
	Supply Chain Integration	.024	.044	.023	.541	.058
a. Dependent Variable: Supply Chain Performance						

If all independent variable becomes zero then the possible value of Y is 11.669. The Data results also analyzed that by keeping all independent variable zero, Supply Chain Performance will increase by 0.029 on a unit increase in Operational Efficiency. This shows there is a significant relationship between Operational Efficiency and Supply Chain Performance since p-value is 0.030.

The Data results also analyzed that by keeping all independent variable zero, Supply Chain Performance will increase by 0.056 on a unit increase in Inventory Management. This shows there is a significant relationship between Inventory Management and Supply Chain Performance since p-value is 0.076.

The Data results also analyzed that by keeping all independent variable zero, Supply Chain Performance will increase by 0.005 on a unit increase in Logistics Performance. This shows there is a significant relationship between Logistics Performance and Supply Chain Performance since p-value is 0.098.

The Data results also analyzed that by keeping all independent variable zero, Supply Chain Performance will

increase by 0.351 on a unit increase in Supply Chain Flexibility. This shows there is a significant relationship between Supply Chain Flexibility and Supply Chain Performance since p-value is 0.000.

In the end, the Data results also analyzed that by keeping all independent variable zero, Supply Chain Performance will increase by 0.024 on a unit increase in Supply Chain Integration. This shows there is a significant relationship between Supply Chain Integration and Supply Chain Performance since p-value is 0.058. This shows that Supply Chain Flexibility affect the Supply Chain Performance most followed by Inventory Management, Operational Efficiency, Supply Chain Integration, and Logistics Performance.

VII. CONCLUSION

The conclusion of this study was to investigate the impact of E-Business Process on Supply Chain Performance in the context of Indian Automobile Industries with various findings. In the view of past experiences, the components of the E-Business Process were relied upon to have a positive impact on the performance of Supply Chain Management in the context of Indian Automobile Industries. Finding from research point out that there is a significant positive relationship between the parameters of Supply Chain that is Operational Efficiency, Inventory Management, Logistics Performance, Supply Chain Flexibility, and Supply Chain Integration with Supply Chain Performance in context of Indian Automobile Industries. The research also shows that E-Business process is properly used by Indian Automobile companies to improve Supply Chain Performance. This research based on E-business as the area of investigation and focus on E-business practices and use of Information Technology tools in Supply Chain Management which has gained significant attention in recent years. This research is limited to the Impact of E-business practices on performance of Supply Chain Management of India Automobile Industry. However, this research on a wider scale especially with regards to the combination of systems with other supply chain partners for easier data and information sharing is needed.

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