Analysis of Flexibility and Strategy on Performance in Context of Supply Chain: An Study for Indian Automobile Companies

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Abstract: Indian Automobile sector is one of the major drivers of economic growth. Currently, the automotive sector contributes more than 7 percent to India's GDP and according to Automotive Mission Plan 2016–26 sets an target to increase the contribution to 12 percent. Hence the application of strategy and flexibility in the supply chain can enhance the performance. The current study has great importance in supply chain management because in the current changing situation due to the implementation of Goods & Services Tax (GST), government focusing on e-vehicles and promotion of public transport the companies analyzing the influence of strategy and flexibility as an important determinant in supply chain performance (SCP). For analyzing the impact of these two determinants on SCP, data were collected with the questionnaire from 111 respondents from the automobile SMSs in India. These collected data analyzed using Partial Least Square method with Smart-PLS 2.0 M3 software. The present study shows that these two determinants have a significant impact on SCP. Firstly, it is found in the study that innovative strategy is having a negative impact on cost performance, logistic performance and quality performance because it involves lots of money. The customer-oriented strategy and agile supply chain strategy was also found to be a major contributor to the cost performance, while all construct of flexibility was found the weak influence on the cost performance.

Keywords **— Supply Chain Management (SCM), Supply Chain Strategy (SCS), and Organizational Performance, of Goods & Services Tax (GST**

I. BACKGROUND

The Indian automobile manufacturers facing big challenges form globalized world as well as local competitors and from changing government policies (like implementation of GST,E-way Billing ,e-vehicles) become responsive to customer's preferences for satisfying them with their product and service(Sachin Borgave, 2010). The big as well as a small and medium enterprise (SMEs) adopting an aggressive and innovative strategy and remains flexible in their supply chain as per fast-changing environment. The application of appropriate strategies with flexibility in the supply chain is playing a vital role. One of the major objectives of supply chain strategy and flexibility is to enhance the performance of the firm. The companies chose those strategies which fulfill the demand and changing need of customers with utmost flexibility. The past research work in the field of supply chain strategy and flexibility and its impact on performance gives a casual relationship between these parameters, but this studied have been conducted for automobile industries which are in current situation one of the fastest growing and major economic drivers in India. In addition the previous research show the impact of a single determinant is analyzing but in present research two crucial determinants supply chain strategy and supply chain flexibility together are taken as independent variable and ties to identify their impact on supply chain performance which is taken as dependent variable. In general perspective Supply chain strategy basically consists of organized instructions which integrated the manufacturers, warehouses, and distributors, so that customers get their product as per their convenience and get satisfied with the product in all respect. In the same perspective, supply chain flexibility can be recognized to play a decisive role in the firm's performance. Currently, automobile manufacturing organizations are adopting those strategies which are increasing their performance and achieving goals. These strategies can make supply chain process smooth and precise in which the movement/storage of raw materials, work-in-process, and finished goods inventory minimize from origin to consumption. For that, Indian automobile firms take on those strategies which integrate all the activities in the supply chain and to achieve a competitive benefit over rivals. For automobile firms,

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supply chain strategies and flexibilities can act as a catalyst in a globally competitive business environment. They are utilizing supply chain strategies and flexibility in their supply chain to beat the competitors. For this reason, managing supply chains determinant is assumed utmost importance, especially in such a complex environment. Managers can successfully manage their business model if they are apt in choosing the right supply chain strategy and make their supply chain flexible. The automobile supply chain deals with the goods which are not fast moving. The present study used three types of supply chain strategies and five types of supply chain flexibility with respect to their effect on three dimensions of supply chain performance.

. II. LITERATURE REVIEW

Presently business condition is to a great degree aggressive and to contend in such focused circumstance firms must take up a fitting and appropriate store network the executive's technique according to the market circumstance. Organizations receive store network technique according to item necessity on the grounds that in the market the assortment of item accessible henceforth supplies chain system changed from item to item. Store network technique for any item or administration relies upon free market activity vulnerability, item lifecycle and fabricating systems. Because of these vulnerabilities, diverse production network techniques rose (H.L.Lee, 2002). Thus, setting the exact SC technique is fundamental for organizations. Firms must need the technique that incorporates and arrange directly through the inventory network to deliver the execution of store network individuals (Cohen and Roussel, 2005). From theories and literature following dimensions of SCS are included: Innovative Strategy (INS), Customer Oriented Strategy (COS), and Agile Supply Chain Strategy (ASCS).The achievement of a production network depends to a great extent on inventory network adaptability which assumes a crucial job in the correct execution of the store network. Adaptability in activity makes an open door for clients in exceptional ways. In the event that the production network is prominently adaptable, it would consistently meet the shifting needs of clients and will offer help to clients in the survey the inventory network positively (Beamon, 1999; Gunasekaran et al., 2001). Flexibility is the skill to change or respond with time, cost and effort (Upton, 1994). Russell and Taylor (2009) characterized store network adaptability as a capacity to alter with changes in item blend, generation volume or structure. It is the capacity to create a wide assortment of items, to present new item and change existing once rapidly, and to react to client's needs. Adaptability is the capacity of a firm to give even data associations over the esteem affix to meet an assortment of client needs. The primary rule of SCM is the sharing of data inside supply chains with the goal that an association can react all the more rapidly to the client's evolving needs (Li and Lin, 2006). Organizations should be sufficiently adaptable to respond to changes in clients' requests (Aggarwal, 1997). , Daugherty et al. (1995) found that data accessibility and client responsiveness are decidedly related which brought about enhancing firm execution. Clients request assortment, quality, focused costs, and quicker conveyance. This has constrained organizations to make configuration changes rapidly and react quicker to client needs so as to continue the organization's upper hand. The outcomes exuding from store network adaptability specifically impact SMEs execution, for instance, expanded income development, decrease time to advertise, bring down expense and enhanced consumer loyalty (Hakansson and Ford, 2002).The following construct of flexibility considered after literature review; Innovative & New Product Flexibility (IF), Product Flexibility (PF), Existing Product Flexibility (EPF), Delivery Flexibility (DF), and Information Flexibility (INF). On the other hand in order to measure performance following supply chain performance construct is operationalized namely cost performance, logistics performance, and quality performance. Supply chain companies have realized the importance of financial and non-financial performance measures (Fantazy et al., 2009): Cost Performance (CP), Logistic Performance (LP) and Customer Satisfaction Performance & Quality Performance (QP).

III. RESEARCH METHODOLOGY

The present study has two independent variables, first supply chain strategy and other flexibility and one dependent variable, supply chain performance. The items for Independent variables have been adopted from previous studies and items for dependent variables were adopted from the studies by Fantazy et al., 2009 Items for each strategy were developed from existing pieces of literature; each item represents the content of definition for the respective constructs. For the content validity of the items, a pre-pilot study was conducted by three academicians and two senior supply chain managers of retail chain stores to make comments on the clarity and appropriateness of the measures developed for the study. After getting their feedback, the items were adjusted and used for pilot study and it revealed good reliability and validity of the items. The items were measured with 5 points Likert scale with response options ranging from scale 1-5.Data were collected from 121 managers in the automobile sector in India. For collecting the data, formal request letter was used for taking permission from the authority of the selected organizations. Then the questionnaires were distributed among the respondents. Around 600 questionnaires were distributed and finally, 121 were collected in usable condition. So the total sample size in this study was 121. The survey was conducted in 2018. Collected data were analyzed using partial least squares (PLS) with the support

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of the software Smart PLS 2.0 M3 The hypotheses of this study were tested based on empirical data by means of structural model of partial least squares (PLS) method. PLSs was used in this study as it is the most appropriate method of data analysis for small sample. In PLS, the test of a conceptual model involves two steps namely outer measurement model and an inner structural model. The findings of measurement and structural models are presented below.

IV. RESULT

Reliability and Validity Test

The present study evaluated the measurement model by assessing the convergent and discriminate validity following the criteria (Chin, W. W. 1998). Cronbach alpha values were used to test the reliability of data. Table 1, shows that all the Cronbach alpha values are above 0.7 which represents a good internal consistency of data (Nunnally, J. C. 1978)

Constructs	Items	Loadings	Cronbach's Alpha	Composite Reliability	Average Variance Expected
INS	1	0.78	0.76	0.85	0.59
	2	0.78			
	3	0.76			
	4	0.77			
ASCS	1	0.72	0.83	0.88	0.60
	2	0.80			
	3	0.64			
	4	0.86			
	5	0.84			
COS	1	0.70	0.88	0.91	0.67
	2	0.82			
	3	0.83			
	4	0.85			
	5	0.83			
NPF	1	0.83	0.89	0.92	0.70
	2	0.84			
	3	0.85			
	4	0.87			
	5	0.79			
PF	1	0.81	0.88	0.90	0.60
	2	0.70			
	3	0.74			
	4	0.87			
	5	0.77			
	6	0.74			
	7	0.81			
DF	1	0.61	0.88	0.90	0.58
	2	0.79			
	3	0.81			
	4	0.75			
	5	0.76			
	6	0.79			
	7	0.81			
EPF	1	0.64	0.85	0.86	0.67
	2	0.95			
	3	0.84			
IF	1	0.78	0.84	0.88	0.61
	2	0.83			
	3	0.80			
	4	0.70			
	5	0.79			
CP	1	0.70	0.87	0.90	0.65
	2	0.82			
	3	0.83			
	4	0.85			
	5	0.83			
LP	1	0.80	0.65	0.81	0.60
	2	0.62			
	3	0.87			
QP	1	0.70	0.78	0.85	0.54
	2	0.84			
	3	0.90			
	4	0.50			
	5	0.66			

Table 1: Reliability and Validity Test

Each questionnaire item was computed for evaluating convergent validity through their loading. All the items having loading higher than 0.7 support a high degree of individual item reliability (Hulland 1999).Total four items were deleted due to their low factor loadings. Now all the loadings are above the 0.7 mark which is enough for convergent validity. The result of composite reliability on careful observation it is found that all construct are reliable under the criteria 0.7-0.9. The Average variance extracted (AVE) for each construct should be above the recommended cut-off 0.50 (Fornell and Larker, 1981) the latent variable can explain at least 50% of its indicator variance. So the measurement model exhibits high convergent validity since all factor loadings are above 0.6, all AVEs are above 0.5, and all composite reliabilities (CRs) are within the range 0.7-0.9.

The discriminate validity for the constructs taken in present research. It compares the square root of AVE value with latent variable correlation. The Square root of each construct AVE > its highest correlation with any other constructs. The Fornell & Larcker criteria show that SQRT (AVE) is greater than its highest correlation with any other construct which shows that construct is unique and convergent validity. The measurement model also

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demonstrates good discriminate validity since the square root of the AVE for each construct as higher than its correlation with other factors.

Testing of Model

This describes the relationship between the latent variables. As suggested by prominent prof. Hair, a structural model is used to incarcerate the linear regression effects of the endogenous construct upon one another. The structural model has the capability to identify the outline of the relationships among the variables (Leohlin, 1998). Thus, this model is a developing area and one of great interest to researches because of its ability to perform direct testing of the theory of interest. The model was assessed using three criteria:

1) Path coefficients (β);

2) Path significant (p-value); and

3) Variance explains (R^2).

The validation of the structural model was achieved using Smart-PLS 2.0. It indicates that the value is very near to strong explanatory influence. So, the supply chain strategies and flexibilities are overall adequately responsible for the variance in supply chain performance in the Indian automobile industry.

Independent Construct	Dependent Construct	Path Coefficient	Variance explains	t-Value
INS	CP	-0.20	0.88	1.73
COS	CP	0.15		1.51
ASCS	CP	0.21		2.34
NPF	CP	-0.23		2.45
PF	CP	0.41		3.15
EPF	CP	0.28		2.40
DF	CP	0.15		1.38
INF	CP	0.25		3.66

Table 2: Output of structural model (SCS & SCF with Cost Performance)

Independent Construct	Dependent Construct	Path Coefficient	Variance explains	t-Value
INS	LP	0.02	0.67	0.13
COS	LP	-0.08		0.49
ASCS	LP	-0.01		0.11
NPF	LP	0.25		1.79
PF	LP	-0.16		1.08
EPF	LP	0.27		1.84
DF	LP	0.23		1.12
INF	LP	0.38		2.83

Table 3: Output of structural model(SCS & SCF with Logistic Performance)

Independent Construct	Dependent Construct	Path Coefficient	Variance explains	t-Value
INS	QP	-0.17	0.41	0.91
COS	QP	-0.01		0.05
ASCS	QP	0.30		1.88
NPF	QP	0.08		0.49
PF	QP	-0.29		1.34
EPF	QP	0.19		0.90
DF	QP	0.70		4.24
INF	QP	-0.19		1.12

Table 4: Output of structural model(SCS & SCF with Quality Performance)

The results of the current research show that innovative strategy has very weak negative impact on cost performance while customer-oriented strategy & agile supply chain strategy have a weak positive impact on cost performance similarly innovation & new product / future research flexibility have weak negative impact on cost performance while sourcing flexibility & process flexibility & existing product flexibility have moderate positive impact on cost performance and finally other dimension of flexibility such trans-shipment and delivery flexibility & information flexibility having weak positive impact on cost performance. Similarly to find the impact of supply chain strategy and supply chain flexibility on supply chain performance parameters such as logistic performance the results of current research show that innovative strategy, agile supply chain strategy & trans-shipment and delivery flexibility have very weak negative impact on logistic performance while customer-oriented strategy have weak

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positive impact on logistic performance similarly sourcing flexibility & process flexibility & existing product flexibility have moderate positive impact on logistic performance while information flexibility strong positive impact on logistic performance and finally other Innovation/New Product Flexibility having no impact on logistic performance

Finally to find the impact of supply chain strategy and supply chain flexibility on supply chain performance parameters such as quality performance the results of current research show that innovative strategy, innovation & new product/future research flexibility sourcing flexibility & process flexibility very weak negative impact on quality performance while customer-oriented strategy & agile supply chain strategy have weak positive impact on quality performance similarly existing product flexibility & information flexibility have moderate positive impact on quality performance and finally trans-shipment and delivery flexibility strong positive impact on quality performance.

V. DISCUSSIONS

In present research study, the impact of supply chain strategy and flexibility on performance is determined by three supply chain strategies dimensions and five dimensions of supply chain flexibility tested with supply chain performance dimensions and identified the relationship between these dimensions. The supply chain strategies that are studied in present research are innovative, customer satisfactory and agile which are tested in a direct one to one relationship with supply chain performance dimensions like cost performance, logistics performance and quality performance & customer's satisfaction. The results show that all dimensions have a significant positive relationship with supply chain performance parameters

Testing the research model with all construct of supply chain strategies and supply chain flexibilities with supply chain performance only innovative strategy shown a negative impact on cost performance and other two supply chain strategy has a significant positive impact on cost performance. Similarly only innovation & new product/future research flexibility have a negative impact on cost performance and other flexibility dimensions such as sourcing flexibility& process flexibility; existing product flexibility, trans-shipment and delivery flexibility & information flexibility have a positive impact on cost performance. Similarly to find the impact of supply chain strategy and supply chain flexibility on supply chain performance parameters such as logistic performance the results of current research show that innovative strategy and agile supply chain strategy have negative impact on logistic performance while customer-oriented strategy have significant positive impact on logistic performance and only trans-shipment and delivery flexibility have negative impact on logistic performance and all other flexibility dimensions such as innovation & new product / future research flexibility, sourcing flexibility& process flexibility existing product flexibility, and information flexibility have a significant positive impact on logistic performance .Similarly find the impact of supply chain strategy and supply chain flexibility on supply chain performance parameters such as quality performance the results of current research show that only Innovative Strategy have a negative impact on quality performance and the other two dimensions of strategy such as Customer Oriented Strategy & Agile Supply Chain Strategy have a positive significant impact on quality performance .The result also shows that Innovation & New product / Future Research Flexibility &Sourcing Flexibility& Process Flexibility have a negative impact on quality performance and other dimensions of flexibility such as Existing Product Flexibility, Trans-Shipment and Delivery Flexibility & Information Flexibility have a significant positive impact on quality performance

VI. CONCLUSION AND IMPLICATIONS

Due to globalization and implementation of GST the Indian automobile companies are facing tremendous challenges and dealing with complex, continuous changing and uncertain environments. To deal with the uncertain and rapidly changing test of customer and environment firms struggling for better strategies and want more and more flexibilities in their supply chain so that firm can enhance their performance. In current research supply chain management of the Indian automobile industry has been studied using the components of the strategy, flexibility, and performance in context with supply chain. This study can help in understanding the features of Indian automobile sector with respect to their supply chain and provide immense utility to the policy-makers and practitioners. Policy-makers can formulate effective and suitable industrial policies to attract adequate investments into the automobile sector and alter their strategies and flexibility to accommodate the ever-changing and dynamic needs of the automobile sector. The prime aspect of the research is the development of a conceptual model after conducting all mandatory tests required to establish its reliability and validity based on the data collected from the Indian automobile sector. This conceptual model can be treated as the base for future studies by academicians and researchers. This research has identified that supply chain performance strongly influence the organizational performance of the firms, while the supply chain performance of the firms are strongly influenced by supply chain strategies and supply chain flexibility practices

The consummation of this research includes empirical results about the relationships among the strategy, flexibility, and performance in the supply chain context. The results show direct effects between the different links of the presented model. Companies should be responsive to these relationships and the impact on performance. They

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should concentrate on making the right decision and choosing the optimum and best type of flexibility with their strategy. The result shows that there are direct impact strategy and flexibility on performance. Companies with customer orientation strategies show the best results on performance and they should focus their attention on product flexibility and delivery flexibility. Companies with innovative strategies should focus on new product flexibility while the companies with agile supply chain strategy have no need to focus on a specific type of flexibility. The results showed that all types of supply chain strategy have an impact on performance. The result from this study shows that there are geographical variations in the relationships between, strategy, flexibility, and performance in a supply chain environment. In order to get optimal performance, the supply chain managers should specifically consider the geographical region they are operating and apply strategy and flexibility as per the exigencies of the situation (Seth and Seth 1990; Slack 2005b, 2005a).

REFERENCES

[1] Aggarwal S (1997), "Flexibility Management: The Ultimate Strategy", Industrial Management, Vol. 39, No. 1, pp. 26-31.

[2] A.Gunasekarana et.al, 2008 "Responsive Supply Chain: A Competitive Strategy in a Networked Economy" International Journal of Management Science, Omega 36, 549 – 564.

[3] Agus, Arawati, 2011 "Supply Chain Management, Supply Chain Flexibility and Business Performance" Journal of Global Strategic Management | 09 | 2011, June.

[4] Beamon (1999), "Measuring Supply Chain Performance", International Journal of Operation & Production Management ,Vol.19 , Issue 3 , pp.275-292

[5] Cachon, G. P., & Lariviere, M. A. (2005). Supply chain coordination with revenue sharing contracts: strengths and limitation. Management Science, 51(1), 30e44.

[6]Chin, W.W. (1998), "The partial least squares approach for structural equation modeling", Modern methods for business research, pp 295-336

[7] Cohen, S., & Roussel J. (2005). Strategic Supply Chain Management: The Five Disciplines for Top Performance. New York: McGraw-Hill.

[8] Daugherty & Bowersox (1995)," Logistics Paradigms: The Impact of Information Technology", Journal of Business Logistics .

[9] Das, A., Narasimhan, R., 2000 "Purchasing competence and its relationship with manufacturing performance", Journal of Supply Chain Management, Vol. 36 No. 2, pp. 17-28

[10] Duclos, L., Vokurka, R., Lummus, R. (2003), "A conceptual model of supply chain flexibility", Industrial Management & Data Systems, Vol. 103 No. 6, pp. 446-456

[11] Fantazy, K., Kumar, V., Kumar, U., 2009 "An empirical study of the relationships among strategy, flexibility and performance in the supply chain context", Supply Chain Management: an International Journal, Vol. 14 No. 3, pp. 177-188

[12]Fisher, M. (1997). What is the right supply chain for your product? Harvard Business Review, 75(2), 105e116

[13] Gerwin D., 1993 "Manufacturing flexibility: a strategic perspective", Management Science, Vol. 39 No. 4, pp. 395-410 39

[14]Gunasekaran A.(2001), "Performance Measures & Metrics in a Supply Chain Environment" , International Journal of Operation & Production Management, Vol.21 ,Issue 1/2 ,pp.71-87.

[15] Hakansson and Ford (2002), "How should companies interact in Business Network", Journal of Business Research, 55(2),pp. 133-139

[16] H.L.Lee(2002), "Aligning supply chain strategies with product uncertainties" , California management review, 44 (3), pp.105-119

[17] Hulland, J. (1999). Use of partial least squares (PLS) in strategic management research: a review of four recent studies. Strategic Management Journal, 20(2), 195–204.

[18] Koh, S.C., Demirbag, M., Bayraktar, E., Tatoglu, E., & Zaim, S. (2007). The impact of supply chain management practices on performance of SMEs. Industrial Management and Data Systems, 107 (1), pp.103- 124

[20]Li and Lin(2006) "Accessing Information Sharing and Information Quality in Supply Chain Management", Decision Support System, 42(3):1641-1656

[21] Nunnally, J.C. (1978) Psychometric theory. 2nd Edition, McGraw-Hill, New York.

[22] Loehlin, J. C. (1998). Latent variable models: An introduction to factor, path, and structural analysis (3rd ed.). Mahwah, NJ, US: Lawrence Erlbaum Associates Publishers

[23] Ringle, C.M., Wende, S., Will, A., 2005. SmartPLS 2.0. Hamburg. www.smartpls.de.

[24 Russel and Taylor (2009), "Operation Management" Wiley, 2009.Business Logistic

[25] Sanchez, A., Perez, M. (2005), "Supply chain flexibility and firm performance: a conceptual model and empirical study in the automotive industry", International Journal of Operations & Production Management, Vol. 25 No. 7, pp. 681-700

[26] Upton D.(1994) , "The Management of Manufacturing Flexibility ",California Management Review ,Vol.36 ,No.1 ,pp.72-89.

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