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# ANALYSIS OF THE IMPACT OF SUPPLY CHAIN FLEXIBILITY ON SUPPLY CHAIN PERFORMANCE: AN EMPIRICAL STUDY IN THE INDIAN AUTOMOTIVE INDUSTRY

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**ABSTRACT:**

*Despite the fact that intensive research has been done in supply chain management (SCM) a little research has been done so far in which this issue is discussed with respect to a single sector in India. This research in the field of supply chain management is mainly concentrating on the impact of supply chain flexibility (SCF) on supply chain performance (SCP). This research is an attempt to bridges the gap and deficiency on the research done previously in this issue and particularly about the relationship between supply chain flexibility dimensions on supply chain performance. Hence, the first and foremost objective of this study is to find how supply chain flexibility (SCF) dimensions are related to supply chain performance (SCP) dimensions. Furthermore, efficient and effective supply chain flexibility is directly related to improving supply chain performance. This research is mainly concentrated on Indian automobile industry which is in current scenario one of the fasted growing and one of the major contributor's of GDP growth in India. The researchers find the type of relationship of supply chain flexibility dimensions with supply chain performance dimensions. This research is based on research done by Fantazy et al. (2009), in his research he suggested that further investigation can be made on his research in a different geographical region. To widen understanding on this topic and to go after the recommendation of the preceding research, this research closely related to Fantazy et al. (2009), and this research is done on the Indian automotive industries which in the current situation have much importance.*

**KEYWORDS**: Supply Chain Flexibility (SCF), Supply Chain Performance (SCP)

## 1. INTRODUCTION

Economic growth of any country either developing or developed is by and large dependent on its key strength in terms of availability of resources and manpower. In India, the economic growth is greatly influenced by automobile industry which shown significant growth and proven to be one of the fastest growing and one of the strongest drivers of technology, growth, and employment (Gottschalk and Kalmbach, 2007). The Automobile industry due to rapid advancement and emerging trends opens a new era in for developing country like India (Choudhary and Goyal, 1997). After economic liberalization, the Indian automobile industry has shown a consistency market growth. Due to globalization and rapid change in government policies of GST and E-Way bill, tremendous development in the field of technology, especially in communication and transport has taken place. Previous research has shown that there is a definite relationship between implementation of effective and efficient Supply Chain Management (SCM) practices like supply chain flexibility (Souresh Bhattacharya et al.,2014) The industry is experiencing an evolutionary phase in which automotive supply chain has a vital role to play. Due to the dynamic industry environment and new competencies, the Indian automotive supply chain is expected to advance significantly because it gives a source of competitive advantage for the industry. In the current scenario implementation of proper supply chain management practices can improve operational efficiency and profit. This research highlighted the impact of the flexible supply chain on the performance for overcoming challenges. It helps in identifying future trends in the automotive supply chains and matching contemporary SCM practices. Effective and efficient supply chain flexibility minimization of the cost associated with supply chain which is the most important aspect for the Indian automobile industry. The most vital aspect of this value chain is the complex system of SCM which integrated with manufacturing. These critical dimensions of SCM (Flexibility & Performance) will help business executive to take decisions on SCM. In today's cutthroat competition and limited availability of resources, the firm's must be better utilized to understand the better application of SCM and thereby provide better value to customers and improve the performance of the organization (Chow et al., 2006). The Indian Automobile industry facing a challenge match its supply chain standards with developed countries (Chang-Tai H. et al., 2009) and industry having a tremendous potential for integration of supply chains (Park, D. et al., 2012). The Indian automobile industry will develop a supply chain that manages long-term growth and such flexible and responsive which can handle short-term volatility. Over the last decade, according to Society of Indian Automotive Manufacturers (SIAM) report shown in figure 1, the Indian automobile industry has shown sustainable growth. The industry on the phase of rapid changes in term of shorter product life cycle, new customers, customization of products. This paper provides empirical support for the broader perspective as it applies to justify that effective and efficient supply chain practices necessary in the automobile industry in India. The research conclusion advocates that managers must develop and deploy such supply chain management flexibility which enhanced the performance of the firm and thereby improving the organizational performance.

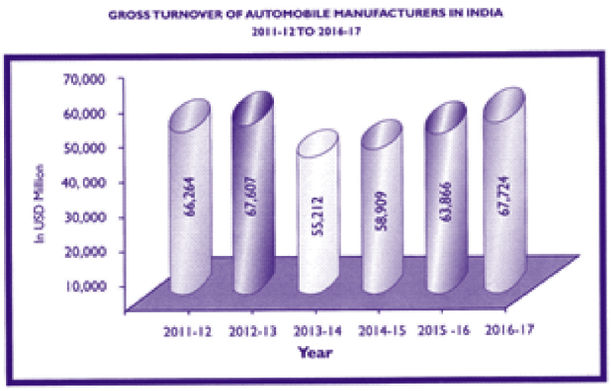


**Figure 1 Gross Turnover of automobile manufactures 2011-12 o 2016—17 (Source: SIAM report)**

## 1. LITERATURE REVIEW

In today's fast-growing market the supply chain management facing tremendous challenges on a daily basis which require direct attention and quick response. With the supply chain being at the core of business operations, these challenges can directly affect the industries in substantial ways. The practice of supply chain management in India is growing rapidly and at the same time facing bigger concern. Flexibility is a complex and multidimensional concept (Sethi and Sethi 1990; Upton 1994, 1995; Garavelli 2003). Due to these different flexibility definitions are available but there is no uniform concept that is broadly accepted. The concept of flexibility has been first introduced into the economics literature by Stigler in the 1930's, in the context of a firm's ability to accommodate to greater variations in the demand output (Carlsson1989; De Toni and Tonchia 1998, 2005). To deal this uncertainty and rapidly changing environment industry needs flexibility in their supply chain organization (Gerwin 1987; Sethi and Sethi 1990; Fawcett et al. 1996; Malhotra et al. 1996; Volberda 1997; Ward et al. 1998; Gunasekaran 1999; Grewal and Tansuhaj 2001; Stevenson and Spring 2007; Chandra and Grabis 2009; Saleh et al. 2009). The supply chain flexibility is very necessary for customer's satisfaction. Flexibility is a complex and multidimensional concept (Sethi and Sethi 1990; Upton 1994, 1995; Garavelli 2003). Due to these different flexibility definitions are available but there is no uniform concept that is broadly accepted. According to B. E. Narkhede (2016) flexibility and delivery are more important than quality and cost in the current manufacturing scenario. Customers want the delivery time as short as possible.

Supply chain performance is a vital and multi-faced rapidly developing area of research in supply chain management. It is defined as the information concerning the processes and products results that permit the assessment and the comparison in relation to goals, patterns, past results and with other processes and products (Petrovic-Lazarevic and Sohal 2002). It is vital to recognize those determinants that force supply chain success. What should be calculated and what action should be taken based upon the measure are the key issues in today's fast-paced, competitive economy. To attain an efficient and effective supply chain, many companies have realized the significance of performance evaluation and what measures should be used. The objectives of performance measurement are to improve the efficiency and effectiveness of a supply chain (Beamon 1999; Gunasekaran et al. 2001), and also consider the overall supply chain goals and the metrics to be applied (Gunasekaran et al. 2001). The organizational performance refers to how well an organization acquires its market-oriented goals, financial goals in terms of performance items such as return on assets (ROA), market share and growth rate. (Vickery et al. 1991). In supply chain performance quality, cost, response time and service level are the performance indicators (Christopher and Towill, 2001). Lippman (2001) identified the effect of product cycle time, due date performance, cost, and quality on operational performance. Different researchers evaluate firm performance has been by in a different manner to assist the firm in measuring their supply chain. Different researchers evaluated supply chain performance in the different style to assist firms in measuring their supply chain.

## 2. RELATIONSHIP BETWEEN FLEXIBILITY AND PERFORMANCE

Many research shows that there is the link between flexibilities and performance. They found that better flexibility leads to better performance thereby improves organizational performance. Gupta and Somers (1996) establish that business strategy has a direct impact on manufacturing flexibility; manufacturing flexibility has a direct impact on organizations. A conceptual model on relationships among supply chain strategy, supply chain flexibility, and supply chain performance is proposed by Fantazy et al. (2009).This model find direct and indirect impact of supply chain strategy and flexibility on performance it is based on previous research done by Vickery et al. (1999) and Fantazy et al. (2009), who did research to present impact of supply chain flexibility dimensions on firms performance in furniture industry Vickery et al. (1999) and on Canadian manufacturers to explain SCM and performance issues. Fantazy adapted a basic model of manufacturing strategy, manufacturing flexibility, and organizational performance into a supply chain model.


Figure: 2 Basic Model (Fantazy et al. 2009)

## 3. HYPOTHESES AND CONCEPTUAL FRAMEWORK

Based on the research model Fantazy *et al.* (2009) in this research following hypotheses develop

**$H_1$**: Supply chain flexibility dimensions have a direct relationship on the supply chain performance Dimensions.

**$H_2$**: Deals with the impact of adoption of proper supply chain flexibility on Supply Chain Performance

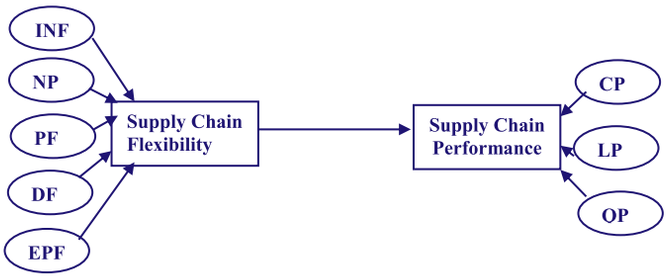


**Figure 2: The Conceptual Framework between Supply Chain and Supply Chain Performance**

(Abbreviations: **INF**-Information Flexibility, **NPF**- Innovation & New product / Future Research Flexibility, **PF**- Sourcing Flexibility & Process Flexibility, **DF**- Trans-Shipment and Delivery Flexibility, **EPF**- Existing Product Flexibility, **CP**-Cost Performance, **LP**-Logistic Performance, and **QP**- Quality Performance & Customer's Satisfaction)

## 4. RESEARCH METHODOLOGY

### 4.1 Sampling and data collection

There is diversity in the collection of data there are different methods that can be used for collecting data viz. using a survey strategy, such as structured observation, interviews, and questionnaires (Saunders et al. 2007). In statistically testing the enormous amount of structured data needed from the different respondent who fills the questionnaire. Hence a large number of respondents that therefore should be contacted and the small information available from respondents, the questionnaire is selected to collect the data needed to test the above hypotheses (Cooper and Schindler 2003; Saunders et al. 2007). Besides this (Cooper and Schindler 2003)

- A questionnaire allows getting in touch with otherwise inaccessible contacts
- It is less expensive (it costs less time and money to reach a large sample)
- A questionnaire is perceived as more unspecified
- It allows respondents time to think about the questions
- The data can easily be worked out used for analyzing and testing
- Although a questionnaire is the most common choice to collect the data needed in this thesis, it has also some disadvantages
- No interviewer interference available for an explanation;
- The questionnaire may not be too long, so the measurement items are limited;

This research is based on a quantitative approach, which was conducted on automobile industries the data collection instrument used was a questionnaire which was sent to small and medium-sized automobile industries and ancillary industries within different supply chains. The data From 129 respondents are also classified by their job functions are the corporate executive, purchasing, manufacturing/production, distribution/logistic, supply chain management, transportation, material land operation from Indian automobile industries.

### 4.2 Reliability analysis

The Cronbach's alpha was conducted to assess the reliability of each scale. Cronbach Alpha values over 0.7 indicate that all the date can be considered consistent (Nunally, 1978). This value is presented in Table 1.

**Table 1.Reliability of each construct**

| Dimensions | Cr onbach's alpha (α) | No. of Items in the construct |
|---|---|---|
| Innovation & New product / Future Research Flexibility(NPF) | 0.863 | 7 |
| Sourcing Flexibility & Process Flexibility(PF) | 0.925 | 9 |
| Existing Product Flexibility(EPF) | 0.858 | 5 |
| Trans -Shipment and Delivery Flexibility(DF) | 0.915 | 9 |
| Information Flexibility(INF) | 0.849 | 5 |
| Cost Performance(CP) | 0.874 | 6 |
| Logistics Performance(LP) | 0.778 | 4 |
| Quality Performance & Customer's Satisfaction(QP) | 0.887 | 7 |

### 4.3 Descriptive Statistics

The next analysis of reliability is descriptive statistics and measurement items which are useful for describing the basic features of data, in a research study with large data, these statistics may help us to manage the data and present it in a summary table 2 for supply chain flexibility dimensions. The descriptive statistics with mean, standard deviation, loading, t-value, skewness and kurtosis are listed in table 2 and 3

**Table 2. Descriptive statistics on item level SCF**

| Dimensions | Types | Item | Item Description | Mean | St. Dev. |
|---|---|---|---|---|---|
| **Supply Chain Flexibility** | **Innovation & New product / Future Research Flexibility (NPF)** | NPF1 | Changing in existing product and development of number of the new products per year at reasonable pricing | 4.27 | 0.819 |
| | | NPF 2 | Reducing lead time | 4.29 | 0.842 |
| | | NPF 3 | Faster delivery to the customer which leads to a better relationship with them | 4.18 | 0.827 |
| | | NPF 4 | Involving vendors and suppliers in the development of new product | 4.43 | 0.789 |
| | | NPF 5 | Creation of new products by use of PLM ( CAD software/ Analysis tools) | 4.53 | 0.614 |
| | | NPF 6 | Development of new product in parallel to the existing product at reasonable cost | 4.33 | 0.776 |
| | | NPF 7 | Better synchronization of operations in SC for development of new product | 4.26 | 0.843 |
| | **Sourcing Flexibility & Process Flexibility (PF)** | PF1 | Managing reasonably the cost of switching from one supplier to another | 4.44 | 0.729 |
| | | PF2 | Association with suppliers in managing the changing situation | 4.44 | 0.791 |
| | | PF3 | Creating Flexible organization in order to meet the variety of customer and supplier expectation | 4.41 | 0.768 |
| | | PF4 | Creating better relationship with supplier and customer in order to manag ing the changing environment | 4.35 | 0.671 |
| | | PF5 | Order size and frequency of delivery may vary depending on demand | 4.36 | 0.674 |
| | | PF6 | Managing close coordination between outside and inside activities in SC by providing intensive distribution | 4.26 | 0.755 |
| | | PF7 | Lunching New product at right time | 4.26 | 0.755 |

| | | | | | |
|---|---|---|---|---|---|
| | **Existing Product Flexibility (EPF)** | EPF1 | Change and modification in features and specifications of existing products | 4.35 | 0.716 |
| | | EPF2 | Managing the available different designs from standard modules | 4.16 | 0.674 |
| | | EPF3 | Modifying Existing product configurations as per Customer need | 4.12 | 0.718 |
| | | EPF4 | Reducing set up time and machining time | 4.07 | 0.595 |
| | | EPF5 | Change in time and cost of production must me manageable | 4.35 | 0.694 |
| | **Trans-Shipment /Delivery (DF)** | DF1 | Movement of stock between locations should be changing as per requirement | 4.58 | 0.682 |
| | | DF2 | Mode of delivery of products must have the variety of options including outsourcing options | 4.46 | 0.639 |
| | | DF3 | Faster mode of delivery must be available on demand | 4.38 | 0.629 |
| | | DF4 | Variety of warehouses, distribution system must be available for delivery of products | 4.40 | 0.745 |
| | | DF5 | Any order quantity from the customer can be satisfied | 4.53 | 0.708 |
| | | DF6 | The time and the cost implications of changing the delivery due dates | 4.44 | 0.750 |
| | | DF7 | Managing the cost of delay in meeting customers' orders | 4.40 | 0.680 |
| | **Information Flexibility (INF)** | INF1 | Efficient flow of information throughout the supply chain network | 4.26 | 0.815 |
| | | INF2 | Meeting varying information needs from existing information systems | 4.60 | 0.580 |
| | | INF3 | Integration of the existing information systems with other systems | 4.43 | 0.636 |
| | | INF4 | Reduce time and cost for exchanging the required information | 4.16 | 0.719 |
| | | INF5 | Update the IT tools and systems to support changing requirements | 4.47 | 0.533 |

**Table 3. Descriptive statistics on item level SCF**

| Dimensions | Types | Item | Item Description | Loading | t-value | Z-value skewness | Z-value kurtosis |
|---|---|---|---|---|---|---|---|
| **Supply Chain Flexibility** | **Innovation &New product/ Future Research Flexibility (NPF)** | NPF1 | Changing in existing product and development of the number of new products per year at reasonable pricing | 0.756 | 10.38 | -0.559 | -1.284 |
| | | NPF 2 | Reducing lead time | 0.840 | 24.84 | -0.606 | -1.325 |
| | | NPF 3 | Faster delivery to the customer which leads to the better relationship with them | 0.850 | 22.27 | -0.361 | -1.448 |
| | | NPF 4 | Involving vendors and suppliers in the development of new product | 0.865 | 24.49 | -0.942 | -0.725 |
| | | NPF 5 | Creation of new products by use of PLM ( CAD software/ Analysis tools) | 0.762 | 14.38 | -0.985 | 0.10 |
| | | NPF 6 | Development of new product in parallel to existing product at reasonable cost | 0.506 | 3.805 | -0.687 | -1.005 |
| | | NPF 7 | Better synchronization of operations in SC for development of new product | 0.649 | 7.957 | -0.531 | -1.361 |
| | **Sourcing Flexibility &Process Flexibility (PF)** | PF1 | Managing reasonably the cost of switching from one supplier to another | 0.835 | 16.88 | -0.929 | -0.501 |
| | | PF2 | Association with suppliers to managing the changing situation | 0.851 | 25.86 | -0.989 | -0.657 |
| | | PF3 | Creating Flexible organization in order to meet variety of customer and supplier expectation | 0.774 | 17.97 | -0.879 | -0.730 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | PF4 | Creating better relationship with supplier and customer in order to manage changing environment | 0.842 | 17.62 | -0.560 | -0.683 |
| | | PF5 | Order size and frequency of delivery may vary depending on demand | 0.774 | 10.91 | -0.606 | -0.661 |
| | | PF6 | Managing close coordination between outside and inside activities in SC by providing intensive distribution | 0.761 | 13.92 | -0.408 | -1.087 |
| | | PF7 | Lunching New product at right time | 0.784 | 11.91 | -0.506 | -0.861 |
| | **Existing Product Flexibility (EPF)** | EPF1 | Change and modification in features and specifications of existing products | 0.652 | 7.036 | -0.647 | -0.790 |
| | | EPF2 | Managing the available different designs from standard modules | 0.891 | 40.04 | -0.216 | -0.768 |
| | | EPF3 | Modifying Existing product configurations as per Customer need | 0.706 | 6.967 | -0.188 | -1.011 |
| | | EPF4 | Reducing set up time and machining time | 0.897 | 56.02 | -0.019 | -0.085 |
| | | EPF5 | Change in time and cost of production must me manageable | 0.826 | 26.80 | -0.609 | -0.734 |
| | **Trans-Shipment /Delivery (DF)** | DF1 | Movement of stock between locations should be changing as per requirement | 0.644 | 8.368 | -1.382 | 0.578 |
| | | DF2 | Mode of delivery of products must have variety of options including outsourcing options | 0.746 | 10.07 | -0.778 | -0.383 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| | | DF3 | Faster mode of delivery must be available on demand | 0.790 | 14.77 | -0.516 | -0.600 |
| | | DF4 | Variety of warehouses, distribution system must be available for delivery of products | 0.769 | 26.29 | -0.811 | -.730 |
| | | DF5 | Any order quantity from the customer can be satisfied | 0.835 | 20.07 | -1.226 | 0.114 |
| | | DF6 | The time and the cost implications of changing the delivery due dates | 0.781 | 13.30 | -0.954 | -0.549 |
| | | DF7 | Managing the cost of delay in meeting customers' orders | 0.794 | 17.93 | -0.701 | -0.594 |
| | **Information Flexibility (INF)** | INF1 | Efficient flow of information throughout the supply chain network | 0.797 | 20.84 | -0.522 | -1.299 |
| | | INF2 | Meeting varying information needs from existing information systems | 0.839 | 17.50 | -1.145 | 0.369 |
| | | INF3 | Integration of the existing information systems with other systems | 0.802 | 18.45 | -0.670 | -0.498 |
| | | INF4 | Reduce time and cost for exchanging the required information | 0.715 | 8.568 | -0.266 | -1.008 |
| | | INF5 | Update the IT tools and systems to support changing requirements | 0.795 | 13.16 | -0.224 | -1.280 |

By inspecting the individual items the items having loading less than 0.7 and at-value less than 1.96 and should, therefore, be dropped (all t-values above 1.96 are significant at the 0.05 level).Remaining items with a loading factor higher than 0.7 provide support with a high degree of individual reliability at item level (Hulland 1999; White et al. 2003). In the current research 4 items having loading less than 0.7, hence these items are eliminated from research. The values for kurtosis between -2 and +2 are considered acceptable in order to prove normal univariate distribution (George & Mallery, 2010). From result, all value of kurtosis is within range, hence data is normally distributed.

Similar descriptive statistics and measurement items which are useful for describing the basic features of data, in a research study with large data, these statistics may help us to manage the data and present it in a summary table 4 for supply chain performance dimensions. The descriptive statistics with mean, standard deviation, loading, t-value, skewness and kurtosis are listed in table 4 and 5.

**Table 4. Descriptive statistics on item level SCP**

| Dimensions | Types | Item | Item Description | Mean | St. Dev. |
|---|---|---|---|---|---|
| Supply Chain Performance | Cost Performance (CP) | CP1 | Return on Investment | 4.38 | 0.677 |
| | | CP2 | Return on Investment growth rate | 4.64 | 0.597 |
| | | CP3 | Market Share | 4.46 | 0.614 |
| | | CP4 | Return on Sales | 4.33 | 0.755 |
| | | CP5 | Return on Sales Growth | 4.53 | 0.663 |
| | Logistics Performance (LP) | LP1 | Reduced warehouse costs. | 4.23 | 0.723 |
| | | LP2 | Reduced obsolescence. | 4.12 | 0.673 |
| | | LP3 | Faster order processing speed. | 4.53 | 0.686 |
| | | LP4 | Reduced inventory at all sites of supply chain. | 4.40 | 0.632 |
| | Quality Performance (QP) | QP1 | Response time to customer query time | 4.50 | 0.615 |
| | | QP2 | Level of customer perceived value of product | 4.27 | 0.718 |
| | | QP3 | Level of service systems to meet particular customer needs | 4.47 | 0.731 |
| | | QP4 | Customer satisfaction | 4.36 | 0.719 |
| | | QP5 | Provide quality product at least cost | 4.44 | 0.729 |

**Table 5. Descriptive statistics on item level SCP**

| Dimensions | Types | Item | Item Description | Loading | t-value | Z-value skewness | Z-value kurtosis |
|---|---|---|---|---|---|---|---|
| | Cost Performance (CP) | CP1 | Return on Investment | 0.643 | 7.173 | -0.653 | -0.632 |
| | | CP2 | Return on Investment growth rate | 0.711 | 9.046 | -1.499 | 1.253 |
| | | CP3 | Market Share | 0.789 | 14.735 | -0.455 | -0.455 |
| | | CP4 | Return on Sales | 0.852 | 38.463 | -0.659 | -0.942 |

| | | | | | | | |
|---|---|---|---|---|---|---|---|
| **Supply Chain Performance** | | CP5 | Return on Sales Growth | 0.836 | 23.809 | -1.140 | 0.134 |
| | **Logistics Performance (LP)** | LP1 | Reduced warehouse costs. | 0.617 | 6.345 | -0.283 | -0.995 |
| | | LP2 | Reduced obsolescenc e. | 0.808 | 15.291 | -0.150 | -0.746 |
| | | LP3 | Faster order processing speed. | 0.771 | 11.260 | -1.189 | 0.137 |
| | | LP4 | Reduced inventory at all sites of supply chain. | 0.899 | 35.173 | -0.566 | -0.575 |
| | **Quality Performance (QP)** | QP1 | Response time to customer query time | 0.706 | 10.074 | -0.860 | -0.224 |
| | | QP2 | Level of customer perceived value of product | 0.850 | 20.005 | -0.470 | -0.928 |
| | | QP3 | Level of service systems to meet particular customer needs | 0.791 | 12.757 | -1.031 | -0.345 |
| | | QP4 | Customer satisfaction | 0.861 | 20.619 | -0.691 | -0.876 |
| | | QP5 | Provide quality product at least cost | 0.893 | 35.704 | -0.929 | -0.759 |

At the individual item loadings are 0.7 or higher in items, indicating that there is a high degree of individual item reliability (Hulland, 1999; White et al., 2003). 2 items have a loading of less than 0.7 eliminated from research.

### 4.3 Structural Equation Modeling Results

This chapter deals with the examines the structural modeling result with the help of Smart PLS. The full form of PLS is Partial least squares (PLS) analysis it is an alternative method over Ordinary Least Square(OLS) regression, canonical correlation, or covariance-based structural equation modeling (SEM) of systems of independent and response variables.PLS is sometimes called “composite-based SEM”, "component-based SEM", or “variance-based SEM”, in contrast to "covariance-based SEM," which is the usual type (e.g., implemented by Stata, SAS, M Plus, LISREL, Amos EQS and other software packages used in statically analysis).In figure 3 the model tested using Smart PLS 2.0 software is shown.

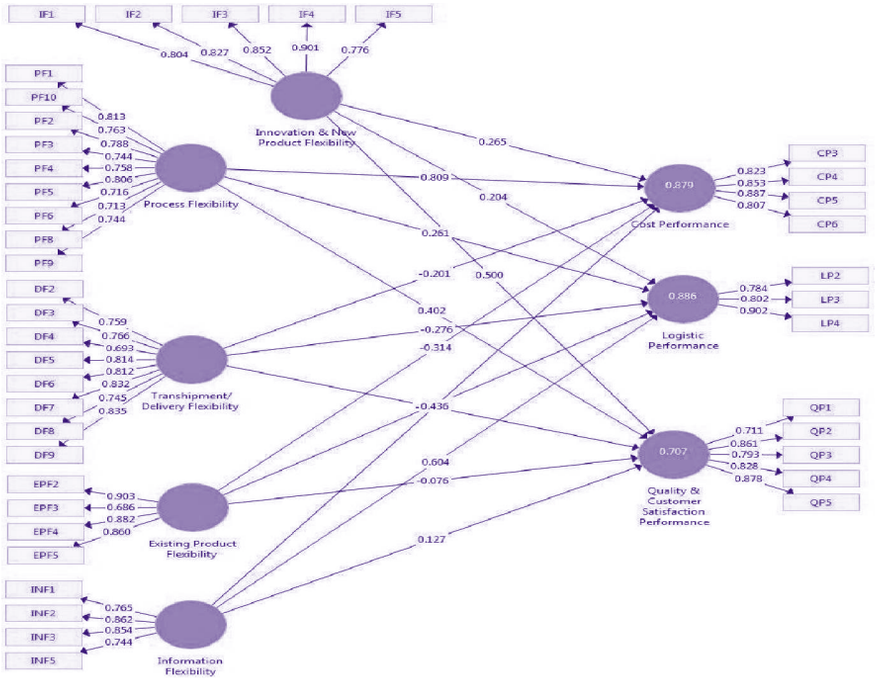


**Figure 3 Research Model tested using Smart PLS**

## 5. FINAL RESULTS

The empirical results of the model using Smart PLS are presented in table 6, table 7 and table 8. The research has found a relationship of supply chain flexibility constructs with supply chain performance construct. The finding of the result shows that a broad point of view is required by companies to determine which type of flexibility is required in a particular situation to accomplish a predetermined goal. To find the relationship of supply chain flexibility on supply chain performance parameters such as cost performance the results of the current research show that innovative flexibility have a very weak relationship with cost performance while process flexibility strong positive relationship on cost performance, information flexibility has a moderate relationship with cost performance while existing product flexibility & delivery flexibility have a negative relationship with cost performance shown in table 6.

**Table 6: Relationship of SCF with cost performance**

| | Total Effect | t-value | Conclusion | $R^2$ |
|---|---|---|---|---|
| Innovation & New product Flexibility - Cost Performance(CP) | 0.265 | 1.429 | $H_1$ Supported | 0.879 |
| Process Flexibility- Cost Performance(CP) | 0.809 | 4.223 | $H_1$ & $H_2$ Supported | |
| Existing Product Flexibility - Cost Performance(CP) | -0.314 | 1.891 | $H_1$ Not Supported | |
| Delivery Flexibility- Cost Performance(CP) | -0.201 | 0.939 | $H_1$ Not Supported | |
| Information Flexibility-Cost Performance(CP) | 0.436 | 3.752 | $H_1$ Supported | |

Path significance: * $p < 0.05$
(t-value > 1.96 (for 2-tailed) which is equivalent to $p < 0.05$).

The results of the current research show that innovative, process flexibility, existing product flexibility and delivery flexibility having a very weak relationship with logistic performance while information flexibility strong positive relationship with the logistic performance shown in Table 7

**Table7. Relationship of SCF with logistic performance**

| | Total Effect | t-value | Conclusion | $R^2$ |
|---|---|---|---|---|
| Innovation & New Product Flexibility- Logistics Performance (LP) | 0.204 | 1.701 | $H_1$ Supported | 0.885 |
| Sourcing Flexibility & Process Flexibility- Logistics Performance (LP) | 0.261 | 1.855 | $H_1$ Supported | |
| Existing Product Flexibility- Logistics Performance (LP) | 0.217 | 1.819 | $H_1$ Supported | |
| Trans-Shipment and Delivery Flexibility- Logistics | 0.276 | 1.623 | $H_1$ Supported | |
| Information Flexibility- Logistics Performance (LP) | 0.604 | 6.866 | $H_1$ & $H_2$ Supported | |

Path significance: * $p < 0.05$
(t-value > 1.96 (for 2-tailed) which is equivalent to $p < 0.05$).

Finally, results of the current research show that innovation flexibility and process flexibility having a moderate relationship with quality performance, existing product flexibility and delivery flexibility having a very weak negative relationship with logistic performance while information flexibility weak positive relationship with the logistic performance shown in Table 8

**Table 8. Relationship of SCF with quality performance**

| Impact | Coefficient | t-value | Conclusion | $R^2$ |
|---|---|---|---|---|
| Innovation & New product / Future Research Flexibility - Quality | 0.500 | 1.759 | $H_1$ & $H_2$ Supported | 0.707 |
| Sourcing Flexibility & Process Flexibility- Quality Performance (QP) | 0.402 | 1.395 | $H_2$ Not Supported | |
| Existing Product Flexibility- Quality Performance (QP) | -0.076 | 0.804 | $H_1$ & $H_2$ Not Supported | |
| Trans-Shipment and Delivery Flexibility- Quality Performance (QP) | -0.060 | 0.868 | $H_2$ Not Supported | |
| Information Flexibility- Quality Performance (QP) | 0.127 | 0.554 | $H_2$ Not Supported | |

Path significance: * $p < 0.05$
(t-value > 1.96 (for 2-tailed) which is equivalent to $p < 0.05$).

## 6. DISCUSSION AND IMPLICATIONS

The most important issue faced by organizations is to apply the appropriate flexibility in any organizational practices. Research conclusion shows that supply chain management flexibility is having the relationship to supply chain performance. Supply chain flexibility is key factors and being the impact on supply chain performance. To efficiently manage the supply chain, organizations need to adopt proper supply chain strategies & flexibility into supply management chain practices (Sufian, 2010). Effective & efficient supply chain management is vital determinant to building and sustaining competitive advantage in the marketplace. The research hypotheses are tested by using Smart -PLS models. The result of this study may be contributing to the supply chain management knowledge in several ways. This study was to put into the knowledge on supply chain management performance by finding the impact of supply chain management flexibility and supply chain management performance.

## 7. LIMITATION AND FUTURE RESEARCH

There are a number of limitations that influence the generalizability of this study.

(i) This study limited only on Indian automobile industry. One of the limitations of this single-sector study is that the conclusions may not be generalizable to other sectors. Future studies replicating this research across various industries and

sector would enhance the understanding of supply chain performance.

(ii) The sample choice was based on a convenience sample, which is often used for exploratory work (Zikmund, 2003), rather than a random probability sample. Further research could be conducted using a random probability sample.

(iii) The sample represented a limited number of companies in one sector only.

(iv) The study is based on a questionnaire. Therefore, there is a possibility of respondents answering questions in a way that is perceived to be more desirable or acceptable than what is actually experienced or believed.

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