

PERFORMANCE MEASUREMENT OF SUPPLY CHAIN MANAGEMENT IN SMALL AND MEDIUM AUTO ANCILLARY UNITS IN COIMBATORE DISTRICT - A SEM APPROACH

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***Abstract:** Supply chain management (SCM) has been a major component of competitive strategy to enhance organizational productivity and profitability. Supply chain efficiencies have been the central theme of a focal organization in designing and implementing supply networks. Supply Chain and Supply chain Management have played a significant role in corporate efficiency and have attracted the attention of numerous academicians over the last few years. SCM is management of material and information flow in a supply chain to provide the highest degree of customer satisfaction at the lowest possible cost. The arrival of major global auto companies has galvanised the domestic sector into adopting Supply Chain best practices. This has enhanced competitiveness leading to a quantum growth in exports. However, the Indian automotive industry has to operate in an unique environment further posing challenges to the already complex automobile supply chain. Therefore, a need is felt to continually study supply chain practices in this sector from a contemporary, practitioner's viewpoint in order to identify key factors of differentiation which would ultimately provide competitive advantage. The present study seeks to understand the performance and the present status, complexities and challenges facing the select auto ancillary units in Coimbatore District. It examines trends such as visibility and innovation, collaboration and supply networks and evolving leadership roles impacting supply chain management and its effective performance. The results also will help further in providing greater understanding of the success factors that lead to successful implementation of SCM strategies to reduce supply chain wide costs and to improve customer service levels.*

***Keywords:** Supply chain management, SCM performance*

INTRODUCTION

Transformation and growth on the auto ancillary units has opened a vast research field involving supply chain performance measurement. The supply chain is not a chain of businesses with one-to one, business- to-business relationships, but a network of multiple businesses and relationships. This mainly happens through linkage of processes namely planning and analytics, supplier relationship

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management, internal supply management and customer relationship management. In that sense, SCM deals with total business process excellence and represents a new way of managing the business and relationships with other members of the supply chain. To succeed today and to pave the way for a better future, Indian organizations need to create strong linkages with their business partners using the concept of supply chain management. More and more Indian organizations today are realizing the importance of developing and implementing a comprehensive supply chain strategy – and then linking this strategy to the overall business goals.

STATEMENT OF THE PROBLEM

In the recent times, auto ancillary units have become an important early point of contact for customers. Even small and medium scale industries have started adopting auto ancillary units. Changes in the environment have been so dramatic and sudden that Indian automotive sectors have realized the inappropriateness of competing effectively in isolation from their suppliers and other associates of supply chain. Rather, the need for adopting collaborative methodologies, at this stage, is more than ever before because of the recent economic deregulation and globalization of the Indian industry. Hence, it is important to measure the performance of supply chain management in small and medium auto ancillary units. Hence, the researcher has chosen this area.

OBJECTIVE OF THE STUDY

“To analyze the performance of supply chain management in select small and medium auto ancillary units in Coimbatore district – A SEM approach”.

REVIEW OF LITERATURE

Gunasekaran *et al.* (2004) in their study entitled “A framework for supply chain performance measurement” examines that performance measurement and metrics have an important role to play in setting objectives, evaluating performance, and determining future courses of actions. Performance measurement and metrics pertaining to SCM have not received adequate attention from researchers or practitioners. The researcher developed a framework to promote a better understanding of the importance of SCM performance measurement and metrics. Using the current literature and the results of an empirical study of selected British companies, the researcher developed the framework presented herein, in hopes that it would stimulate more interest in this important area.

Bhattacharya *et al.* (2014) in their study entitled “Supply Chain Management in Indian Automotive Industry: Complexities Challenges and Way Ahead” seeks to understand the present status, complexities and challenges facing the Indian

automobile sector. It examines trends such as visibility and innovation, collaboration and supply networks and evolving leadership roles impacting supply chain effectiveness. Strategies for overcoming challenges are presented as also a framework for further study and analysis.

METHODOLOGY

To fulfill the research objectives, a comprehensive survey questionnaire was designed to capture the facts, figures as well as qualitative responses about the supply chain performance in the sample auto ancillary units. A pilot survey was conducted to assess the appropriateness of the questionnaire for executives in Indian organizations. The following methodologies are used in the study.

Area of Study

The study on the performance of supply chain management in select small and medium auto ancillary units has been limited to Coimbatore district.

Sampling Technique

The researcher has adopted stratified sampling method for this study. The sample size of the study is 313.

Sources of Data

The study was mainly based on primary data. A structured questionnaire was used for data collection. Considerable data has also been tapped from secondary sources, such as books, magazines, research articles published in various journal, websites, etc.

LIMITATIONS OF THE STUDY

The study has been restricted to 313 respondents only. The coverage of this study is limited to Coimbatore district only and may not apply the findings and suggestions to other areas.

DATA ANALYSIS USING STRUCTURAL EQUATION MODEL (SEM)

RESEARCH MODEL AND HYPOTHESIS

The research hypotheses have been defined on the basis of the performance of supply chain management in select small and medium auto ancillary units in Coimbatore district. The following figure is a graphic presentation of the developed hypothetical model. On the basis of structural equation model, the following hypotheses are proposed.

HYPOTHESIS OF THE STUDY

“The following variables are positively correlated with the determinants of the performance of supply chain management in select small and medium auto ancillary units in Coimbatore district”.

Table 1
Variables Specification
-Manifest and Latent Variables for Sem

<i>Variables No.</i>	<i>Manifest variables</i>	<i>Latent variables</i>	
VAR0001	Your supply chain is able to Handle different nonstandard orders also	HDN	Supply Chain Flexibility (SCMF)
VAR0002	You are able produce products characterized by various features, options, sizes and colors	PCF	
VAR0003	You are able to rapidly adjust capacity so as to enhance or reduce your production in response to changing customer demand	ACP	
VAR0004	You introduce large numbers of product improvement/variation	ILP	
VAR0005	You frequently introduce new products or parts	INP	
VAR0006	Your suppliers are able to adjust capacity to ramp up or reduce their production based on your customer demand	RPD	
VAR0007	There is a high level of communication and coordination between all functions in your Company	HCC	Supply Chain Integration (SCMINT)
VAR0008	Cross-functional Teams are frequently used for supply chain design and improvement in your Company	CFT	
VAR0009	There is a high level of integration of information systems in your Company	IIS	
VAR0010	There is a great amount of information exchange between your company and your trading partners	GIE	
VAR0011	Your suppliers deliver materials/components/products to you on time	DMT	Supplier Performance (SUPPPER)
VAR0012	Your suppliers deliver the goods at competitive price	DCP	
VAR0013	Your suppliers provide high quality materials / component / products to you	HQM	
VAR0014	You are getting material in Small lots only whenever you need them	SLO	

contd. table 1

Variables No.	Manifest variables	Latent variables	
VAR0015	Your Suppliers can supply materials based on your customer demand	SCD	Logistics and Performance (LOGPER)
VAR0016	You are regularly solving problems jointly with your logistics providers	SPL	
VAR0017	You have the continuous improvement programs and long term plans where you include your transport and logistics providers also	CIP	
VAR0018	You are using your logistics providers for reverse logistics functions like taking back our containers and other packing material also	RLF	
VAR0019	Your logistics providers are able to deliver your customers on time	DOT	
VAR0020	Your logistics providers deliver to customers with a high degree of reliability	DHR	
VAR0021	Your logistics providers are flexible and can adapt to the sudden changes in delivery schedules	LPF	
VAR0022	Your logistics providers provide services at competitive costs	PSC	
VAR0023	Your logistics providers are able to address your complaints with the reasonable period	ACR	

Chart - 1: Research Model Specification

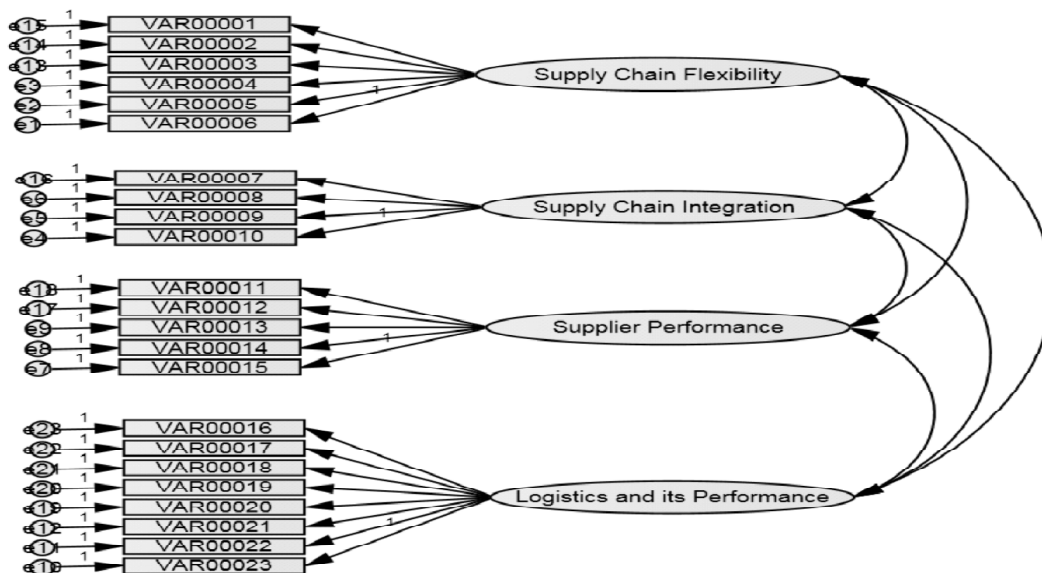


Chart - 2: Unstandardised Estimates

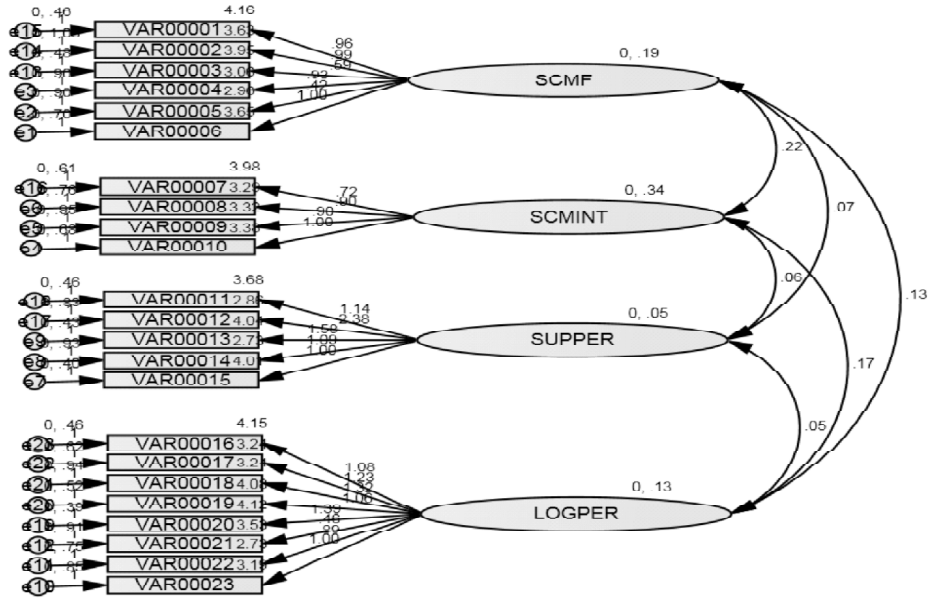
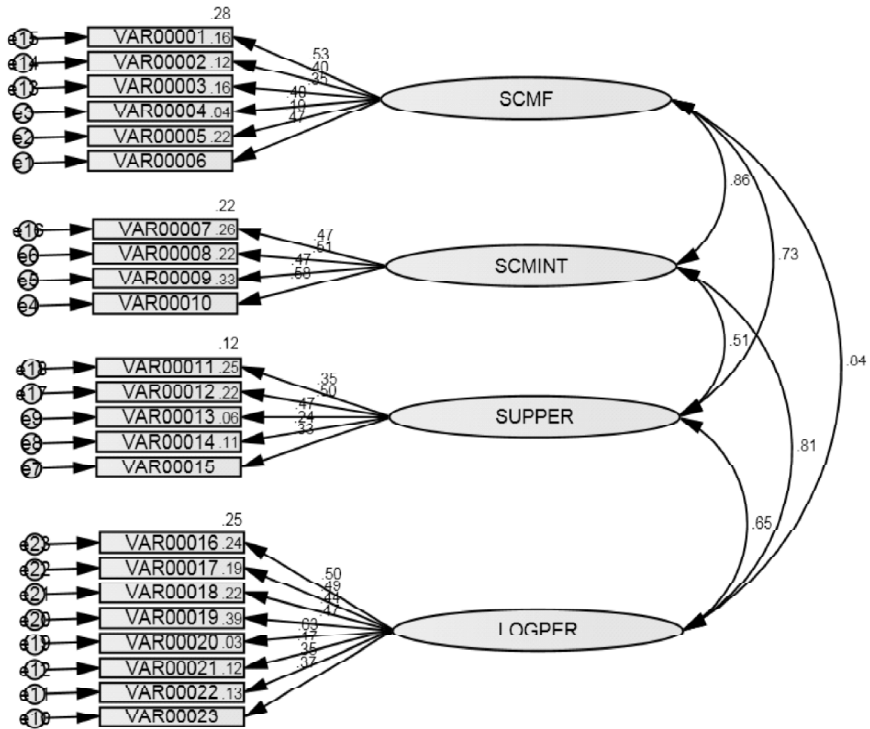


Chart 3: Standardised Estimates



TESTING OF HYPOTHESES - STANDARDISED ESTIMATES

The following table represents the results of the testing of the hypotheses for measuring the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.

Table 2
Supply Chain Management Performance
Testing of Hypotheses - Standardised Estimates

<i>Hypotheses</i>		<i>Hypothetical Relationship</i>	<i>Results</i>
H ₁ : There is a positive impact of HDN and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	HDN	Positive	Confirmed
H ₂ : There is a positive impact of PCF and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	PCF	Positive	Confirmed
H ₃ : There is a positive impact of ACP and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	ACP	Positive	Confirmed
H ₄ : There is a positive impact of ILP and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	ILP	Positive	Confirmed
H ₅ : There is a positive impact of INP and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	INP	Positive	Confirmed
H ₆ : There is a positive impact of RPD and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	RPD	Positive	Confirmed
H ₇ : There is a positive impact of HCC and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	HCC	Positive	Confirmed
H ₈ : There is a positive impact of CFT and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	CFT	Positive	Confirmed
H ₉ : There is a positive impact of IIS and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	IIS	Positive	Confirmed
H ₁₀ : There is a positive impact of GIE and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	GIE	Positive	Confirmed
H ₁₁ : There is a positive impact of DMT and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	DMT	Positive	Confirmed

contd. table 2

<i>Hypotheses</i>		<i>Hypothetical Relationship</i>	<i>Results</i>
H ₁₂ : There is a positive impact of DCP and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	DCP	Positive	Confirmed
H ₁₃ : There is a positive impact of HQM and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	HQM	Positive	Confirmed
H ₁₄ : There is a positive impact of SLO and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	SLO	Positive	Confirmed
H ₁₅ : There is a positive impact of SCD and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	SCD	Positive	Confirmed
H ₁₆ : There is a positive impact of SPL and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	SPL	Positive	Confirmed
H ₁₇ : There is a positive impact of CIP and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	CIP	Positive	Confirmed
H ₁₈ : There is a positive impact of RLF and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	RLF	Positive	Confirmed
H ₁₉ : There is a positive impact of DOT and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	DOT	Positive	Confirmed
H ₂₀ : There is a positive impact of DHR and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	DHR	Positive	Confirmed
H ₂₁ : There is a positive impact of LPF and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	LPF	Positive	Confirmed
H ₂₂ : There is a positive impact of PSC and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	PSC	Positive	Confirmed
H ₂₃ : There is a positive impact of ACR and the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.	ACR	Positive	Confirmed

Chi-square = 123369.6, Degrees of freedom = 276, Probability level = 0.000

DISCUSSION OF THE RESULT

From the path diagram, it is inferred that all the measured variables are influenced with the latent variable of successful operation for measuring the supply chain

management performance of select small and medium auto ancillary units in Coimbatore district and also have positive relationship with the significance at 1 percent and 5 percent level.

Table 3
Regression Weights
Lisrel Maximim Likelihood Estimates

<i>Latent Variable</i>		<i>Measured Variables</i>	<i>Estimates</i>	<i>SE</i>	<i>CR</i>	<i>P</i>
SCMF	<--	HDN	3.655	.054	68.168	***
SCMF	<--	PCF	2.958	.055	54.061	***
SCMF	<--	ACP	3.064	.059	52.334	***
SCMF	<--	ILP	3.380	.057	59.257	***
SCMF	<--	INP	3.323	.063	53.098	***
SCMF	<--	RPD	3.291	.058	57.083	***
SCMINT	<--	HCC	4.010	.038	105.532	***
SCMINT	<--	CFT	2.728	.056	48.433	***
SCMINT	<--	IIS	4.045	.042	96.553	***
SCMINT	<--	GIE	3.185	.056	56.787	***
SUPPER	<--	DMT	2.732	.052	52.197	***
SUPPER	<--	DCP	3.527	.055	64.501	***
SUPPER	<--	HQM	3.949	.042	94.318	***
SUPPER	<--	SLO	3.633	.062	58.176	***
SUPPER	<--	SCD	4.163	.045	91.830	***
LOGPER	<--	SPL	3.984	.050	79.554	***
LOGPER	<--	CIP	2.863	.060	48.016	***
LOGPER	<--	RLF	3.681	.041	89.798	***
LOGPER	<--	DOT	4.121	.045	90.757	***
LOGPER	<--	DHR	4.077	.046	88.299	***
LOGPER	<--	LPF	3.236	.061	52.829	***
LOGPER	<--	PSC	3.243	.051	63.146	***
LOGPER	<--	ACR	4.147	.044	93.225	***

***- Significant at 1% level

The above table discloses that the regression coefficient of the exogenous variables. It is concluded that the critical ratio of all the manifest variables are above the table value 2.962 and it is significant at 1 percent level for measuring the supply chain management performance of select small and medium auto ancillary units in Coimbatore district.

Table 4 indicates that the model fit indices of the variables. The entire test has the range of 0 to 1. The comparative fit index (CFI) scored 0.822, normed fit index (NFI) scored 0.715, relative fit index (RFI) scored 0.877, incremental fit index (IFI)

Table 4
Model Fit Indices

<i>S.No</i>	<i>Model Fit Indices</i>	<i>Calculated Value</i>	<i>Acceptable Threshold Levels</i>
1	Comparative Fit Index(CFI)	0.822	0-1
2	Normed Fit Index (NFI)	0.715	0-1
3	Relative Fit Index (RFI)	0.877	0-1
4	Incremental Fit Index (IFI)	0.829	0-1
5	Parsimonious Normed Fit Index (PNFI)	0.733	0-1
6	Parsimony Comparative Fit Index (PCFI)	0.872	0-1
7	Tucker Lewis Index (TLI)	0.789	0-1
8	Root Mean Squared Error of Approximation (RMSEA)	0.03	0.05 or less would indicate a close fit of the model

scored 0.829, parsimonious normed fit Index (PNFI) scored 0.733, parsimony comparative fit index (PCFI) scored 0.872, Tucker Lewis index (TLI) scored 0.789, and the Root Mean Squared Error of Approximation (RMSEA) secured 0.03 that indicates a close fit of the model.

RESULTS AND DISCUSSIONS

In the present study, all the measured variables are influenced with the latent variable of successful operation for measuring the supply chain management performance of select small and medium auto ancillary units in Coimbatore district and also positive relationship with the significance at 1 percent and 5 percent level. Further, the innovation of technology has a lower impact on the SCM performance of the sample units. Hence, the companies should take some more special concentration on their application of technologies and also the supply chain management seeks to enhance competitive performance by closely integrating the internal functions within a company and effectively linking them with the external operations of suppliers, customers, and other channel members. The performance of such supply chain management can be attained through efficient linkage among various supply chain activities, and the linkage should be subject to the effective construction and utilization of various supply chain practices for an integrated supply chain. This means that a firm that is pursuing the effective construction of SCM practices needs to pay attention to SC integration. SCM practices implemented to achieve superior supply chain performance require internal cross-functional integration within a firm and external integration with suppliers or customers to be successful.

CONCLUSION

The process of choosing appropriate supply chain performance measures is difficult due to the complexity of these systems. This research presents the performance

measures used in supply chain models and also presents a framework for the selection of performance measurement systems for the sample units. Further research can be carried out by using a specific case to integrate supply chain strategy with Business strategy. Business to Business transaction in India is at an infant stage. Some detailed study can be carried out in this area. Finally, research could also focus on establishing actual performance development in supply chain management reflecting in cost-saving and customer satisfaction effects.

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