

# Supply Chain Performance: A Meta Analytical Approach and its Future Prospects

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## Abstract

Primary purpose of this paper is to develop a context-dependent, multi-perspective and multilevel concept called 'supply chain performance'; second to classify literature available on supply chain performance. The field related to performance among supply chain partners has historically been collected through studies in micro- functional areas. While some effort towards producing a broader organizational perspective has been made, nonetheless, performance in SCM continues to be largely eclectic with little consensus on its conceptualization and research methodological bases. A number of key findings emerged: consensus is lacking on the definition of the term; research on supply chain performance emphasizes to focus on financial goals and negligible attention is given to non-financial parameters, such as, customer satisfaction, responsiveness of the supply chain and competitive advantages. Lack of theories related to competitive aspect of SCP is also found. This review paper has attempted to identify various conceptual and research methodological aspects of supply chain performance along with its classification and various systems followed for the evaluation of performance among partners. This review may be one of the first to develop a context for multi-perspective multilevel concept called performance among supply chain members in Indian context.

**Keywords**-Supply chain management, Supply chain performance, Literature, Research

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## Introduction

In today's highly global environment having a smooth managed supply chain network is an achievement. Today the environment is just not about the internal decisions and actions, competition is between supply chains and not individual organizations. Considering financial and non-financial factors, performance measurement of the supply chain is required. The performance measurement enables managers to reveal progress, drive motivation and communication while diagnosing problems to monitor performance. Performance measurement also provides an insight to potential opportunities available; identify success and effectiveness of the strategies. Performance measurement is a process to quantify the efficiency and effectiveness of any action. The extent to which a customer's requirements are met is effectiveness and to measure how economically a firm's resources are utilized when providing a pre satisfied level of customer satisfaction is efficiency (Neely, Platts, Gregory, 1995). The key to measure supply chain performance is not just by studying those areas that are under performing but also analyzing all the aspects which are aligned with supply chain strategy. Companies looking to excel in the market place more or less realize the importance of supply chain performance. Supply chain performance is associated with goals, measures, measurement methods that specify procedures,

responsibilities and accountability of supply chain participants. The role of performance measurement in an organization's functioning has started gaining importance; still there are many firms which do not have enough insights and strategies dealing its measurement. Organizations have shifted to supply chain management software to measure performance related to supply chain, but still tools need to be developed to measure the developments obtained from these software's. Measuring supply chain performance is very critical to know whether an organization has improved or degraded in its efforts to bring profitability for the business.

The objective of this paper is to develop a context-dependent, multi-perspective and multilevel concept called 'supply chain performance'. To know what exactly supply chain performance is and to classify literature available on supply chain performance and finally to propose areas for future research. In totality the paper contributes to performance measurement frameworks and metrics involved

## Classification Of Literature

The reported literature may be classified as per the various systems followed to measure performance among supply chain partners. Some of the systems followed for performance measurement, reported in literature are as follows:

Table No: 1

<b>Sr. No.</b>	<b>Name of the Author</b>	<b>Title of Paper/Journal</b>	<b>Issue addressed in the Paper</b>	<b>Pending Issues/ Untouched Issue in the Paper/Future Scope</b>
1	Ramaa A (2015)	Design and Development of Performance Measurement System for Supply Chain	The Empirical study addresses the various aspects of performance measurement system of supply chain of medium sized supply chain industry of India. Indian Manufacturing industries give prime importance to quality, cost and time as compared to other factors.	Study restricted to medium sized manufacturing units. Further different models can be applied to measure performance of supply chain
2	Rajwinder Singh (2014)	Modeling Supply chain performance	The paper is concerned with retail industry and factors affecting its supply chain. Supply chain indicators have also been focused. Gap analyses done to construct a model for supply chain performance	Paper focused only on Organized retailer and macro aspects. In future study can be broadly done concentrating on micro aspects and also considering both Organized and Unorganized retailers
3	Hamid Kazemkhanlou (2014)	Study of Performance Measurement Practices in Supply Chain Management	The Paper analyzes various models used to assess supply chains by highlighting their specific characteristics and applicability in different contexts. It also offers an analytical grid breaking these models down into seven layers. This grid will help managers evolve towards a model that is more suitable for their needs.	There is a need to reliably and accurately measure activities in which the flow of material, information and cash, through transformation processes, to finished product.

4	Latha Shanker (2014)	Performance evaluation and optimum scheduling of goods in multi echelon supply chain networks	This research aims to develop different models to evaluate supply chain networks and also focus to measure the effectiveness of the model	Model Can be further developed for practical implementation.
5	C.Ganeshkumar (2014)	A Study on the Relationship among Supply Chain Management Components, Supply Chain Performance and Organizational Performance of Manufacturing Industries in Union Territory of Puducherry	The paper Addresses Supply chain concerns, supply chain competence, supply chain practice, supply chain performance and organizational performance of manufacturing undertakings in the Union Territory of Puducherry. Use of statistical techniques done to analyze the data	Conducted at macro level ignoring micro aspects of individual organizations  Results based only on manufacturing industry
6	Jacob Pratabaraj S (2014)	Supply chain performance in textile industry	The Empirical analysis done on performance metrics and measurements in a supply chain in textile industry. Quality, flexibility , dependability and innovation derived as performance metrics	Performance metrics can be cross examined with customer expectations across different income groups which may also impact supply chain performance
7	Amit Kumar Marwah (2014)	Determinants of Supply Chain Performance of Indian manufacturing Organizations	Stresses on the need of an exhaustive model to assess the supply chain performance. Framework develops model basis independent and dependent variables .	The scope of this paper is limited only to manufacturing organizations , further could be extended to other industries as well.
8	Gandhi Archana (2013)	Merchandisers Performance in Improving Supply Chain Competitiveness of Apparel Export Units	The paper targets merchandiser's impact on supply chain performance. Analysis done through factor and correlation analysis. Further reveals the importance of supply chain parameters on merchandising	Sample restricted to NCR region for apparel industry which may be further taken across. Study is not applicable for organizations with turnover below Rs20 Crores

9	Madhusudhana Rao c (2013)	Integration of supply chain elements and supply chain performance measurement	The Paper addresses the need for organizations and their supply chain partners to work together in synergy to gain competitive advantage and develops mathematical models to measure supply chain performance	More input required on data to get more insights on cost based performance improvement. Models can be further developed for benchmarking through learning index
10	Sarode Avinash d (2012)	Effect of logistical operation relationship on the performance of supply chain management	Analytical tool developed to address mechanism of performance measurement of supply chain. Different links of supply chain recognized.	Paper focusses only on domestic appliances and automobile industry. Real life practicalities ignored and not worked on to test the tool.
11	Madhu Bala (2011)	Supply Chain Performance attributes for the fast moving consumer goods industry	This Paper identifies the supply chain performance attributes relevant to the FMCG industry. Compares three supply chain operational models considering SCOR to be best suited for FMCG industry	The scope of the paper is limited only to FMCG industry. Only three operational supply chain models studied : REA, SCOR & BSC
12	Richard Cuthbertson (2011)	Performance measurement systems in supply chains: A framework for contextual analysis	The paper demonstrates an approach for analyzing existing supply chain performance measurement systems that can be applied across different supply chains and sectors. This will create an opportunity to use a consistent data collection process across a variety of supply chain situations and thus generate data for further theory development.	

13	Heim G. R., Peng D. X., (2010)	The impact of information technology use on plant structure, practices, and performance: An exploratory study. <i>Journal of Operations Management</i> , 28, 144–162.	This study examines the impact of IT use on the structure, practices, and performance of manufacturing plants.	Future research should develop more refined measures of dynamic intelligence variables and retest the research propositions. It would also be very interesting if researchers having time-series panel data on these inputs and outcomes could perform a related analysis. Another direction for future research is to examine the extent to which process, integration, and collaboration intelligence drive performance in other production domains, particularly service operations.
14	MerSchmann Ulf, Thonemann Ulrich W., (2010)	Supply Chain flexibility, Uncertainty and firm performance: An empirical analysis of German manufacturing firms. <i>Int. J. Production Economics</i>	Uncertainty leads to flexibility in Supply Chains. Flexibility is desirable but it has a cost to it. Paper address the issue regarding the matching of uncertainty & level of flexibility required. It also addressed the firm performance with respect to uncertainty & flexibility.	Study lacks in mixed mode survey. Results may be generalized by conducting research at some other place. Same measures may be used for flexibility and uncertainty which is otherwise used differently in current research.
15	Li G., Yang H., Sun L., Sohal A.S., (2009).	The impact of IT implementation on supply chain integration and performance. <i>Int. J. Production Economics</i> , 120, 125–138	This study aims to investigate the relationship among three factors: IT implementation, supply chain integration (SCI), and SCP. It presents a conceptual structure model in which IT implementation can affect SCP either directly or indirectly, via SCI. Data collected from 182 Chinese companies are analyzed using structural equation modeling.	This study did not classify the various supply chains in the samples, as has been proposed by various authors, who suggested that supply chains could be categorized into efficient supply chains and responsive supply chains, and that supply chains facing different environmental dynamism should use different supply chain practices.

16	Mario Sacomano Nato (2009)	Performance measurement in the supply chains: A study in the automotive industry	The Paper addresses performance measurement systems, Supply chain performance measurement. Evaluates suppliers and dealers by drawing importance of strategy performance with interference of customer satisfaction in the supply chain process.	Role of Information sharing can be studied to a wider extent and can make impact on supply chain performance
17	R Bhagwat (2007)	Performance measurement of supply chain management using the analytical hierarchy process	This Paper develops a survey methodology to measure performance of the organizations for its success and competitiveness, demonstration of this methodology in real life problem is also presented	
18	Bared M., Sapir D. E., (2003)	Flexibility in logistics systems-modeling and performance evaluation  Int. J. Production Economics 85,155-170	Research works has utilized the rich manufacturing oriented literature and decision making flexibility literature for building flexibility types pertinent as design factor in a logistic system. It also has quantitatively analyzed the effect of such a factor, namely trans routing flexibility, on logistics dependability, a new performance measure of a logistic system, as suggested in this paper.	Paper did not consider any economic aspects of the problem.

19	Martinez Angel, Perez Manuela Perez	Supply chain flexibility and firm performance A conceptual model and empirical study in the automotive industry.	Paper has addressed two issues first, quantitatively analyze the relationships between supply chain flexibility and firm performance, secondly quantitatively analyze the impact of some supply chain characteristics on flexibility performance: Results contribute to a better understanding of the forces and constraints that companies face with flexibility capabilities.	Paper does not address which flexibility dimensions are the most critical responses (if any) to environmental uncertainty across industries. It also does not include basic flexibility dimensions at shop floor level such as machine N labor that can also impact on firm performance.
20	Moron D. K., Haan J. d.,	Improving supply chain performance to satisfy final customers: “Leagile” experiences of a polish distributor. Int. J. Production Economics.	The paper addresses the question: in what circumstances could companies move between lean and agile supply chain strategies?. Paper consists of three sections first the lean and agile approaches to supply chain are elaborated. Second a case study is presented on the developments in a supply chain of lifestyle exposing FMCGs in Poland, with distribution as the focal process. Finally, theory and practice are confronted in a discussion section leading to conclusions and recommendations.	

## Performance Measurement Systems

The performance indicators have a long history to look after. In 19<sup>th</sup> and 20 century, the performance indicators were in the form: the cost per yard, the cost per metric ton then the diversification and authorization have induced the reformation of performance measurement and DuPont company in year 1903 had executed the “rate of return on investment” to appraise the performance of different units and developed the “DuPont system scale” which was used widely. This happened to be the way evolution of performance measurement. Several studies highlight the need for the right type of performance measures and performance measurement system in the supply chain. The paper presents some of the systems followed till date for performance measurement:

### Function based measurement system (FBMS)

Developed by Christopher in 1995. The Model explains the detailed performance measure applicable at different linkages of supply chain, model lacks to cover the most important measure required to quantify the entire supply chain. Moreover approach of this model is easy to implement and individual departments can be targeted too. This system isolates the supply chain from the company strategy giving localized benefit that may harm the total supply chain benefits.

### Dimension based measurement system (DBMS)

Performance can be measured on dimensions. According to Benita M. Beamon there are three types of dimensions to measure performance i.e, Resources (R), Output (O), and Flexibility (F). She further advocated that these three dimensions are inter-related and all three of them must be measured in order to measure performance of supply chain.

### Supply chain operations reference model (SCOR)

Supply chain operations reference model has been developed and performed by the supply chain council and is considered to be the framework for analyzing, reviewing, assigning, categorizing the processes for comparable benchmarks of a supply chain in detail. The heart of SCOR is a pyramid of four levels plan, make, deliver & return. The operations start from suppliers and end up to customers. This model is a complete process of reengineering, benchmarking business process measurement into a cross functional framework. Reliability, responsiveness, flexibility, cost and asset are the five elements basis which performance of most processes is measured.

### Supply chain balanced scorecard (SCBS)

Kaplan and Norton (1992) introduced the supply chain

balanced score card for logistics and logistics controlling. The indicators of balanced score card must be closely associated with organizations strategic objectives so as to enhance performance of the supply chain. Supply chain balanced score card tracks a limited number of indicators. Balanced score card approach came into existence not actually for supply chain processes. To measure performance need to closely align metrics with organizational objectives and target must be clear. This scorecard basically covers four areas, i.e, Financial, customer, internal business and training.

### Hierarchical based measurement system (HBMS)

As proposed by Gunasekaran et al., (2001) metrics are classified into Strategic, Tactical and operational level in the framework of engineering supply chain performance. To bring decisions into actions these metrics are fit to the best place by the appropriate management level. This model brings together financial and non-financial aspects into which metrics are divided.

### Interface based measurement system (IBMS)

In the interface based measurement system performance measures are defined between supply chain linkages i.e, stages. The performance of supply chain in this model is measured by connecting and aligning each link with other from the point of origin to point of consumption in a view to increase value worth of shareholder (Pohlen and Lambert, 2001). Information sharing plays a vital role in interface based measurement system, as this system considers supply chain to be a series with different links and sharing of information is required at all linkages. Transparency and trust are two role playing elements in this approach, which is not possible at all levels of management.

### Perspective based measurement system (PBMS)

Perspective based measurement system is an inter functional measurement system (Parikshit Charan et al.,2007) developed by Otto and Kotzab (2002). As dimension based measurement system, perspective based measurement system also has six perspectives i.e, operations research, logistics, dynamics, marketing, organization and strategy. These are the metrics which measure performance of supply chain management.

## Conclusion

This study reveals that the area of supply chain performance is growing in importance and scope. Focus is to develop models and design a strategy to measure supply chain performance to cope up with changing business environment and enhance competitiveness of the organization. There is a shift from financial aspects to non -financial aspects in the supply chain system. This paper has made an attempt to present a review for performance measurement in supply chains. After briefly discussing the definition literature review has been presented. Paper finally discusses various systems followed to measure

performance among supply chain.

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