

An Integrated Retail Supply Chain Performance Measurement (RSCPM) Model for Indian Retail Sector

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Abstract:

Retailing is defined to include all the business activities relating to selling of goods and services to the final consumers. It is the final link in a product supply chain. In India, retailing is one of the fastest growing industries. The Indian retail industry has presently emerged as one of the most dynamic and fast paced industries as several players have started to enter the market. It accounts for over 10 per cent of the country's gross domestic product (GDP) and around eight per cent of the employment in India. The country is today the fifth largest global destination in the world for retail. The role of supply chain in Indian organized retail is very significant for on it depends the growth of this sector. In the organized retail market in India the role of supply chain is very important for the Indian customer demands at affordable prices a variety of product mix. It is the supply chain that ensures to the customer in all the various offerings that a company decide for its customers, be it cost, service, or the quickness in responding to ever changing tastes of the customer.

Successful supply-chain performance is becoming increasingly collaborative in operation the performance management process should be linked to the company's strategy; selecting metrics concretizes strategic choices (Lohman et al., 2004, Forslund, 2014). Optimal supply chain performance requires the execution of a precise set of actions and strategies. This study develops and empirically tests a conceptual Retail Supply Chain Performance Measurement (RSCPM) framework, which also provides empirical justification for a framework that identifies five key dimensions of SCM practices and describes the relationship among SCM practices, Supply chain

performance measures, and supply chain profitability. Data for the study were collected from 213 operations and supply chain heads from leading retail store outlets in India. From the results it can be mentioned that the selected measures provide a good guide for managerial decision making processes. Further, this study also provides more understanding about the supply chain management practices along with the supply chain performance measures and its effect and relationship with supply chain profitability, the association are found to be positive. Overall, this study provides additional insight into the growing field of the relationships between external internal factors, supply chain management practices, performance measures and supply chain profitability. Governance Structure in form of Contractual and Relation based alliance were used to investigate whether the relationship vary across them. It was found that among the two construct there is significant difference between the governance structures

The study shows that the overall relationship are more complex and challenging and there is enough managerial scope for taking effective decision for efficient supply chain performance once the relation are clearly understood by the practitioners.

Keywords: external internal factors, supply chain management practices, performance measures and supply chain profitability, Governance Structure.

Introduction

Retail industry is fourth largest industry in India and it contributes 10% to GDP. Supply chain management (SCM) plays an important role in retailing. Managing supply chains requires retailers to perform a delicate “balancing act” that simultaneously meets multiple needs. There exist several entities in a supply chain starting from manufacturers, transportation, distribution, wholesale, retail, and end customers. At each and every junction the supply chain partners expect timely, reliable and quality delivery of the right amount of products at low cost (Mandal, 2012). Recent literature has explored few supply chain practices in India (Sahay and Mohan, 2003), barriers to efficiency in supply chain (Sahay et al., 2003), channel support activities in the industrial and consumer goods manufacturing sector (Paswan, 2003), and the importance of relational norms in business exchanges (Singh et al., 2006; Varman and Costa, 2009). Most of these studies focus on industrial organizations, small and medium-sized enterprises (SMEs) or traditional Indian retail formats (Dabas et al, 2012). Despite increasing global interest in Indian

retailing, not much literature exists to provide valuable insights into integrated models or frameworks which determine the seamless union of various entities links in a supply chain in India

Evidence has shown that organizations seldom achieve the competitive advantage offered by supply chain management technique. This may be attributed to the fact that current methodologies for analyzing supply chains are not sufficiently comprehensive, particularly when it comes to understanding the complexities of SCM and SC profitability in a unified context. In addition, researchers have not comprehensively answered key questions such as what are the linkages between different dimensions of SCM and what are the linkages between the underlying dimensions of SCM and SC performance. Gap also exists in terms of understanding of the relationship between SC performance and SC profitability. This paper seeks to address these issues. This paper aims to investigate the relationships between the identified measures viz, Environmental Uncertainty (customer uncertainty, supplier uncertainty, competitor uncertainty and technology uncertainty) and corporate culture as external influencing factors and Technology drivers as internal influencing factors on Supply chain management practices, Supply chain performance measures and Supply chain profitability using partial structural equation modelling (SEM).

Literature Review

Designing and managing supply chain is a complex managerial challenge in today's competitive business environment. Globalization, deregulation, more demanding customers, and the advances in information technology all contribute to this complexity and at extremities of various uncertainties which are difficult to predict for example environmental uncertainty, changing technologies and to add, the corporate culture of Indian industries.

In retail, Supply chain performance directly affects quality, customer lead times, inventory levels, and delivery time and the supply chain management has a direct impact on company bottom line. Understanding the very latest systems, practices and world class performance in supply chain management is a key component in evaluating organization's performance.

To better understand the antecedences and consequences of SCM, six constructs have been identified through a comprehensive literature review. The same are briefly discussed below;

ENVIRONMENTAL UNCERTAINTY

The inability to accurately perceive something about the external environment because of difficulties in anticipating and assimilating environmental conditions (Dwyer and Welsh, 1985, Wang and Fang, 2012). This construct is identified as the external force for SCM practice.

CORPORATE CULTURE

SCM theory points to the necessity for top management support (Gold et al., 2010), the installation of cross functional teams (Chen and Paulraj, 2004), enhanced communication and the pursuit of win-win situations for all included partners (Seuring and Müller, 2008). Top Management Support, being described as a strategic orientation, is necessary in all organizations involved in the SC (Beske, 2012). This constructs is identified as the internal force for SCM practice.

TECHNOLOGY DRIVERS

Information technology (IT) has emerged as one of the most popular categories of technological innovation being implemented in the supply chain (Russell and Hoag, 2004). Indeed, IT is purported to be one of the most managerially-relevant research topics in extant supply chain management (SCM) literature (Thomas et al, 2011, Hazen and Byrd, 2012). Mendelson (2000) found evidence of the contingency effect of ICT on the relationship between information-intensive architectures and improved performance. ICT are used to facilitate SCM practice (Chavez et al, 2012).

SCM PRACTICE (SCMP)

SCM practices have been defined as the set of activities undertaken in an organization to promote effective management of its supply chain. Donlon (1996) describes the latest evolution of SCM practices, which includes supplier partnership, outsourcing, cycle time compression, and continuous process flow, and information technology sharing.

SC PERFORMANCE MEASURES (SCPM)

Performance indicates the overall efficiency and effectiveness of SCM. The first universal performance measures that were used in supply chain performance measurement were generated by Pittiglio, Rabin, Todd and McGrath, widely known as PRTM (Wong et al., 2008). Interest in performance measurement and management has notably increased in the last 20 years (Taticchi,

2008, Gopal and Thakkar, 2012). Nine major dimensions of SC performance are proposed based on the studies which encompass three types of performance measurement as suggested by Beamon (1999): Relationship measures (Supplier Performance (output measure), Partnership quality) and Traditional measures (Efficiency, Quality, Supply Chain Flexibility (flexibility measure), Supply Chain Integration (resource measure), Product innovation, Customer Responsiveness (output measure), Supplier Responsiveness, Market performance and SC Integration.

SC PROFITABILITY

SC profitability is a continuous and flexible process that involves managers and those whom they manage acting as partners within a framework that sets out how they can best work together to achieve the required results (Armstrong, 2006, Agha et al, 2012). SC profitability is the end result of activities; it includes the actual outcomes of the strategic management process or how well an organization fulfils its market and financial goals.

Research Methodology

This research methodology adopted for this work was completed in three phases. In phase 1, review of literature was done. Keeping in mind the key findings as emerged from the review of literature, a conceptual framework for Retail Supply Chain Performance Measurement (RSCPM). Measures for relevant constructs and variables that were readily available in the published literature were studied in detail. For measuring the Environmental Uncertainty (EU), Corporate Culture (CC), Technology Drivers (TD), SCM Practice (SCMP), SC Performance Measures (SCPM) and SC Profitability (SCP) already available Likert scales were adapted in consultation with the industry and academics experts. Few new variables were added and some deleted based on the consultation with the experts keeping in mind the relevance to the Indian retail sector. Phase II of the study was focused on establishing the reliability and validity of the measures used in the study. A pilot study was conducted on 162 operational and supply executives. Cronbach alpha and Confirmatory Factor Analysis (CFA) were used to test the statistical fit and finalize the list of measures. In Phase III a final survey was conducted on 213 operational and supply chain heads dealing with the retail supply chain management.

Table 1: Hypothesis Development

Hypothesis	Authors
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1 (a)	Higher level of environmental uncertainty, leads to higher the level of SCM practice.	Dess and Beard, 1984; Krishnan et al., 2006, Moorman and Miner, 1997, Wang and Fang, 2012, Lester and Parnell, 2007, Starbuck, 1976, Parnell et al, 2012.
1 (b)	Corporate culture support for SCM, leads to the higher the level of SCM practice.	Li and Lin, 2006, Wu et al., 2004; Li and Lin, 2006
1 (c)	The higher the usage of ITC tools, the higher the level of SCM practice.	Bharadwaj, 2000, Mohammadi et al, 2012
2	The higher the level of SCM practice, leads to the higher the level of SCM performance.	Simchi et al., 2003, Li et al., 2005, Salhieh, 2011, Cuthbertson and Piotrowicz, 2008, Singh et al, 2010
3	The higher the level of SCM practice, the higher the level of SC Profitability	Narasimhan et al, 1998, Prasad, 2000, Tan et al, 1998, Stuart, 1997, Carr and Person, 1999, Stanley and Wisner, 2001, Lamming, 1996, Stuart, 1993, Vickery et al. 2003
4	Higher level of SCM Performance leads to higher level of SC Profitability.	Akyuz, and Erkan, 2010; Beamon, 1999, Deshpande, 2012, Barringer and Harrison, 2000; Cousins et al., 2006; Lamming et al., 2013; Prahinski and Benton, 2013, Cadden et al, 2013

Subsequently Structural Equation Modeling (SEM) was used to analyze the data and test the hypotheses covered in the proposed Integrated Retail Supply Chain Performance Measurement (RSCPM) model. All the analysis and validation were performed using the software SPSS – 21 and AMOS – 21.

Result and Findings

Structural Equation Modelling (SEM) was used to test the relationship between the all the constructs at $\alpha = 0.05$, Table 2 presents the regression weights for the various relationships. The relationships were found to be highly significant across all the selected constructs.

Table 2: Regression Weights: (All Constructs)

		Estimate	S.E.	C.R.	Regression Weights	P
SCMP	ENVIRON	.102	.046	2.236	.150	***
SCMP	CC	.017	.031	.572	.037	***
SCMP	TECHDR	.132	.026	4.974	.374	***
SCMPM	SCMP	1.233	.152	8.135	.852	***
SCMPCRP	SCMP	1.000			.575	
SCMPSSP	SCMP	3.572	.411	8.687	.794	***
SCMPIS	SCMP	2.123	.243	8.723	.799	***

SCMPIQ	SCMP	3.364	.355	9.478	.934	***
SCMPLRP	SCMP	1.237	.159	7.801	.671	***
PERTMPI	SCMPM	1.007	.090	11.222	.703	***
PERTMQ	SCMPM	.950	.082	11.532	.718	***
PERTME	SCMPM	.855	.073	11.749	.728	***
PERRTC	SCMPM	.830	.068	12.174	.748	***
SCP	SCMP	.469	.115	4.064	.347	***
SCP	SCMPM	.563	.079	7.148	.602	***
PERSCF	SCMPM	.862	.075	11.500	.716	***
PERSCI	SCMPM	.814	.079	10.241	.654	***
PERTMMP	SCMPM	1.240	.127	9.749	.628	***
PERRMPQ	SCMPM	1.000			.812	

The above table shows the significant relationships between the selected items on the constructs and across the constructs. It is seen that the relationship between the all constructs is found be significant at ($\alpha=0.05$). The SEM path diagrams for the correlations between all the constructs are shown in figure 1.

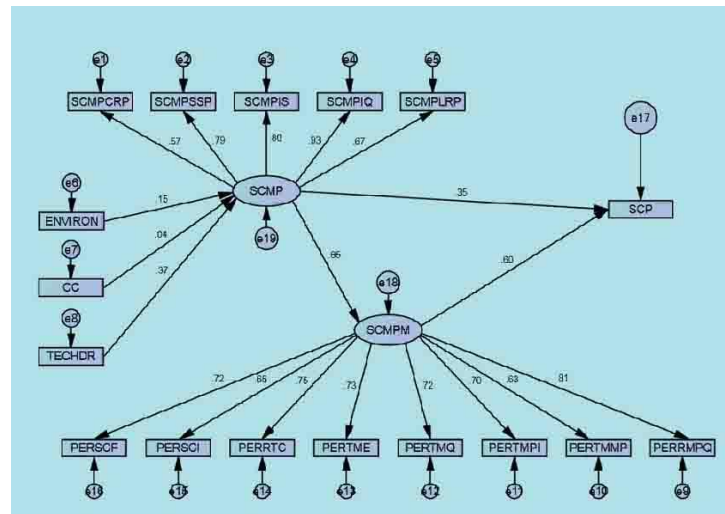


Figure 1: Structural equation model

It is found that the model fit is satisfactory though the cut off values are relatively low based on meeting the above standards used by the researchers for SEM, still the model is accepted as good model with CFI = 0.989, GFI = 0.993, RMR = 0.061, Cmin/Df = 5.279. The significant relationships between the various constructs and the items used for defining the constructs can be found from the table given above.

The findings for the structural equation model are presented in table the result indicate that there is significant relationship between all the identified constructs. The structural model shown

above has four hypothesized relationship among the constructs external, internal factors (EU, CC, TD), Supply chain practices (SCMP), Supply chain performance measurement (SCPM) and Supply chain profitability (SCP). The loading for SCMP has EU = 0.15, CC = 0.04 and TD = 0.37 from the loading it was seen that corporate culture was having lowest loading on SCMP it's clearly evident that corporate culture support is imminent for the higher level of SCM practice within and across the SC units. However Indian corporate support seems to be less considerate in this context.

On the other hand there is strongest influence of Supply chain practices (SCMP), Supply chain performance measures (SCPM), the loading factor SCPM = 0.85 which is a reinforcement that the best supply chain practices are the initiatives that influence the whole supply chain, its parts or key processes (Cuthbertson and Piotrowicz, 2008, Singh et al, 2010) which also influence the supply chain performance. But when compared with Supply chain profitability (SCP) the load value was relatively low = 0.35, from which it can be concluded that though Supply chain practices (SCMP) has effect on Supply chain profitability (SCP) but it does not strongly linked with the Supply chain profitability (SCP).

Finally the role of Supply chain performance measures (SCPM) on Supply chain profitability (SCP) was found influencing strongly with loading value = 0.60, the various identified constructs for Supply chain performance measurement (SCPM) show positive significance which leads to improved organization performance.

Conclusion

This paper provides empirical justification for a framework that identifies five key dimensions of SCM practices and describes the relationship among SCM practices, Supply chain performance measures, and supply chain profitably. It examined three research questions: (1) do organizations with high levels of SCM practices have high levels of Supply chain performance measures; (2) do organizations with high level of SCM practices have high levels of Supply chain performance measures; (3) do organizations with high levels Supply chain performance measures have a high level of supply chain profitably?

From the results it can be mentioned that the selected measures provide a good guide to managerial decision making processes. Further, this paper also provides more understanding

about the supply chain management practices along with the supply chain performance measures and its effect and relationship with supply chain profitability, the association are positive among them. Overall, this paper provided additional insight into the growing field of the relationships between external internal factors, supply chain management practices, performance measures and supply chain profitability. Clearly, the field has ample space to grow in terms of research and practice

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