Analysis of Indian retail demand chain using total interpretive modeling

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Abstract

Purpose – The study aims to present demand chain management (DCM) modeling of Indian apparel retailers. This will result in a structured model presenting contextual interrelationship among DCM variables so that retailers can proactively manage their demand chain.

Design/methodology/approach – The research follows an exploratory research design. It initially involves identification and analysis of influential factors of the implementation of DCM practices through the review of literature. Then, these variables were analyzed using total interpretive structural modeling or TISM followed by a statistical verification and case-based validation of the model.

Findings – The major findings of the paper are: top-management commitment and support, information management and supply chain agility in supply chain are the most significant enablers with the highest driving power. The other apparel retail specific significant variables are assortment planning, category management and marketing orientation. The model also indicates that the firms that implement customer-centric DCM practices do well in terms of organizational performance and thereby achieve differential advantage over their competitors.

Research limitations/implications – Because the literature on DCM is still in nascent stage, the study bases itself on interpretive method; that is, TISM of analysis with a limited number of experts. Future studies may consider larger sample with more advanced statistical tools such as structural equation modeling for further validation of the findings.

Originality/value – The novelty of the paper lies in the study of an emerging supply chain philosophy; that is, DCM and its key practices *per se*. It has rarely been studied from the theory building perspective hitherto. Moreover, TISM-based approach is applied for the first time to study the DCM practices and its drivers *vis-à-vis* dependents.

Keywords Modeling, Supply chain management, TISM, Fuzzy MICMAC, Apparel retailing, Demand chain management (DCM)

Paper type Research paper

1. Introduction

During the 1980s and 90s of the last century, supply chain management (SCM) emerged as a powerful source of competitive advantage (De Treville *et al.*, 2004) as Christopher and Ryals (2014) and Santos and D'Antone (2014) posited that in the business arena, it is the supply chains that compete, not the firms. Sensing the vitality of the SC functions, companies began reorganizing logistics and purchasing functions into SCM organizations across different

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industry verticals including apparel retailing (Venkatesh *et al.*, 2015). Business models based on such philosophy emphasized on cost reduction and efficiency enhancement to reward customers with reduced prices. This notion led the organizations to assume that to be efficient, supplying what customer needs at reduced prices is the ultimate goal of organization (Walters and Rainbird, 2004). The paragons of SC-efficiency-led model as business strategy have been widely cited across the globe as cited in the works of Walters and Rainbird (2004), Mohan and Deshmukh (2013) and Deshmukh and Mohan (2016). Waller (1998) conducted case studies about Woolworths and Coles in Australia, Marks & Spencer and Sainsbury in the UK and McDonald's and Wal-Mart in the USA as having achieved everyday low prices based on SC efficiency strategies. Despite attaining excellence in supplying, some of them confronted competitive challenges during early 2000s. As reported by Shoebridge (2003), customers are demanding relevant menu variety and menu solutions at McDonald's rather than promotional products. Therefore, Walters and Rainbird (2004) asserted that the problems arose not because companies mismanaged the operational effectiveness, but rather they missed the shift in customer expectations. Therefore, they suggested that supply chains are not necessarily any better today than they were when the concept of SCM evolved 20 years ago.

SCM excels at moving products toward end user efficiently; however, Langabeer and Rose (2002), Soliman and Youssef (2001) and, Wen and Song (2015) maintained that such efficiency has gradually become the necessary condition but not sufficient to ensure enhancement in the company's competitive position because competitors can saturate the market with lower-cost substitutes under any price war based on cost reduction and efficiency. As a result, several markets are becoming commoditized with the prices being driven down and thus the cost and margins. It clearly reflects that mere overarching efficiency can not ensure the sustainable value delivery to consumer. The managers should grasp that it is not the trade-off between the efficiency and effectiveness but the strategic fit of the two with customer focus can bring about positive change.

With the advent of customer-centric corporate philosophy, the quintessence of the shift in functional philosophy has become a mandate for the organizations willing to ensure their long-term sustenance and fostering growth. The customer-facing functions such as marketing and SCM underwent a radical philosophical transition and thereby, it has been overemphasized that these functions should be integrated to reap the benefits of synergy (Jüttner *et al.*, 2003, 2007; Walters and Rainbird, 2004, 2007). Such complementary integration of marketing and SC led to creation of a new corporate philosophy of demand chain management (Agrawal, 2012; Santos and D'Antone, 2014), which synthesizes the demand creation aspect of marketing with the demand fulfillment facet of supply chain. In recent past, demand chain management (DCM) has gained similar consideration as SCM with a focus on strategy development (Francis, 2008). The scope of DCM is broader as compared to SCM because of its ability to sense real-time customer demand and ability to develop an offering to meet market needs (Canever *et al.*, 2008; Agrawal, 2012; Deshmukh and Mohan, 2012, 2016; Santos and D'Antone, 2014).

In spite of the overarching importance associated with the DCM, retailers in India still seem to emphasize the efficiency of their supply chains. Such an efficiency-led business model pushed retailers to excessively focus on the costs which in turn, resulted in their reluctance to invest in consumer intelligence, inadequate use of Point-of-Sale (POS) data, no knowledge about back orders and missed sales, lack of integration between the channel partners to point a few (Stockert, 2004; Jacobs, 2006). This cripples their ability to harvest the benefits of synergizing the capabilities of marketing and supply chain to enhance the performance and customer lifetime value (Madhani, 2015). Also, the literature on the DCM is

highly theoretical and elusive in this context (Hilletofth, 2011; Santos and D'Antone, 2014). Hence, the present study aims to identify the key enablers or drivers of DCM which are necessary for its implementation and to explore the contextual interrelationship between them.

In order to analyze these variables in the parlance of finding contextual interrelationship among them, total interpretive structural modeling (TISM) is being used. The classification of the variables according to their position on driving and dependence power is done using Matrices' Impacts Cruises Multiplication Applique a un Classement (MICMAC) and fuzzy logic is applied to get a precise approximation in the analysis. Thus, the study follows a notion that each variable is associated with multiple ones in such a fashion that it either drives the other or is dependent on other variables. The focal point agenda of the study is to analyze, model and present various DCM practices for a two-pronged objective, one is to contribute to the existing body of knowledge and the other is for apparel retailers so that they can develop appropriate strategies to enhance organizational performance keeping the efficiency and effectiveness of retail supply chain intact.

The paper has been structured into five sections including the introduction. The next section presents review of literature on DCM and Indian apparel retailing followed by research methodology which covers TISM model building and fuzzy MICMAC analysis. It concludes with managerial implication and scope for future research.

2. Review of literature

2.1 Demand chain management

DCM has evolved from the SCM literature, and it has been argued that it is a broader concept than SCM. The broadness of the DCM concept emanates from the synthesis of demand fulfillment and demand creation aspects of SC and marketing, respectively (Hilletofth and Ericsson, 2007; Rainbird, 2004; Heikkilä, 2002; Wen and Song, 2015). In other words, DCM focuses on sensing the real-time customers' response followed by rapid respond to it (Agrawal, 2012; Agrawal *et al.*, 2010; Ericsson, 2011a, 2011b; Deshmukh and Mohan, 2016). Some scholars posited it as a mechanism to understand the customer's demand and the transformation of that understanding into actionable strategies and plans for the whole group of firms involved in the chain (Langabeer and Rose, 2002 and Wen and Song, 2015). In this context, DCM is viewed as an integrative function of SC and marketing (Jüttner *et al.*, 2007) which can be explained with the following three sub-functional processes:

(1) managing the integration between demand and supply processes;

(2) managing the structure between the integrated processes and customer segments; and

(3) managing the working relationships between marketing and supply chain management.

Thus, the literature clearly lacks *modus operandi* for the integration of these processes for enhancing responsiveness of business (Rainbird, 2004).

The extant body of literature on DCM delineates that a number of studies were conducted to understand the DCM concept and its application in different industries using qualitative methods such as case study, but very few suggested a comprehensible framework for quantitative inquiry. It was also asserted by Hilletofth (2011) that DCM researches have been highly conceptual and unclear on the core aspect of alignment between the supply and demand chains. The literature uses varied terms and partial definitions to represent this idea. For instance, Christopher and Ryals (2014) argued DCM to be an integrative function linking "value creation" and "value delivery" processes where the former indicates the realm of

marketing whereas the later is the forte of SCM. Thus, they collectively form the competitive strategy of any business. Likewise, Rainbird (2004) proposed that an effective DCM mainly involves the "interaction" between supply and demand activities. Heikkilä (2002) opined that DCM combines the efficiency and customer satisfaction. Hilletofth (2011) suggested that DCM involves the "coordination" of demand and supply processes and argues that both types of processes should be given equal importance. Agrawal (2012) asserted that DCM hinges upon the sense and respond philosophy; that is, sensing the real-time need of consumers and rapid respond to it with agile processes. Jüttner *et al.* (2006) took a customer-oriented approach to suggest that DCM relates to the "integration" of demand-creation and demand-fulfillment processes. Yet, there is a lack of understanding concerning the organizational efforts required to implement the alignment proposed by the DCM approach (Hilletofth, 2011), especially, in relation to the internal organization of the focal firm in a network (Agrawal, 2012). For the present study, the operational definition of DCM can be referred to as "a set of internal and external processes that deal with sensing the real time customer need and rapid respond to it with enhanced supply chain".

Although the ambiguity in describing the DCM concept existed in its emerging phase as scholars were taking it up from scratch. There are a plenty of studies concerning management of various touch points between intra-firm department that performs supply and market related activities; namely, organizational demand and supply interfaces. Such interfaces were explored in the seminal work of Lawrence and Lorsch (1967). The study emphatically argued in favor of the need for departments to work together to achieve the expected performance outcomes. Since then, researchers have been exploring why two or more interfacing organizational departments should combine their efforts and how they could achieve that (Barratt and Barratt, 2011; Ellinger, 2000; Gimenez, 2006; Griffin and Hauser, 1996; Ruekert and Walker, 1987; Shapiro, 1977; Santos and D'Antone, 2014). In addition, Corsaro and Snehota (2011) confirmed that the concept of alignment is frequently associated with how individuals and work groups line up practices, interests, information, goals and behaviors.

To ensure the unequivocally well-established DCM conceptualization, which the previous literature seems to be missing, there is a need for sincere effort and commitment from the academic community and the practicing managers so as to clarify what this demand and supply chain "alignment" proposed by the DCM approach actually means and how it could be implemented. Such reflection could create the means to improve the DCM notion of alignment and contextualize it into wider academic debates (Santos and D'Antone, 2014 and Christopher and Ryals, 2014). At this pretext, following research questions can be posed to explore the knowledge on DCM and SCM interdepartmental interfaces:

RQ1. What are the key variables (drivers, enablers and outcomes) of DCM which enable integration of marketing and SC function?

RQ2. How are DCM variables interrelated with each other?

RQ3. Can these interrelationships be verified and validated?

The present study is an attempt to answer the above mentioned research questions by designing an interpretive model using a mix of multi-attribute modeling theory and statistical testing. The further extension of literature review is shown through variable identification Table I.

2.2 Indian apparel retail industry

Indian retail industry is one of the most attractive destinations in terms of employment and income generation. Globally, India is among the top ten retail destinations (EY, 2015). Retail

S. no.	DCM variables
D1	Information management
D2	Inventory management
D3	Customer service management
D4	Supplier relationship management
D5	Supply chain agility
D6	Top management commitment and support
D7	Assortment planning
D8	Category management
D9	Purchasing management
D10	Supply chain performance
D11	Differential advantage
D12	Marketing orientation

Table I.
DCM variables for total ISM

is India's one of the largest sectors, accounting for over 10 per cent of the country's GDP and around more than eight per cent of employment; however, it is still in a nascent stage (Garg, 2010). As per the market research report (PwC Report, 2015; KPMG, 2014), the retail market in India grew at a compound annual growth rate (CAGR) of 12.47 per cent during the period 2007-2012 and is expected to grow at a rate of 13.23 per cent from 2012 to 2018. This high growth trajectory is explicitly visible when the organized retail penetration is merely 2-3 per cent (Deloitte, 2013) and infrastructural bottlenecks such as SC inefficiencies and poor connectivity with few high potential sub-urban and rural areas. Yet, there is no dearth of potential as revealed by AT Kearney, the well-known international management consultancy, that recently identified India as the "second most attractive retail destination" globally from among 30 emerging markets. Having seen such prospects, Government of India has recently permitted infusion of foreign direct investment (FDI) up to 51 per cent in multi-brand retailing and 100 per cent in single brand retailing. The entry of more global apparel retailers may cause even fierce competition to the Indian retailers unless they are prepared to capture and meet the unmet needs of their shoppers. And the trends clearly indicate that most of the Indian apparel retailers lack a competitive strategy for their SCs.

Of the entire Indian retail pie, apparel retail holds the lion's share after grocery (Deloitte, 2013), comprising both organized and unorganized; however, clear estimates for the latter are difficult to find (Technopak Report, 2014). Yet, another research report revealed that by 2020 Indian apparel market is expected to reach US$ 130 bn with the major categories being mens' wear (43 per cent), women's wear (37 per cent) and kids' wear (20 per cent). As per Technopak Report (2014), the share of organized apparel retail business is US$41 bn, which is poised to grow around US$64 bn by 2018. Presently, e-tailing is emerging with rapid pace and comprises merely 5-7 per cent of apparel market though it is likely to grow at a CAGR of more than 35 per cent in coming 10 years (Market Research Report, 2012). Despite high industry attractiveness, the existing practices indicate that customers are not getting the apparel offerings of their choice as well as the way they want to have it (Stockert, 2004 ; Jacobs, 2006).

Previous researches in the Indian retail industry such as Venkatesh *et al.* (2015) and Anbanandam *et al.* (2011) confirmed that almost one-third of the Indian companies had no SC strategy. But, because of the influence of the western counterparts on the SCs, it has become clearly a visible element across the business (Anbanandam *et al.*, 2011; however, it varies from product to product and industry to industry. Emulating the best practices by their global counterparts across the world, Indian apparel retailers too have begun counting on their demand-supply chain as a strategic tool, and it has become a key agenda in the board

room discussion as part of overall business strategy and not just an operational issue. Amid this phase of emergence, some of the apparel retailers have moved a step further in making their SCs customer centric or in other words began implementing DCM practices because, the paradigm shift in the base of competition from enterprise level to the demand and supply chain level, was experienced by the practitioners (Christopher and Ryals, 2014). This way DCM can act as supplementing philosophy to existing push-based traditional SC and make the retailers attain higher performance and thereby competitive advantage (Deshmukh and Mohan, 2016; Madhani, 2015).

3. Research methodology

The study aims at identifying, determining and analyzing the core variables of demand DCM which should ideally be the focus of senior management of retail industry to accomplish higher organizational performance and differential competitive advantage through enhanced SC practices. Taking cognizance of these objectives, a group of retail experts both practitioners and academicians have been identified. The practitioners or industry experts were identified based on their experience in retail industry; that is, those who spent more than 10 years in various capacities along with professional competence. Academic experts, on the other hand, were considered for consultation based on the area or domain they teach or research. Here, their expertise related to retail management, marketing management and retail SCM teaching or research groups and the like in the institutions of high repute in India was considered important. The respondents possessed at least 10 years of teaching or research experience in the concerned subject along with the professional competence demonstrated through consultancy, research projects and publications. Based on the responses received from the experts, TISM model was constructed to reflect the contextual relationship among the variables or enablers of DCM practices implemented by the apparel retailers. In the first phase, total 18 respondents (11 from industry experts and 7 from academics) were consulted to get the responses for developing an interpretive logic knowledge base and corresponding model, and in the second phase, data were collected from 41 respondents (including the previous 18) for verifying the contextual relationship in the TISM model. As the study follows an exploratory design, the sample size was kept small for the preliminary survey at the initial stage; however, it was increased at the later stage to seek comprehensive coverage for verifying the relationship. Based on the responses received, TISM model was constructed to reflect relations among the variables of DCM practices being practiced by the apparel retailers. These variables were explored initially through a systematic review of the literature. Then, the final TISM model showing interrelationship among the drivers of DCM was constructed. The relationship between the variables was verified using one sample *t*-test. It furthered to analyze the results through the fuzzy MICMAC for classifying the variables of DCM.

3.1 Rationale and process of TISM method

The reason behind the application of interpretive structural modeling (ISM) is strongly advocated by Sushil (2012) who stated that it is a process that translates unclear and poorly articulated mental models of systems into visible, well defined models useful for many purposes. It is a structural relationship diagram which makes it easy to visualize the inter-relationship between various elements. In other words, it helps in presenting a complex system in a simplified way (Venkatesh *et al.*, 2015). It enables to make a mind map of elements which depend on one another to form a complex relationship. However, the method has some limitations which have been subsequently discussed. To overcome some of its limitation, Sushil (2012) embarked on a new approach to it which is known as TISM which is an innovative extension of ISM (Warfield, 1974). TISM is used to develop hierarchical

structure of the set of variables of interest. It deals with the interpretation of embedded objects by a systematic iterative application of graph theory. It results in the development of directed graph or digraph for the complex system among the set of variables. This is a novel qualitative multi-attribute decision modeling method that has been widely used in the field of investigation (Nasim, 2011 and Prasad and Suri, 2011). The point of distinction between traditional ISM and TISM is that the latter answers the question – "why" the relationship exists between two elements besides answering "how" in the former. The model construction is delineated stepwise in the next section. TISM helps the identification of the structure within a system. The steps involved (vide Figure 1) in the TISM methodology (Sage, 1977; Jharkharia and Shankar, 2005; Sushil, 2012; Yadav, 2014) are:

(1) *Identification of variables*: The main variables for the analysis were explored through the review of extant literature and validated through the expert (both industry and academic) consultation.

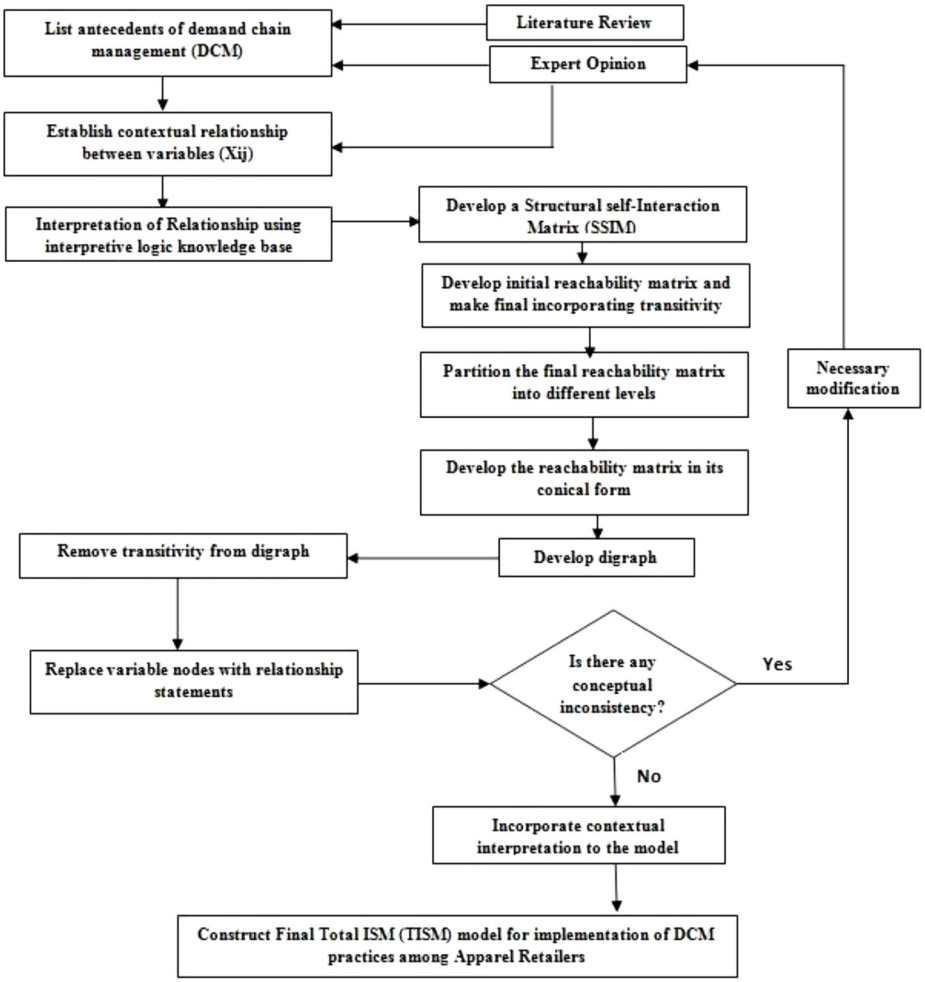

Figure 1.
Flow diagram of TISM construction

(2) *Preparation of an ISM questionnaire and response generation*: Using questionnaire as tool, the experts were further consulted to seek their responses on "leads to" type of relationship (means A is necessary or sufficient for B and so on) among the underlying variables following the notation given in step 3 where each question establishing relationship between any two variables under consideration is provided with four alternatives and the respondent experts have to opt one of them.

(3) *Establishing contextual relationship*: After collecting responses through ISM questionnaire a structural self-interaction matrix (SSIM) is prepared which also popularly known as VAXO matrix. The notations used to develop the SSIM are ut infra:

- V: DCM variable i leads to variable j;
- A: DCM variable j leads to variable I;
- X: DCM variable i leads to variable j and vice versa; and
- O: No relationship between the variables.

(4) *Interpretation of relationship*: This step gives TISM an edge over traditional ISM (Yadav, 2014), as the former seeks an interpretation of the relationships. In the context of the study, the interpretation will be "In what way factor A will influence or enhance factor B?" It will help achieve insightful understanding.

(5) *Interpretive logic of pair-wise comparison*: An "Interpretive Logic-Knowledge Base" can be generated for pair-wise comparison of the elements; the answer for each comparison may be Yes (Y) or No (N). If the answer is Y, further interpretation is necessary.

(6) *Initial reachability matrix*: Having obtained SSIM, the next step is to convert it into a binary matrix by substituting VAXO by 1 and 0 keeping the rules mentioned below into account:

- *Rule 1*: If the (i, j) entry in the SSIM is V, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry is 0.
- *Rule 2*: If the (i, j) entry in the SSIM is A, then the (i, j) entry in the reachability matrix is 0 and the (j, i) entry becomes 1.
- *Rule 3*: If the (i, j) entry in the SSIM is X, then the (i, j) entry in the reachability matrix becomes 1 and the (j, i) entry also becomes 1.
- *Rule 4*: If the (i, j) entry in the SSIM is O, then the (i, j) entry in the reachability matrix becomes 0 and the (j, i) entry also becomes 0.

(7) *Final reachability matrix*: From the initial reachability matrix, final matrix is prepared by incorporating the rules of transitivity. The transitivity of the contextual relation is a fundamental assumption in ISM. It states if X is related to Y and Y is related to Z, then X must be related to Z.

(8) *Level partition and digraph*: Using the final reachability matrix obtained in step 5 level partition is done by inspecting the driving and dependence power of the variables. Based on the partition level, a directed graph or digraph showing interrelationship among the variables is prepared.

(9) *Interaction matrix*: By translating the final digraph using 1 to indicate direct and significant transitive links a binary matrix is prepared. It is further developed as an interpretive matrix by providing the relevant interpretation from the knowledge

base. The comments of interaction matrix in relation to the TISM for the retailers is exhibited in the TISM model (vide Figure 2).

(10) *Total interpretive structural model*: To develop TISM, connective information from the digraph and the relevant information of interaction matrix are used. The nodes of the digraph are substituted by the interpretation given in the interaction matrix. The final TISM is exhibited in the Figure 2.

3.2 Variable identification

For execution of the proposed model, there were 12 key variables. Extant literature scans on DCM and its application in various contexts were conducted. The TISM questionnaires were given to the experts both from academic and practicing community to establish mutual relationship among the variables simultaneously; a semi-structured interview was also held to elicit more qualitative inputs. And, at the later stage the responses were analyzed to construct TISM-based model following the steps mentioned in the research methodology section.

The process of variables identification initiated with a thorough literature survey of approximately select 150 selected papers from the various journals available on Web of Science and Google Scholar, Science Direct, Emerald, Sage, Wiley in the area of SCM, Marketing, Retailing and Operations Management. The top journals such as *Journal of Modeling in Management (JM2), Journal of Marketing, Journal of Operations Management, Journal of Retailing, Journal of Retailing and Consumer Services, Journal of Supply Chain Management-An International Journal, and Journal of Supply Chain Management* to name a few were referred. The criterion for selection was that the papers should be related to the theories and cases containing the concept of DCM. However, most of the papers on DCM were either case based or qualitative ones and therefore, to bring more clarity on the concept, a need for quantification was felt which requires identification of DCM variables. Around 18 variables were listed and presented through a critical review of selected papers for discussion before academic experts and later only 12 variables (vide Table I) were retained based on their perceptible similarity found in literature, relevance and validity. With the responses collected from the experts about the DCM practice and their interrelationship using TISM questionnaire, and responses to a semi-structured interview by them, a summary was prepared followed by final analysis. The variables are listed in Table I and described with literature support in Table II. Precisely, these variables may be described from a research perspective.

3.3 Total interpretive structural modeling

ISM is an analytical method applied for identifying and summarizing relationship among specific variables which defines a problem or an issue (Warfield, 1974; Sage, 1977). It provides the means by which order can be imposed on the complexity of such variables (Soti *et al.*, 2010; Jharkharia and Shankar, 2005; Mandal and Deshmukh, 1994). The advanced form of ISM is TISM which provides reason behind each contextual relationship between variables (Yadav *et al.*, 2015; Yadav, 2014).

Several studies were conducted using this methodology to simplify the complex relationship among the underlying elements (Sage, 1977; Mandal and Deshmukh, 1994; Faisal *et al.*, 2006, 2007, Venkatesh *et al.*, 2015; Yadav, 2014; Yadav *et al.*, 2015). The model uses judgment from the group of experts and establishes association among them (Mandal and Deshmukh, 1994; Sharma and Bhat, 2014). Many other applications of TISM or ISM in the domains other than DCM comprised performance management in automotive manufacturing (Yadav *et al.*, 2015), risk management (Venkatesh *et al.*, 2015), telecom

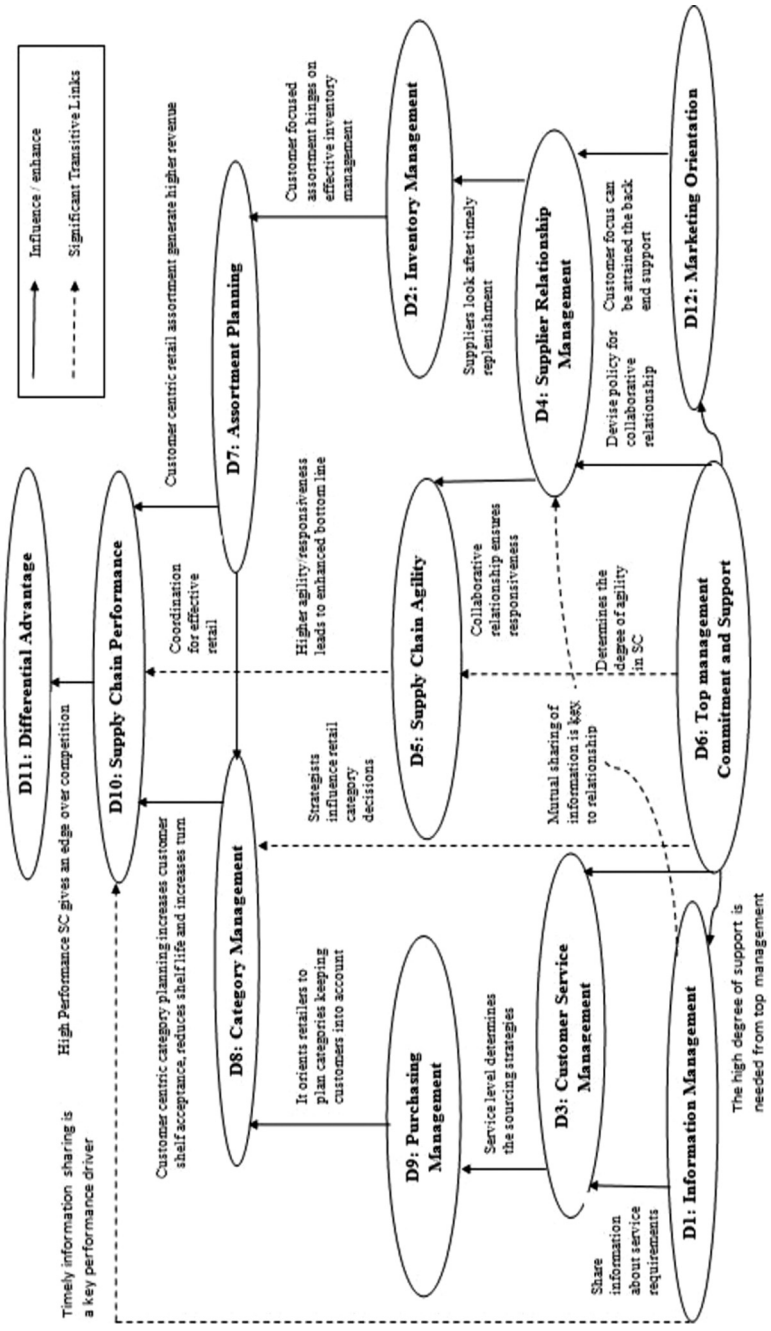

Figure 2.
Final TISM model with interpretation

Table II.
Literature review on DCM variables

S. no.	Author	Variables	Brief description
1	Chander *et al.* (2013), Langabeer and Rose (2002), Vollmann *et al.* (2000) and De Treville *et al.* (2004)	Information management	A mutually trust-based process of acquiring, sharing, analyzing and responding to demand information obtained through ICT tools and techniques
2	Jacobs (2006), Christopher and Ryals (2014), Ryals and Holt (2007), Agrawal *et al.* (2006), Agrawal (2012)	Inventory management	A tactical decision encompassing planning, classifying and controlling the flow of goods (raw, semi finished and finished)
3	Mentzer (2001), Parvatiyar and Sheth (2001), Deshmukh and Mohanty (2008)	Customer service management	A process of providing significant value-added benefits to the supply chain in the cost-effective way leading to long-term customer relations. In other words, it can be defined as an enhanced ability to provide value-added benefits to the customers in terms of fulfilling customer demand and information needs
4	Deshmukh and Mohan (2012), Agariya and Singh (2011), Parvatiyar and Sheth (2001), and Spekman *et al.* (1998)	Supplier relationship management	An interface between the focal firm and its suppliers with focus on upstream interaction
5	Deshmukh and Mohanty (2010), Mentzer (2001)	Supply chain agility	An ability of an organization to respond rapidly and efficiently to changes in customer demand both in terms of variety and volume to a volatile marketplace particularly when the conditions are not defined well in advance
6	Mentzer (2001), Charan *et al.* (2008)	Top management commitment and support	An assurance from the senior managers for the implementation of demand chain philosophy across the company operations
7	Syam and Bhatnagar (2015), Jacobs (2006), Agrawal (2012), Sinha and Uniyal (2008), Newman and Cullen (2002)	Assortment planning	A strategic process that determines the width, breadth and depth of the retail product line in the merchandise mix
8	Sinha and Uniyal (2008), Jacobs (2006), and Newman and Cullen (2002)	Category management	A process of managing categories as strategic business units (SBUs). This produces enhanced business results by achieving a robust bottom line for each category
9	Jacobs (2006), Agrawal (2012, 2003)	Purchasing management	A process involving need identification, search of suppliers/vendors, evaluation, selection and thereby placing, tracking and receipt of order of the desired products/services
10	Christopher and Ryals (2014), Wagner *et al.* (2012), and Frohlich and Westbrook (2002)	Supply chain performance	A measurement metric revealing overall effectiveness of an organization in financial, marketing and operational terms
11	Ayers and Odegaard (2006), Mohan and Deshmukh (2013), Esper *et al.* (2010),Barney (1991), and Porter (1996)	Differential/ Competitive advantage	An edge over competitors that gives a firm a favorable position in the marketplace
12	Narver and Slater (1990), Jaworski and Kohli (1993), Deshmukh and Mohan (2012), Jacobs (2006), and Selen and Soliman (2002)	Marketing orientation	An organizational culture in which all employees are committed to the continuous creation of values for customer through three behavioral components: customer orientation, competitor orientation and inter-functional coordination

(Yadav, 2014), world-class manufacturing (Haleem *et al.*, 2012), SCM (Agrawal *et al.*, 2007), product design (Lai *et al.*, 2006), vendor selection (Mandal and Deshmukh, 1994) etc. Further, studies explored contextual relationship to find out mutual association among variables that were modeled including analysis of enablers of SC agility (Sharma and Bhat, 2014), modeling critical success factors of R&D performance (Tripathy *et al.*, 2013); barriers of eco-friendly manufacturing adoption (Mittal and Sangwan, 2011 and 2014), analyzing the barriers for six sigma program implementation (Soti *et al.*, 2010), analyzing the barriers for energy saving in China (Wang *et al.*, 2008) and critical factors of enterprise resource planning (ERP) implementation (Jharkharia and Shankar, 2005).

As per the requirement of multi-attribute decision modeling, the model was constructed using the practical experience of experts from industry and in-depth knowledge base of academicians to simplify and to decompose a complicated system into several sub-systems and construct a multilevel structural model. The variables of the SSIM in this paper are the antecedents or the enablers of demand chain implementation in an organization. These variables were identified through extant literature survey and consultation with experts. Though the literature revealed numerous enablers of DCM for an organization, the study incorporated the most relevant and common across industries as recommended by the industry and academic experts. The proposed model would be generic one and can be modified in accordance with the strategic plan of the organization. Based on the responses from experts, the analysis was done to reach at preparing SSIM, which is shown in Table III to analyze the variables identified (Table I). The structural self-interaction matrix and initial reachability matrix were developed in accordance with the steps and rules discussed in TISM methodology section. The SSIM, initial reachability matrix and final reachability matrix for the model are as shown in Tables III-V respectively.

The SSIM can describe relationship between variables in following way. The DCM variable-information management (D1) leads to other variables such as inventory management (D2), supplier relationship management (D4) and assortment planning (D7) as information can be treated as the backbone of any SC. It means information management (D1) is necessary or sufficient for other variables mentioned above. In other words, an effective information sharing practice among the demand chain partners enhances the ability of an organization to efficiently manage its inventory, assortment and collaborative relationship with suppliers. It also leads to category management (D8) because managing categories in retail settings heavily relies on real-time information from both suppliers as well as customers. It further leads to marketing orientation (D12). In other words, it may be

Variables	D12	D11	D10	D9	D8	D7	D6	D5	D4	D3	D2
D1	V	V	O	O	V	V	O	O	V	A	V
D2	O	O	V	O	O	V	O	O	O	A	
D3	O	V	O	O	V	O	O	V	V		
D4	O	V	O	O	V	O	O	A			
D5	X	V	O	O	V	V	A				
D6	V	V	O	O	V	V					
D7	A	V	V	O	X						
D8	A	V	V	A							
D9	O	V	O								
D10	A	V									
D11	A										
D12											

Table III.
Structural self-interaction matrix (SSIM)

Variables	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
D1	1	1	0	1	0	0	1	1	0	0	1	1
D2	0	1	0	0	0	0	1	0	0	1	0	0
D3	1	1	1	1	1	0	0	1	0	0	1	0
D4	0	0	0	1	0	0	0	1	0	0	1	0
D5	0	0	0	1	1	0	1	1	0	0	1	1
D6	0	0	0	0	1	1	1	1	0	0	1	1
D7	0	0	0	0	0	0	1	1	0	1	1	0
D8	0	0	0	0	0	0	0	1	0	1	1	0
D9	0	0	0	0	0	0	0	1	1	0	1	0
D10	0	0	0	0	0	0	0	0	0	1	1	0
D11	0	0	0	0	0	0	0	0	0	0	1	0
D12	0	0	0	0	1	0	1	1	0	1	1	1

Table IV.
Initial reachability matrix

Variables	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12
D1	1	1	0	1	1[a]	0	1	1[a]	0	1[a]	1	1
D2	0	1	0	0	0	0	1	1[a]	0	1	1[a]	0
D3	1	1	1	1	1	0	1[a]	1	0	1[a]	1	1[a]
D4	0	0	0	1	0	0	1[a]	1	0	1[a]	1	0
D5	0	0	0	1	1	0	1	1	0	1[a]	1	1
D6	0	0	0	0	1	1	1	1	0	1[a]	1	1
D7	0	0	0	0	0	0	1	1	0	1	1	0
D8	0	0	0	0	0	0	0	1	0	1	1	0
D9	0	0	0	0	0	0	1[a]	1	1	1[a]	1	0
D10	0	0	0	0	0	0	0	0	0	1	1	0
D11	0	0	0	0	0	0	0	0	0	0	1	0
D12	0	0	0	1[a]	1	0	1	1	0	1	1	1

Table V.
Final reachability matrix

Note: [a]Shows the "obtained after incorporating the transitivity" the detailed description of about the transitivity is given on pg. 8/point 7

described that better information exchange among various departments, knowledge about customers and understanding about the competitors gives retailers an edge and such business is said to be customer centric in true sense. However, customer service management (D3) leads to it because of the customer interface it has to undergo, which gives feedback to electronic data processing or information technology division about market conditions in a retail firm.

Similarly, inventory management (D2) leads to assortment planning (D7) which implies that the retail merchandise mix that covers width and depth, is influenced by the inventory management practices by retailers. This also leads to the SC performance (D10) which indicates the strategic role of inventory for apparel retailers. Because of the short life cycle of fashion merchandise both excess and shortage affect the SC performance severely. However, to ensure higher customer service levels (D3), retailers have to keep higher levels of inventory which demands a trade-off between the various inventory costs such as ordering cost, carrying costs etc. Likewise, inventory levels (D2) can be managed well if the firm maintains collaborative relationship with its suppliers (D4). The other variables also showed similar relationship which may be inferred using the VAXO notation in the ISM methodology rules. The next step after this was to develop reachability matrix following the rules given in the

methodology section. After obtaining the initial reachability matrix, it was further converted to the final reachability matrix following the rule of transitivity.

The next step was to transform the final reachability matrix to the canonical matrix format by arranging the elements according to their levels. The levels were assigned in Table VI. As per the methodological requirements, the levels were assigned in such a fashion that the variable with lowest driving power was assigned level I and likewise variable with highest driving power was assigned last level. The variables with equal driving or dependence were assigned same level. The levels assigned help to draw digraphs and eventually the TISM model. Based on the six levels derived in the Table VI, a structural model was developed. A relationship between two variables (of DCM) is shown by an arrow which points from a higher level variable to a lower level variable. The variables with higher driving power are known as higher-level variables whereas the variables with lower driving power but high on dependence are called lower-level variables. The model depicts that the higher-level variable leads to the lower-level variables. In other words, lower-level variables are at upper end in the TISM hierarchy for instance differential advantage and SC performance and are driven by the higher-level variables such as top-management commitment and support, information management, etc. The TISM model for the interrelationships between the DCM variables is shown in Figure 2.

The TISM makes use of SSIM to define the relationship among DCM variables. The initial reachability matrix was binary matrix with 0 and 1. Where "1" denotes a relationship between the two variables and a "0" denotes no relationship. It implies that only extreme level of relationships or dichotomous relationship between variables was considered. To ensure a higher level of precision to denote strength of relationship between any two variables, the gray area between 0 and 1 has to be considered. Therefore, based on the driving and dependence power of the DCM variables, they were analyzed using fuzzy MICMAC analysis. For this purpose, a fuzzy direct relationship matrix was developed through expert opinion on the strength of relationship between the variables under consideration. The scale used for measuring the strength of relationship is shown in Table VII.

Variable	Reachability set	Antecedent set	Intersection	Levels
D1	1	1, 3	1	VI
D2	2	1, 2, 3	2	IV
D3	1, 3	3	3	VI
D4	4	1, 3, 4, 5, 12	4	IV
D5	5, 12	1, 3, 5, 6, 12	5, 12	V
D6	6	6	6	VI
D7	7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9, 12	7, 8	III
D8	7, 8	1, 2, 3, 4, 5, 6, 7, 8, 9, 12	7, 8	III
D9	9	9	9	IV
D10	10	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 12	10	II
D11	11	1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12	11	I
D12	5	1, 3, 5, 6, 12	5, 12	V

Table VI. Level partitioning matrix

No.	Very weak	Weak	Moderate	Strong	Very strong	Perfect
0	0.1	0.3	0.5	0.7	0.9	1

Table VII. Fuzzy relationship scale

In the scale, 0 denotes "no relationship" and 1 denotes "perfect relationship". In some case, variables may or may not be related. Sometimes a DCM variable may drive or direct others and sometimes it may not. The scale is shown in Table VII.

The driving power of the DCM variables is shown as the sum of row elements whereas the dependence power is shown as sum of column elements. The fuzzy direct relationship matrix was recursively multiplied by the binary direct reachability matrix until a fuzzy MICMAC stabilized matrix was obtained. A stabilized matrix is referred to as a matrix which shows constant driving and dependence power for at least last two iterations. The binary direct reachability matrix was prepared by substituting right diagonal elements in the initial reachability matrix by 0. In this particular model, the matrix was presented in Table VIII along with the driving and dependence powers of DCM variables in stabilized form. The variables were further divided into autonomous and linkage variables along with driving and dependent ones.

3.3.1 Verifying path relationships. The directed arrows show the relationships among the variables as shown in Figure 2. The model presents total 21 paths or links identified. The responses of experts were taken into consideration to develop such links. In addition, 41 other respondents (mostly retail practitioners including the previous ones who were consulted for filling TISM questionnaire) were contacted to fill the questionnaire containing items measured on a five-point Likert-type scale where "5" denotes "strongly agree", "1" means "strongly disagree" and "3" is a neutral point of the link. It was also matched with the justifications given by previous expert. The 21 links were then statistically verified by setting research hypotheses; one of which is:

$H_A(i)$. There is positive significant difference between the observed mean and specified mean related to the opinion of the experts.

that is, $H_A(i)$. Mean (observed) – mean (specified) > 0.
Here, i = 1-21

To test the hypotheses, a one-tailed, one-sample independent *t*-test was applied using SPSS 19. The "specified mean" was set to 3.5 and it was found that hypotheses for 2 out of 21 paths or links were rejected. The all other links were not rejected, it means those links were verified. Because those two links could not be verified, it was decided to drop them from the validated TISM model depicted in Figure 2. The summary of hypotheses testing is presented in Table IX.

3.3.2 Validation of model structure. After verifying various path relationships, the model structure was validated by matching it with real-life setting. For the purpose, two case-lets

Table VIII. Fuzzy MICMAC stabilized matrix

Variables	D1	D2	D3	D4	D5	D6	D7	D8	D9	D10	D11	D12	Driving power
D1	0	0.7	0	0.5	0.3	0	0.7	0.7	0	0.7	0.7	0.3	4.6
D2	0	0	0	0	0	0	0.5	0.5	0	0.5	0.5	0	2
D3	0.5	0.5	0	0.7	0.5	0	0.7	0.7	0	0.7	0.7	0.5	5.5
D4	0	0	0	0	0	0	0.7	0.7	0	0.7	0.7	0	2.8
D5	0	0	0	0.5	0.3	0	0.5	0.5	0	0.5	0.5	0.3	3.1
D6	0	0	0	0.7	0.7	0	0.7	0.7	0	0.7	0.7	0.7	4.9
D7	0	0	0	0	0	0	0.7	0.7	0	0.7	0.7	0	2.8
D8	0	0	0	0	0	0	0.3	0.3	0	0.7	0.7	0	2
D9	0	0	0	0	0	0	0.5	0.5	0	0.5	0.5	0	2
D10	0	0	0	0	0	0	0	0	0	0	0.7	0	0.7
D11	0	0	0	0	0	0	0	0	0	0	0	0	0
D12	0	0	0	0.3	0.3	0	0.5	0.5	0	0.5	0.7	0.3	3.1
Dependence power	0.5	1.2	0	2.7	2.1	0	5.8	5.8	0	6.2	7.1	2.1	

S. no.	Factors linked	Mean	SD	*t*-value	Significance	*H0* rejected/not rejected*
Link 1	Top-management commitment and support (TMCS) influences or enhances information management practice	4.450	0.605	7.025	0.000	Not rejected
Link 2	Information management influences or enhances TMCS	3.400	1.045	−0.428	0.337	Rejected
Link 3	TMCS influences or enhances marketing orientation	4.250	0.851	3.943	0.000	Not rejected
Link 4	Information-sharing influences or enhances supplier relationship management practices	4.450	0.686	6.190	0.000	Not rejected
Link 5	Information management influences or enhances customer service level	4.400	0.503	8.007	0.000	Not rejected
Link 6	Information management influences or enhances supply chain performance	4.250	0.786	4.265	0.000	Not rejected
Link 7	TMCS influences or enhances category management	4.750	0.444	12.583	0.000	Not rejected
Link 8	TMCS influences or enhances supply chain agility	3.900	0.789	2.260	0.017	Not rejected
Link 9	TMCS influences or enhances supplier relationship management practices	4.250	0.639	5.252	0.000	Not rejected
Link 10	Marketing orientation influences or enhances supplier relationship management practices	4.350	0.745	5.101	0.000	Not rejected
Link 11	Customer service level influences or enhances category management	3.400	1.501	0.401	0.533	Rejected
Link 12	Customer service influences or enhances purchasing management	4.250	0.851	3.903	0.000	Not rejected
Link 13	Supplier relationship management influences or enhances supply chain agility	4.250	0.786	4.265	0.000	Not rejected
Link 14	Supplier relationship management influences or enhances inventory management	4.650	0.587	8.759	0.000	Not rejected
Link 15	Inventory management influences or enhances store assortment optimization	3.850	0.671	2.333	0.015	Not Rejected
Link 16	Purchasing management influences or enhances category management	4.550	0.686	6.842	0.000	Not rejected
Link 17	Assortment planning influences or enhances category management	4.000	0.858	2.605	0.009	Not rejected
Link 18	Supply chain agility influences or enhances supply chain performance	4.650	0.587	8.759	0.000	Not rejected
Link 19	Category management influences or enhances supply chain performance	4.250	0.851	3.943	0.000	Not rejected
Link 20	Assortment planning influences or enhances supply chain performance	4.400	0.503	8.008	0.000	Not rejected
Link 21	Supply chain performance influences or enhances differential advantage	4.750	0.444	12.583	0.000	Not rejected

Note: *Reject *H0* if significance value (one tailed) < 0.025

Table IX.
Results of one-tailed one sample *t*-test

were picked, which conformed to the hierarchical structure shown in Figure 2. For developing these case-lets, secondary data such as company web sites, related news reports, news web sites, updates on apparel retailing, magazines etc. were used. The case companies selected were Zara and Shoppers Stop as apparel retailers, where the former represents the global market whereas the latter exemplifies Indian retail scenario. These companies have been chosen purposively as they have been practicing DCM practices for more than a decade and set new industry benchmark in serving their customer.

Case-let A – Zara: Zara has been a global apparel retailer since 1975 and belongs to a Spanish group-Inditex. It is one of the largest fashion retailing brands in the world with its eight brands and over 6,700 stores in 88 countries. Figure 3 exhibits the model structure for Case-let A, which clearly conforms to the TISM model structure. The model demonstrates that the company's top-management commitment and support (D6) to be a customer-centric fashion retailer became a driving force for adopting agile supply chain strategy (D5) which is evident through its least in the industry fabric-to-fashion cycle; that is, just a week compared to the industry average of around three months. Zara could achieve least time-to-market because of its collaborative relationship with its more than 350 supplier workshops at its back-end so as to ensure timely front-end shelf presence. This hierarchy further moved to better inventory management practices (D2) at Zara which ultimately led to enhanced assortment planning (D7) as Zara kept using POS data to reduce the in-store inventory level to its minimum with its "buy it or miss it" or "now or never" fashion mantra.

Case-let B – Shoppers Stop: Shoppers Stop, one of the leading players in Indian organized lifestyle retailing space since 1991. It has a pan India presence with 74 stores in 36 cities of India. With numerous milestone crossed, Shoppers Stop was awarded as "most favoured retail destination" of the year by Images Retail Forum on 2004 and Business World in 2011 awarded it with "most Respected Company" in the retail sector. Shoppers Stop has won an award for "Excellence in Retail Supply Chain" at Express Logistics and Supply Chain Forum 2015. Based on the best practices followed in retail SCM, Shoppers Stop was selected as one of the cases in the present study.

The four key practices can be attributed for its grand success, namely, top-management commitment and support (D6), customer service (D3) with point-of-sale solution, customer relationship management (First Citizen Program) and effective information management practices (D1) in terms of data mining and warehousing project (Project Drishti). Figure 4 presents the model structure for Case-let B, which apparently shows how the committed top management to become a retailer of customer choice led to customer relationship management program in the form of First Citizen and POS-based effective customer service and information.

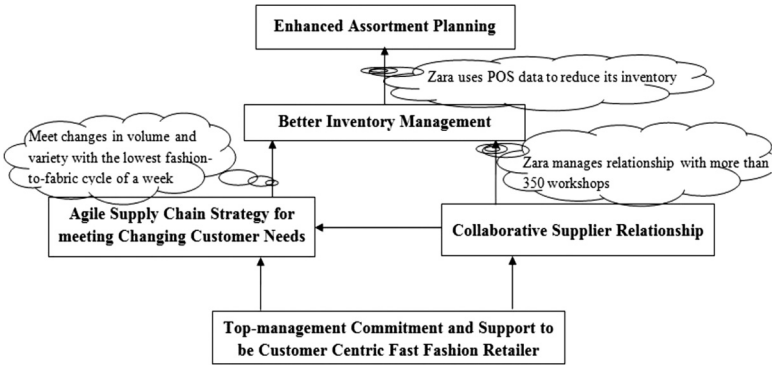

Figure 3.
Model structure for Case-let A

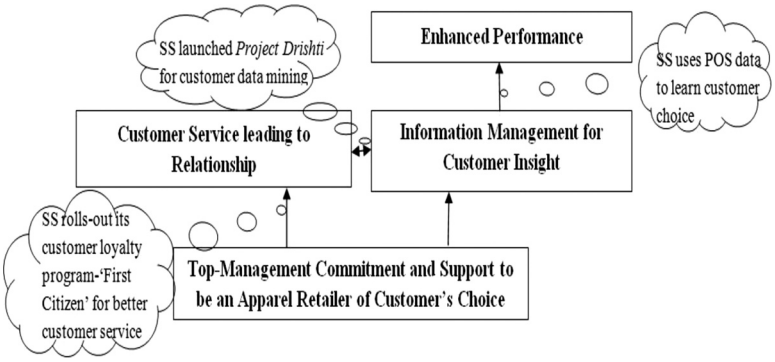

Figure 4.
Model structure for Case-let B

The validated DCM model exhibited in Figure 2 showed hierarchical relationship among different processes. The validation of demand chain TISM model presents its validity in parlance of global *vis-à-vis* Indian context where case company A (Zara) validated at a global level whereas Shoppers Stop (case company A) showcased the execution of DCM practices in Indian context.

4. Findings and discussion

The proposed TISM model establishes interaction and interrelationship among 12 DCM variables. Based on the structural relationship and fuzzy MICMAC analysis output, the graph was prepared and presented in Figure 5. In this cross-impact matrix multiplication applied to classification of variables under consideration, the MICMAC graph comprises four quadrants. We begin with the left upper quadrant that covers five DCM variables, namely, D1, D3, D5, D6 and D12 as "independent or driving variables". These are characterized by high driving power but low on dependence. The TISM model endorses that proper management of information (D1) within the organization and across SC can enhance the organizational capability to respond to customers' need proactively. Information management is expected to play a strategically crucial role, as real-time information about customer, suppliers and competitors to help retailers immensely. The case company B (Shoppers Stop) attained the benefits of strategically managing their information aspects. The best way to capture real-time customer information is POS scanners, whereas suppliers information exchange is a complex process, as integrating the suppliers with varied organizational missions and objectives is indeed a daunting task. To enable a paradigm philosophical shift from push-led SCM to pull-based DCM, the top management (D6) of retail firm plays a pivotal role. Thus, they must be committed to implementing certain policy changes to ensure the execution of the same. Both, case company A (Zara) and case company B (Shoppers Stop) were benefitted by their top managements' commitment.

Another key driver is marketing orientation (D12) of retailer that encompasses customer centricity, competitor orientation and effective inter-functional coordination (Narver and Slater, 1990). In an endeavor to execute the sense and respond to DCM philosophy, a retail organization is expected to be customer centric in marketing efforts over and above the traditional production-led thinking. For this, intelligence acquisition (such as through POS), analysis and dissemination among other functional units becomes quintessential (Jaworski and Kohli, 1993); however, it remains imbalanced unless the intelligence about the competitors in the market is obtained and responds well.

The model and matrix also position SC agility (D5) among independent variables which reflects the ability of apparel retailers to respond quickly to the changes in the customer

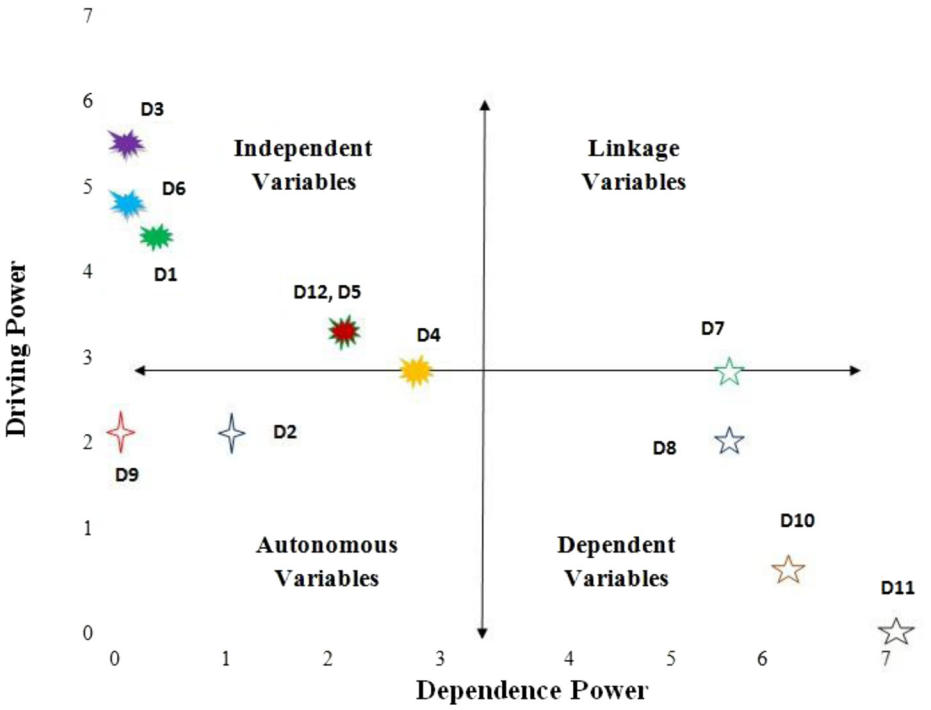

Figure 5.
Fuzzy MICMAC matrix

demand in terms of both volume and variety. The variable in the real sense is influenced by the way retailers manage information and commitment and support of the top management. However, in reality such responsiveness and flexibility is easier said than done because translating the customer requirements into profitable value proposition takes time and this cycle time usually results into missed sales, opportunity lost, and even customer dissatisfaction, as reported by one of the retail consultants and seasoned retailers among expert respondents. Yet, case company A (Zara) made its process agile enough by shortening its fabric-to-fashion cycle to one week compared to industry standard of three months. Similarly, case company B (Shoppers Stop) excelled in terms of customer service (D3) by launching its loyalty program "First Citizen" to offer superior services to its loyal customers. Supplier relationship management (D4) holds the position of transient variable i.e. between autonomous and independent cluster (vide Figure 5). It implies that Supplier Relationship Management (SRM) (D4), with moderate on driving power and dependence dimension in MICMAC analysis is one of the crucial DCM enablers which corroborates with the findings of the prior studies (Vollmann and Cordon, 1998; Corsten *et al.* 2011; Cao *et al.*, 2015, and Madhani, 2015). The case company A (Zara) demonstrated how it maintains collaborative relationship with more than 350 workshops which provide flawless services to Zara every time.

The second quadrant exhibits "autonomous variables" that possess both weak driving and dependence powers. The variables in this cluster are highly disconnected from the system and can have individual effects. Purchasing Management (D9) and inventory management (D2) are the parts of this cluster. Because centralized sourcing dominates the retail scenario, many companies assumes purchasing as a different silo which impedes the

implementation of DCM (Jacobs, 2006). For inventory management (D2) it might require proactive mechanism in place that advocates for vendor managed inventory, quick response, ERP inventory module etc. to function in an integrated manner. The above factors can have an autonomous effect on the business.

There is no variable in the third quadrant, that is, linkage variable except D7 (partially). The fourth cluster is of dependent variables which are denoted as variables with high dependence but low driving power. It consists of D8, D10, D11 and partially D7. D7 is treated as another transient variable between dependent and linkage variable cluster. Category management (D8) as dependent variable reflects the way retailers manage their categories as strategic business units is affected by factors such as customer service level and assortment planning. The description in the interaction matrix along the TISM model (Figure 2) shows that customer-centric category management increases shelf and product acceptance by customers, and enhances bottom line performance. SC performance (D10) is another variable that is of strategic importance. The higher revenue from the overall marketing operations and the lower cost are set as the key drivers of higher SC performance. It can be seen in the case company B (Shoppers Stop) where the company performed well by adopting DCM strategies. Therefore, there has to be a rewarding Interfunctional relation between marketing and SCM, which is the core foundation of DCM implementation. Overall excellence in the business operations leads an organization towards attaining competitively advantageous (D11) position. This is the ultimate objective of any firm, however, sustaining the position is challenging one. As shown in the TISM model the differential advantage holds the topmost position, which signifies that the attainment of it depends upon the proper execution of other DCM variables by apparel retailers.

Assortment planning (D7), which is a transient or transitory variable that partially positions in linkage cluster and a part in dependence one, exhibits both strong driving *vis-à-vis* high dependence; therefore, it should be given more importance by apparel retailers, and hence, it should be dealt meticulously to get new customer and keep the existing ones satisfied during all their exposures and grow in quantitative as well as in qualitative manner. The larger variety in store assortments offer a wider choice to the customers (Syam and Bhatnagar, 2015); however, sometimes customers feel impaired with variety in abundance and it causes "over choice" (Toffler, 1984; Gourville and Soman, 2005). The case company A (Zara) maintains an assortment that its customers like the most; it attracts them to store frequently due to its "now or never fashion" model. An ideal assortment should contain a customer centric mix of merchandise with adequate required width, breadth, and consistency so as to ensure higher customer satisfaction which in turn is reflected in enhanced performance.

In addition, the TISM method can also offer the outcome about the significance of different variables when analyzed on case-to-case basis. However, such results are not generalizable as they apply in limited setting or context. The TISM modeling can also be applied to other business contexts where the interaction and interdependence among underlying variables are required to be explored along the rationale behind such interaction. Another application of the TISM and MICMAC can be the root-cause analysis where the root cause of any issue that an organization confronts is determined based on the dependence and driving power of the underlying variable. For instance, if the dependence power of the variable is zero, it would indicate that the variable is one of the root causes of the issue under consideration. On the other hand, a variable with higher dependence power is subjected to further exploration and investigation. A variable with zero driving power is the effect of all other factors. The TISM method combined with preliminary statistical verification (through *t*-test) with the fuzzy MICMAC analysis presents a more systematic approach with precise interpretive explanation about interdependence and interrelationship among retail specific DCM variables. Such methodology is an apt choice especially for the theoretical context

where the exploration of the concept is not yet performed to identify the underlying constructs and variables. With the help this methodology, an interpretive structure can be developed which is subject to further validation through probabilistic or statistical modeling such as structural equation modeling (SEM). Moreover, to model the variables as multi-criteria cause and effect analysis, other multi-object modeling techniques such as decision-making trial and evaluation laboratory may be applied.

5. Limitation and scope for future research

Although the work offers important aspects in retail DCM space, and thereby, enriches existent literature, there are some limitations which should be taken into account. In fact, the present research is predominantly an exploratory study primarily based on a limited sample size and the model finds application only in Indian apparel retail context. Future researchers may develop this research further by analyzing it on the larger sample, across different industry contexts with descriptive research design so as to ensure its generalizability. As far as methodological rigor is concerned, the total interpretive structural modeling or TISM along with fuzzy MICMAC was based on the expert choice method. These experts belong to a specific industrial setting, which may leave a room for biases. Though the study encompassed a mix of interpretive modeling and a statistical tool such as *t*-test for verification of the links among the variables followed by industry-specific case lets for validation, it is imperative to test the model developed in this study using advanced statistical modeling, namely, SEM.

6. Managerial implications and conclusion

An augmented strategic significance of SCs across different industry verticals (Christopher and Ryals, 2014) in general and apparel retailing in particular calls for a perspective transformation from supply-led push thinking to demand-led pull approach to keep customer at the heart of the business decisions (Jacobs, 2006). Because of short life cycle, changing customer tastes and preferences, rising substitutes etc., it becomes imperative for the Indian apparel retail practitioners to adopt the practices and strategies that enable the shift from traditional SC to cutting edge demand chain thinking. The present study is an attempt to contribute to the existing body of knowledge on DCM in the sense that it identified DCM variables which form a base for future descriptive research in the domain. The DCM variables identified in the present study will serve as ready reckon check list for apparel retailers to ensure its pertinent execution in their businesses to achieve the strategic advantage. Specifically, the model suggested that the entire execution of the DCM in an organization hinges on the commitment and support of top management which is depicted at the bottom of the model (Figure 2). Other core enablers of the retail demand chain are information management, retailers' marketing orientation, customer service and supplier relationship management. Information management emerged as the second strongest driver, which influences the level of customer service, supplier relationship management and ultimately the performance (Figure 2) which corroborates the findings of previous research (Korhonen *et al.*, 1998; Vollmann and Cordon, 1998). These DCM drivers further influence the retail category management and store assortment. And the outcome of a well-coordinated hierarchy of DCM drivers is enhanced SC performance and ultimately the differential advantage for the organization (Figure 2). The contextual relationship among the enablers of DCM will help managers analyze their existing business critically. Particularly, the retail managers can apply key independent variables identified in the present study to enhance customer centricity of their supply chains, and gives an impetus to ultimately move to the DCM. Thus, the study provides a direction to retail managers on adoption of demand chain strategies which will not only help to build an efficiently robust retail SC by cost reduction

but also foster high effectiveness by enhancing the bottom line performance in the long run as DCM synergizes the merits of the two. Also, global retailers foraying to operate in the Indian market as well as the domestic retailers can apply the model developed in the study and the findings of the research can help them formulate business strategies specific to their business to implement DCM practices. The variables of DCM, if implemented well, will help managers in Indian apparel retailing to attain greater customer satisfaction with their offering on the one hand and improved SC performance (Frohlich and Westbrook, 2002) on the other. In turn, it gives the organization an edge over competitors.

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