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DEVELOPMENT OF CONTEXTUAL FRAMEWORK FOR SUPPLY CHAIN MANAGEMENT PRACTICES USING INTERPRETIVE STRUCTURAL MODELLING

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Abstract

Supply Chain Management (SCM) is gaining increasing interest among researchers and practitioners of operations and supply chain management to improve performance across the entire business enterprise. The growing importance of SCM is driven as it is one of the most important areas for competitiveness and growth of industries. The supply chain is associated set of resources and processes that begins with the sourcing of raw materials and extends through to the delivery of end items to the final customer. The study has endeavoured to review some of the supply chain practices and identified factors responsible for choosing best SCM practices. The purpose of this research study is to develop the contextual framework for supply chain management practices and to establish relationship among them using interpretive structural modelling (ISM) and present a hierarchy based model of the practices. It will help the managers to know the importance of key supply chain practices and how these dimensions influence the supply chain performance. Finally, limitations, managerial implications, and scope of future study are presented at the end of this paper.

Keywords: *Supply Chain Management (SCM), Supply Chain Performance, Interpretive structural modelling,*

1. Introduction

Supply Chain Management (SCM) is gaining increasing interest among researchers and practitioners of operations and supply chain management to improve performance across the entire business enterprise. The growing

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importance of SCM is driven as it is one of the most important areas for competitiveness and growth of industries. Today's intense competition requires that firms excel simultaneously in several areas without trade-off, including innovativeness and responsiveness to their customers. Recently, firm level competition has been replaced with competition among supply chains. Supply chain (SC) is a network consisting of customers, retailers, wholesalers, manufacturers, suppliers, and service providers (Hugos, 2006). The primary aim of each supply chain is to maximize the overall value generated.

As supply chains are very vibrant now, flexibility is the key enabler for success of supply chains (Wadhwa et al., 2008). It means organizations should be flexible in developing their strategies and selection of SCM practices. Selection of appropriate SCM practices play key role in success of organizations. Coordination is one of the important drivers for successful implementation of SCM practices in a supply chain network (SCN). Increasing competition due to market globalization, product diversity and technological breakthroughs stimulates independent firms to collaborate in a supply chain that allows them to gain mutual benefits.

A review of literature on SCM practices pointed that a great extent has been written about SCM practices and implementation in different sectors but little attention has been paid to make contextual relationship of these practices.

On the other hand, there is critical need to identify the measure for shaping accomplishment priority of SCM practices for their successful implementation in manufacturing industries. Also, Akyuz and Erkan (2010) stressed in their study need for the development of more precise framework and empirical testing of the performance measures for future research. Zeng et al. (2013) proposed top management leadership and process management dimensions to see their impact on quality performance. Perhaps, only few literature studies are reported in which structural relationship among various SCM practices is investigated. Mishra and Sharma (2016) identified the 10 human dimensions and further established the structural relationship among the identified human dimensions using interpretive structural modelling (ISM) approach. Authors, in the present study considered only human dimensions for effective supply chain coordination (SCC), however the effect of non-human dimensions on SCC can be investigated in order to develop a broader and generic framework for SCC. To this effect, authors in this study attempted to develop a model based on qualitative analysis to support the conceptual and descriptive statements in the literature regarding the SCM practices.

In order to link this gap, the present study uses an interpretive structural modelling (ISM) approach to determine the relative importance of different dimensions in the manufacturing industries. The objective of this paper is to review some of the SCM practices. This study has also tried to identify various factors responsible for selecting best SCM practices and development of a framework for this purpose.

The paper is organized as follows. Section 2 discusses literature review for identification of best SCM practices. Section 3 discusses about objectives of the study. Section 4 discusses about the development of framework for selecting best SCM practices by interpretive structural modelling (ISM). Section 5 presents results and discussion and finally last section provides concluding remarks followed by scope for future research.

2. Literature review

In this section, authors have tried to review some of the SCM practices, to identify the gaps and to develop a contextual framework for supply chain management practices.

SCM practices are defined as approach applied in managing integration and coordination of supply chain, demand and relationship in order to satisfy consumers in effective and profitable manners (Wong et al., 2005). SCM includes a set of approaches and practices to effectively integrate suppliers, manufacturers, distributors and customers for improving the long term performance of the individual firms and the SC as a whole in a cohesive and high performing business model (Chopra et al., 2006). According to the Council of Supply Chain Management Professional (CSCMP), SCM encompasses the planning and management of all activities involved in sourcing and procurement, conversion and all logistics management activities as well as coordination and collaboration with channel partners. A competitive advantage in SCM could be enhanced by the implementation of leading-edge practices, such as supplier quality evaluation, supplier partnerships, customer satisfaction evaluation, competitive benchmarking, and continuous improvement teams (Evans and Lindsay, 2002). Li et al., (2005) endeavored to develop and validate a measurement instrument for SCM practices.

Their instrument has six empirically validated and reliable dimensions which includes strategic supplier partnership, customer relationship, information sharing, information quality, internal lean practices and postponement. According to Sandberg and Abrahamsson (2010), top management commitment plays a key role in developing supply chain strategies for effective SCC.

Based upon the critical review of the literature and opinion/discussion with the experts from the industry and academia seven best SCM practices identified and are explained below.

2.1 Lead-time management

Lead time is the time of a supply chain network to respond to customer demands. In other words, lead time is defined as the time between when the customer order is made and when order is completely satisfied (Chan, 2001). Lead-time management measures are time-to-market, time-to-serve, time-to-react. Lead time in the SCM is the time from the moment the supplier receives an order to the moment it is shipped.

In the absence of finished goods or intermediate (work in progress) inventory – it is the time it takes to actually manufacture the product without any inventory other than raw materials or supply parts. According to Singh et al. (2007), lead-time reduction is a major driver for competitiveness. Lead-time components are order entry time, order processing time, order picking, packing and assembly time, order dispatch time, transit time and order receipt time (time between receipt and display).

2. Customer relationship

Customer relationship covers the practices on complaint handling, customer satisfaction, and long-term relationship establishment. Ultimate goal of SCM is customer satisfaction. Basically, customers require better product quality, faster delivery and cheaper costs, or quality-delivery-cost (Vanichchinchai and Igel, 2009). Good relationship with customers is essential for business continuity.

Business begins and ends with customers; it begins with identifying consumers needs and ends with satisfying them. Building a close partnership with customers, improving customer satisfaction and managing customer complaints, is equally important as establishing a close partnership with suppliers, customer relationship management is an important component of SCM practices. Many factors are responsible for good customer relationship such as: quality, trust, cost (price) etc. The phenomenon of customer complaints can be considered a fact of life with which organizations have to deal with in one way or another. Complaints could be an opportunity for organisations to learn from. Moreover, valuing complaints in this way improves organisations' long-term relationships with their customers.

2.3 Coordination

Coordination is one of the important drivers for successful implementation of SCM practices in a supply chain network (SCN). Increasing competition due to market globalisation, product diversity and technological breakthroughs stimulates independent firms to collaborate in a supply chain that allows them to gain mutual benefits. Coordination is defined as a process of managing dependencies between activities. Dependency theories were first applied to SCM in the 1990s. The most commonly accepted definition of coordination in the literature is the act of managing dependencies between entities and the joint effort of entities working together towards mutually defined goals.

More recent work in SC coordination focuses on quantitative models for revenue sharing and decision support models for specialized systems

(Boyaci and Gallego, 2004). The need for coordination is evident in SCs, as companies forming a SC are dependent on the performance of other organisations. The lack of coordination may result in poor performance of supply chain (Arshinder and Deshmukh, 2008). Supply chain coordination is achieved when a decision maker, acting rationally, makes decisions that are efficient for the whole supply chain. Singh (2011) recognized the role of SCM practices and developed a framework for coordination in supply chain of small and medium enterprises. Mishra and Sharma (2016) developed an integrated framework for effective supply chain coordination (SCC) with focus on human dimensions which makes use of Six Sigma and interpretive structural modelling (ISM) for effective SCC.

2.4 Top management commitment

Top-management involvement should be demonstrated by actions that are needed and not just by words or declarations of quality policies. Thus, top-management must exercise leadership abilities to influence the behaviour of others. Top-management commitment refers to how senior leaders and management core group guide the organization and assess the organizational performance (Teh et al., 2008).

They influence others towards achieving some kind of desired outcome (de Jong and den Hartog, 2007). Lee et al. (2001) revealed that top-management commitment as one of the quality practices influence both quality performance and financial performance. Studies further showed that top-management commitment significantly affects the customer satisfaction and job satisfaction (Sit et al., 2009; Pannirselvam and Ferguson, 2001; Ooi et al., 2007).

According to Gonzalez and Guillen (2002), top-management commitment helps to allocate resources and encourage actions like deployment of information-gathering devices, encourage the use of statistical tools and techniques and others. Top management plays key role in developing supply chain strategies. Success of the supply chain depends on the effectiveness of strategies (Sun et al., 2009). Top management commitment is a key enabler for effective SCM (Sandberg and Abrahamsson, 2010, Mishra and Sharma, 2015 and 2016).

2.5 Supplier management

Service quality of an organization can be improved by selecting a quality supplier. Beside this, Zineldin and Fonsson (2000) found that developing long-term relationships with the supplier can increase the organisation's competitiveness. In past, supplier relationships and management was not considered to be a critical dimension for service industries but due to increase in number of service companies, service globalization and customer changing needs, supplier partnership and supplier management become an essential element of TQM programme. Salvador et al. (2001) studied that how interaction among an organisation and its suppliers and customers helps to accomplish high material quality impact-based performance. Kuei et al. (2001) reported that supplier selection is one of the critical success factors in managing supply chain quality.

The benefits of supplier quality and management are flow of information sharing can be speeded up and stable relationships can lead to stable delivery and prices (Talib and Rahman, 2010). Mishra and Sharma (2014) measured the quality performance by considering the supplier satisfaction index and found that increasing the quality of all supply chain practices leads to cost reduction, improved resource utilization, and improved process efficiency.

2.6 Responsiveness

The responsiveness of a supply chain describes how quickly it responds to customer input. Li et al. (2008) have observed that for responsive supply chain, agility in supply chain is an important factor. Conflicts in vision and goals of supply chain members result in the individuals profit maximization in place of profit maximization of whole supply chain (Arshinder et al., 2007). Long-term orientation is expected to have three specific outcomes, i.e. increased relational behavior, decrease conflicts and increased satisfaction. Availability of point of sales data is important for a responsive supply chain (Michelino et al., 2008). Responsive supply chain ensures delivery in time, cost reduction and accurate forecasting of data (Mehrjerdi, 2009).

2.7 Information sharing

Information sharing improves coordination between supply chain processes to enable the material flow and reduce inventory costs and impacts the supply chain performance in both cost and service level (Zhao et al., 2002). Information sharing between buyers and suppliers has resulted in the growth of virtual supply chains.

In a virtual supply chain, the main driver would be 'information' rather than the actual physical flow of goods. The lack of information sharing between stages of the SC magnifies the bullwhip effect. The empirical finding from Narasimhan and Nair (2005) revealed that information sharing can increase the operational synergy among supply chain partners. Sharing of information between supply chain members helps to substitute information with inventory and lead time, reduces the SC costs, reduces the demand variability, enhance responsiveness and improve the service level (Arshinder and Deshmukh, 2007; Stanley et al., 2009). Gaudreault et al. (2009) have observed the impact of information sharing to improve the SC performance.

The findings of the empirical study by Baihaqi and Sohal (2013) suggested that information sharing enables companies to achieve internal integration and work in a collaborative fashion with their supply chain partners. Information sharing serves as the glue that links all activities within a company and across the supply chain. Thus, increased information sharing activities will improve the quality of information by encouraging more complete and frequent information flow (Mishra and Sharma, 2015).

3. Objectives

The main objectives of the study are:

- To identify and rank the SCM practices
- To establish the relationship among identified SCM practices
- To understand the managerial implications of SCM factors and their relationships using interpretive structural modelling (ISM) and suggest the scope for future research

4. Introduction to ISM

It is an interactive learning qualitative tool in which a set of different and directly related elements are structured into a comprehensive systematic model (Sage, 1977). It helps to improve orders and direction to the complexity of relationship among various element of the system (Sage, 1977). According to the Sharma et al., (2011), it is a method for developing the hierarchy of system enablers to represent the system structure. Thus, it is a modelling technique in which specific relationship and ordered structure are portrayed in a graphical model (Borade and Bansod, 2012). Singh et al., (2003) applied ISM for knowledge management in engineering industry. Singh et al., (2007) applied ISM for improving competitiveness of SMEs. Singh (2011) employed ISM approach to develop the structural relationship among different factors of coordination and responsiveness in supply chain to take strategic decisions. Mishra and Sharma (2016) established structural relationship among various human dimensions using ISM. Keeping in view the need for developing the structural relationship among different SCM practices, study makes use of ISM approach.

4.1 ISM Methodology

ISM methodology is interpretive as the judgment of the group decides whether and how the variables are related. Based on mutual relationships, an overall structure is obtained from the set of complex variables. It is an approach where specific relationships of the variables are modeled and finally overall structure of the system under consideration is presented in a digraph model through a hierarchical configuration. The process of ISM starts with the identification of variables that could be related to each other in a system. After variables are identified, direct and indirect relationships (contextual relationships) are identified between these variables, which are then converted into a structure self-interaction matrix (SSIM) based on pair-wise comparison of variables. The SSIM is transformed into a reachability matrix which includes variable transitivity. Finally, the partitioning of the variables and an extraction of the structural model, called ISM is derived.

In the present paper, ISM has been applied to understand the interrelationships among the SCM practices that help in improving the SCM performance. Although, the various procedural steps of ISM are well documented in ISM literature (Mishra and Sharma, 2016, Mandal and Deshmukh, 1994; Warfield, 1974), a complete understanding of various steps as discussed above are demonstrated through the flow diagram in Figure 1.

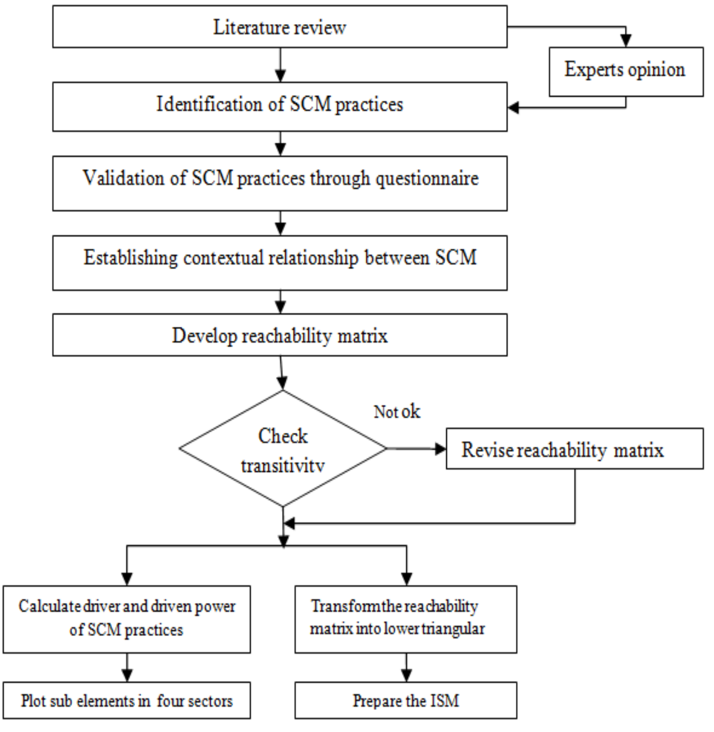

Figure1. Flow diagram of research methodology (ISM)

4.2 ISM development

This section presents the details of interpretive structural modelling approach to find structural relationship among various supply chain practices.

4.2.1 Structural self-interaction matrix

In this exercise experts from industry as well as academia were consulted to find out the contextual relationship between the dimensions. For analyzing a contextual relationship between the dimensions “leads to” criteria is chosen here. For expressing the relationship between SCM practices for supply chain coordination, four symbols have been used to denote the direction of relationship between the practices (i and j)

- V= Dimension i will help to achieve dimension j.
- A= Dimension j will help to achieve dimension i.
- X= Dimension i and j will help to each other.
- O= Dimension i and j are unrelated.

Based on contextual relationship, the SSIM for SCM practices is developed as shown in Table 1. The following statements would explain the use of symbols V, A, X, O in SSIM in Table 1.

- Dimension 1 (Top management commitment) helps to achieve dimension 7 (Responsiveness), Thus, the relationship between dimensions 1 and 7 is denoted by “V” in the SSIM means dimension 1 leads to dimension 7.
- Dimension 4 (Lead time management) can be achieved by dimension 5 (Coordination), Thus, the relationship between dimensions 4 and 5 is denoted by “A” in the SSIM means dimension 5 leads to dimension 4.
- Dimension 2 (Customer relationship) and dimension 3(Information sharing) help each other. Thus, the relationship between dimensions 2 and 3 is denoted by “X” in the SSIM means dimension 2 and dimension 3 lead to each other.
- Dimension 2(Customer relationship) and dimension 6(Supplier management) are unrelated. Thus, the relationship between dimensions 2 and 6 is denoted by “O” in the SSIM means dimension 2 and dimension 6 are unrelated with each other.

Table 1 Structural Self Interaction Matrix

S. No.	SCM practices	1	2	3	4	5	6	7
1	Top management commitment	1	V	V	V	V	V	V
2	Customer relationship	A	1	X	X	X	O	V
3	Information sharing	A	X	1	V	A	X	V
4	Lead time management	A	X	A	1	A	X	V
5	Coordination	A	X	V	V	1	V	V
6	Supplier management	A	O	X	X	A	1	V
7	Responsiveness	A	A	A	A	A	A	1

4.2.2 Initial Reachability Matrix

The SSIM has been converted into a binary matrix, called the initial reachability matrix by substituting V, A, X and O with 1 and 0 as per case. The substitution of 1 and 0 are as per following rules:

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

Following these rules, initial reachability matrix for the SCM practices are built and shown in Table 2.

Table 2 Initial Reachability Matrix

S. No.	SCM practices	1	2	3	4	5	6	7
1	Top management commitment	1	1	1	1	1	1	1
2	Customer relationship	0	1	1	1	1	0	1
3	Information sharing	0	1	1	1	0	1	1
4	Lead time management	0	1	0	1	0	1	1
5	Coordination	0	1	1	1	1	1	1
6	Supplier management	0	0	1	1	0	1	1
7	Responsiveness	0	0	0	0	0	0	1

4.2.3 Final Reachability Matrix

The final reachability matrix is obtained by incorporating the transitivity. The transitivity is checked, by checking if an element (dimension) i leads to element j and element j leads to element k then element i should leads to element k. Final reachability matrix is shown in Table 3. In Table 3, driving power and dependence of each dimension are shown. The driving power for each dimension is the total number of dimension (including itself), which it may help achieve, while dependence power is the total number of dimensions (including itself), which may help achieve it.

These driving power and dependencies will be later used in the classification of dimensions and in MICMAC analysis. The dimensions will be divided into four groups of autonomous, dependent, linkage, and independent variables (Jharkharia and Shankar, 2005, Mishra and Sharma, 2016).

Table 3 Final Reachability Matrix

S. No.	SCM practices	1	2	3	4	5	6	7	Driving power	Rank
1	Top management commitment	1	1	1	1	1	1	1	7	I
2	Customer relationship	0	1	1	1	1	0	1	5	III
3	Information sharing	0	1	1	1	0	1	1	5	III
4	Lead time management	0	1	0	1	0	1	1	4	IV
5	Coordination	0	1	1	1	1	1	1	6	II
6	Supplier management	0	0	1	1	0	1	1	4	IV
7	Responsiveness	0	0	0	0	0	0	1	1	V
	Dependency	1	5	5	6	3	5	7	32	
	Rank	V	III	III	II	IV	III	I		

4.2.4 Level partitions

The reachability and antecedent set for each dimensions is found from the final reachability matrix. The reachability set for particular dimension consists of the dimension itself and other dimension, which it may help achieve. The antecedent set consists of the dimensions itself and other dimension, which may help in achieving them. Afterward, the intersection between reachability and antecedent set is derived for all the dimensions. The dimensions for which the reachability and the intersection sets are same are the top level dimension in the ISM hierarchy.

The top level dimension of the hierarchy would not help to achieve any other dimension above their own level in the hierarchy. Once the top level dimension is identified, it is separated from the other dimensions. Then the same iteration process is repeated till the level of each dimension is found. The identified levels assist in building the diagraph and the final model of ISM (Singh and Kant, 2008). The dimensions, along with their reachability set, antecedent set, intersection set and the levels, are shown in Table 4 to 10.

Table 4 Iteration 1

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,2,3,4,5,6,7	1	1	
2	2,3,4,5,7	1,2	2	
3	2,3,4,6,7	1,2,3	2,3	
4	2,4,6,7	1,2,3,4	2,4	
5	2,3,4,5,6,7	1,2,5	2,5	
6	3,4,6,7	1,3,4,5,6	3,4	
7	7	1,2,3,4,5,6,7	7	I

Table 5 Iteration 2

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,2,3,4,5,6	1	1	
2	2,3,4,5	1,2	2	II
3	2,3,4,6	1,2,3	2,3	
4	2,4,6	1,2,3,4	2,4	
5	2,3,4,5,6	1,2,5	2,5	
6	3,4,6	1,3,4,5,6	3,4,6	

Table 6 Iteration 3

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,3,4,5,6	1	1	
3	3,4,6	1,3	3	
4	4,6	1,3,4	4	
5	3,4,5,6	1,5	5	III
6	3,4,6	1,3,4,5,6	3,4,6	

Table 7 Iteration 4

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,3,4,6	1	1	
3	3,4,6	1,3	3	
4	4,6	1,3,4	4	IV
6	3,4,6	1,3,4,6	3,4,6	

Table 8 Iteration 5

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,3,6	1	1	
3	3,6	1,3	3	V
6	3,6	1,3,6	3,6	

Table 9 Iteration 6

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1,6	1	1	
6	6	1,6	6	VI

Table 10 Iteration 7

Dimensions	Reachability set	Antecedent set	Intersection set	Level
1	1	1	1	VII

4.2.5 MICMAC analysis

MICMAC is Matrice d' Impacts Croises Multiplication Appliquee A unClassement. The objective of Cross -Impact Matrix Multiplication Applied to the Classification (MICMAC) analysis is to analyze driving and dependence power of each dimension. According to Ravi et al., 2005; Singh et al., 2007; Talib et al., 2011; and Mishra and Sharma, 2016, MICMAC analysis is a classification based on driving power and dependence of each dimensions. The driving power and dependence of each of these dimensions are calculated as shown in Table 3. From the Table 3(final reachability matrix) driving power and dependence are found by adding an entry of "1" in their particular row and column for each dimension respectively. Based on the driving power and dependence, a matrix diagram is constructed as shown in Figure 2. All these dimensions are classified into four categories i.e. autonomous, dependent, linkage and drivers and placed on different quadrant depending on their driving power and dependency. For example, a factor that has driver power of 7 and dependence power of 1 is positioned at a place that corresponds to driver power of 7 and dependency of 1. Based on its position, it can be defined as a driving dimension.

The first quadrant includes autonomous dimensions that have weak driving power and weak dependence. These variables are relatively disconnected from the system. The result shows that there are no SCM practices in the autonomous category. The second quadrant consists of the dependent dimensions that have weak driver power but strong dependence. Responsiveness belongs to this cluster. Third quadrant has the linkage dimensions having strong driving power and strong dependence. These dimensions are unstable due to the fact that any change in these dimensions will have an effect on other and also a feedback on themselves. Customer relationship, information sharing, lead time management and supplier management belongs to this category. The fourth quadrant includes independent dimensions or drivers with strong driver power and weak dependence. Top Management commitment belongs to this quadrant.

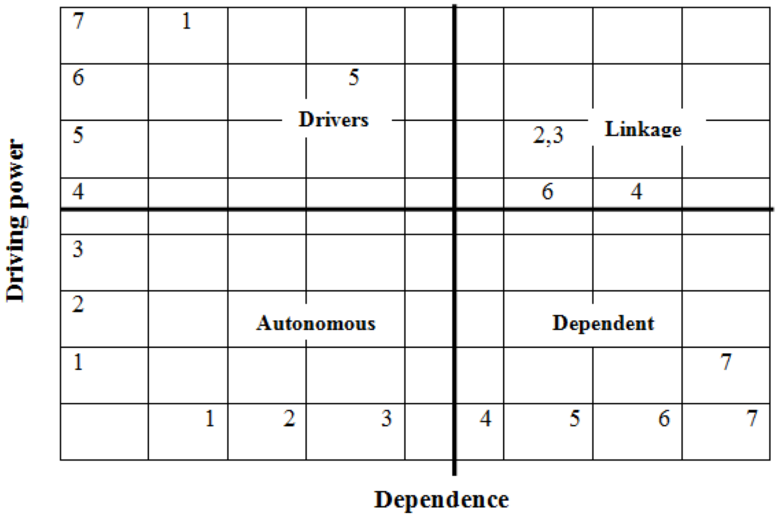

Figure 2 Driving power and dependence diagram

4.2.6 Formation of ISM

From the final reachability matrix (Table 3) the structural model is generated by means of vertices/nodes and lines of edges. A relationship between the dimensions i and j is shown by an arrow that points from i to j or j to i depending upon their relationship. This graph is called a diagraph. ISM model developed after removing the transitivity as described in ISM methodology, the diagraph is finally converted into ISM as shown in Figure 3. From the level partition results 'Responsiveness' (7) practices which is assigned level I is placed at the top followed by customer relationship (2) which are found at level II and so on. It is also observed from this figure that top management commitment (1) is a very significant factor for improving the SCM performance as it forms the base of the ISM hierarchy. Responsiveness (7) will ensure the performance of supply chain as this variable appeared at the top of the hierarchy, thus all the SCM practices are placed at pre-define level as presented in level partition section from Table 4 to 10. The top management commitment (1) leads to the supplier management (6). Supplier management leads to information sharing (3), information sharing leads to lead time management (4) and lead time management leads to coordination (5) and so on. Thus all these SCM practices are essential for any organization/society for improving supply chain performance.

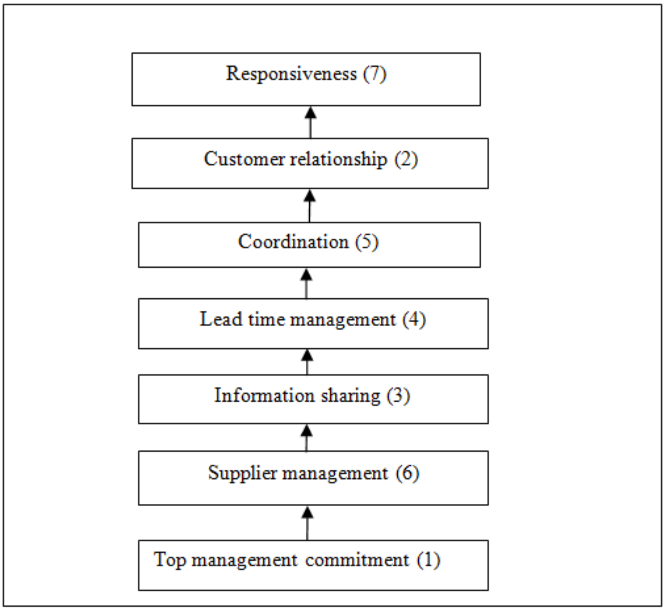

Figure 3 ISM-based model for selection of SCM practices

5 Results and Discussions

A successful supply chain should be well coordinated which not only enhance SCM performance by taking into account various administrative and technical dimensions but also human and behavioral dimensions too. Supply chain practices play a pivotal role in improving the performance of SCM and growth of industries to compete globally. To this effect, in this research an attempt has been made by authors to identify and develop a hierarchy of SCM practices that would help managers and practitioners in effective SC coordination and performance. An ISM based model has been developed to analyze the interaction among different supply chain practices. The major findings of the developed ISM model are as follows.

- The driving power-dependence matrix (Figure 2) indicates that no SCM practice is captivating place in the autonomous dimensions cluster for improving SCM performance. Autonomous variable generally appears a weak drivers as well as weak dependent and are relatively disconnected from the system. The dearth of any autonomous practices in this study indicates that all the considered practices influence the SCM performance. Therefore, management should pay attention to all SCM practices for improving SC performance.

- Responsiveness is a weak drivers but strongly dependent on other dimensions. They are seen at the top of the ISM hierarchy (Figure 3). Responsiveness dimension represents the desired objectives of the supply chain process and are classified as dependent dimensions.
- Customer relationship, Information sharing, Lead time management, Supplier management are seen as a linkage practices that has a strong driving power as well as strong dependence. They are also unstable. Therefore, these form the middle level of the model. Thus, it can be inferred that among all the 7 variables selected in the study, these dimensions are unstable. Any action on them will have an effect on others and also a feedback on themselves.
- The driving power – dependence matrix indicates that SCM practices such as top management commitment have highest driving power and less dependency, and are at the bottom of the ISM hierarchy. It means top management commitment will help organization to achieve their desired objectives and are classified as independent variables or drivers.

6 Conclusions

In modern era, SCM has appeared as way of improving competitive advantage of organizations. However, most of the organizations fail in choosing the suitable SCM practices and their effective accomplishment. In this research, using the ISM methodology, a relationship model among SCM practices has been developed. Selection of suitable SCM practices is very significant factor for strategy development. Selection of SCM practices will depend upon many factors such as business objectives, market condition, nature of product etc. If an organization is manufacturing functional product, supply chain strategy will focus on cost reduction. If it is innovative product, supply chain strategy will focus on reducing lead time that is improving the responsiveness. It has been observed from the results that among all the SCM practices, top management commitment have highest driving power.

In this research, using the ISM methodology, a relationship model has been developed which provides a very useful understanding of the relationship among SCM practices, however this model has not been statistically validated. The present model can be statistically tested with the use of structural equation modelling which has the capability of testing the validity of such hypothetical models. Thus, this approach can be applied in the future research to test the validity of this model. This paper is restricted to simply implication of ISM methodology in modelling the SCM practices but in imminent it can be extended to comprehensive research in various facet of SCM such as technological, environmental, sustainability, operational and many more. Due to limited number of factors, this study has some limitations also. Therefore this framework can be expanded by including some more factors. As a future scope, study can be carried out by taking various sub factors in different categories and can be prioritized by analytical hierarchy process in perspective of various sectors.

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