CHAPTER 4

UNDERSTANDING THE INTERRELATIONSHP OF ASC ENABLERS

In today's business scenarios, customer is not only limited to high quality and lower price product but also requires variability of products with flexible order quantity and delivery lead time. This creates uncertainty, global competition and complexity in business environment. Therefore, the main objective behind the introducing agility in supply chain is to respond in a timely and effective manner to market volatility and other uncertainties in business environment. Agile supply chain (ASC) forces the enterprise to adapt to the unpredictable market demands, does the fast restructuring of dynamic alliance, promotes the cooperation and the production mode between enterprises and thus enhances enterprise's integrated management and economic efficiency (Fei and Shilei, 2009).

To implement agility in supply chain it is essential to provide a driving force at every stage of supply chain. These driving forces can be called as enablers of the ASC. ASC enablers are enabling technologies and methodologies which are very much significant to achieve agility (Haq and Boddu, 2015). Identification of ASC enablers is necessary for supply chain manager not only to understand the fundamental preconditions of supply chain agility, but also to provide a practical guide to successful evolution to a truly ASC. To facilitate a better understanding of the enablers of ASC, an analysis of enablers, inter-relationship, hierarchy of importance and classification would be essential (Soti et al., 2010). The ASC enablers are modelled using interpretive structure modelling (ISM) to provide a hierarchy of importance and inter-relationship between them. In the present chapter ISM is used to provide an overview of the various enablers, their inter-relationship, hierarchy of importance and their contribution towards agility in supply chain. The objectives of this chapter are listed as below:

- to identify the major enablers which are responsible for making the supply chain agile
- to identify and analyse interrelationship among various enablers of the ASC using interpretive structural modelling (ISM)
- to classify the ASC enablers depending on their driving power and dependence

4.1 Identification of ASC enablers

As discussed earlier for making supply chain agile large number of variables play their role, these variables can be called as ASC enablers. To determine these enablers literature is reviewed from the year 1995 to 2016 using the keywords such as agile manufacturing, agility, ASC enablers, agility index, etc. In order to collect the research papers for the review, a rigorous search was carried out using the database of reputed publishers like Emerald, Springer, Science direct, Elsevier, Taylor and Francis, Inderscience. Only journal papers were included in the review. Table 4.1 shows summary of literature review of ASC enablers. After literature survey, brain-storming sessions are conducted among the author of the present dissertation, one expert from academia and one expert from the case-organisation. First authors approached to the case-organisation along with one expert from academia for the discussion on ASC enablers and aspiring to develop the contextual relationship among the enablers. There were two experts who took part in brain-storming sessions for ISM methodology, one from academia and one from industry. The expert from academia is the senior most professor of IIT (BHU) Varanasi in the area of Industrial Engineering and Management and the expert from industry is the Chief Manager of a department at case-organization. The expert from academia has 35 years of experience and the expert from industry has 26 years of experience. There was consensus among the experts. Development of contextual relationship among enablers is explained in detail in section 4.2.

From Table 4.1, it is observed that adaptability is considered as ASC enabler in this dissertation even though it is identified by only one research paper (Sharma and Bhat, 2014). According to experts, adaptability positively affects the supply chain agility of the case-organisation. Apart from this several scholars have also acknowledged the importance of adaptability for agility of supply chain (Lee, 2004; Takii, 2007; Tuominen et al., 2004). After thorough discussion seven key enablers for making supply chain agile were finalised. These enablers with their definitions are listed in Table 4.2.

Table 4.1: Agile supply chain enablers from the literature

Agile supply chain enablers	**Source**											
	Gunasekaran (1999)	**Christopher (2000)**	**Dowlatshahi and Cao (2006)**	**Faisal et al., (2006)**	**Agarwal et al., (2007)**	**Gunasekaran et al., (2008)**	**Swafford et al., (2008)**	**Hasan et al., (2009)**	**Pandey and Garg (2009)**	**Vinodh and Prasanna (2011)**	**Vinodh et al., (2013)**	**Sharma and Bhat (2014)**
Virtual Enterprises	√		√			√		√		√	√	
Collaborative Relationship				√		√			√	√	√	√
Use of IT	√	√	√		√	√	√	√	√	√	√	
Market Sensitivity		√			√				√	√	√	√
Customer Satisfaction					√				√			
Adaptability												√
Flexibility							√					√

There are two more enablers 'innovativeness' and 'build-to-order' reported in literature but for the present case these are not considered. Case-organization for which ASC enablers are identified is producing locomotives engines. The innovations in locomotives industry are not cutting edge technology and it is for less as compared to products like mobile. As confirmed with Chief Manager of case-organization, it will take approximate 2-4 years to give new features in a product or to launch a completely new product. Hence innovativeness is not considered as enabler. Build-to-order is the policy that company (case-organization) follows. The product manufacturing starts once order is received, so this is a process that initiates manufacturing. Therefore this is also not taken as enablers. Though for identifying the agility enablers 12 research papers (Table 4.1) looks like small number however there has given due diligence in bringing down from a large number of paper to these 12 papers which specifically highlight the ASC enablers.

Table 4.2: Agile supply chain enablers and their definition

Enablers	**Definition**	**Source**
Virtual Enterprises	Virtual Enterprises is a temporary alliance of enterprises that come together to share skills or core competencies and resources in order to better respond to business opportunities.	Camarinha-Matos and Afsarmanesh (1999)
Collaborative Relationship	A collaborative relationship is close and coordinated relationships of organizations with their major business partners such as suppliers, manufacturers and distributors.	Sharma and Bhat (2014)
Use of Information Technology	Use of information technology is the use of internet, extranet, CAD, CAM, MRP, MRP II, EDI, ERP etc which leads to quick response, elimination of non-value adding activities and minimization of human errors.	Hasan et al., (2009)
Market Sensitivity	Market sensitivity means that the supply chain is capable of reading and responding to real demand and changes therein.	Christopher (2000)
Customer Satisfaction	Customer satisfaction is the customer's reaction to the value received from the purchase or utilization of the offering.	Agarwal et al., (2007)
Adaptability	Adaptability is the firm’s ability to correctly predict and, therefore, appropriately adapt to an unexpected change in the environment.	Takii (2007)
Flexibility	A supply chain is said to be flexible if it can ensure smooth undisrupted supply of the products from supplier to the end user under all uncertain or risky environments.	Tiwari et al., (2013)

ASC enablers improve performance of supply chain in various manners like managing risk, responding to changing market need, improving productivity and quality of production and so on. Effects of ASC enablers on the performance of supply chain are listed in Table 4.3.

Table 4.3: Effects of ASC enablers on Supply Chain performance

Agile supply chain enablers	**Effect on Supply Chain**
Virtual Enterprises	• Respond quickly to changing market needs (Gunasekaran, 1998). • Company can boast its earning (Dowlatshahi and Cao, 2006). • Improved product and process design, reduced manufacturing risk, improve responsiveness, improved manufacturing design and operations (Hasan et al., 2009).
Collaborative Relationship	• Risk can be managed effectively (Faisal et al., 2006). • It may take few minutes to finalize the deal between a buyer and supplier if there exists a trust or strong relationship (Pandey & Garg, 2009). • Firm can achieve efficiencies, flexibility, and a competitive advantage when building collaborative relationships with their supply chain partners (Nyaga et al., 2010).
Use of IT	• Improved productivity and quality of production (Hasan et al., 2009). • Paper work has been eliminated with IT utilities (Vinodh and Prasanna, 2011). • Minimization of human errors and elimination of non-value adding activities (Hasan et al., 2009). • The quick and faster flow of information (Pandey & Garg, 2009).
Market Sensitivity	• Capable of reading and responding to real demand (Christopher, 2000). • Quick introduction of new products (Sharma and Bhat, 2014).
Customer Satisfaction	• High level of customer satisfaction related to the corporate profitability (Oliver, 1993). • Customer satisfaction negatively influences customer complaints and positively influences customer loyalty (Yu et al., 2005).
Adaptability	• Adjust supply chain's design to meet structural shifts in markets (Lee, 2004). The higher complexity of changes can be handled with higher level of adaptability (Takii, 2007). • Firm with higher level of adaptability can have better chances of its long-term survival (Tuominen et al., 2004).
Flexibility	• Respond quickly, and achieving good performance (Upton, 1994).

- Provide higher service level (Angkiriwang et al., 2014).
- Flexibility ensures smooth undisrupted supply of product from supplier to end user (Tiwari et al., 2013).

4.2 Developing a contextual relationship among enablers

Next step of ISM methodology suggests the use of the expert opinions in developing the contextual relationship among the variables (Pandey and Garg, 2009). For expert opinions one can use various management techniques such as brain storming, nominal technique, etc. Hence while developing a contextual relationship among the identified enablers, same experts were consulted which were explained in Section 4.1. These experts were having more than 25 years of experience in the supply chain domain. A thorough brain storming session was carried out to find out the contextual relationships among SCA enablers. The experts, who participated in our study, were asked to identify the relationships among the enablers of ASC. In developing the contextual relationship among enablers, the existence and direction of relation between any two enablers is questioned to expert. The following four symbols are used to denote the direction of relationship between any two enablers (*i* and *j*):

- V: enabler *i* will ameliorate enabler *j* (relation from *i* to *j* but not in both direction)
- A: enabler *j* will ameliorate enabler *i* (relation from *j* to *i* but not in both direction)
- X: enabler *i* and *j* will ameliorate each other (relation from *i* to *j* and *j* to *i*)
- O: enablers *i* and *j* are unrelated (no relation)

4.3 Developing a Structural Self-Interaction Matrix (SSIM)

After brain storming session with the experts the contextual relationship among enablers are obtained. These relationships are formed in the form of a matrix called the Structural Self-Interaction Matrix (SSIM). The SSIM for all the interdependencies is as shown in Table 4.4. The following statements explain the use of symbols V, A, X and O for agility enablers in SSIM.

Table 4.4: Structural self-interaction matrix

Enablers		FL	AD	CS	MS	IT	CR	VE
1	Virtual Enterprises (VE)	V	X	V	X	A	X	-
2	Collaborative Relationship (CR)	V	O	V	O	A	-	
3	Use of Information Technology (IT)	O	V	O	V	-		
4	Market Sensitivity (MS)	V	A	V	-			
5	Customer Satisfaction (CS)	A	A	-				
6	Adaptability (AD)	V	-					
7	Flexibility (FL)	-						

- According to experts opinion Virtual Enterprises (VE) would ameliorate Customer Satisfaction (CS). For CS, VE play a significant role. At the same time CS is not helping much to the enabler VE. Hence, the relationship is depicted as ‘V’ in Table 4.4.
- CR is ameliorated by use of IT which means that CR is helped by use of IT. CR does not help the variable use of IT. This unidirectional reverse relationship is shown as ‘A’ in Table 4.4
- VE and MS ameliorate each other so the relationship is ‘X’ in Table 4.4
- No relationship seems to exist between use of IT and CS so relationship is ‘O’ as shown in Table 4.4

4.4 Developing a reachability matrix

The SSIM is transformed into a binary matrix by substituting V, A, X, O by 1 and 0 as per the case. This binary matrix is called initial reachability matrix. The fundamental rules for the binary conversion are already explained in chapter 3. Based on the binary conversion rules, the SSIM given in Table 4.4 is converted to initial reachability matrix as given in Table 4.5.

Table 4.5: Initial reachability matrix

Enablers		1	2	3	4	5	6	7
1	VE	1	1	0	1	1	1	1
2	CR	1	1	0	0	1	0	1
3	IT	1	1	1	1	0	1	0
4	MS	1	0	0	1	1	0	1
5	CS	0	0	0	0	1	0	0
6	AD	1	0	0	1	1	1	1
7	FL	0	0	0	0	1	0	1

The initial reachability matrix is further converted into the final reachability matrix by checking it for transitivity. The transitivity of the contextual relation is a basic assumption in ISM. Methods to verify the initial reachability matrix for embedded transitivity has been described earlier in chapter 3. After incorporating the transitivity the final reachability matrix is shown in Table 4.6.

Table 4.6: Final reachability matrix

Enablers		1	2	3	4	5	6	7	Driving power
1	VE	1	1	0	1	1	1	1	6
2	CR	1	1	0	1*	1	1*	1	6
3	IT	1	1	1	1	1*	1	1*	7
4	MS	1	1*	0	1	1	1*	1	6
5	CS	0	0	0	0	1	0	0	1
6	AD	1	1*	0	1	1	1	1	6
7	FL	0	0	0	0	1	0	1	2
Dependence		5	5	1	5	7	5	6	

1* entries are included to incorporate transitivity

Final reachability matrix, which is furnished in Table 4.6, also shows the driving power and the dependence of each enabler. For a particular enabler, the driving power is the total number of enablers (including itself) which it may help to achieve [equation (4.1)]. The dependence is the total number of enablers which may help achieving it [equation (4.2)]. These driving powers and dependencies will be used to classify enablers into four groups of autonomous, dependent, linkage and independent enablers. Example: for enabler 1 (*i.e.*, VE) the driving power and the dependence will be expressed as:

$$Driving\ power = \sum_{j=1}^{7} a_{1j} \qquad (4.1)$$

$$Dependence = \sum_{i=1}^{7} a_{i1} \qquad (4.2)$$

Where a_{ij} is the unitary value at i^{th} row and j^{th} column.

4.5 Partitioned reachability matrix into different levels

According to ISM methodology which has been explained earlier in chapter 3, the final reachability matrix (Table 4.6) can be partitioned into different levels. In order to partition reachability matrix into different levels it is required to identify the reachability set and antecedent set for each enabler. From the final reachability matrix, the reachability and antecedent set for each enabler is derived in Table 4.7. For example the reachability set of enabler 1(VE) consists of itself (enabler 1) and the other enablers which it may help to achieve (*i.e.* enabler 2, enabler 4, enabler 5, enabler 6 and enabler 7). Therefore, reachability set of enabler 1(VE) is (1, 2, 4, 5, 6, 7). Whereas the antecedent set of enabler 1(VE) consists of itself (enabler 1) and the other enablers which may help in achieving it (*i.e.* enabler 2, enabler 3, enabler 4, and enabler 6). Therefore, antecedent set of enabler 1(VE) is (1, 2, 3, 4, 6). Subsequently, the intersection set of enabler 1(VE) is derived from the reachability set and antecedent set which would be (1, 2, 4, 6). Similarly the reachability set, antecedent set and their intersection set for all the seven enablers are derived and shown in Table 4.7.

As per ISM rules, the enablers, for which the reachability set and the intersection set are the same, are assigned as level I. From Table 4.7, it is clear that enabler 5(CS) has same reachability set as well as intersection set, hence enabler 5(CS) is assigned as level I. The top level enabler in the hierarchy would not help achieve any other enablers above its own level. Therefore, once the enabler is assigned a level, it is separated out from the rest of the enablers for the next iteration. Now enabler 5 is separated out from the remaining enablers for the next iteration. After removing enabler 5 from Table 4.7, we get reachability set and antecedent set of the remaining enablers (Table 4.8). This will be followed by identification of intersection set and II level enablers. In Table 4.8, the enabler 7 (FL) is put at level II. After removing enabler 7 from Table 4.8, reachability set and antecedent set of the remaining enablers are obtained. This process is continued until the level of each enabler is found. For the present problem level of each enabler is found in four iterations (Table 4.7 to Table 4.10). There are four enablers namely enabler 1(VE), enabler 2(CR), enabler 4(MS) and enabler 6(AD) partitioned as the level III. Finally, enabler 3 (use of IT) comes at level IV. These levels help in building the digraph and the final ISM based model.

Table 4.7: Iteration I

Enablers	Reachability Set $R(p_i)$	Antecedent Set $A(p_i)$	Intersection Set $R(p_i) \cap A(p_i)$	Level
1 VE	1,2,4,5,6,7	1,2,3,4,6	1,2,4,6	
2 CR	1,2,4,5,6,7	1,2,3,4,6	1,2,4,6	
3 IT	1,2,3,4,5,6,7	3	3	
4 MS	1,2,4,5,6,7	1,2,3,4,6	1,2,4,6	
5 CS	5	1,2,3,4,5,6,7	5	I
6 AD	1,2,4,5,6,7	1,2,3,4,6	1,2,4,6	
7 FL	5,7	1,2,3,4,6,7	7	

Table 4.8: Iteration II

Enablers		Reachability Set $R(p_i)$	Antecedent Set $A(p_i)$	Intersection Set $R(p_i) \cap A(p_i)$	Level
1	VE	1,2,4,6,7	1,2,3,4,6	1,2,4,6	
2	CR	1,2,4,6,7	1,2,3,4,6	1,2,4,6	
3	IT	1,2,3,4,6,7	3	3	
4	MS	1,2,4,6,7	1,2,3,4,6	1,2,4,6	
6	AD	1,2,4,6,7	1,2,3,4,6	1,2,4,6	
7	FL	7	1,2,3,4,6,7	7	II

Table 4.9: Iteration III

Enablers		Reachability Set $R(p_i)$	Antecedent Set $A(p_i)$	Intersection Set $R(p_i) \cap A(p_i)$	Level
1	VE	1,2,4,6	1,2,3,4,6	1,2,4,6	III
2	CR	1,2,4,6	1,2,3,4,6	1,2,4,6	III
3	IT	1,2,3,4,6	3	3	
4	MS	1,2,4,6	1,2,3,4,6	1,2,4,6	III
6	AD	1,2,4,6	1,2,3,4,6	1,2,4,6	III

Table 4.10: Iteration IV

Enablers		Reachability Set $R(p_i)$	Antecedent Set $A(p_i)$	Intersection Set $R(p_i) \cap A(p_i)$	Level
3	IT	3	3	3	IV

4.6 Developing conical matrix

Next step is to develop conical matrix, which is just before building the digraph. A conical matrix (lower triangular format) is developed by arranging the elements according to their levels. In conical matrix the enablers are written down on x-axis and y-axis, based on their levels starting from Level-I. In our case, the enabler being in level-I is CS. This enabler is first written down on the x- and y-axes. FL, being in level-II is written after the level-I variables. Similarly, all other enablers can be written down. The conical matrix is similar to the reachability matrix with the exception that the variables in the conical matrix are written on the x- and y-axes based on their levels. The relationships between the variables are taken from the reachability matrix. Table 4.11 shows the conical form of reachability matrix.

Table 4.11: Conical form of reachability matrix

x-axis / ***y-axis***	**Enablers**	**CS**	**FL**	**VE**	**CR**	**MS**	**AD**	**IT**
5	CS	1	0	0	0	0	0	0
7	FL	1	1	0	0	0	0	0
1	VE	1	1	1	1	1	1	0
2	CR	1	1	1	1	1	1	0
4	MS	1	1	1	1	1	1	0
6	AD	1	1	1	1	1	1	0
3	IT	1	1	1	1	1	1	1

4.7 Formation of ISM-based model

From conical form of reachability matrix (Table 4.11), the structural model is generated by means of vertices or nodes and lines of edges. If there is a relationship between the enablers *i* and *j*, this is shown by an arrow which points from *i* to *j*. This graph is called a directed graph or digraph. A digraph is drawn after removing the indirect links between enablers which is shown in Figure 4.1. The digraph is finally converted in to ISM model by replacing nodes of the factors with statements as shown in Figure 4.2.

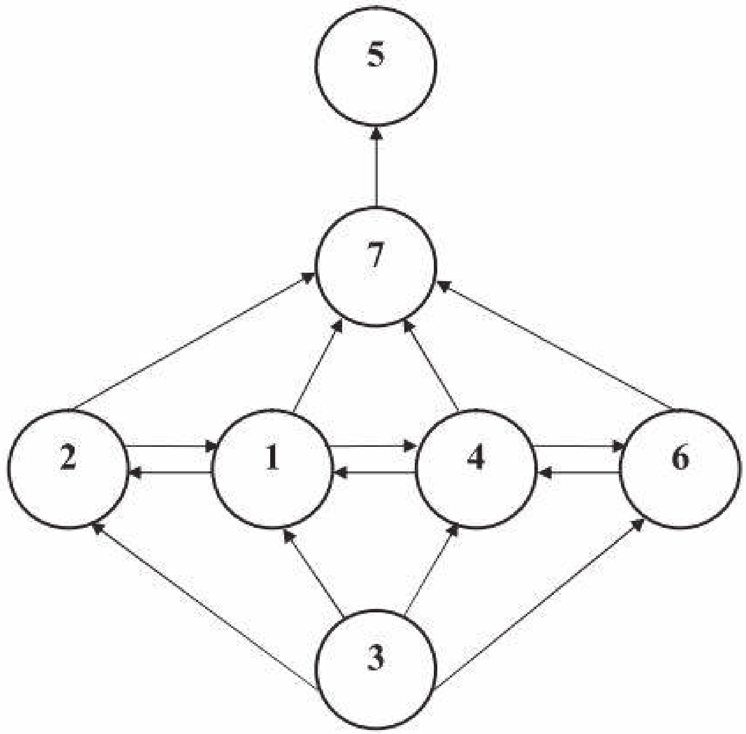

Figure 4.1: ISM digraph

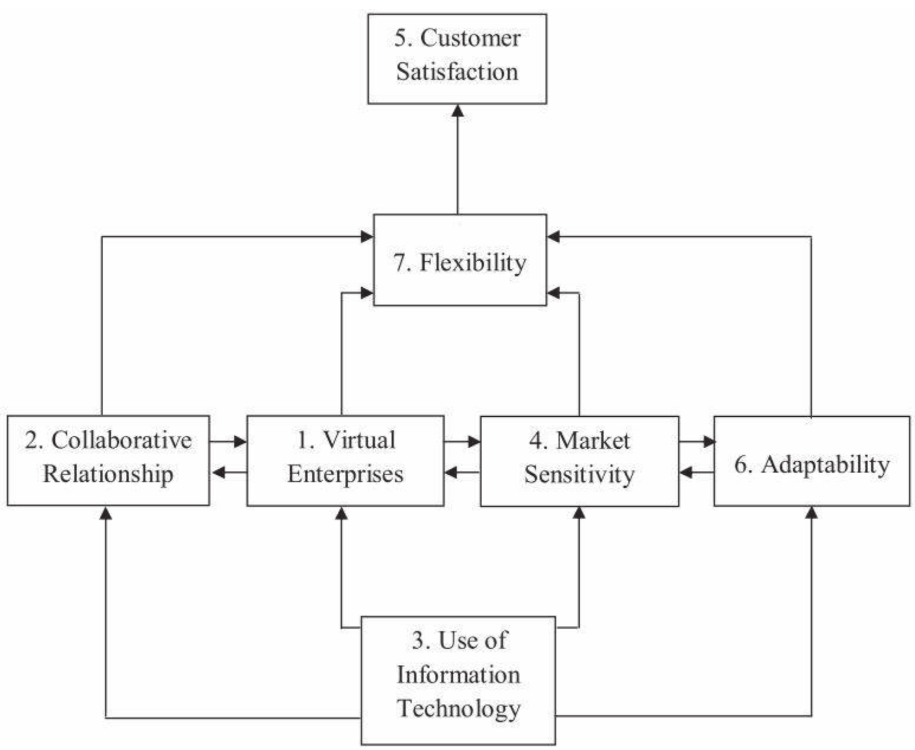

Figure 4.2: Formation of ISM based model

For the development of the digraph, it should be noticed that, the top level comprises the enablers of level-1, followed by the level-2 enablers and so on. The direction of arrows shows the relationship type. At the top of the ISM model, there is enabler named CS. It is due to the reason that CS is assigned as level I in partition of reachability matrix. CS is highly dependent on other enablers because of high dependence which shows that any action on any other enablers will have an impact on CS. CS also has very low driving power due to which it is not driving any other enabler. It means that any action on this enabler will not affect any other enabler. Enabler 7 (FL) is put at level II in partition of reachability matrix hence, it will be after enabler 5(CS) in the ISM hierarchy. Flexibility is affected by many enablers such as VE, AD, CR and MS. However, it acts as driver for customer satisfaction and driven by virtual enterprises, adaptability, collaborative relationship, market sensitivity and use of information technology. The more flexible the supply chain is, the more easily it can respond to the uncertainties, unpredictable situations and risks which leads to high customer satisfaction. The third level hierarchy of ISM model is populated by the following enablers: virtual enterprises, adaptability, collaborative relationship and market sensitivity. These enablers have a high driving power as well as dependence, implying a careful treatment of these enablers, as any action on these enablers will have an effect on others and also a feedback on themselves. Finally enabler 3 (use of IT) comes at last level (i.e. level IV) hence it comes at the bottom of ISM hierarchy. Use of IT represents high driving power and weak dependency, therefore, this enabler is the chief facilitator of other enablers. All other enablers are highly dependent on this enabler and shall primarily be focused by the manager for making the supply chain agile. Enabler use of IT has the capability to condition the whole supply chain and can be called independent driver of supply chain agility. The ISM model also shows that enablers collaborative relationship and virtual enterprises help to achieve each other; enablers virtual enterprises and market sensitivity help to achieve each other; enablers market sensitivity and adaptability help to achieve each other. This result has an important implication. Manager should handle these pairs of enablers with extreme care and precaution as an action on any one pair will have an impact over the other pair.

4.8 MICMAC analysis

It is of interest to know the degree to which each enabler influences and gets influenced by the other enablers in the problem under study (Poduval et al., 2015). For this purpose MICMAC analysis is used. MICMAC principle is analyzed and classified the ASC enablers in to four categories namely autonomous, dependent, linkage, and independent based on their driving power and the dependence. After classification enablers are plotted in to driver-dependency diagram as shown in Figure 4.3. In driver-dependency plot dependency is taken as x-axis and driving power is taken as y-axis.

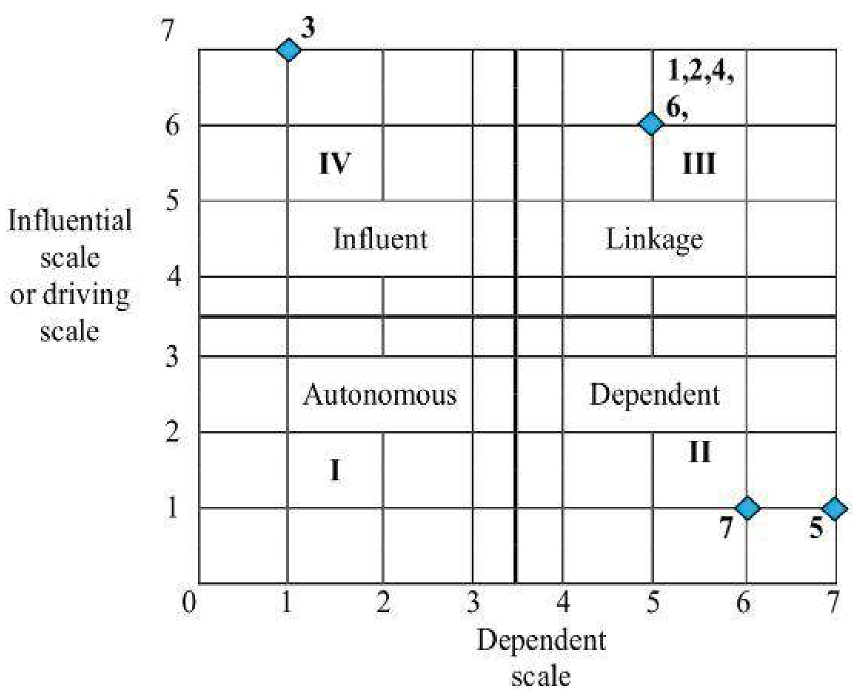

Figure 4.3: Classification of enablers based on driving power and the dependence

- Quadrant 1 shows the first cluster of the enablers, these are autonomous enablers. Autonomous enablers have weak driver power and weak dependence and do not have much influence on the other enablers and agility of supply chain. These enablers are relatively disconnected from the system with which they have only few links, which may be strong (Pandey and Garg, 2009). In the present case, there is no autonomous enabler. The absence of any autonomous enabler indicates that all the considered enablers are responsible for making the supply chain agile. Managers need to pay attention to all identified enablers.
- Quadrant 2 shows, the second cluster which are known as dependent enablers. Dependent enablers have weak driver-power but strong dependence. These enablers are especially sensitive to the evolution of independent enablers and/or linkage enablers. In the present case customer satisfaction and flexibility are in the category of dependent enablers.
- Quadrant 3 represents the third cluster of enablers called as linkage enablers. Linkage enablers have strong driving power and strong dependence. These enablers are unstable due to the fact that any action on these enablers will have an effect on others and also a feedback on themselves (Soti et al., 2011). Enablers such as virtual enterprises, collaborative relationship, market sensitivity and adaptability were classified as linkage enablers.
- Quadrant 4 shows the fourth cluster of enablers known as independent enablers. These enablers have strong driving power but weak dependence. These enablers are most crucial enablers since they can act as a controller of agility. In present study, 'use of information technology' comes in this category.

4.9 Significance of the findings of MICMAC analysis

It is of interest to know the degree to which each enabler influences and gets influenced by the other enablers in the problem under study (Poduval et al., 2015). For this purpose MICMAC analysis is used. MICMAC analysis classifies the ASC enablers into four groups based on driving power and the dependence power of the enablers. These four groups are autonomous enablers, dependent enablers, linkage enablers and independent enablers. Autonomous enablers have weak driving power and weak dependence and do not have much influence on the other enablers and agility of supply chain. In present study there is no autonomous enabler found out. The absence of any autonomous enabler indicates that all the considered enablers are responsible for making supply chain agile. Managers need to pay attention to all identified enablers. Enablers having high dependence and low driving power are called dependent enablers. These enablers are strongly dependent on other enablers. According to the present study, 2 enablers appear in this quadrant namely CS and flexibility. Third group has the linkage enablers that have strong driving power and also strong dependence. These enablers are unstable in the fact that any action on these enablers will have an effect on others and also they affect supply chain agility. Four enablers VE, CR, MS and adaptability come into this category. Enablers having high driving power and low dependence come under independent enablers. These enablers are most crucial enablers since they can act as a controller of agility. In present study, 'use of IT' comes in this category.

4.10 Justification of doing the MICMAC analysis

ISM methodology is used to identifying interrelationship among ASC enablers. MICMAC analysis is a part of ISM that is further used to group the enablers into four different categories based on their nature.

4.11 Utilization of findings of chapter 4 further in the context of thesis

The main objectives of this thesis are to develop conceptual model to evaluate the agility of supply chain (chapter 5) and to develop hybrid (AHP-GP) to maximize the agility of supply chain (chapter 7). For doing so, seven variables are considered. These seven variables are ASC enablers. Now before going to structure these two problems, it is quite important for researcher to understand the behaviour of the enablers and their relative importance as well. ISM gives the behaviour of the enablers and their relative importance.

It should be noted that the facts of chapter 4 are not utilized further in the context of the thesis. The reason for doing chapter 4 was to curiously explore more about the considered seven agility enablers.

4.12 Concluding remarks

To formulate strategies for building agility in supply chain, it is quite important for the supply chain managers to understand characteristics and interrelationship of enablers. The outcomes of this study are to develop a hierarchy of enablers using ISM and classification of enablers with the help of MICMAC analysis. A hierarchy of enablers developed in this study provides the manager with an opportunity to understand the focal areas that need attention to make the supply chain agile. A supply chain can be robust and profitable if these enablers are incorporated properly. In the present work seven critical enablers are identified for the modelling of an effective and agile supply chain. There may be other enablers to this problem but increase in the number of enablers to this problem may increase the complexity of the ISM methodology. So the most important enablers in the development of ISM model are considered. Other enablers which are least affecting to the issue have not been taken in the development of ISM model. To finalize ASC enablers the experts' help has been taken. The interrelationship and importance of each of the enabler is studied with the help of the ISM technique.