Impact of Knowledge Sharing in Supply Chain Networks

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Abstract - This work examines the importance of inter-organizational supply chain relationship from a network perspective. We have tried to find the answer of the following questions: how does knowledge sharing effect network value in an inter-organizational business network? What is the influence of knowledge sharing in creating new knowledge? This paper makes a significant and substantial contribution to knowledge generation on a number of fronts. Firstly, the study develops a substantive theory to understand the overall network level value creation in an inter-organizational business network. In recent years, a core theme within the value delivery attracts attention is supply or value chain management. In this work we have examined: which actors in the chain create value and which delivery process provides the best value for which customers? Secondly, the study contributes the better understanding of the influence of tacit knowledge sharing or experience sharing to create the network value. The role of the interaction has also explored regarding the new knowledge creation. Thirdly, the importance of “time” is considered in a different dimension for interaction process. As such, the study's contribution consists of developing a rigorous framework to unpack the new theory of network level value creation, adding a new layer to the analysis through the role of knowledge sharing among the network member organizations, providing greater understanding about the knowledge sharing, new network knowledge creation and the overall network value for the whole business network.

Keywords: Knowledge sharing, Network, Value, Supply chain, Interaction.

1 Introduction

This study deals with the area of inter-company networks or business networks, focusing on value creation through relationships with suppliers, sub-suppliers and even competitors in order to become more efficient or innovative. In recent years, increasing emphasis has been placed on the ways in which relationships link companies in supply chain and networks. Procurement has changed dramatically from being primarily an inward-directed operation with administrative characteristics to strategic. This shift has changed the perspective on the purchasing activities [14]. Efficient and effective purchasing requires a supply network perspective. When purchasing is important, then suppliers are more important- not only in the financial terms. Attaining the strategic potential residing in more efficient purchasing requires a reorientation in the view of suppliers and their resources. Forming close relationships with suppliers is a means of gaining access to these resources. For this reason purchasing issues increasingly cross the boundaries of the buying firm. However, in many cases these efforts need to be further extended. A buying company might benefit substantially from encouraging co-operation among its suppliers, for example in terms of joint activities in product development. Efficient supply chains require not only the direct involvement of supplier. Even suppliers to the suppliers must be integrated in these activities to avoid sub-optimization [19, 31]. The present development of industry often described in terms of the new economy is characterized by enhanced specialization and sub-division of activities in combination with developments in information technology. Most firms focus their operations and try to develop a more specialized competence. This means that the resources available in a network become increasingly scattered, implying that firms are dependent on access to the resources of other firms. The reality has become more and more network-like. Though relationships are not new phenomena but definitely it has become a much more focused phenomenon in current business world.

2 Conceptual Framework

2.1 The Concept of Value

A growing number of business researchers point to the pivotal importance of business relationships for value creation [7, 9, 36, 38]. The concept of value in business markets has recently attracted attention from both academics and managers and has also been widely used in the marketing discipline [5, 6, 35, 44]. The business market can be understood better by applying the concept of value. Anderson and Narus [4] regard value as the cornerstone of business market management because of the predominant role that functionality or performance plays in business markets. Given the fundamental nature of value in business markets, it is critical for firms to comprehend the mechanisms and means of value creation [11, 45]. Though value is an increasingly relevant concept but many firms often cannot define value or measure it. It is then surprising that there has been only a little research till date examining “what value is, how it is produced, delivered and consumed and how it is perceived by the customer” [40].
Value can be regarded as a trade-off between benefits and sacrifices [9, 11]. Some define value in business markets monetarily [4, 6] whereas others use a broader value definition that includes non-monetary revenues, such as competence, market position, and social rewards [44, 45]. In the context of this study we understand value as the perceived trade-off between multiple benefits and sacrifices gained through a customer relationship by key decision makers in the supplier's Organization. Those benefits and sacrifices can result from the relationship under question as well as from connected relationships on which the focal relationship has an impact or is affected by those other relationships [43].

**Figure 1: Conceptual Framework**

For the majority of current industrial marketing research concerned with value creation, the focus is on the customers' value [5, 44, 9, 36, 41]. Reasoning behind such concentration is the assumption that supplier firms will only succeed in the marketplace once they offer “more” value to their customers compared to their competitors [4, 39, 46]. Customers are becoming a key source of competitive advantage because, in addition to revenues, suppliers can gain product ideas, technologies, and/or market access, etc. from their customers [7, 15, 20, 42, 45]. Value creation is regarded as the essential purpose for a customer firm and a supplier firm engaging in a relationship [18]. This does not only apply to customers but also to suppliers. Empirical results indicate that suppliers focusing on a few selected customers achieve higher profitability in long-term relationships by reducing their discretionary costs to a greater extent than supplier firms who employ a transactional approach to deal with customers [25, 32]. A conceptual framework to generate new knowledge by knowledge sharing is shown in Figure 1.

### 2.2 Network Value and Its Categorization

In the business network, relational exchange enlarges the domain of value laterally and diversely, and can be considered the dimension of scope of relationship in relationship marketing. Meanwhile, the commitment, trust, communicating quality and experience effect on individual exchange behavior lie on the intensive development of specific exchange activity and which can be considered the dimension of the relationship depth.

Johanson and Mattsson [24] believe that in a network organization where members specialize in different functions and rely on each other, various resources and complex operations can be integrated by coordinating activities among organizations. Furthermore, those coordinating activities should include exchange and adaptation, where exchange activities refer to obtaining external resources and coordinating activities refer to balancing member relationships and to making the network tolerant. In addition to economic exchange, the objectives of value exchange within a network also include technical, knowledge, legal and information exchange [29]. Allee [2] applied an analytical diagram to demonstrate the complex exchange relationships among network members in the pharmaceutical industry, identifying different value exchange objectives and arguing that exchange value can be influenced by the relationship activities of suppliers and demanders. Furthermore, one specific exchange relationship may influence other exchange relationships, meaning that any focal relationship may generate some indirect, secondary effects [37].

When we look at business relationships both internally in an organization and with external business partners we can see a variety of currency exchanges taking place. According to Allee [2], there are two types of value exchanges exist in term of network value: tangible and intangible value exchanges [Figure 2 in the next page]. Tangible value exchanges involve all exchanges of goods, services or revenue, including all transactions involving contracts and invoices, return receipt of orders, request for proposals, confirmations or payment. Knowledge products or services that generate revenue or are expected as part of service (such as reports or package inserts) are part of the tangible value flow of goods, services and revenue. Intangible value exchanges include two primary subcategories: Knowledge and Benefits. Intangible knowledge exchanges include strategic information, planning knowledge, process knowledge, technical know-how, collaborative design, policy development, etc., which flow around and support the core product and service value chain. Intangible benefits are advantages or favors that can be offered from one person to another. Examples might be offering to provide political support to someone. Or a research organization might ask someone to volunteer their time and expertise to a project in exchange for an intangible benefit of prestige by affiliation. These are intangible “products” that can be exchanged, as indeed people can and do “trade favors” to build relationships. This research mainly deals with the intangible value (knowledge and benefits) exchanges within the business networks.

Network members can affect one another owing to the contents of value exchange they offer, the operation activities they engage and how much dependent on each other. Additionally, network members should focus on the whole network value improvement by adapting the distribution of exchange value and the degree of interdependence in different hierarchies, which may positively, negatively, or neutrally [19]. Ritter [37] identified seven relationship types of derived value among organizations, including: system selling, combination advantages, exclusive rights, mediation, competition, lobbyism and surety.
By analyzing the effect of derived relationships and identifying the exchange relationship as either unilateral or bilateral, Ritter also identified ten derived relationship models, including: neutrality, assistance, hindrance, synergy, lack, competition, unitary neutrality, initiation, by-pass and hierarchy. Though Ritter demonstrated contents and relationship models of derived value, the effects of the knowledge sharing on the network value among the business network member organizations has not yet been investigated.

![Diagram of Value Exchange](image)

**Figure 2:** Types of Value Exchange

### 2.3 Interaction Process

Interaction is at the heart of the relationship and network perspective of business markets as developed by the industrial marketing and purchasing (IMP) group [16, 19]. There was the predominant idea that business processes consist of independent actions of individual companies, directed towards a generalized group of customers, suppliers or competitors and intended to affect the group as a whole.

There are five related issues in interaction that help provide a key to understanding it. The five issues are:

- a) Time;
- b) Interdependence
- c) Relativity
- d) Jointness and
- e) Subjective interpretation.

The word “interaction” is now frequently used in academic discussions about business. There have been many papers that refer to interaction, or to its apparent outcomes or to the implications that may have for business management. But there have been only limited attempts to examine the characteristics and dimensions of interaction itself in an economic setting [12]. Increasing technological intensity and the associated pressures of cost have led companies to become more specialized and hence more interdependent with each other. This increasing interdependence has led to ever-more complex interactions, facilitated by improved communications between companies with an ever wider variety of resources and ways of operating.

All interaction has specific meanings for those involved and for those affected by it. All subsequent interaction will be based on these interpretations of that meaning by all of those who affected by it. All interaction is concerned with the physical world. The economic effects of interaction appear in the physical world and the outcomes of interaction are within the constraints of that physical world. Interaction can be seen as the interplay between different actors, but also as the interplay between the abstract ideas of those actors and the physical constrains that surround them. In this way, interaction provides the link between technology and economy. Interaction occurs between three analytical levels (firms, relationships, and network), with the firms’ actors, activities, and resources and their analogues at the relationship level (actor bonds, activity links, and resource ties) and network level (actor web, activity pattern, and resource constellation) “conditioning” each other [19].

The entwinement of social and economic exchange as firms interact in a business relationship necessarily occurs in time [21] and so is influenced by human perceptions of time. For humans, time measures the separateness of events, so that two exactly similar events can be differentiated by their timing [1]. While one can measure time from many points (e.g., 0 AD, Greenwich), the human mind must relate time to the present [13] and so events are positioned in the past, present, or future. Halinen [22] suggested an approach for business markets, with a division between horizontal time (i.e., past, present, and future of a relationship) and vertical time (i.e., variations in social, organizational, and cultural perspectives). In this approach, Halinen suggests that the present of any relationship is conditioned by the past and future and that different cultural boundary will determine the human perspective of the past, present, and future depending on the nature of the management problem(s).

A consideration of time as past, present and future immediately raises a problem: How long is the present, or what are the boundaries of the present? When does it begin and when does it end? This problem arises because, in reality, the human “present” is continuously moving and cannot be grasped as anything more than the “everlasting present” [28]. However, humans truly facing a cognitively continuing present would be immediately overwhelmed by uninterrupted complexity and so must rely on the past and the future to define an acceptable period as their present [30]. The nature of the present is determined by the time horizon of the actors’ social, organizational, and cultural perspectives [22], in conjunction with the cognitive ability of an actor. It means time limits potential interaction, for this, it is only possible to conduct inter-firm coordination in the present, and so correct timing is an issue in business relationships [23].

Time is the first and probably most important issue when analyzing interaction. Time comprises a major problem for all of those involved in interaction, whether as participants or as researchers. Time largely defines the nature of interaction as a process in which sequential events are related to each other. History matters in interaction and so do future expectations. In fact, interaction is delimited in time. It has no easily identifiable beginning or end. The interaction that take place between single actors at any one time as well as the characteristics of the actors themselves are outcome of their previous interactions, as well as of their current interactions with others and their anticipations, as well as of their current interactions with others and their anticipation of future
interactions. No matter when or where we look at interaction, what we see is the continuation of things from before. This applies just as much to the interactions surrounding the start up of an apparently entirely new company as it does to the interactions involved in the latest delivery of a continuously purchased component to a long-established customer.

The interdependencies between actors form the second issue when trying to understand interaction. These interdependencies are partly, but not solely related to time. Thus, the development and change of interdependencies are an important consequence of interaction over time. Interdependencies are also an important precursor of interaction and are an inherent characteristic of the context of interaction. Pre-existing interdependencies are built into the prevailing technological and economical structure in which companies have specialized in performing particular activities. These interdependencies, in turn are parts of larger interacted patterns of activities. In this way, interdependencies provide an important link between the technological and economic dimensions in the total structure.

One obvious characteristic of an interactive world that includes time and interdependencies is that it is relative. Actors employ their resources differently in interaction with different counterparts and develop their interdependencies differently with each of them. Ford and Håkansson [12] argued that the value of an actor’s resources is different, depending on the particular relationships in which they are employed. This relativity applies to everything when business is conducted in a network. An interaction is not described in isolation, but only in relation to others that exists in parallel or in sequence with it.

The importance of relativity in interaction raises two important issues as follows: The first issue concerns what are the appropriate dimensions of interaction in a particular setting. A consequence of relativity is that there are no simple or stable rules to enable us to determine what interaction is appropriate. The second issue of relativity concerns the way in which the dimensions of interaction change over time. Interaction always involves relative movement over time. Thus, some companies may systematically adapt towards each other and away from others through their interactions, resource investment and increased interdependence.

Jointness is one of the key elements in an interactive world. The combination of interdependencies and relatively creates opportunities over time for companies to take part in directed, collective or joint interaction with specific others. This jointness may be conscious or not. An important manifestation of jointness is that when companies interact with each other, their individual development will be affected by that interaction, rather than simply be in line with their own intentions. Another aspect of jointness is that the interactions of any two companies together will be affected by their respective interactions with third parties. Jointness reduces the importance of an actor’s own intentions and increases the importance of the combined intentions of interacting parties in relations to others.

Jointness provides important opportunities for the participants in interaction, but it is also important to note that these opportunities can always be disregarded by those involved.

Subjective interpretation is the final issue of identifying characterizing interaction. Interpretation is an outcome of the bounded rationality of an individual actor. At the simplest level, subjective interpretation means that the actions of actors will be based on their individual interpretation of the actions of others and of the world around them. One important consequence of this for the researcher is that subjective interpretations separate the reasons for actions from their effects. These effects will relate more to how actions are interpreted by actors than to the original reasons for those actions. Interpretations means that the subjective dimension becomes important, as there will be variation between the interpretations of different actors. Subjective interpretations are not random but are a consequence of actors’ previous experiences of actions, re-actions and re-reactions.

3 Reason for Focusing on Knowledge Sharing

Knowledge sharing is essential for the functioning of any business network as it influences the interaction between the network actors and the outcomes they are able to achieve. Without the capacity for sharing knowledge, no business network can utilize the specialized resources and capabilities of its members, nor can it co-produce new knowledge. Thus, knowledge sharing is a critical factor in terms of its relative competitiveness [8, 27]. In order to articulate knowledge sharing, a basic conceptualization of the concept of knowledge is needed. Most scholars divide knowledge into explicit/codifiable knowledge or information, and tacit knowledge or know-how [34]. Information is seen as easily codifiable knowledge that can be shared between actors, presuming that the “syntactical rules required for deciphering it are known” [26].

By comparison, know-how involves knowledge that is tacit, ‘sticky’, and difficult to codify and transfer [33]. A more fundamental question is whether knowledge and knowledge work are viewed primarily from a functionalist and rather unproblematic perspective, or whether one recognizes the inherent ambiguity and rhetorical character, as emphasized by Alvesson [3]. Knowledge sharing thus refers to sharing not only codified information, but also beliefs, images, experiences and contextualized practices. Inter-organizational interaction research shows that this is essential for creating mutual knowledge and expectations between network actors. It is only through knowledge sharing that a base of jointly held knowledge, necessary for mutual understanding, can be created and maintained [4]. This jointly held knowledge base is vital for the evolution of mutual trust between the network actors, and there is strong evidence that trust is a necessary condition for any deeper inter-firm cooperation.
4 Research Method

Agent Based Modeling (ABM) technique is proposed to analyze the problem and simulate. ABM becomes established as one of the key methodologies for understanding complex socio-economic systems. It determines overall behavior of a system, constructed of many individual entities, the agents, some or all, intelligent and adaptive, representing individual behavior and interactions and allowing computer simulation through time to determine system outcomes. The methods of building the agent behavior and the connectivity of the agents as a population are crucial elements. The ABM is capable of modeling bottom-up effects as well as modeling top-down effects, arising at the collective level and influencing the level of individual agents.

The reason for choosing the ABM for this research is the dynamic nature of the relationship within the business network. The value creation process is complex and dynamic in nature. In general, the main purpose of agent based modeling is to help in developing new and formalizing already existing theories. Namely, with regard to the process of formalization, which includes precise formulation of a theory, as well as securing its coherence and completeness, computer simulations in social sciences can be said to have the role similar to mathematics in natural sciences. As aspects that make computer simulations more appropriate for formalizing social science theories than most of mathematical models, it is possible to identify the following ones [17]:

Programming languages are more expressive and less abstract than most mathematical techniques;
- Computer programs deal more easily with parallel processes and processes without a well-defined order of actions than systems of mathematical equations;
- Programs designed in accordance with the principles of software engineering are modular, which facilitates their modification; mathematical systems often lack this kind of modularity;
- It is easier to build simulation systems which include heterogeneous agents- for example to simulate organization with different perspectives on their business network, different stocks of knowledge, different capabilities and so on- while this is usually relatively difficult using mathematics.

Some other reasons to choose the agent based modeling for the research includes the following advantages of ABM [10]:
- Possibility of modeling more “fluid” or “turbulent” social conditions when modeled agents and their identities are not fixed or given, but susceptible to changes that may include “birth” or “death” of individual agents, as well as adaptation of their behavior;
- Possibility of modeling bounded rational agents, making decisions and acting in conditions of incomplete knowledge and information;
- Possibility of modeling process out of equilibrium.

5 Conclusions

In this paper we have proposed a framework for value creation through relationships with suppliers, sub-suppliers and other associates including competitors in the area of inter-company networks or business networks. An exclusive potential issue has been identified and critically analyzed. A business organization could be benefitted several ways by interacting and sharing knowledge between different agents. The corresponding issues to interact effectively are discussed and the current state of existing work also has presented briefly. A thorough investigation and experiment with real life data is desirable to evaluate the outcome of the proposed framework which could be the agenda of future work.

References


