Value Creation In A Virtual Network Organisation

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Abstract

Global competition and rapid changes in industry structure are encouraging organisations to address needs for flexibility and real-time value creation and delivery (Achrol, 1997; Eggert and Ulaga, 2002). The objective of this paper is to develop a framework to guide the real-time creation and delivery of customer value in a virtual network organisation in the business-to-business sector (B2B). The proposed theoretical framework explains how superior customer value can be generated through the application of an Intelligent-Agent System (IAS) in which agents simultaneously represent customer focus, customer orientation and market orientation.

Keywords: virtual network organisation, customer value, value creation, customer focus, customer orientation, market orientation

Virtual Network Organisations

Various organisational forms have emerged from the formalisation of relationships between, for example, suppliers, competitors and other vertical or horizontal partners from the early 1990s. Achrol (1997), and Cravens and Piercy (1994) explained these new organisational forms as "networks" or, where predominantly managed electronically, "virtual networks". Thus, in a virtual network, the IT architecture links actors, and overarches managerial agreement, with little physical interaction across network actors and network clients.

There is general agreement that the purpose of a network is to maximise advantages of the various core competencies of members within the network, operating as a single organisation across partner organisations to address ever-changing demand. Ideally, network information is processed and distributed in real time throughout the entire network, which allows network management to make decisions and coordinate actions quickly in their drive to deliver value and build customer satisfaction. Networks create an opportunity for different organisations to come together and concentrate on projects that could not be completed by one or two organisations acting independently (Hale and Whitlam, 1997; Franks, 1998; Pihkala, Varamaki and Vesalainen, 1999; Wang, 2000; Lau, Wong, Ngai and Hui, 2003).

In forming networks the major purposes of partners are to gain the flexibility to serve the rapidly changing and competitive marketplace, to share and develop the knowledge and skills needed to compete, to achieve operating best practice and create additional value or benefits for their customers (Cravens and Piercy, 1994; Mowshowitz, 1997; Franks, 1998). In particular, virtual networks have the infrastructure through which to capture, and interrogate customer and market data efficiently and effectively, providing management with real-time options to advance the customer's value proposition.

Customer Value Research

Customer value has proven to be a difficult concept to define and measure (Woodruff, 1997; Zeithaml, 1988). However, most researchers view customer value as the results or benefits (of goods or services) customers receive in relation to total costs (such as price paid plus other costs related to the benefits) (Christopher, 1996; Zeithaml, 1988; McNaughton, Osborne and Imrie, 2002; Kotler *et al*, 2003). An extension of this view, and important to this research, is Woodruff's (Woodruff, 1997) value hierarchy which recognises how the value is reconfigured by customers over time, and, prior to repurchase, considered within context of value generated during consumption or use, compared to overarching goals.

Customer value in the B2B context should be considered as the trade-off between the multiple benefits and sacrifices of a supplier's offering, as perceived by key decision-makers during consumption and repurchase deliberations, taking into consideration the available alternative supplier's offering in a specific use situation and organisational goals (Eggert and Ulaga, 2002).

Value Creation in Virtual Network Organisations

Recent research has identified the cultural, structural and process barriers that face organisations as they strive to retain a customer focus while becoming market oriented (Hadcroft and Jarratt, 2004). The authors argue that structures, systems and the culture that supports a market orientation will limit a firm's ability to exhibit customer intimacy and may subsequently decrease the ability of the firm to delight its customers. A virtual network, as defined above, facilitates the introduction of intelligent agents that can simultaneously adopt multiple orientations for network engagement with the market and its customers.

In the real world, an organisation will adopt a cultural orientation and values most relevant to its life cycle position and competitive strategy, and will build systems and processes to support that orientation. Harris (1998) provides examples of organisational values; orientations towards teams, outcomes, details and cultural artifacts of structure, strategies and systems that shape employee behaviour. He also refers to the assumptions about the interaction between an organisation and its environment contained in mental models that managers embrace to make sense of their environment (Day and Nedungadi, 1994). These assumptions, Harris argues, "are the most cerebral level of culture.... which determine the more explicit systems of meaning" (1998, p. 356). Such systems of meaning are the foundations of alternative cultures and perspectives.

In general market-oriented businesses are committed to understanding both the expressed and unexpressed needs of their customers, and the capabilities and plans of their competitors through the processes of acquiring and evaluating market information in a systematic and anticipatory manner (Slater, 2001). As compared with market-oriented organisation a firm implementing a customer-oriented approach concentrates effort on customer problem solving, identifies generic customer needs and come up with efficient and effective solutions (Kotler, 2000). Market orientation implies attention to both the representative needs of the generic category of customers of a firm's goods and/or services i.e. a customer orientation and to competitors, i.e. a competitor orientation, although more recently the interests of other stakeholders have been incorporated within its domain. In organisations with a manufacturing platform, a customer orientation embraces both the representative needs of a customer category and development of production best practice to meet those needs (Hadcroft and Jarratt, 2004). Within decentralised structures where there is an absence of an enterprise-wide customer or market orientation, a heightened sense of responsiveness to multiple stakeholder requirements can exist at both the acute customer focus level and at the customer-oriented level. Such diversity in focus is unlikely to exist in centralised structures.

The cultural constraints of the real world are invisible in a virtual world. In a virtual world, intelligent systems can deliver value generated in response to systems of agents capturing value requirements through drawing on teams of agents simultaneously representing client organisation needs, client organisation's customers' needs, collective learning from customer groups, competitive action, technology changes and other resource changes.

In order to achieve high levels of customer satisfaction, retain customers over time and build market share, an organisation must deliver ever-improving value to its customers (Alomaim, Tunca and Zairi, 2003). Through identifying, simultaneously, factors impacting on the environment of its client base and their customers, best practice across the current client base and specific clients can be captured within the value definition. Business services that can be

reconfigured and re-delivered as such knowledge emerges provide a real-time, proactive value option, providing new value consideration dimensions to Woodruff's value hierarchy.

To achieve real-time value creation within the virtual network organisation, intelligent-agents can participate and play an important role in identifying components and forms of value appropriate to achieve customer satisfaction for both client organisations and their customers. Thus, the three major opportunities presented in business service delivery via a virtual network are a) expanded data resource access, b) a simultaneous focus on individual customer needs and the generic needs of customer groups and c) the synthesis of knowledge from simultaneous orientations that are transformed pro-actively in real-time into enhanced value delivery.

Proposed Conceptual Model Value Creation in a B2B Virtual Network Organisation

Figure 1 illustrates a virtual network organisation containing three network partners and three different business customers. The theoretical model adopting simultaneous cultural domains of a customer focus, a customer orientation and a market orientation relies on its network partners' resources to generate value laden services for client organisations, minimising production costs and producing the value in real time. Intelligent-agents monitor the processes, execute any specific tasks given, integrate value attributes and thus assure service quality.

Network Partner 1 Network Partner 2 Network Partner 3 Customer-oriented Network Organisation Virtual Network Management Structure Intelligent-Agent Systems (IAS) Market Orientation Customer Orientation Manager (MOM) Manager (COM) Network Relationship / (Mobile Agent) (Best Practice Agent) Coordinating Manager NRCM Customer Focus Superior Customer (Collaborative Agent) Manager (CFM) Value Manager (SCVM) (Monitoring Agent) (Recommending Agent) Existing Client Organisation 1 Existing Client Organisation 2 New / Potential Client Organisation Value requirement Change in required value-Superior solutions for new client-Repeat value-New solutions for existing Change in client organisation's customer needs, Based on previous experiences generated from COM, integrated with client provided through the picked up by MOM & confirmed with CFM via SCVM in response to CFM. NCRM. Solution reconfigured and offered via CFM via the NRCM and deliver thru SCVM during consumption.

Figure 1: Intelligent-agents in a virtual network organisation

The connections among the network partners are the information and knowledge exchanged and the services that are transferred from one to another. The Customer Focus Manager (CFM - Monitoring agent) monitors and adapts value based on the client's specific needs and feedback. In addition to drawing on feedback accumulated by the CFM, the Market Orientation Manager (MOM - Mobile agent) moves from its home server to network partner servers to retrieve reliable data on the client organisation's customers and transfers that value relevant data back to the home server for integration with the Customer Orientation Manager (COM - Profiling / Best Practice agent) through the Network Relationship Manager (NRM - Collaborative agent).

The COM will be capable of analysis, suggesting best practice solutions and solution changes from data retrieved from network partners and the CFM's of client organisations with similar

needs and regulatory requirements. Those best practice solutions will then pass over to the Superior Customer Value Manager (SCVM - Recommending agent) via the NRM. The SCVM will then have access to the necessary knowledge and real time information to deliver a quality solution to resolve any ad hoc requirements specified by the clients or potential clients. Each agent is thus responsible for performing duties that are assigned depending on that agent's characteristics. A virtual value solution system integrating multiple-agents will have a common infrastructure and agent architecture to support system functioning, specifically, sharing of data, processing resources across networks, exchanging information and collaborating on tasks.

Experimental Research Design: Creating an Intelligent System through Evolutionary Programming of Agents

Research on intelligent-agents or agent-based systems began in the late 1980s (Jennings and Wooldridge 1998). In the early 1990s the focus shifted to the learning capability of agents (Kupfer, 1994; Maes, 1994). Subsequently, the intelligence capability of such agents was explored with a view to their mimicking human actions (Jennings and Wooldridge, 1998).

An agent is a program that provides an ideal method to investigate cooperating activities (Jennings and Wooldridge, 1998). Agents assist users through hiding the complexity of difficult tasks, performing tasks assigned by the user and undertaking multiple different activities and procedures (Riecken, 1994; Maes, 1994). An agent is a program that performs a specific task with a minimum of direct human supervision. An intelligent-agent system (IAS) can combine computers and humans, working cooperatively in space and time to solve complex problems.

The effective functioning of this virtual network organisation experiment relies on an automated business planning / execution system, the heart of which constitutes a set of software agents simulating personnel in a conventional organisation. The success of this IAS working in real / quasi-real time relies heavily on the intelligent behavioural characteristics of the participating software-agents. Hence, these behavioural characteristics need to be properly defined and programmed into the system in such a way the agents achieve the capability to plan and execute their tasks while optimising the performance of the network as a whole.

The first stage of the research design requires the development of a set of theoretically derived rules to define the agents. However, due to complex nature of business decision processes and inter-agent communication requirements, designing a set of rules based on rigid conditions of activation does not render an optimum methodology to define the behavioural characteristics of these agents. Instead, the design process requires an intelligent framework which is *flexible* and can handle ambiguity and vagueness associated with the decision making processes in typical business environments. Towards this end, we employ Fuzzy Logic (FL) which belongs to the paradigm of Artificial Intelligence (AI), as a tool to define the action-rules of these software-agents. This approach presents an opportunity to experimentally test the theoretical framework with the objective of advancing Woodruff's value hierarchy theory within this context.

Fuzzy Logic Rules

To demonstrate the integration of fuzzy knowledge bases, within restricted space limits, we give below some fuzzy logic based rules as examples. These rules depict how fuzzy set theory and fuzzy if-then rules can augment the strategic decision making capabilities of software agents in a human like manner using imprecise and vague input information. The ultimate goal is to predict changes in value design in changing environments and customer demands. Table 1 explains five different types of variables that can be used within the fuzzy rules and

represent the action-rules of the IAS. We give below, a set of example fuzzy rules for each of the three(3) customer situations that could exist in relation to a virtual network organisation.

Table 1: Explanation of variables

Variables:	Explanation:
Customer_Experience	History, past experience of existing clients.
New_Solution	New ideas, outcomes or extra value for existing clients.
Customer_Desirability	Potential of new client's interest and determination to do business with us.
Standard_Solution	Standard value or solution improved by past experience that can be provided to new client organisations.
Repeat_Value	Previously delivered solution that can be re-delivered to existing client organisations.

Existing client 1 (new solution):

If Client_Experience is HIGH and New_Solution is LOW then Focus_Priority is HIGH

If New_Solution is HIGH and Client_Experience is LOW then Focus_Priority is MEDIUM

If Client Experience is HIGH and New Solution is HIGH then Focus Priority is HIGH

(1) If Client_Experience is LOW and New_Solution is LOW then Focus_Priority is HIGH

New client (standard solution):

If Client_Desirability is HIGH and Standard_Solution is LOW then Focus_Priority is HIGH
(2) If Standard_Solution is HIGH and Client_Desirability is LOW then Focus_Priority is HIGH
If Client_Desirability is HIGH and Standard_Solution is HIGH then Focus_Priority is HIGH
(3) If Client_Desirability is LOW and Standard_Solution is Low then Focus_Priority is HIGH

Existing client 2 (repeat purchase standard solution):

If Repeat_Value is HIGH and New_Solution is LOW then Focus_Priority is HIGH
If New_Solution is HIGH and Repeat_Value is LOW then Focus_Priority is MEDIUM
If Repeat_Value is HIGH and New_Solution is HIGH then Focus_Priority is HIGH
(4) If Repeat_Value is LOW and New_Solution is LOW then Focus_Priority is HIGH

As an example, the first rule can be explicitly stated as: If the *Customer_Experience* has been 'high' and *New_Solution* requirement is 'low' then, for example, the Superior Customer Value Manager (Recommending Agent) modifies its behaviour so as to set its 'Focus_Priority' (the Recommending Agent's response towards the respective client) parameter to HIGH. Many of the rules are self explanatory, however some require further detail (marked as 1, 2 3 and 4 above). In cases 1 and 4, although we deal infrequently with this existing client, and they rarely request a new service the network's objective is to leverage additional value and to create close relationships with their clients. Therefore, 'Focus_Priority' for both these situations is HIGH.

In a similar manner, in situation 2, although the customer is not a current purchaser of the network's business solutions, however, if we are capable of providing value, then the virtual network organisation will seek to leverage the value and create a close relationship with this potential, new client organisation. Therefore, the 'Focus_Priority' is classified as high.

Finally in situation 3, the customer's solution requirement is not closely aligned with the solution expertise of the network and thus it would be difficult for the network to tailor-make a solution that perfectly matched this potential client's request based on our past experience alone. However, through the co-ordination of intelligent agents within the virtual network organisation and the support of our network partners, an improved solution can be generated and superior customer value offer will build a relationship with this new client. Therefore, again, the 'Focus_Priority' is set to be HIGH. It is to be noted, as opposed to classical crisp logic, that these decisions are made analogous to a human decision using the fuzzy set theory.

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