

A Supply and Value Chain Management Methodology for the Internet Environment

by

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Abstract

In this paper we try to tackle following problems: How it is possible to combine theory and practice in the Internet environment? How it is possible to combine fast technological development and sound commercial progress? How it is possible to create a common view to small and medium size companies as well as to big international enterprises in Internet environment? To answer these questions we need a bridge between theory and practice, i.e. a good methodology with practical methods. The result of our theoretical research has revealed a new management methodology both for supply and value chains.

1. Introduction

In many companies and especially in small and medium size companies e-business and e-environment have been a problem in practice. People in small and medium size companies have not had time enough to go through important technological aspects of the Internet environment. They have not had time enough to think their companies' internal and external business processes especially how to change them according to the new requirements. On the EU-level there has been also a problem how to organize facts and rules round this new technology and how forcefully should EU policy makers sell this new technology to small and medium size companies (cf. Deeds-project objectives). The question has been raised: What kind of policy is needed for this new Internet Business Media?

In this paper our aim is to construct a new theoretical framework to help both businessmen and policy-makers to manage this challenging new environment. The main idea is to look at both supply chain and value chain from a systemic view and to create constructs, concepts and variables for managing purposes.

The basic idea of our methodology is described in the following Figure 1. We start with different management theories and combine the new business environment with different methods to the theoretical framework.

In the theoretical side we analyse both supply chain and value chain in detail, i.e. we use management theories to find first main constructs and concepts, which are fixed to supply and value chains. We then find out the main characteristics, parameters, variables and indicators, with which we can position the company position in supply and value chains and find out the new paths for business change processes. The overall metaphor we are using is "Digitizing Business Practice".

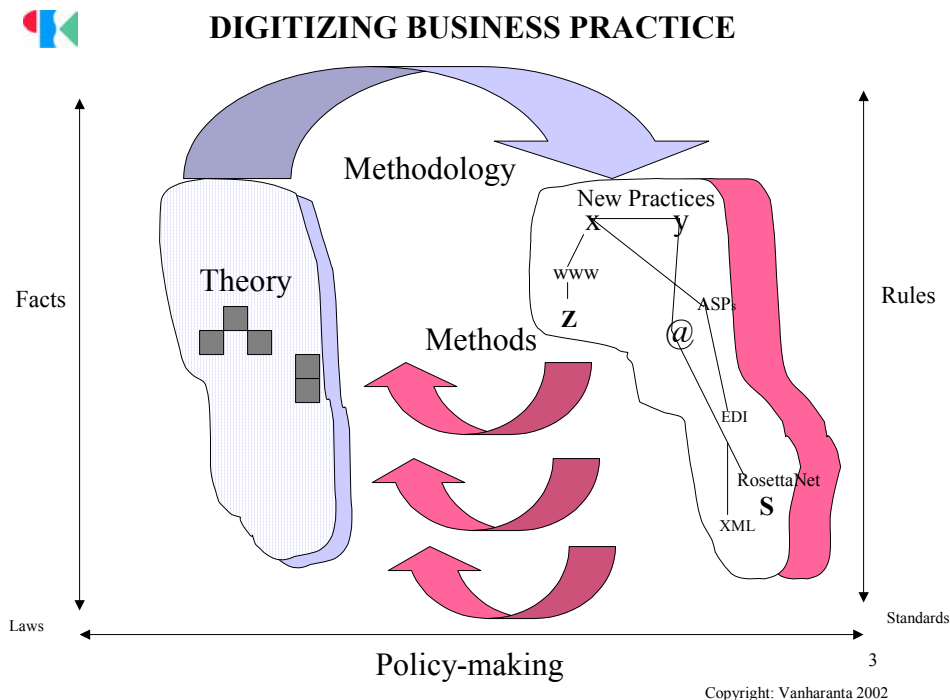


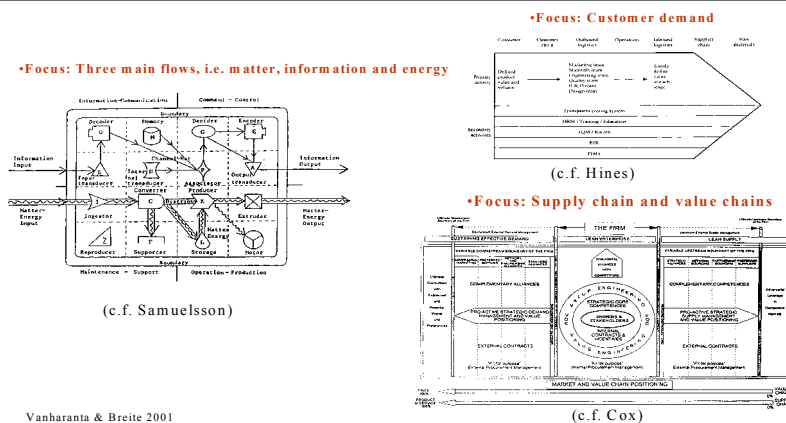
Figure 1.1. Digitizing Business Practice

2. Analysing Current Supply and Value Chain Management

In this study the supply and value chains are separated so that both concepts are dealt-with and analyzed apart following in many ways Samuelsson's Systemic view (See figure 3.3). On the theoretical level this course of action means that supply chain and value chain are two different concepts that have to be studied separately. This research view is supported by Porter's (1985) and Cox's (1996) descriptions of the supply and value chain (Figures 3.4 and 3.10). Porter (1985) stressed the managing of the value chain and supply chain in a single separated part of the network. This focus was based on the view of competitive advantage throughout the whole value system. Cox (1996) has developed more holistic (network) view of supply and value chains (See also Hines figure 3.6.). The basic idea of these views are that at the beginning of the supply and value chains the supply and value for the customer both are 0 % and after the whole "value creating process" (at the end of the supply chain and after all the companies' value chains) the value for the customer is 100% and the products/services are fully delivered. This, in turn, according to Cox means that the company has to control its suppliers and their core competencies continually, because the suppliers' core competencies have to support the company's own core competencies (Cox 1997, cf. also Kidd 1994).



Theory of systems, chains, networks, etc.



Vanharanta & Breite 2001

Figure 2.1. Theory of Systems, chains and networks

As a result, we can conclude that the company should maximize its own value adding and “minimize” number of suppliers. Thus it is able to control its own supply chain in a holistic manner. The basic idea of these different descriptions is to find properties which affect effective and efficient material, information, and capital (funds) flow between the “lowest” supplier and end customer in the supply chain.

A detailed and separated examination of these two chains is important because it makes to possible to find out the real properties behind the supply and value chains. After revealing the properties it is possible to manage these chains and we can start to speak supply and value chain management.

3 The Supply and Value Chains

3.1 The Supply Chain

For a company, the supply chain is normally a big and wide concept that describes the means by which the company produces products or services to meet its customers’ needs. It seems to play a key role in the modern efficient manufacturing concept. In most cases, however, a total or full supply chain concept consists of several networked companies, which all have the same basic objective: “to fully meet customer requirements”. (See eg. Handfield and Nichols 1999, Hughes et al. 1999)

In the New Economy, information and information technology seem to drive the supply chain to new requirements and dimensions (cf. Evans and Wurster 2000). To understand these new demands in the supply chain and in supply chain management, it is important to analyze the supply chain and supply chain management in detail. It is also important to know what kind of elements the supply chain consists of and what are the main characteristics with which it is possible to manage the supply chain in the best possible way.

To better understand the new trends in the supply chain it is good to go through the latest definitions from the literature. Kalakota and Whinston (1997) define the new supply chain as follows: “*A supply chain is a collection of interdependent steps that, when followed accomplish a certain objective such as meeting customer requirements*”. Aitken (1999) defines the supply chain as: “*A network of connected and interdependent organizations mutually and co-operatively working together to control, manage and improve the flow of materials and information from suppliers to end user.*” Tan et al. (1998) describe the supply chain in slightly different words: “*A supply chain is a network of business units and facilities that procure raw materials, transform them into intermediate goods and then final products, and deliver the products to customers through a distribution system.*” Handfield and Nichols (1999), in turn, emphasize the importance of the material and information flow so that the supply chain encompasses all activities associated with the flow and transformation of goods from the raw materials stage (extraction), to the end user, as well as the associated information flows. Material and information flow both up and down the supply chain. Hughes et al. (1999) have highlighted different types of supply chain. According to them, supply chains have to be examined in totally different ways in different business situations. Saunders (1997) stresses the business strategy and manufacturing views in the operational levels of the supply chain. Poirier and Reiter (1996) concentrate optimization of the supply chain. The supply chain should be an error-free, totally efficient network, from original supply to final consumption. Also the Supply Chain Council’s SCOR-Model emphasises efficient optimization of the supply chain (see <http://www.supply-chain.org>). The SCOR- Model itself is based on the standardized and structured model. With the help of this model, the supply chain can be optimized to a reference level by using information technology tools.

Each of the above mentioned definitions stresses that the supply chain consists of interdependent organizations of suppliers and that the supply chain consists of different business processes controlled by these organizations. It is therefore important to all member companies of the supply chain to know how materials, services, and information flow through the supply chain from the “lowest” supplier to the end customer in the most efficient way. In many cases the supply chain seems to be a tool by the help of which a set

of networked companies compete against another set of networked companies in a specific market. It is therefore also important to understand how to manage the supply chain and what it looks like.

On the basis of the above mentioned and other supply chain literature, the researchers have picked up main features (characteristics) of supply chain to be used for purpose of supply chain management. These properties roughly cover the general features of current supply chain concepts but they do not define the supply chain concept in general terms. With the help of these properties this study tries to describe the “mechanisms” which further efficiency and effectiveness of the supply chain. In the classification below some of the features are clearly overlapping and the differences between the properties are not therefore absolutely clear. However, using these properties, a single type of supply chain can be analyzed to find its own specific characteristics.

Comparison of the Features

The features were compared with Croom’s et al. “Content-oriented Criterion” (Croom et al. 2000).

On the basis of a rough interpretation of Figure 3.1, the following could be said:

1. All of the researched and found features are presented in the content-oriented criterion and as a result of this it is supposed that the features represent essential characteristics of the supply chain. It is assumed that characteristics of the supply chain can be managed using these thirteen different features.
2. The main goal of the content-oriented criterion is more in the transactions of the supply chain.
3. The Chain Approach category seems to be better than the Network Approach if added value will be the basis of study.

Content-oriented Criterion	Chain Approach												Network Approach												All Over				
	Dyadic Supp. Manuf.				Dyadic Manuf. Distr.				Chain Suppl.- Manuf. -Distr.				Network Upstream			Network Downstream			Network Whole			Relationship	Knowledge	Information	Assets				
Properties of Supply Chain	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	Relationship	Knowledge	Information	Assets	
Number	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	
	Efficiency of Material Fluidity	Efficiency of Information Fluidity	Efficiency of Funds Fluidity	Utilization of Manufacturing Competencies	Understanding the Relationships of Upstreaming	Understanding the Relationships of Downstreaming	Capabilities of Technology Networking	Capabilities of Communication Networks	Suitability of Core Competencies	Accessibility to the Virtual Supply Chain	Ability to Collaborate	Holistics of Adding Value	Transparency of Activities																

- Content oriented criterion contains this property
- ◐ Content oriented criterion contains partially this property
- Content oriented criterion does not contain this property

Figure 3.1 The features of the Supply Chain

Classification of Supply Chain Management

Our classification of supply chain management based mostly on business management and decision-maker's view. The aim of this view is to help decision-maker describe his/her company's current supply chain management in the company's business context. Moreover, the aim is help decision-maker to develop company's supply chain management. Our examination view is little bit different than "conventional" literature view of supply chain management. For example, Saunders (1997) describes supply chain management as containing different relationships between suppliers and as controlling supplies in the supply chain. He also stresses that supply chain management does not form company organizations. Monczaka et al. (1998) in turn see that a strategic view in supply chain management is important. The chain has to contain elements that guarantee a fast information flow between each of the member elements. The whole supply chain must also be agile and flexible in order to compete effectively and to respond quickly to changing customer demands. Kuglin (1998) has found that supply chain management varies from one enterprise to another. His definition of supply chain management for a manufacturer stresses the concept of extended enterprise, which means that a company produces a product and/or service that is, low-cost of high-quality and delivered quickly to the marketplace. In this way customer-centred supply chain management extends the concept to cover the whole life cycle of the product and service, as well as customer satisfaction. Taylor (1999) further combines logistics management and purchasing management to the supply chain and Handfield and Nichols (1999) would like to create a sustainable competitive advantage.

The different definitions and views of supply chain management mentioned above do not cover all supply chain management descriptions. A final and overall description has not yet been made. (see e.g. Croom et al. 2000, Saunders 1995, Cooper et al. 1997, Cox 1997) However, they all give us a possibility to find important constructs behind supply chain management. According to our analysis the impact of the supply chain management seems to lie on two constructs: *The Knowledge Level of the Supply Chain* (Commercial

Challenge) and *the Utility Level of Technology in the Supply Chain* (The Technological Challenge). These constructs form the basis of our research dimensions.

The Knowledge level of the Supply Chain -construct describes the knowledge level in the supply chain. If the knowledge level is high all the individual members of the supply chain are conscious of their own position in the supply chain and they know how to add value to the supply chain. A low level means that the member companies do not know or understand the meaning of the supply chain concept (see Figure 3.2).

The Utility Level of Technology in the Supply Chain -construct describes what state of technological readiness the members of the supply chain possess. If the level of readiness is high, the use of IT between the members is formalized and structured (e.g. extranet, EDI etc.). If the utility level is low a single member may possess good technological readiness but no uniform system or policy for the use of IT exists between the various functions in the supply chain. By using these two constructs as factors, it was possible to roughly classify supply chain management into four different management categories, i.e. *Functional Management*, *Information Network Management*, *Technical Network Management*, and *Dynamic Network Management* (see Figure 3.2).

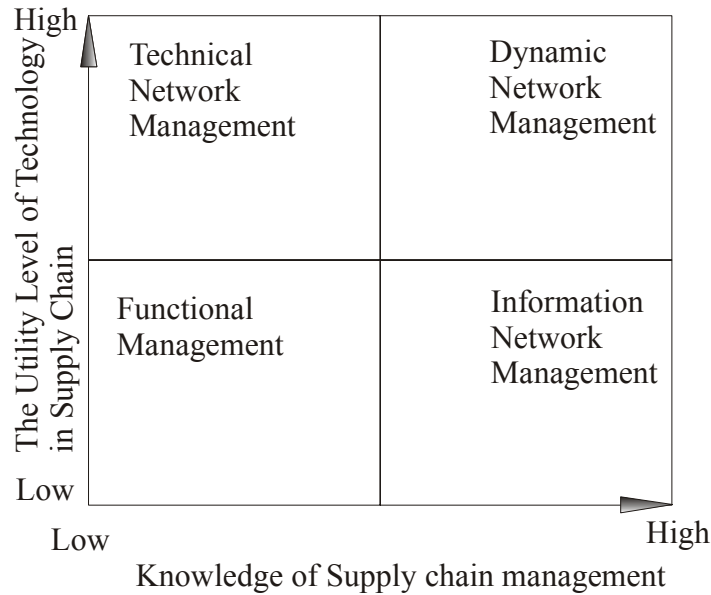


Figure 3.2 Classification of Supply Chain Management

Functional Management

Companies that follow **Functional Management** are companies that do not use long-term contracts and do not like to build partnerships. This means that they do not co-operate with other companies and that their business activities are mostly based on the “ad hoc” - principle. These companies are not used to utilize IT in their normal external activities and they do not belong to any formalized business network.

Information Network Management

According to our evaluation the **Information Network Management** area contains the companies whose purchasing and supply chain management is already very well developed on the conceptual level. The companies have formed an active network, which has clear and consistent objectives. Every member in the supply chain has a structured and qualified position in the network, where all member companies know the needs of their end customers. Moreover most agreements between different companies are based on the “win-win” principle. In this area integrated use of IT is still low. Typically the companies have their own IT systems, but they do not have special applications, e.g. EDI or Extranet, to be used for horizontal and vertical integration in the supply chain.

Technical Network Management

The companies which, in general, have a very well developed IT system, for example EDI, Extranet and Internet, belongs to the **Technical Network Management** area. The companies use IT to move their own business processes to another company but only temporarily. The companies do not commit themselves to the network or supply chain, so the barrier to entrance into and exit from the supply chain or the network is low.

Dynamic Network Management

The demands of the **Dynamic Network Management** area come from the concepts of extended enterprises and virtual supply chains. In the virtual supply chain companies have organized material, information, product, service and funds flows for example according the model of Christopher (1998). The system creates a common information “highway”, which the companies control by means of IT, i.e. with different EDI, Intranet, Extranet and Internet applications. The relationship between different network members is based on partnership, which in most cases is based on the “single sourcing”-principle. All members have the same goal: to provide superior logistics, to erect barriers to entry for competitors by means of the supply chain, and to satisfy customer needs. In several cases the companies have integrated their business processes and value chains to correspond to the supply chain needs by means of IT. This type of supply chain management fulfils most of the above mentioned general properties (c.f. Figure 3.1).

By using the above mentioned two constructs and four categories, it is now possible to find a new challenge on supply chain management. This new potential area of supply chain management is illustrated in Figure 3.3.

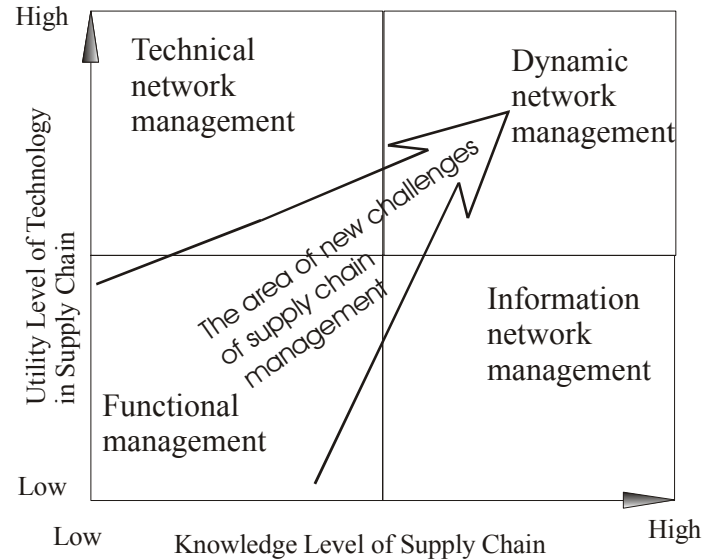


Figure 3.3 Development of Supply Chain Management

The company reaches the Dynamic network management area in its supply chain management by adding knowledge, information, and utilizing of technology to the company's purchasing and supply functions. As Figure 3.3 illustrates, both development activities are needed and they should be in balance.

In the development process the above mentioned features should be utilized. The features used are chosen so that they fit the company's business situation in the best possible way. It is important that the company forms a measurement system. With the aid of this measurement system, the company can control the development process.

3.2 Value Chain

In general, value adding can be examined mainly through two different ways, which have also functional as drivers of several different value chain concepts. In the first case, the scope of examination focuses on the company itself. In the second case the scope emphasises the company's customers. The first view is based mostly on management accounting. Management accounting has the general value-added approach,

which stresses the importance of companies knowing which activities add value to the customer (Innes and Mitchell, 1995). It could also be said that management accounting concentrates on a company's capability to add value by transferring used resources and invested capital to operating profit. Especially cost accounting, which concentrates on the used resources and handles added value in a product oriented way (see e.g. Horngren and Foster, 1991). It examines how to allocate different costs to a product and how different activities add value to the product. Economic value added (EVA) focuses on the company's capability to add value in the context of invested capital and the cost of capital. Thus EVA is a residual income measure that subtracts the cost of capital from the operating profits generated in the business (Stewart, 1991).

The second main examination method contains several different points of views. In the supply chain view, if a company wants to be an active member of the supply chain, it must add value either directly or indirectly to its end customers. In this case the main point is the holistic view, where value is added to the whole level of the supply chain. This means that single company must know the demands of the supply chain and how to satisfy these demands. If the company's added value is examined from the supply chain management point of view, the company's ability to add value to the whole supply chain is essential. What is also essential is a single company's ability to acquire value from its suppliers, and the way it delivers added value further to its customers.

When the company adds value directly to the end customer, it is essential to know how to create this value for the customer and what things affect and form the customer's value thinking (see e.g. Porter and Kramer (1999), Kim and Mauborne (1999)). Vandermerwe (2000) also stresses that the value-adding processes should not contain value gaps or discontinuities. Day (1990) emphasizes value superiority, where customers take into account perceived costs and perceived value. Barsky and Ellinger (2001) stress the role of reverse logistics programs, which add value when goods need to be disposed of, returned, or exchanged. In these point of views the examination concentrates on the relationship between company and its single customer or customers. So the goal of the company is to satisfying holistic way its customers' needs.

In the New Economy view, the main point of value-adding processes is correct management of information, which is an essential element when the company adds value for its customer (cf. Evans and Wurster 2000). In this examination information, form of information (bits), and information technology are the essential elements, with the help of which the company adds value for its customers. Thus these elements also create new value adding possibilities and capabilities for companies.

As mentioned above, different examination views of value adding have led to several different value chain concepts. This also means that value chain concepts, especially their features, are needed more as well as new kinds of examination. The following chapters will try to at least partially decrease the above mentioned examination needs.

Value Chain Definitions

In general a single company's value adding is described by using the value chain concept. The content of the value chain concept varies in several cases, but a very popular value chain concept is Porter's value chain. Porter (1998) describes the value chain: "*A company's value chain is a system of independent activities, which are connected by linkages. Linkages exist when the way in which one activity is performed affects the cost or effectiveness of other activities.*" Linkages' role in the value chain is essential. They illustrate how the single activity affects other activities, thus serving as an important source of competitive advantage and value adding. (Porter, 1985)

Currently the development of IT, e.g. electronic commerce, and the development of different "isms" in manufacturing, like JIT and the agility-concept have led to a situation where different companies have to integrate the horizontal and vertical components of their own value chain more and more closely to the suppliers' and customers' value chains (see e.g. Tuunainen 1999, Kidd 1995, Browne et al. 1996). As a result of these different developments, the above mentioned linkages have become more and more separate from the activities. This trend has led to several new value chain concepts. In

the following we present ten different value chain concepts to find out the features of the value chains in more detail.

Samuelson (1981) already presented twenty years ago a system, which separates inputs into: information, material, and energy flows that go through an organization (Figure 3.3). The detailed system description is based on the Living Systems Theory (LST) (Miller 1978) and on Samuelson's own InformatiCom concept. In the system the organization responds to information and material flows in a systematic way. The organization's inputs are past results, information, material and energy. The organization converts inputs into outputs for customers and for its own internal activities. Samuelson's system shows how information is processed in different part processes and how information is connected from input information to output information. Moreover, the system contains the logistics aspect of the material flow, which is clearly separated from the information flow. In the system is also described how to the outer disciplines, i.e.

- Information – Communication
- Command – Control
- Maintenance – Support
- Operation – Production

form the general management concepts in an organization. With the help of these disciplines, activities, linkages and operations are managed in the system (cf. Figure 3.3).

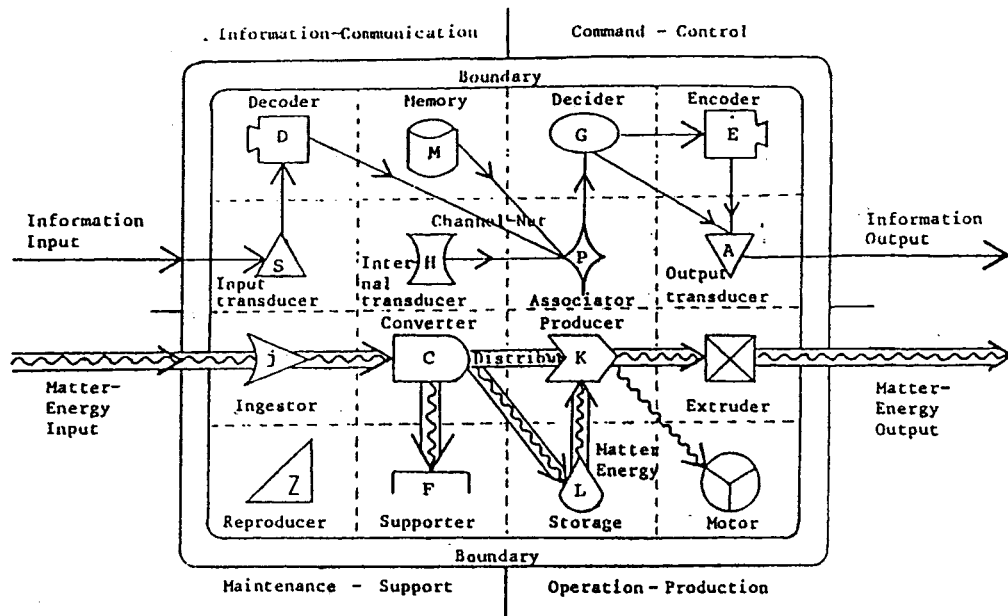


Figure 3.3 Samuelson’s Systemic view with the Nineteen Critical Subsystem Symbols (Samuelson 1981, p. 211)

Porter’s (1985, 1998) value chain, in turn, is based on the description of competitive advantage, describing a value chain competing with another value chain (Figure 3.4). With the help of the value chain concept companies can analyse and describe their source of competitive advantage. Horizontally interdependent activities which produce added value for the consumer, the costs of these activities and how these activities produce the profit margin for the company, are examined in a value chain analysis. The value chain is divided into primary activities involved in the physical creation, sale, and transfer of goods and services to the customer, and into support activities which provide technology, personnel, and purchased inputs and which coordinate the primary activities. So to generate added value the company has to know how to add value to a customer’s value chain and how to control costs. Cost management is based on the effectiveness of the business process and on limiting the bargaining power of the suppliers. In this concept a company can consist of several different value chains and the value chains of the separate companies form the value system. We can say that Porter’s concept deals with technology, especially information technology (IT), from a more static point of view. In this concept IT is not separated into an activity of its own, but it is one part of several support activities, which are used mainly to support primary activities.

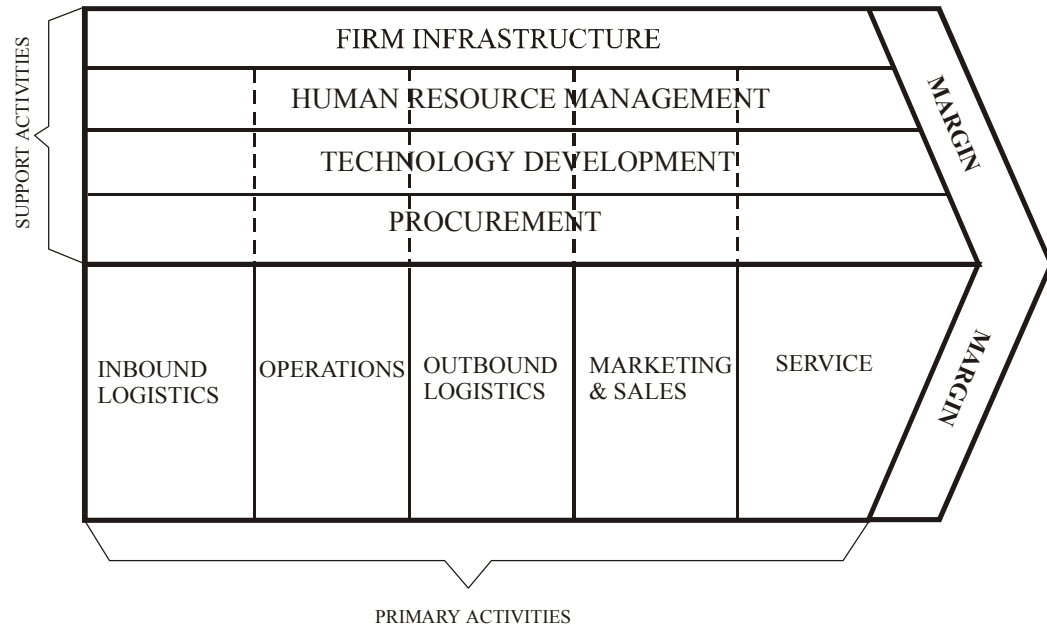


Fig. 3.4 The Generic Value Chain (Porter 1985, p. 37)

Porter has stressed that the Internet itself does not add value, but the Internet should be integrated into the company's value chain. Thus the Internet affects in several different ways both primary activities and support activities. (Cf. Porter 2001)

Day (1990) describes the value chain as follows: *"the value chain requires a comparison of all the skills and resources the firm uses to perform each activity. In practice, it is most useful for comparing relative cost position."* It has to fit the channel, with whose help the company brings its products or services to the market. The channel indicates customer needs (ensures access to the market) and controls the company's strategy. Moreover, it should be a link between the suppliers' value chain and the customers' value chain. The channel consists of different activities, and every activity should support the overall strategy of the business. Day's value chain is based on Porter's framework, but differs in one important respect: *"marketing is highlighted as an integrating general management function that ensures an external orientation to all value creating activities"* (Day 1990) (Figure 3.5).

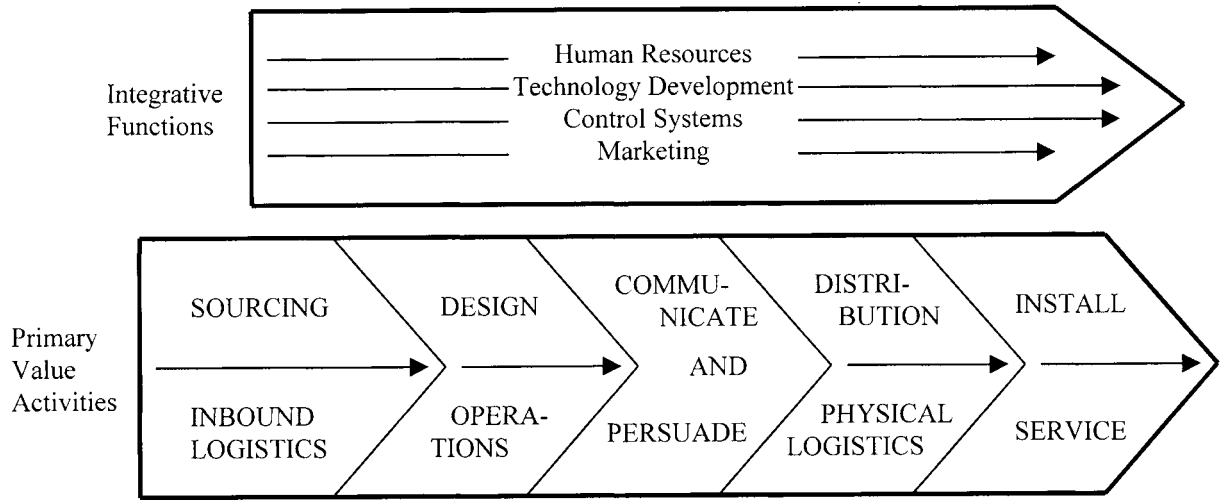


Fig. 3.5 A Marketing-Driven Value Chain by Day (Day 1990, p. 153)

Hines' (1994) value chain thinking is based on the lean, Just-in-Time (JIT) and target costing concepts (Figure 3.6). Competitive advantage is reached by integrating suppliers and customers, which together form a different type of business process: they create a network and partnerships. As a result of this, companies and their value chains are moving from a company centred chain to a product centred chain.

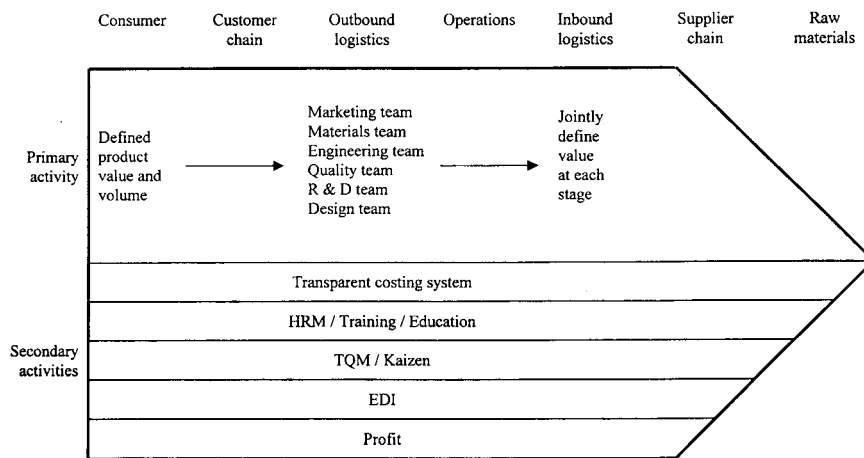


Fig. 3.6 The Integrated Materials Value Pipeline (Hines 1994, p. 49)

We can say that Hines' value chain concept differs in several different ways from the above mentioned value chain. Its primary activities concentrate strongly on the focused value of the product or service in its different stages, suggesting the main goal of the value chain is to add value for consumer and customer. As a result of this, the outbound logistics based on strongly different teams and teamwork and value chain have been "turned around". Moreover, in the secondary activities Hines emphasizes the different utilization of concepts like transparent costing system, knowledge creation (HRM / training /education), quality (TQM and kaizen).

Cronin (1995) has herself developed value chains and also followed Porter's value chain thinking (Figures 3.7 a, b and c). In Cronin's value chain the processes are not, however, dealt with horizontally and vertically. In this construction the value chain is more and more based on the virtual principle. We can see that in this value chain new technological developments in information technology are strongly changing companies' business processes. Companies' internal and external relationships are handled by information technology and companies' business ideas and value adding are more and more based on dynamic information technology. This trend has led to different value chain thinking, where the value chain has been divided into three separate elements. These elements are "inputs from supplier", "internal operations", and "customer relations". In the "inputs from supplier" element (c.f. Figure 3.7a) is emphasized how to help of the Internet can be reduced the meanings of time and location. This means that the company can add value by using the Internet its acquisition activities. For example, the company has the ability via the Internet to find quickly (effective factor) the different suppliers for different purposes (efficient factor).

In the “internal operations” element (c.f. Figure 3.7b), a company’s value adding is based on the effective sharing and acquiring of the information within the company. This is based on the idea that the role of information is more and more important to a single company, thus it is essential that companies can manage to acquire and share information in the most effective way. By using the Internet, the company can with relatively low costs share and acquire information at the global scale.

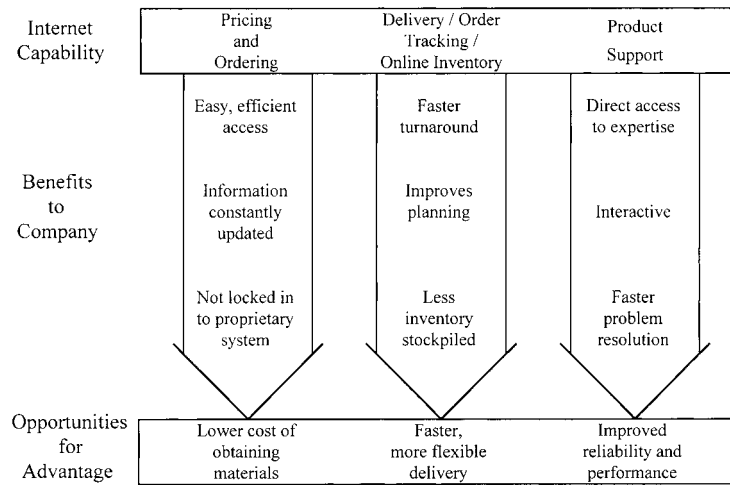


Fig. 3.7a Internet Value Chain: Inputs from Suppliers (Cronin 1995, p. 58)

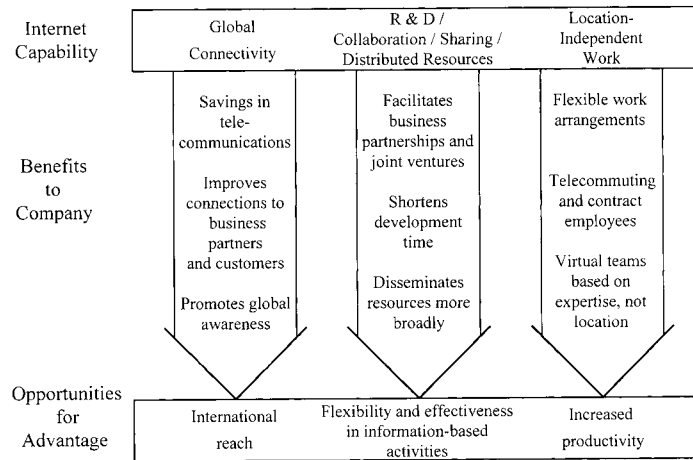


Fig. 3.7b Internet Value Chain: Internal Operations (Cronin 1995, p. 60)

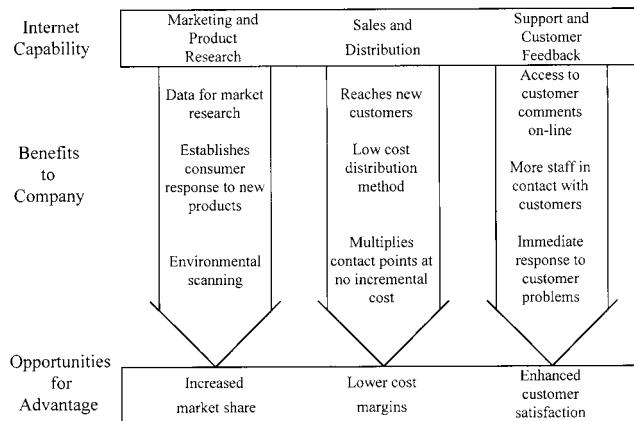


Fig. 3.7c Internet Value Chain: Customer Relations (Cronin 1995, p. 61)

The “customer relations” element (c.f. Figure 3.7c) is based on the idea that utilizing direct information from customers’ needs and attitudes adds value in companies. Direct information from customers’ needs and attitudes are acquired with the help of the Internet. Information of products and services distributed via the Internet (e.g. electronic catalogues) to the markets. After this distribution, using the discussion groups and bulletin boards collects customers’ views of these above mentioned products and services.

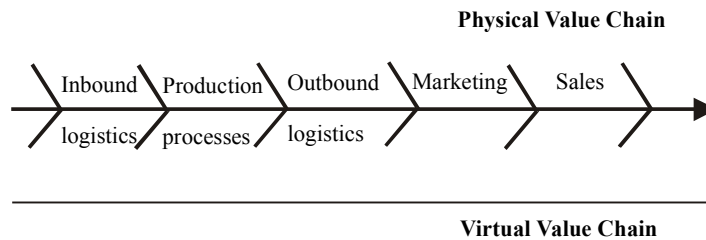
Cronin (1995) clearly brings different things to the value chain concept like

- Online inventory
- Product support
- Global connectivity
- Distributed recourses
- Internet capability
- Multiplies contact point at no incremental cost

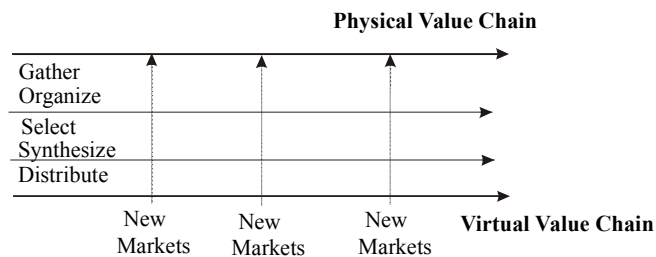
Rayport and Sviokla (1995) have divided the value chain into two separate parts, which they call the Physical Value Chain and the Virtual Value Chain (Figure 3.8). The first part represents the “physical world market place” or “place value chain” and the second part represents “market space” or the “space value chain”. This is also very close to Samuelson’s ideas where material and information flows are separated. The physical value chain consists of the physical world market place which mainly contains material and components. Thus the product is the ending point of a set of value-adding processes that occur in the physical world. The main principle of this part of the value chain is close to Porter’s value chain. In the virtual value chain information itself is turning into a critical factor in the creation process of competitive advantage in companies. Information has to be used to create new knowledge, i.e. new value for the customer. In the Rayport and Sviokla model companies adopt value-adding information processes in three stages:

1. **Visibility** – Companies acquire the ability to see physical operations more effectively by using information. This means that the information technology system is used to co-ordinate activities in a company’s physical value chain. It is the basis of the foundation for the virtual value chain. With the help of IT, it is then possible to plan, execute, and evaluate results with greater precision and speed, i.e. with better knowledge we get better results. (Rayport and Sviokla, 1995)
2. **Mirroring Capability** – Companies substitute virtual activities for physical, by beginning to create a parallel value chain in the market space. The companies move a number of value-adding activities from the marketplace to the market space. (Rayport and Sviokla, 1995)
3. **New Customer Relationships** – Companies deliver value to the customer in new ways. They create value in the market space by using information technology. The new relationships between a company and the customer is strongly based on using information technology. This means that the part of products or services is in form of bits and this kind of products or services are delivered by information technology. (Rayport and Sviokla, 1995)

Creating value (knowledge creation) in the virtual value chain involves a sequence of five activities: gathering, organization, selection, synthesization, and distribution of information (c.f. also Samuelson 1981). By using these five activities, it is possible to create a value matrix, with which companies can create new markets and new relationships with existing markets.



Building the Virtual Value Chain (Rayport and Sviokla, 1995, p. 39)



Value Matrix: Building Relationships (Rayport and Sviokla, 1995, p. 46)

Figure 3.8 Rayport’s and Sviokla’s Value Chain System

The reason why the value chain is divided into two separate value chains is that in both value chains, information (market space) and material (physical world market place) need to be managed in the most effective way. (c.f. also Samuelson 1981)

Cokins' (1996) new value chain thinking is based on the Activity Based Costing (ABC) – concept (Figure 3.9). From input resources a company produces products or services and generates costs for the company. The customers' and suppliers' needs are not observed and calculated. In general, this kind of overall system demands a very highly advanced information system. In most cases dynamic environment cost drivers require that information is collected automatically. There is a need to develop an automatic system, which collects cost information from the dynamic environment.

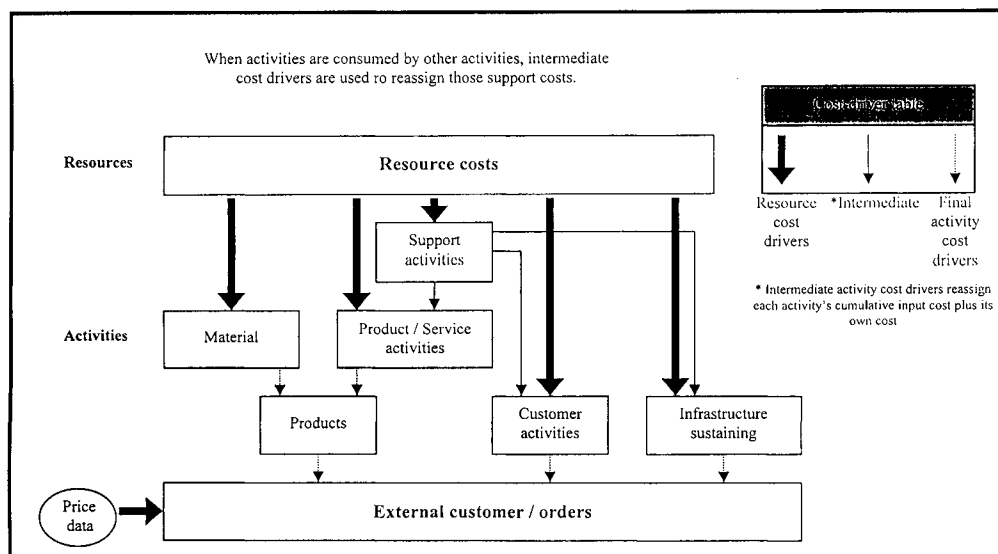


Fig. 3.9 Tracing Intermediate Costs to Customer (Cokins 1996, p. 93)

We can say that this kind of value chain thinking mainly consists of the following elements: activities, cost drivers, information management, and information technology. The main points of this system are that by using a management accounting system (mainly information technology) in a “holistic way” companies can effectively manage information and its recourses. As a result of this, companies can achieve a competitive advantage.

Cox's (1996) value chain is founded on the idea that a company's environment changes all the time and the company or value chain has internal and external boundaries, which must adapt to the changing environment. These boundaries are usually constructed by different contracts, with which firms try to keep costs to the minimum and to get maxi-

imum efficacy in the changing business environment. The goal of the firm is cost efficiency in its internal and external transactions along the whole value chain. The internal functions must constitute a major part of the company's core competence (c.f. Hammel and Prahalad 1996), and they must fit the company's overall goals. The company's core competence is then a significant part of the value chain and it affects the company's position in the supply chain ("relational competence analysis") and in the markets. The firm's value chain also consists of other activities and concepts that maintain Cox's "medium asset specificity, low asset specificity" activities and the company's network and relationship with external partners.

Cox also stresses that at the beginning of the supply and value chains the value for the customer is 0 % and after the whole "value creating process" (at the end of the supply chain and after all the companies' value chains) the value for the customer is 100 % and the delivery is also 100 %. Cox clearly separates in this way these two chains, i.e. 1) Supply Chain and 2) Value Chain and gives graphical presentations of how the supply chain and value chain develop at separate times (Figure 3.10).

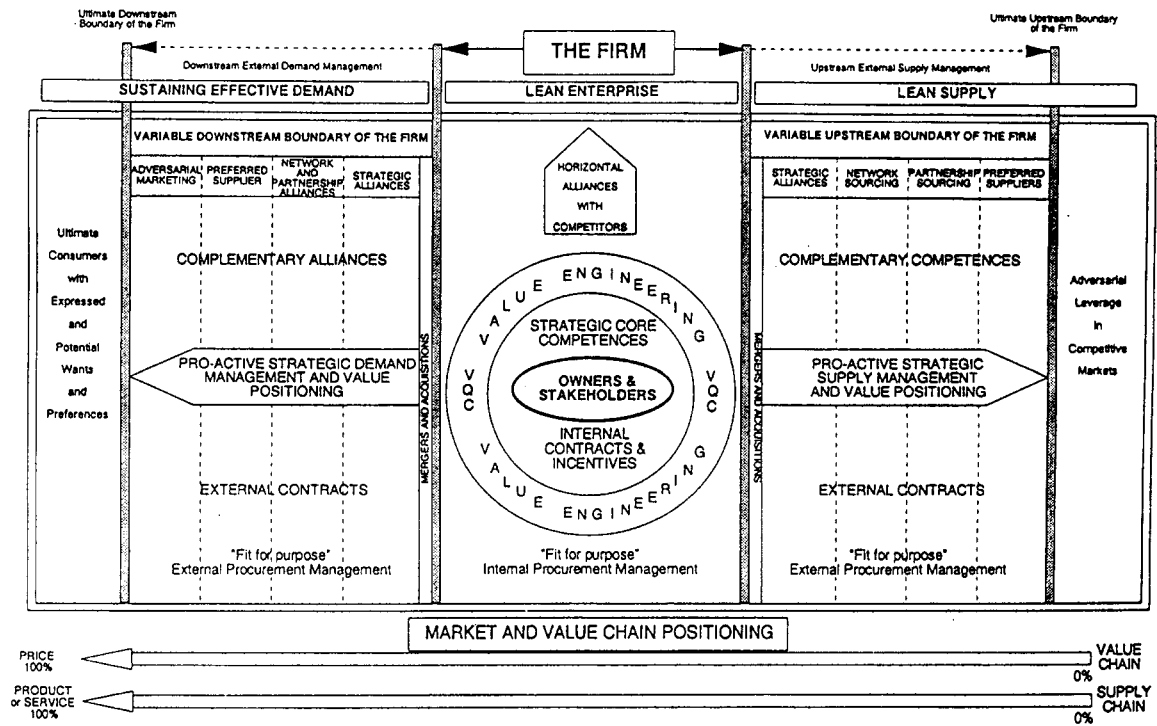


Fig. 3.10 Strategic Procurement Management, the Firm and the Market (Cox 1996, p. 67)

Ansari and Bell's (1997) value chain consists of several active members (distributor, supplier, the company's own departments), which all have to add value (e.g. by bringing in information, material, know-how) in the different phases of the value chain process (Figures 3.11 and 3.12). These phases of the process are: the planning phase of product strategy and profit plans, product concept and feasibility, product design and development, production logistics and support. Every member has to have the ability to add more value to the value chain and eliminate non-value-added activities in order to reduce costs. The role and importance of an active member changes in the different stages of the value chain process. Therefore it is important that every actor identifies its own location and the position of the other actors in the value chain process. In order to be realized, the value chain process requires that "extended enterprise" actors have to behave like teams.

The ultimate goal of the value chain process is to manage costs so that the targeted margin will be achieved by the active members. This is achieved by managing customer demand, by using technology effectively, by avoiding waste through using the right processes, and by being conscious of the basic functions and principles of the dynamic value chain. There is a value chain flow which transfers information from customers to all members of the value chain. It is therefore also an important component in the target costing system and the system needs to take into account the recycle function. Figure 3.11b shows that customers have a backward link with the service and support providers while the product is in use and with recyclers when the product is to be disposed of. In this value chain concepts have new elements like recyclers, service and support. Recyclers stress value adding in a situation where the product is under use by its customer. These elements can be a part of the market maker, or they may be separate organizations. It is essential that each step and organization add value to the product. Information transportation between all activities and between all members is an essential component in the system. Information technology therefore acquires a very special support activity if this kind of system is to be realized.

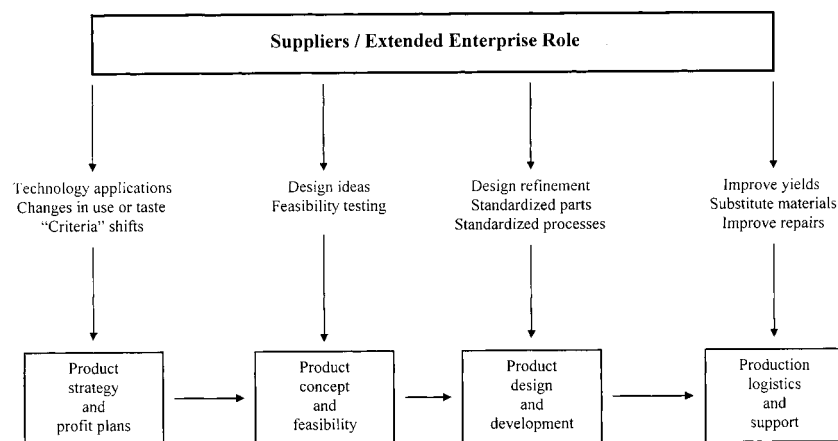


Fig. 3.11a Contributions of Value Chain to Target Costing (Ansari et al. 1997, p. 82)

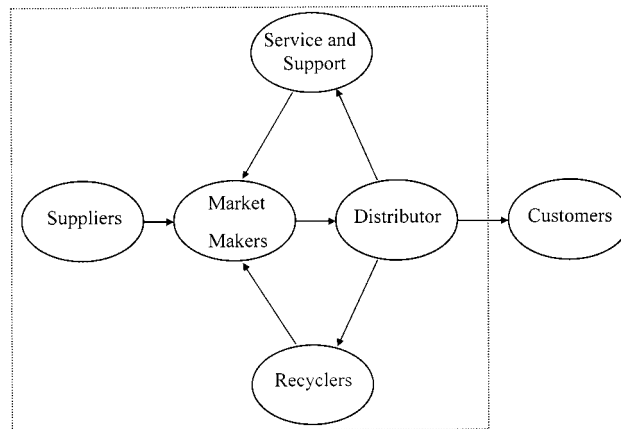


Fig. 3.11b A Typical Extended Enterprise (Ansari et al. 1997, p. 80)

Cristopher's (1998) value chain thinking is based on the concepts of the virtual supply chain and the extended enterprise, where there is strong horizontal and vertical integration (Figure 3.12). The goal of this value chain is to create maximum flexibility inside the company. The chain requires an "intelligent" information system, flexible manufacturing units, supplier partnerships, customers and, moreover, a flexible (virtual) organization. An "intelligent" information system is achieved through global information networks that link one end of the value chain to others. The system can be called an extended value chain or a virtual value chain and it is valid in Internet, Extranet and Intranet applications. Information technology is also an essential part in this value chain. Cristopher (1998) also stresses the meaning of branding. The role of branding concentrates on a product, because the extended enterprise is managed with the help of the product. Branding is an important "value maker", because extended enterprise "consists of" several different partners (suppliers and customers) and thus branding is set to the partners' common goals.

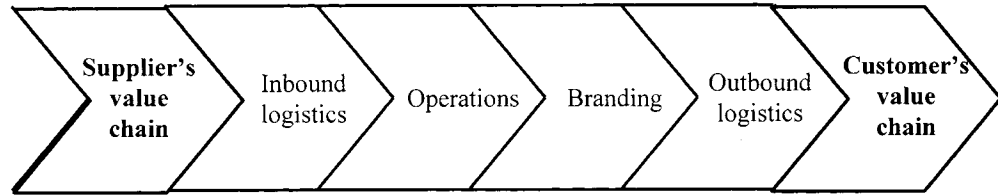


Fig. 3.12 The Extended Value Chain (Cristopher 1998, p. 271)

Features of the Value Chain

In general, as described in the previous chapters value chain concepts have been described using many different methods and with many different properties. These ways and properties cover the main features of current value chain concepts in literature. All these characteristics can be further divided into categories based on internal and external properties. With Internal properties we mean characteristics/features which add value inside the value chain of companies or business processes i.e. the internal effectiveness and with external properties we mean characteristics which create and exchange value within the value chains i.e. the external effectiveness. In this research which is based on previous pages Internal properties have been analysed to confirm the following main value elements: *Ability to Manage Resource Allocation, Material Fluidity, Information Fluidity, Utilization of Cost Management, Ability to Sustain Profit Margin, Ability to Sustain Value Margin, Adaptability to External Changes, Utilization of Information Technology, Networking Capability, Utilization of Internet, Accessibility to Virtual Company Structure*. External properties, in turn, according to the analyses, are supported by the following main value elements: *Integration Degree to the Supplier's Value Chain, Integration Degree to the Customer's Value Chain, and Capability to Adapt the Extended Enterprise Concept*.

When we find out in this taxonomy some of the properties of these main value elements

we find out that they are overlapping and the differences between properties are not fully clear. However, using these elements, a single type of value chain can be analyzed with fourteen specific characteristics.

Most of the researched properties contain some characteristics of technology, either directly or indirectly. Information technology particularly affects many properties. It seems directly to affect the following properties: *Accessibility to Virtual Company Structure, Utilization of Information Technology, Utilization of the Internet, Adaptability to External Changes, Capability to Adapt the Extended Enterprise Concept*. Indirectly, in turn, it seems to effect the following properties: *Networking Capability, Effectiveness of Information Fluidity, Integration Degree with the Supplier's Value Chain, and Integration Degree with the Customer's Value Chain*. The result of these perceptions is that information technology strongly effects the value chain concept and a company's ability to add value to its organization. This also supports the general understanding that information, knowledge, and information technology especially effect a company's ability to add value. They are an essential part of a company's main value adding functions (see e.g. Earl 1989, Porter 1998 and 1985, Drucker 1998 and 1988).

Figure 3.13 illustrates how the different value chain concepts are comprised of these properties. It can be seen from the figure that most of the different value concepts are marked either fully (●) or partially (◐) with these properties, which contain characteristics of information technology. The marks used are described more accurately below:

● means that the value chain contains this property. The idea of this description is that value-adding in the value chain concept is strongly dependent on this property.

◐ means that the value chain partially contains this property. The idea of this description is that value-adding in the value chain concept is not presented clearly and this property is not emphasized.

○ means that the value chain does not contain this property. The idea of this description is that this property is not seen to increase value to an organization or a customer.

There are ten different value chain concepts and in each of them information technology plays a key role. Four value chains have this property fully in use and five value chains have this property at least partially. Only one of these properties is not used at all. This analysis reveals that information technology is very well embedded in the value chains.

The strategy of information technology is an important issue for a company. IT directly affects classical production management characteristics like cost structure, flexibility, quality, productivity, profitability etc. Companies also have to use information technology in the most effective way to get the best possible results. They have to know how to organize all of their IT activities. (Earl 1989) It is essential to know how IT systems are implemented and what are the user's (as a member of organization) and the company's business process requirements. Moreover, both users and companies have to know what kind of potential IT has for their company.

As mentioned above, information technology is embedded in several different elements of value chains. This also means that an active user, who operates with information technology, should also be a considerable "value actor". As a result of this it is very likely that usability of information technology is also very important when companies create value for their customers. This is not directly embedded in the researched value chain concepts.

Number	Properties of Value Chain	Authors and Type of Value Chain									
		Samuelson	Porter	Day	Hines	Cronin	Rayport & Sviokla	Cokins	Cox	Ansari & Bell	Cristopher
1	Ability to Manage Resource Allocation	●	◐	◐	◐	○	●	◐	○	◐	◐
2	Material Fluidity	●	◐	◐	◐	●	●	◐	○	◐	●
3	Information Fluidity	○	○	○	●	●	◐	○	●	●	◐
4	Utilization of Cost Management	◐	○	○	○	●	●	○	○	○	●
5	Ability to Sustain Profit Margin	●	◐	◐	◐	◐	●	◐	○	◐	◐
6	Ability to Sustain Value Margin	○	●	●	●	●	○	●	●	●	◐
7	Adaptability to External Changes	○	●	●	●	●	◐	●	●	●	◐
8	Utilization of Information Technology	○	○	○	◐	○	○	○	◐	●	●
9	Networking Capability	○	◐	◐	●	○	○	○	◐	◐	●
10	Integration Degree with Supplier's VC	○	●	●	◐	◐	○	●	●	●	◐
11	Integration Degree with Customer's VC	○	●	●	◐	◐	●	○	◐	◐	◐
12	Utilization of the Internet	◐	○	○	◐	●	●	○	◐	○	●
13	Capability to Adapt the Extended Enterprise Concept	◐	◐	●	◐	●	◐	○	◐	◐	◐
14	Accessibility to Virtual Company Structure	○	◐	◐	●	○	○	○	◐	◐	●

- Value chain contains this property
- ◐ Value chain contains partially this property
- Value chain does not contain this property

Figure 3. The Features of the Value Chains

Classification of Value Chain Management

In order to better understand value chain management, we have divided different value chain management concepts into four different categories, which are based on the features of the value chains presented. In Figure 3.14 the categories are arranged so that they describe how the value chain concept supports the two main factors already presented in the supply chain analysis, i.e. **Utility Level of Technology**, (The Technology Challenge) and **Utility Level of Knowledge** (The Commercial Challenge). From these dimensions we have created four classification categories: the “Static Value Chain”, the “Virtual Value Chain”, the “Knowledge Focused Value Chain”, and the “Dynamic Value Chain”.

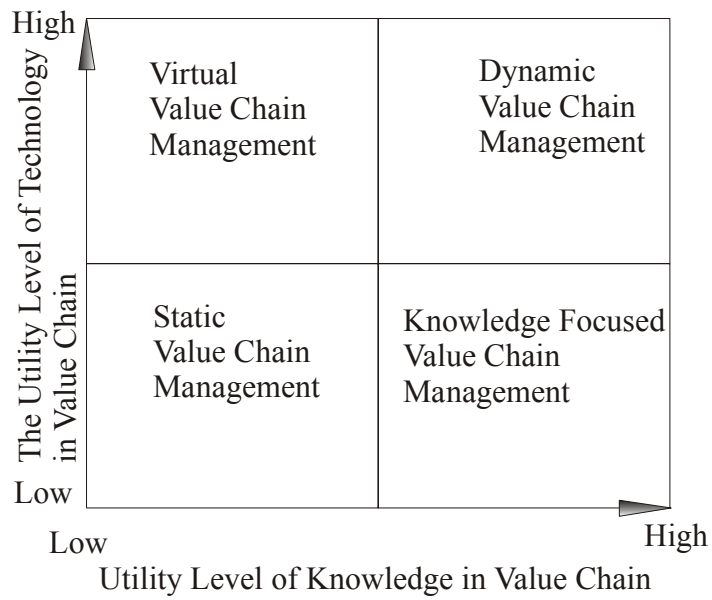


Figure 3. Classification of Value Chain Management

The **Utility Level of Technology in the Value Chain** indicates how well the described value chain concept takes into account the technical connection to the supply chain. This dimension illustrates technical connections to suppliers and customers. If the degree of technical supply chain integration is high, the value chain concept allows and, indeed, requires us to follow the changes of product specifications and to take into account different suppliers and distributors through technological applications. If the degree of technical supply chain integration is low, the value chain concept is usually part of the company's normal activities and reflects mainly the company's internal functions.

The **Utility Level of Knowledge** indicates how sensitive the value chain is to changes in knowledge level. If the knowledge level of the supply chain is high and also the ability to explain the market is high, the value chain pulls information into the supply chain and value chain members, in a proactive manner that indicates the market's demands. If the ability to explain the market is low it means that the value chain is passive to any change in the market.

The **Static Value Chain** describes the company's state at a certain moment. Concepts are usually functional descriptions of a company's activities, where the position of suppliers and the relationship to retailers, distributors, and markets has not been taken into account. The value chains which lie in this area usually concentrate their efforts mainly to the following properties: **utilization of cost management (7), ability to sustain profit margin (8), ability to manage resource allocation (9), and ability to sustain value margin (10).**

The area at the **Knowledge Focused Value Chain** contains a value chain concept which usually concentrates only on a company but does not take into account the relationship to suppliers. The market driven value chain strongly indicates market needs and thus this concept takes into account the changes in the market and connects retailers, distributors and end customers to the company. This type of value chain tries to cope with the following properties: **utilization of cost management (7), ability to sustain profit margin (8), ability to manage resource allocation (9), ability to sustain value margin (10), adaptability to external changes (11), and integration degree with customer's value chain (13).**

The **Virtual Value Chain**, in turn, has a network viewpoint along with strong utilization of information technology (IT). In this concept the main point is that the company's value chain is tightly connected to the supply chain. The goal of the strong relationship is to produce material, information and knowledge for the market. Relationships between all members of the chain are maintained with IT. Usually the concept does not indicate the changes in the market, or how the customer's needs will change in the future. In this area the following value chain properties are important: **accessibility to virtual company structure (1)** (is strongly supported), **utilization of technology (3)** (should be high), **utilization of cost management (7)** (is applied), **ability to sustain profit margin (8)** (is strong), **ability to manage resource allocation (9)** (is good), and **ability to sustain value margin (10)** (is possible).

In the area **Dynamic Value Chain Management** the company leaders are already applying a concept which is usually based on the network viewpoint and strong utilization of IT. The main point is that the value chain is part of the supply chain, and the value chain has strong connections to other parts of the supply chain. Moreover, the concept has structures that immediately indicate changes in the market. Those structures are based on win-win principle contracts with customers and on the information flow from the customers and the market. This type of value chain fulfils most of the above mentioned important properties. By using these four areas, we have found a new trend of development for value chain management (see Figure 3.15.).

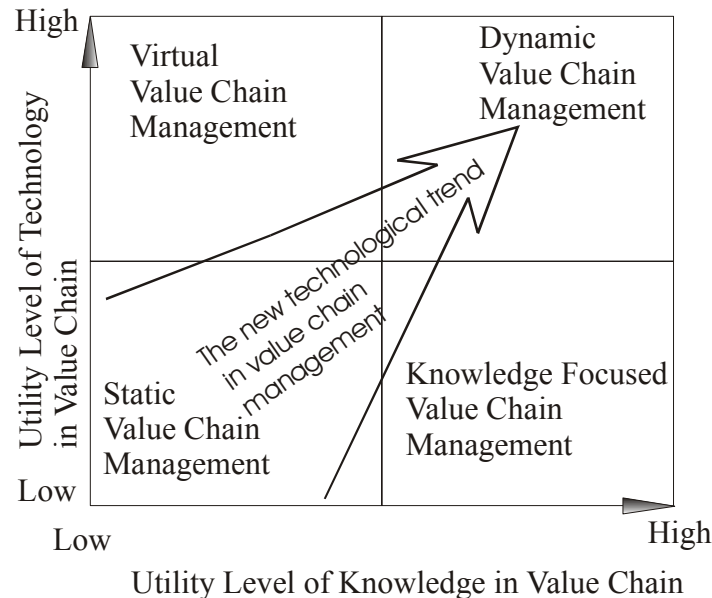


Figure 3. The New Trend in Value Chain Management

The main factors which affect this development consist of companies' utilization of IT and the above mentioned important company characteristics as well as the high utility level of understanding the value chain. Dynamic value chain management is focused on these characteristics. It seems that a high degree of technical supply chain integration is not enough; companies also need a deep understanding of how to explain markets. Technological skills are not enough either on their own. Managerial skills are also needed to control technology and understand the relationships between people, company and technology by using the human focus.

4. Conclusions

In this research we have studied two main flows in business: supply chain flow and value chain flow. We have found general properties for both of these flows and can now better understand their basic behaviour in business. The found properties can be used to characterize business environment, its trends and movements.

By positioning a business with these characteristics it is possible to find out where the business really is. It is also possible to find out the technological position of a company and commercial potential of a company in a specific industrial sector and context.

The theoretical concept can be applied in all businesses, because in every business there are supply chains and value chains to be managed. The latest research results indicate that it is possible to find new ways to implement both the new Internet technology and the commercial content to be fixed in the value and supply chains.

The following Figure 4.1 Digitizing Business Practice / An e-Business Construct describe very well the above-mentioned possibilities which the new technology can give to the changing markets. We have to utilize the challenges at hand with the intellectual capital we have. The new management methodology focuses to manage this important human capital to digitize the business.

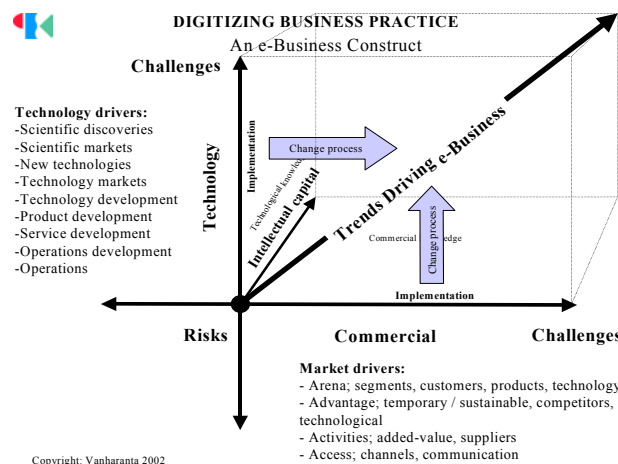


Figure 4.1 Digitizing Business Practice / An e-Business Construct

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