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DOCTORAL THESIS

Value Creation in a Virtual World

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Chapter One Introduction

The typical large business 20 years hence will have fewer than half the levels of management... and no more than a third of its managers (than today).Its structure and management problems and concerns will bear little resemblance to the typical manufacturing company circa 1950 that textbooks still present as the norm. Instead it is far more likely to resemble organizations that neither the practicing manager nor the management scholar pays much attention to today: the hospital, the university, the symphony orchestra. For them the typical business will be knowledge- based, an organization composed largely of specialists who direct or discipline their own performance through organized feedback from colleagues, customers and headquarters. For this reason it will be what I call an information based organization (Drucker 1988).

1.1. Background

Economics theory is based on the utilisation of the factors of production: land, labour and capital. However, without the addition of information to enliven them and change their value these traditional resources cannot be fully developed. The change in value that information brings to them is the basis for trade and all economic development and an attendant body of theory and practice. Information is also a major contributor to management theory and practice surrounding value creation. However in the face of the information explosion of the late twentieth century, many of these economic and business theories and practices have become inappropriate or inadequate. This thesis addresses the issue of value in the information age.

The information age is the record of human history which is punctuated by three innovations: writing, printing and computing. Writing allowed oral information to be collected and recorded in a permanent form; printing enabled its widespread distribution and the electronic computer further enabled the collection, manipulation and distribution of information on a global scale. Since the invention of moveable type and Gutenberg's printing press in 1455, the printed page has been the medium of choice for the compilation, storage and distribution of information for much of the world. Although twentieth century radio, film and television greatly expanded the distribution of information, it was not until the advent of electronic computers that the contribution of

information to all human activity changed significantly and ushered in the current stage of the information age.

Powerful high speed computers and digital technologies have changed the way that information is accessed, manipulated, transmitted and stored. Information and communications technologies (ICT)¹ have irreversibly lowered the cost of information and increased its global distribution. As information technology has become more accessible and user friendly, information of all kinds has likewise become more accessible at lower cost. Economic relationships, organisational structures, and enterprise processes that were formerly predicated on familiar and commonly accepted assumptions of information availability and asymmetry are now changing because of changes in the way information is distributed. Furthermore, the internet and its related communication technologies have created new communication and distribution channels to bring enterprises and customers around the globe into closer proximity than ever before and pave the way for new businesses.

In the 1990s, commerce began to be conducted over the internet. However, many of these overly enthusiastic 'e-commerce' enterprises failed dramatically in the 'dot com' crash of 2000 because of their over-reliance on single technologies and, in some cases, a general lack of business acumen. Despite the crash, the business community has continued to support ICT, but in a more reasoned manner and now deploys it across the entire enterprise, not only in the buying and selling arena. The application of technology to the entire business environment is known as e-business of which e-commerce is a subset.

However, despite the growth of e-business' and steadily rising expenditures on ICT, many business owners and managers remain anxious about the impact of computers in business. On one hand, applications such as spreadsheets, databases, web sites, email and electronic banking are now accepted organisational tools. But, on the other hand, there is considerable underlying scepticism and anxiety about their real worth and their contribution to competitive advantage. Network technologies are particularly problematic. The internet's communications capabilities are generally well understood, but their consequential impact on organisational structure, enterprise environment and enterprise performance are less well recognised, let alone understood. Most managers intuitively recognise the internet's potential as a driver of general change, but remain sceptical about

¹ ICT is an umbrella term that encompasses all forms of technology used to create, store, exchange, and use information. ICT is distinguished from information technology (IT) by its inclusion of communications devices or applications such as radio, television, cellular phones, satellite systems and the applications associated with them. ICT infrastructures include, networks, large-scale computing facilities and telecommunication facilities.

e- business' contribution to their own business and they struggle to accommodate the seemingly endless succession of new capabilities and technological demands of net based technologies.

Until the release of the internet and the World Wide Web (WWW) in 1993 all enterprises and consumers were bounded by recognised social and geographic constraints that defined their respective industry environments and marketplaces. The internet removed many of these constraints and helped globalise the business environment. It changed the rules of competition and caught traditional enterprises such as Encyclopaedia Britannica off guard. Encyclopaedia Britannica, which relied on traditional sales, print and distribution systems to produce and market its expensive multi-volume collection, was almost eliminated overnight when on-line alternatives such as Encarta with its multi-media capability were bundled with Microsoft software at very little cost and made available globally. Other new enterprises, such as Amazon Books, were specifically designed to exploit the new environment and prospered as a result. The question that remains foremost in the minds of most business leaders is, 'How can my enterprise survive and thrive in this new and constantly changing virtual, or electronic environment?'

1.2. Research Question

Over time, the subject of value and its appropriation has been extensively examined by researchers from all business and related disciplines such as sociology, psychology, mathematics, economics and others. Numerous valuable perspectives and explanatory frameworks have been developed as a result of this extensive effort. Understandably however, many of the previous research efforts are constrained by discipline boundaries or apply a narrow single focus to the issue. Interestingly, the ICT community did not appear to register interest in economic value and competitive advantage until the development of e-commerce and e- business. Consequently there is little interdisciplinary research on the issues of value, business and ICT. Furthermore, most of the theoretical perspectives previously developed do not adequately address the issue of value, and wealth creation, in the information age which, according to Drucker, is the purpose of the enterprise (Drucker 1998). The body of research also tends to overlook ICT's constantly changing capabilities, pervasiveness, ubiquity and technological convergence, all of which are features that enterprises must address when considering their strategic, operational and tactical options. In these new and different circumstances the research question is, "How can an enterprise create economic value and sustainable competitive advantage in a virtual world?" This

research suggests that the answer to this question does not lie in the direct employment of ICT itself but rather it requires a different appreciation and use of electronically enhanced information.

1.3. Research Objectives

This research describes a framework for solving the problem of how enterprises can create value in a virtual world. To accomplish this objective, the research focuses on the following issues:

- An analysis of the relationship of information, value creation and sustainable competitive advantage:
- An investigation of the impact that changes in information have had on existing value creation theories from strategy, marketing, finance and information systems disciplines: and
- Examination of virtual organisation as a recognisable value creation strategic theory

1.4. Research Methodology

Information Systems provide the interface between computer science and the various disciplines in the business arena. As an applied, interdisciplinary discipline, Information Systems lacks a solid body of existing theory and often uses partial theories that require development, or uses a reference theory based on other disciplines such as management, marketing or computer science (Clarke 2000). Consequently, issues such as value or strategy may be legitimately examined from perspectives within computer science, systems analysis or one of several business-based disciplines either individually or in combination, as is the case here. The motivation for this research is to contribute to understanding by using an instrumentalist approach which seeks to understand and design some type of intervention in a given environment by identifying a problem, in this case: 'how to create value and competitive advantage in a virtual world?' and attempting to devise a solution from existing technologies or prototyping new ones (Zmud 1998).

Thus the methodology used in this dissertation is straightforward. Firstly, theories of information, ICT and value and their relationships to enterprise structure, strategy, value creation, mass customisation and information systems are examined and evaluated. Then, the impact that advances in information technology have had on them and their contribution to the generation of business value is assessed. These perspectives have then

been integrated into a novel, generic business model, the Virtual Value Creation (VVC) framework for accessing how information assets are used in an enterprise to create value and also to determine where additional opportunities for more effective use of information may exist.

Since a model should be both descriptive and prescriptive (Hedman 2000), seven case studies were selected to demonstrate the VVC's capability. The cases constitute a purposive sample selected from the primary, secondary, tertiary and quaternary industries. The data was obtained from unstructured interviews with enterprise owners, representatives or employees, enterprise publications, enterprise websites and other publicly available sources. The purpose of the case studies was to qualitatively describe the VVC's ability to capture the enterprise's deployment and current use of its information assets. Since the VVC is also normative or prescriptive by default, it also identifies opportunities where information might be more effectively used to achieve enterprise goals.

This methodology was chosen in preference to the more conventional scientific research tradition of theory development and hypothesis testing based on empirical before and after observations because of our perceptions that the extent of ICT adoption is constantly changing and that concepts such as value, information content or enterprise success remain vague and without have generally accepted, clearly defined, quantifiable meanings. Without this degree of specificity, attempts to test the model through a large survey, using a structured questionnaire for example, were considered to be inappropriate from the point of view of the survey instrument's design. (Additionally, the degree of available funding limited the size of the population so that it was considered unlikely to yield a sample that would be significantly acceptable).

This thesis examines how enterprises use information to create value. The enterprise is the object of research and because information and information technology pervade the entire enterprise, impacting on all disciplines a cross disciplinary approach has been adopted. This research recognises the valuable contributions made by other researchers from outside the business and ICT disciplines but confines itself to these mainstream disciplines because of their general focus on value and information. A strictly functional perspective has been avoided because we consider that it would inevitably negate the spirit of ICT integration which is an underlying theme of this work.

During the late 1980s and 1990s a number of different techniques such as Total Quality Management (TQM) and Business Process Reengineering (BPR) examined the enterprise

and its relationship to its customers as business systems. At the time, a systems view of the firm was a novel option, now however, the explosive growth and pervasiveness of ICT requires enterprises to adopt and maintain a systems view of their own activities as well as those of their customers and suppliers. This research also reflects this perspective. The benefit of adopting a systems approach is that it helps breakdown organisational complexity and provides a framework for understanding the broad relationships and how the enterprise operates. Interdisciplinary research is challenging at any time, but it is even more so in an environment characterised by rapid change. The issue of information in ICT itself poses particular difficulties because of information's various roles. Amongst other things, information is an input to all processes. It is an input to ICT as well as being an integral element of ICT itself. It can also be an output of enterprise processes and a product of value in its own right.

The methodology of this dissertation is straightforward. The issues of information, ICT and value are examined from various perspectives found in the literature. Then their impact on structure, strategy, value creation in the enterprise, mass customisation, and information systems are evaluated. From this assessment a framework for assessing Virtual Value Creation (VVC) has been developed and employed to map the information based value creation capabilities of a limited number of enterprises in the primary, secondary, tertiary and quaternary industry sectors.

1.5. Thesis Structure

Chapter 2 follows this introductory chapter with an investigation of information and its value. It examines the information age and the relationships of information and organisational structure and information based enterprises and products. It observes the ways that enterprises use information to create value and proposes that to be successful in the digital economy enterprises must leverage information assets more efficiently than their rivals.

Chapter 3 introduces the concept of the Virtual Enterprise (VE) as a theoretical organizational concept arising out of changed market conditions and advanced ICT capabilities. VEs are characterised by various configurations of networks of collaborating partnerships and intensive ICT linkages. In contrast to a pre-determined structural arrangement of a VE, virtual organisation (VO) is presented as a meta-management strategy that has application in all value oriented organisations.

Chapter 4 examines the theoretical foundations of value creation from the perspectives of strategic management and ICT. It explores the development of corporate strategy and value driven sources of competitive advantage from the viewpoints of innovation, the resource based view of the firm, transaction cost economics, network theory the value chain and virtual organisation. In chapter 5, value is examined from the competing perspectives of shareholders and customers. These conflicting views are harmonised within a customer based view. The customer perspective is amplified by the introduction of value chains and supply chain concepts.

Chapter 6 introduces mass customisation as a tool to satisfy the demands of customer perceived value. Mass customisation focuses on the entirety of an enterprise offering as a value proposition which can now, through the impact of ICT, be designed to meet the value requirements of individual customers.

The contribution of information systems to the enterprise is addressed in chapter 7. In particular, the progressive integration of enterprise processes with external activities such as supply chain and customer relationships are addressed. The contributions of information system alignment and impacting strategies to corporate strategy and value creation are discussed. The chapter introduces the concept of the Business Model as an ICT based construct that integrates strategy and operations.

Chapter 8 integrates the numerous business and information theories of value creation that have been discussed in previous chapters. These are summarised and positioned within the current ICT empowered business environment as Functional and Foundational Requirements. All of these are represented in a novel framework that describes the core organisational and ICT elements required for an enterprise to create value in a digital environment. The Virtual Value Creation (VVC) model is a strategic framework that focuses on value creation by emphasising customer relationships, organisational structures and capabilities, supplier relationships and enterprise and industry environmental issues. The object of the model is to provide enterprises with a framework that may be used to determine their present and potential capability to use available information to create value

Chapter 9 maps a small sample of enterprises from agriculture, manufacturing, construction, advertising, food, software and tertiary education onto the VVC to demonstrate the model's relevance and utility both as an enterprise and as an industry tool.

Chapter 10 discusses results of the VVC's mapping and the implications for the various firms examined in the sample. The VVC's advantages and disadvantages are identified and conclusions about these and suggestions for future research are outlined.

The chapters of this thesis are organized in the sequence illustrated below in Figure 1

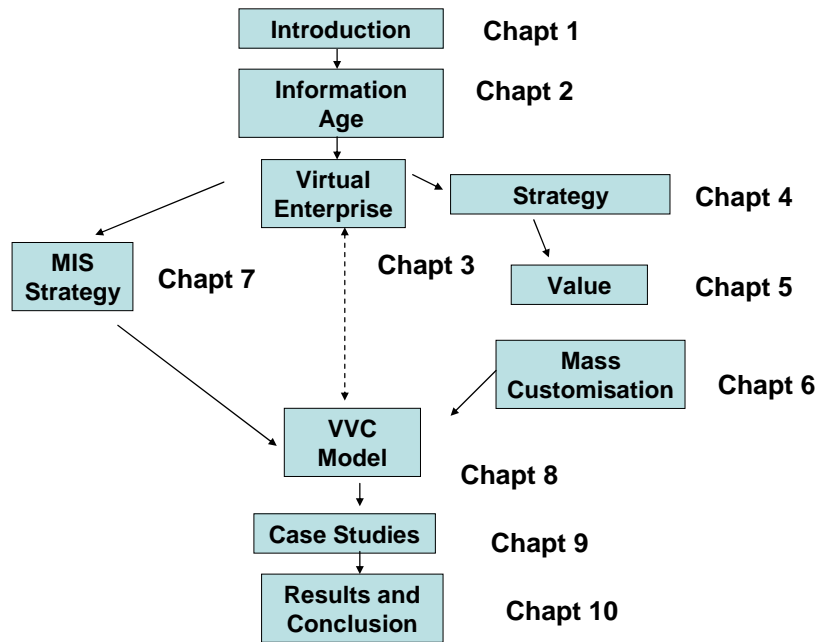


Figure 1 Thesis structure

Chapter Two The Information Age – Issues

2.1. Introduction

This thesis is concerned with two fundamental business issues: information and value creation. This chapter lays the foundation for the investigation of these topics by introducing, establishing and defining many of the issues that are further illuminated in subsequent chapters. Specifically it defines information, its characteristics, its evaluation, and its relevance to the information age. Then it introduces information as a factor of production, as a driver of organisational structure and as product. Finally, a novel taxonomy of information usage: value maintenance, value adding and value creation is introduced to describe the way that enterprises use information.

2.2. Information Defined

Information is a term variously related to concepts such as data, knowledge, truth and wisdom. It forms part of the data/information/knowledge/wisdom (DIKW) hierarchy as shown in Figure 2 (Ackoff 1989). When unprocessed data or facts from a recognisable domain are organised so that they have meaning and value, they are considered information. When information from various domains is integrated with experience it is considered to be knowledge (Turban 1999). Wisdom is knowledge that endures over time.

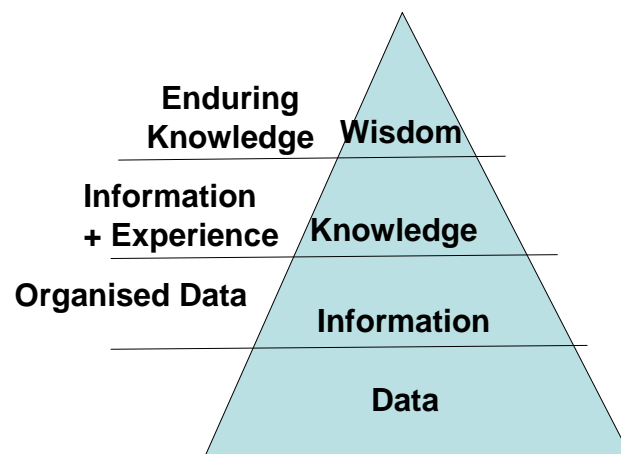


Figure 2 Data/Information/Knowledge/Wisdom (DIKW) Hierarchy

Characteristics of Information

Information has unique characteristics. Unlike physical objects that slowly degrade with use and the passage of time, information is enhanced and expands over time as it is used and shared. As information grows, chaos is reduced and replaced with order, uncertainty is reduced and knowledge is increased. As an intangible, information is indestructible. Most importantly, information is portable and can be easily and inexpensively summarised, compressed, transported and accessed globally via by a wide variety of media and modes.

We acknowledge that knowledge and its management have attracted a considerable body of research. However, this thesis confines itself to information as the foundation of human endeavour, the underpinning of all economic activity and the basic currency of ICT.

2.3. Value of information

Information is used both in decision making and non decision making scenarios. In decision making, information reduces the risk of error and therefore improves the chances of a successful outcome. In non decision making scenarios, information is accumulated for possible future use. In both scenarios, the value of information is associated with its utility, distribution and sufficiency

Value is generally considered to describe either the importance of something or its worth (1995). In classical economic theory, value is described as being either intrinsic or exchange based (Pearce 1986). Intrinsic value is inherent in an object and is constant, regardless of circumstances or time, whereas exchange value is the price realized at the time of an exchange (Bowman 2000). The exchange value of information varies with the interaction of supply and demand.

The asymmetry of information distribution, or its supply, amongst the firm and its suppliers and consumers determines the relative bargaining and competitive strengths of each player (McNurlin 2002). In many cases the supply, or availability, of superior information forms the basis for competitive advantage. For example, Wal-Mart USA is well known for using its electronics links with its suppliers to better control and coordinate its inventories and thereby increase its stock turns (Evans 1997). The costs of the information systems that capture and transmit that information are significant, but they are outweighed by the value of the information that allows Wal-Mart to outperform its rivals. The internet places more information in the hands of the consumer than ever before,

empowering them and increasing competition. For example, on line shoppers now have far greater opportunities to research products and compare prices and make online purchases from a large selection of enterprises that are far removed from the consumer's physical location. To paraphrase an old axiom, 'information is power'

Demand for information is closely related to the concept of utility. Utility theory generally states that individuals rationally spend their incomes on purchases that maximise the individual's satisfaction or minimise the expected cost of their purchases (Samuelson 1985) (Bowman 2000). Satisfaction is a function of utility, so the greater an object's utility is perceived to be, the greater is its exchange value.

In decision making, economists define the economic value of information as the value of the best decision with information less the value of best decision without the information. The economic value therefore, can be regarded as the incremental increase in expected utility due to a better informed decision or a decrease in the expected cost (Varian 1999). This however, requires an accurate assessment of the associated total costs and benefits, which is rarely available to individuals. In its place individuals use subjective perceptions of the costs and benefits from which they derive measures of relative value (Walters 1999). The value of information is therefore subjective and variable. It can also be perishable. For example, the value of information about seating availability on a particular airline increases in value as departure approaches but then rapidly diminishes and returns to almost zero after the scheduled aircraft has departed. Similarly, skills that were once highly regarded and valued, such as those of a wheelwright before the advent of the automobile, can be overtaken by technology and rendered obsolete and economically insignificant.

The value of information is also relative. Some types of information such as business secrets and intellectual property have value because its possession gives advantage to those who possess it over those who do not. Information such as this would lose its value if it became commonly known. Other types of information such as advertising messages increase in value when they are widely distributed. Regardless of the value society places on such information, its capacity to influence purchasers or products imbues it with commercial value.

As a general concept the utility of information can be translated into some monetary equivalent representing how much someone would pay to acquire a given piece of

information (Laffont 1989). Economic theory would suggest that, information that does not inform a better economic decision. (Turban 1999).

The value of information is based on a number of factors that constitute the context in which the user exists and the uses that the user will make of it. Information may therefore be valuable to one person but valueless to another. The value of utility requires answers to questions such as, how good is the information based on its relevance and reliability? Is it complete, accurate and timely, can it be validated or verified and is there a feedback mechanism? (Alter 2002). These factors are incorporated into the hierarchy, shown in Figure 3.

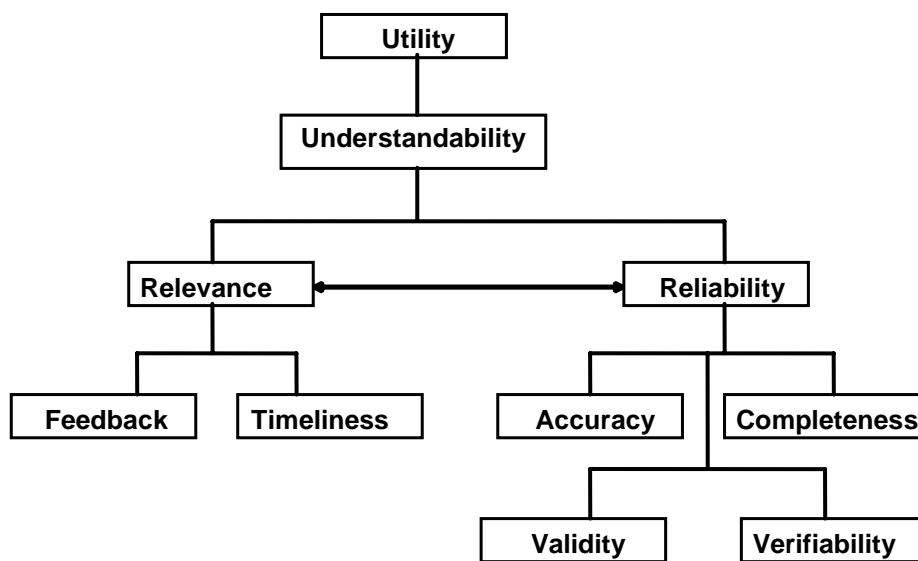


Figure 3 Hierarchy of information qualities

The value of information may also be viewed from the quality of communications, which focuses primarily on technical accuracy and information communications, and examines how information can be summarized and still retain meaning (Davis 1997).

However, the value of information is not entirely defined by its immediate utility and contribution to decision making. In non decision making scenarios some information, such as that anticipated from medical research or space exploration may have no immediate utility because there may be no readily apparent use for it. However, it aids human and institutional learning and control by enabling model building and providing motivational feedback. It also enables background building where information is not earmarked for a particular decision, but stored and accumulated to form the foundation for

future discoveries often many years hence (Davis 1997; Gelinas 2004). In economic terms, information such as this has no value until its utility is realised or its acquisition costs can be reduced.

The distribution cost of information is a significant component of its valuation. The cost effectiveness of the distribution of information is determined by the trade-off between richness and reach. Reach is determined by the number of individuals who can access the information. Richness describes the volume of information; its degree of customization and interactivity (Evans 1997). In the past large volumes of information could only be carried economically across limited distances; so that even users of high value information were constrained by the costs and logistics of distribution. ICT and the internet greatly reduce the acquisition, production and distribution costs of information so that now reach and richness can be enhanced simultaneously. For example, the physical volume of content and distribution costs of a newspaper ultimately determines the extent of its reach. However, an internet based news service does not suffer from these physical limitations and can extend the depth of its content and its reach simultaneously to serve a global readership.

Theorists, researchers and practitioners alike frequently complain about the paucity of information from which to draw reliable conclusions and worry about the value of their results (Davis 1997). The historic difficulty with information however, is actually not one of information insufficiency, but rather that information is dispersed too widely amongst various sources and informants and rarely exists in a concentrated or integrated form (Hayek 1945). The dispersal and aggregation constraints have largely been overcome by digitisation, the internet and powerful search engines. However, while the volume of available information has increased by many factors the difficulties now facing information users are related to its presentation, relevance, reliability and veracity (Denton 2001). Overcoming these issues can impose costs on the information user that impact information's value.

2.4. The Information Age

Writers and theorists often speak of the information age', 'information society' networked society, or the digital economy but their meanings differ. To some, the information age is the history of information, or it is the era following the Industrial Revolution. To others, the information age began in the 1950s when the gathering manipulation, classification,

storage and retrieval of information became central to the workings of society. More recently, the information age began in the last quarter of the 20th century when information became easily accessible through computers and computer networks (Glossary 2003). Castells described the information age as beginning with the internet and its associated technologies (Castells.1996). Regardless of timing, the underlying consensus is that the current information age exists because of developments in ICT, especially in network technologies and other new technologies, such as multimedia and mobile computing, which are rapidly becoming part of the business landscape. The increasing pervasiveness of ICT in business continues to reinforce the perception that ICT now plays a pivotal role in determining how well businesses will perform (Galenas 2000). The information age is driven by two interrelated forces; computerization and globalisation (Burn 2002). Moore's Law which predicted the doubling of computational power on a micro chip every eighteen months or so has so far proved to be reasonably accurate (Turban 1999), and has enabled the development of computing functionality that was almost unimaginable a few years ago. ICT's essential capability is its ability to digitize information: data, graphics and audio visual material so that it can be manipulated electronically. Globalisation relates in part to the relaxation of international trading barriers to liberalise trade. The synergy between open global markets and an inexpensive highly capable digital communications network has been the major catalyst of the information age.

Presently, telecommunication is perhaps the most important ICT infrastructure and its most visible component is the internet. Since its public release in 1993, the internet's world wide take up and use has been spectacular and internet traffic has been doubling about once a year (Krishnamurthy 2003).The infrastructure supports global connectivity now consists of over 300 million personal computers. The internet has three attributes that make it important for enterprises: ubiquity, reliability and scalability (Weill 1998). The internet provides individuals and enterprises with global connectivity and an inexpensive website can give them a global presence on the World Wide Web (WWW). The internet's alternative routing capability makes it highly reliable and to date, apart from the actions of criminal or vandals, the internet has proven intensely scaleable and capable of handling millions of users daily without major difficulty (McNurlin 2002).

The internet is governed by Moore's Law and Metcalf's Law. As noted above, Moore's Law anticipates a stream of increasingly capable systems and applications as a result of a

reasonably predictable doubling of microprocessor computing power approximately every eighteen months. Metcalf's Law suggests that the value of a network increases in proportion to the square of the number of individuals in it. The idea behind Metcalf's law is one of critical mass and that a certain number of users is required before a network can be self sustainable. Business networks in particular require a stable of loyal supporters before they can be economically viable. This has particular implications for enterprises reaching out to the internet market space via an enterprise website and explains in part why additional business is not immediately generated by a single website.

ICT systems have developed in a virtuous circle shown in Figure 4. Technological advances are driving and being driven by corporate demands for increased communications and applications that can be deployed in all areas of commerce.

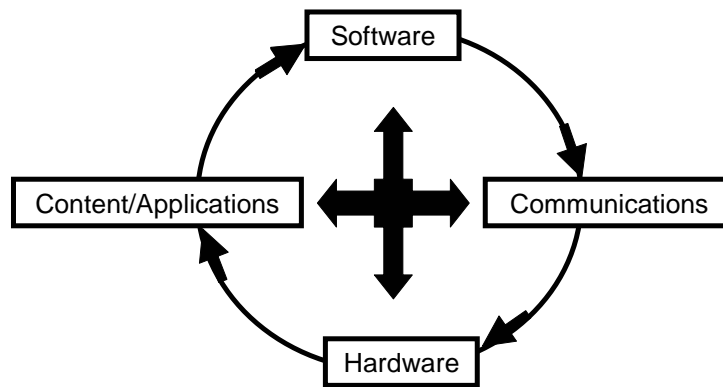


Figure 4 Virtuous circle of ICT development

The combination of increased power, digitising technologies and miniaturization has further enabled functional integration and technological convergence. Within the enterprise, large ICT applications are now capable of coordinating and directing almost all of the enterprise's activities as a single integrated system. Technological convergence is driving the development of single multi-purpose devices such as mobile phones that combine wireless telephony with the functions of personal data assistants (PDA), office based applications such as word processing and spreadsheets, SMS messaging and complete internet and email access and digital photography. As a consequence enterprises and individual are becoming increasingly reliant on ICT systems for their daily conduct. At present there is little indication that the rate at which new technologies are being developed is likely to diminish markedly in the foreseeable future. So we can confidently predict that the information intensity of all enterprises will continue to increase as new

ICT capabilities and applications, such as internet based telephony (VoIP) and streaming multi media applications become commonplace in personal and commercial activity.

Geopolitical changes have lowered many trade barriers and increased global competition. However, it is the internet that is the enabling technology that facilitates fast, inexpensive transfer of digitised documentation, manufacturing information, logistics controls and international monetary transfers and other activities necessary for international trade. This capability has contributed to the transfer of manufacturing capacity from developed countries to low labour cost, developing countries such as India and China. As manufacturing has moved offshore, the economies of developed countries have become increasingly reliant on information based service industries and less dependant on physical resources and manufacturing.

E-Business

In the late 1990s, the novelty of the internet ignited a great deal of enthusiasm for the development of internet based enterprises. Electronic commerce (e-commerce) defined as 'electronically mediated information exchanges between an enterprise and its external stakeholders (Chaffey 2002), initially consisted of business to customer (B2C) or business to business (B2B) relationships. B2C and B2B activities are the major concerns of marketing and procurement staffs who are closely involved with consumers and suppliers. Large numbers of e-commerce 'dot.com' enterprises were launched into the new environment only to fail spectacularly in the 'dot com' crash of 2000 for the lack of the full enterprise wide support for their e-commerce activities and sufficient business acumen for them to prosper. Since that time, enterprises have continued to take up ICT but while the growth has been less publicised it is more far reaching.

IBM first coined the term e-business to mean the transformation of key business process through the use of internet technologies but it is now understood to be the integration of ICT into the enterprise's operations, processes and business model (Chaffey 2002). E-commerce is generally considered to be a subset of e-business. The management of e-business is rapidly achieving a higher profile as it comes within the purview of senior enterprise executives as part of enterprise governance.

E-Business applications such as the internet and the World Wide Web (WWW) have significantly changed enterprise and industry financial operations and confront many accepted practices. For example, automation of operational transactions and electronic

financial transactions challenge some accounting and auditing requirements for paper based audit trails. As the financial foundation of many enterprises shifts towards services costing methodologies that do not adequately address intangible assets are similarly being questioned. ICT is also changing the nature of work and an increasing number of employees now work remotely or from their homes connected to their employers by the internet. Recruiting is now largely conducted on the internet, and many enterprises are moving to internet based training. Web based commerce also exposes the enterprise to a greater range of complex legal and ethical issues such as privacy and intellectual property in a global marketplace. Macro and micro economic theories have also had to be reassessed in an environment where information surpasses capital as the principle economic driver and the availability of information undermines the traditional foundations of commercial relationships.

In summary, the information age is driven by lower computing costs, increased computing power, lower transaction costs, miniaturization and global computer networks. What sets the information age apart from the industrial revolution is the degree to which ICT has pervaded daily life and the widespread use of networks which connect people and organizations and serve as conduits for the abundance of information that now exists in our society. It is this combination of pervasiveness, connectivity and information that makes it so powerful and influential. ICT, as e-business, influences all aspects of the enterprise, from its relationships with other enterprises and customers to its own internal operations. Therefore if ICT managers are to be effective they must adopt an enterprise perspective that encompasses both strategic and operational concerns. Regardless of the wishes of enterprise management, every business is now an information business and a participant, to a greater or lesser extent, in the information age which is characterized by:

- ICT ubiquity,
- global reach,
- High information density,
- high levels of personal and enterprise connectivity,
- information as the most significant factor of production,
- networked organisations, and
- an almost complete reliance on information and ICT (Stair 1999).

2.5. Information as a factor of production

Historically, economic activity is recognised to be dependent on the interaction of three factors; land, labour and capital (Samuelson 1985). In the long period predating the Industrial Revolution, land and labour were considered as the prime sources of productive advantage. However, during the Industrial Revolution in the 1780's machines began to replace human labour and society moved from an agrarian to an industrial base and capital emerged as the strategic resource ahead of land and labour. During the late 20th century and the emergence of the so called information age, information technology was first used to make production more efficient by automating existing operational processes, just as technology had previously been employed to improve efficiency in farming and manufacturing. However, information is now considered to be the prime strategic resource with enterprise wide implications.

Information is widely recognized as an input and an output of production but its intangibility still makes its contribution difficult to measure. Nonetheless, its importance is such that it now determines how the other three, land, labour and capital are employed (Drucker 1994; Brynjolfsson 1995). Capital is important because it can be used as a substitute for raw material and labour. Similarly, information can be used as a substitute for raw material, labour and capital. Therefore, in the same way that an enterprise must address the management of human and physical resources, it must also address the issue of information in a comprehensive manner. One of the defining characteristics of the information age is recognition of the changed status of information relative to the factors of production.

2.6. Information and Organisational Structures

Enterprises actively use information to minimise risk in decision making, coordinate the activities of their business units and reduce costs. However, a subtle but more far reaching impact of the uneven distribution of information is the way that it defines the enterprise's internal and external relationships and its own organizational structure.

Transaction costs, as described by Coase and Williamson (Coase 1937; Williamson 1985), are the costs associated with 'doing business' such as searching for suppliers, administering contracts and process execution. All enterprises are subject to these costs which determine much of the formal structures and business control and coordination relationships that characterise contemporary business (Drucker 1994; Evans 1997; Frenzel

1999). Coase and reasoned that when transaction costs are high, hierarchical, vertically integrated enterprise structures are more effective than market structures consisting of numerous small collaborating enterprises. In practice, the enterprise must determine the extent of the transaction costs associated with the operation and coordination of its functions and processes and then decide where each process will be located and who will perform it. This is known as the 'make or buy' decision and the outcome of this decision is the basis for organizational structure. For example, many firms use the services of external accounting firms rather than maintaining a staff of qualified accountants on site. Here, the enterprise 'buys' the accounting capability that it needs because the associated transaction costs are less than would be the case if the enterprise 'made' the accounting function as part of its formal organisation.

Flattening organizational structures have been a feature of business for a decade or so. These have largely been brought about by a move towards decentralization and outsourcing facilitated by improved communication technologies and organizational re-engineering. ICT's capability to dramatically reduce transaction costs has accelerated the movement towards outsourcing. This and ICT's networking capability gave rise to the concept of information based networked organizations, such as Nike and Dell, or internet based organisations such as Amazon, as foreseen by theorists such as Drucker, Handy, Davidow and Malone and others (Drucker 1988; Handy 1989; Davidow 1992).

2.7. Information Based Enterprises and Products

The information age has produced new types of information based products and businesses that rely on the internet (Porter 1985). Essentially any product or service that can be digitised is a candidate for the internet. New products and services such as SMS messaging on mobile phones, personalised news services, online share trading and banking and the ubiquitous email all rely on digitising power of ICT and the internet for their existence.

The internet is a new distribution channel for the delivery of digital products such as news, advertising and music to completely new digital marketplaces. As expected, a large collection of completely original online enterprises, such as Google, eBay and Apple's iTunes have been created to take advantage of the opportunities that these digital markets create. In the e-business arena there is a continual stream of new net based applications that help enterprises streamline, automate, integrate and coordinate their operations. All of

these products and enterprises are the result of the information age. It can be assumed that other innovative products and services will continue to be developed to take advantage of new ICT capabilities as they develop.

ICT enables value to be redefined. Often value is expressed in a price comparison between competing products. But as enterprises seek to differentiate their products from their competitors, they frequently build in extra information based features such as online ordering or additional product support and user information and a variety of other features designed to develop customer loyalty.

2.8. Discussion

Enterprises exist in information rich environments, but historically they were unable to fully utilise the available information because their access was impeded by the absence of appropriate information technology. Consequently they were obliged to focus on the other, traditional, factors of production, namely land, labour and capital as a basis of economic activity. The acquisition, manipulation and distribution of information are essential for all economic activity; however, it is information's unequal distribution that defines economic advantage, competition, and commercial relationships. ICT's powerful digitisation and network capabilities have made information readily available and changed its distribution. In doing so it has had a profound effect on the theory and conduct of business especially commercial competition and business relationships. Because the changes are so far reaching, an understanding of how they impact the enterprise's use of information and its relationship to value creation is essential for an enterprise's future success. We suggest that an enterprise's use information can be illustrated on a broad spectrum of three broad overlapping patterns: value maintenance, value adding and value creation.

Value Maintenance

At low levels of information usage firms use information to maintain existing operations and procedures. As described earlier, information is routinely used in these circumstances to enhance decision making, and to monitor and manage the operations of the firm. Such 'value maintainers' use information to maintain the status quo of their pre-existing, traditional structures and internal and external relationships.

Value Adding

Value adding is about the impact of digitization, automation and communication. Enterprises that actively use digital information to automate and improve existing processes, without making significant changes to the organization, its processes or market relationships, are considered 'value adders'. They use information and ICT to electronically replicate physical value chain processes and exploit the efficiencies gained from ICT. Rayport and Sviokla described this as the replicating stage in the creation of a virtual value chain (Rayport 1995). Broadly, the firm benefits because information is used to reduce transaction costs and thus make the existing operation more effective. In value adding enterprises there is a high degree of ICT adoption as existing technologies and products are updated and replaced. Although the application of ICT inevitably alters some practices and processes, value adders tend to leave the business processes largely unexamined and untouched. However, simply digitizing and automating existing processes will not yield optimum results if the processes themselves are flawed. We suggest that, to many firms and practitioners; overlaying existing, unchanged processes and practices with a veneer of information technology represents the 'cutting edge' of operational excellence.

Value Creation

Firms that use information to create new value have either evolved to value creation from value maintenance and value adding, or are new firms operating in an information rich environment. Firms that create value accumulate all of the information driven possibilities in value maintenance plus value adding and exploit these to create new sources of value such as completely new innovative business models and new products and services that were not previously available.

Amazon Books founder Jeff Bezos uses the WWW as a substitute for a shop front to sell books and cds. If Bezos had maintained the same trading system used by traditional book stores, but in an on-line environment, the value adding would have been minimal.

However, he created an entirely new web-based business model by offering consumers immediate 24 hour access to millions of books, with added services such as limited inspection of the contents, access to book reviews and a wide variety of related products at lower cost with faster delivery than is possible in traditional 'bricks and mortar' stores. (Schneider 2004). Similarly, Dell computers developed their direct selling model which

not only allows consumers to investigate, configure order and pay for a range of PCs and peripheral products on line but also is virtually integrated with a network of suppliers. The result is that there is no inventory of finished goods, only a minimal inventory of parts and work in progress and customers receive their customized orders in approximately 7 days (Magretta 1998).

Information and ICT have also enabled the development of a range of products that are either information intensive or pure information and can only exist on the WWW. Online banking and financial services now offer a faster and wider range of products than was possible without electronic intervention. Newspapers now provide paperless online news services that are constantly updated and can be customized to the preferences of individual subscribers. Digital distribution of information products such as computer software, music, photographs, product designs, are illustrations of successful value creation efforts that have built on existing practices and used information and ICT to create entirely new realities.

Widespread digitisation means that so many previously physical objects have been transferred to the virtual space that it is almost possible to conduct personal affairs and business without being in physical contact with others. Firms use this development to create value by actively creating or encouraging the development of virtual communities of customers and suppliers and then electronically involving them, as 'prosumers' in product development (Prahalad 2000).

Value creators recognize that effective use of ICT enabled information, promises to become critical to their success. They understand that information enables old and new businesses to leverage information assets and therefore operate more efficiently. The cumulative effect of information at the value creation level is that operating costs are reduced, cycle times are improved, innovation is encouraged and the enterprise becomes more capable and responsive. A common feature of these enterprises is that they use information enabled networked organizational structures to create value.

The relationship of each of these patterns to value creation is shown in Figure 5. which illustrates the enterprise's maturity in its preferred use information. As illustrated the impact of information usage on the enterprise's value creating capacity is cumulative

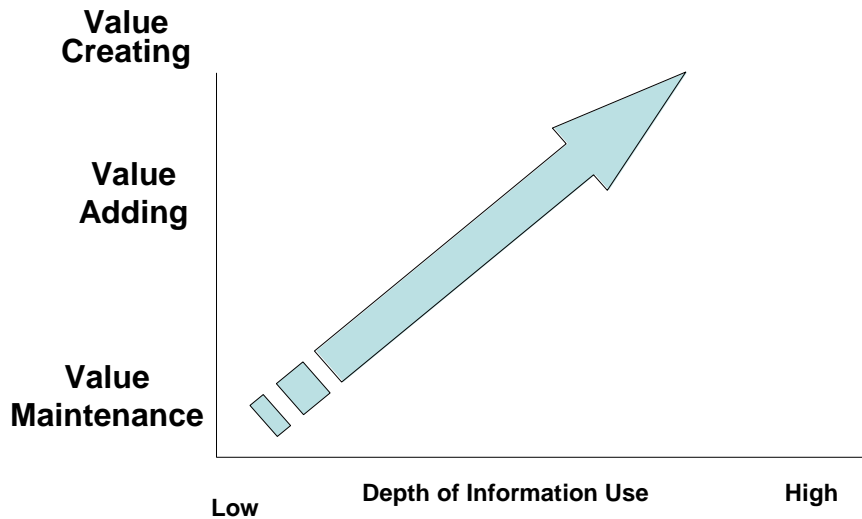


Figure 5 Information usage and value creation

In the days following the release of the internet, some business theorists quickly realised that it would change the way information had traditionally been used and that it had the potential to dramatically alter business strategy and structures (Quinn 1992, Handy 1998, Drucker 1993). They predicted that enterprises would quickly move to a complete online, virtual environment based on fully networked structures and extensive use of information. In 1992, Davidow and Malone predicted manifestation of the new structural arrangement was the virtual enterprise (VE). Although the VE has not as yet fulfilled all of its proponent's expectations, it is an important and evolving concept that numerous firms have partially adopted with some success. The VE, which is completely reliant on information and ICT for its existence, is examined in some detail in the next chapter.

Chapter Three Virtual Enterprise

3.1. Introduction

Chapter 2 presented an overview of the impact that the 'Information Age' has on the way firms gather and use information to create value. A particular outcome of burgeoning ICT developments has been their effect on organisational and industry structures. Managerial hierarchies exist and succeed because markets are unable to match the hierarchy's capability to coordinate all of its activities and produce the economies of scale necessary to drive costs and prices down (Miller 1997). Hierarchies succeed when there are high levels of standardisation in relatively stable environmental and technological conditions. However, in the early 1990s globalisation of the international economy and increased ICT capabilities induced significant changes in the business environment; market entry costs fell, global competition increased and traditional hierarchically based market structures began to crumble (Bleecker 1994). The speed of these changes outstripped corporate capacity to respond (Saabeel 2002) and many large corporations, such as General Electric in the USA and Daimler Benz in Germany were surprised to discover that they did not possess the resources required to outperform their smaller, more agile and often more specialised competitors. In response they were obliged to consider wider, decentralised often global, production and supply options (Mozley Roche 1995; Venkatraman 1998) coincidentally made available by trade liberalisation.

Business theorists and practitioners observed these corporate difficulties and concluded that traditional business hierarchies were no longer appropriate in a rapidly changing global environment. They proposed new information based business models that exploited ICT's growing capabilities, particularly the internet's low cost communications capability. The new models had many names. Handy described a 'shamrock enterprise' (Handy 1989), Drucker spoke of a 'knowledge based enterprise' similar to a symphony orchestra (Drucker 1993). Quinn called it an 'intelligent enterprise' (Quinn 1992) and Davidow and Malone popularised it as the 'Virtual Corporation' (Davidow 1992). More recent European researchers have begun describing entities that simultaneously display autonomous and cooperative behaviours as holonic enterprises (Ulmer 2002).

As shown in Figure 6, the structural outcome of the interaction of marketplace turbulence and uncertainty combined with increasingly complex products is a network identified as a

virtual organisation. Increasing product complexity drives modular production techniques which simplify production while providing flexibility in product configuration.

Unpredictable markets cause uncertainty and risk. Firms try to ameliorate the impacts of risk and product complexity by forming alliances and partnerships with others to spread the risk of new products and new ventures and to increase organisational competence. The result is a networked virtual organisation.

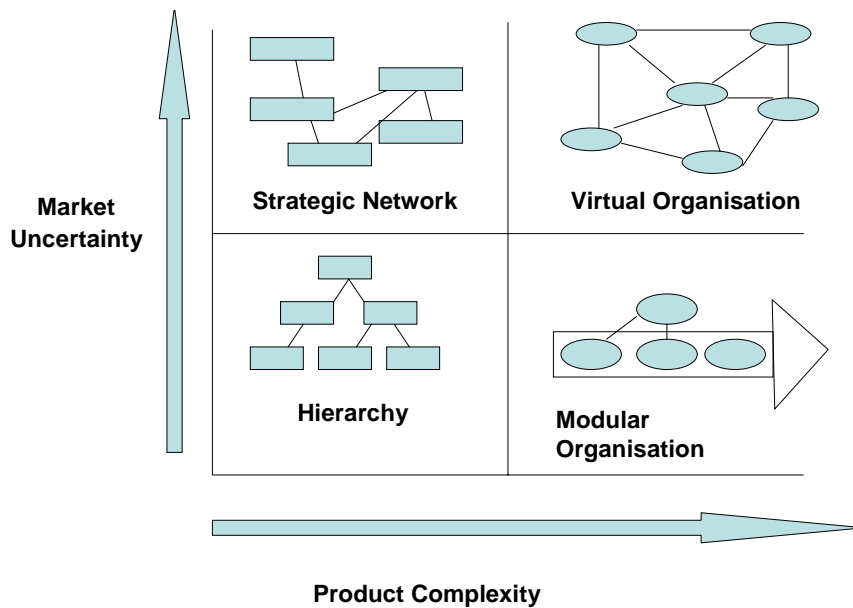


Figure 6 Relationship of product complexity, market uncertainty and organisational types (Adapted from Wigland et al)

An MIT study into organisations of the 21st century described two possible scenarios. The first, ‘small companies large networks’ described constantly shifting networks of small firms and contractors. The second scenario posited “virtual countries” of huge, vertically and horizontally integrated holding companies with little dominion over land and fixed assets but deriving their influence from intangible assets such as information (Laubacher 1997).

As the names and concepts of the anticipated structures multiplied, successful new and transformed organisations such as Amazon Books, Dell Computers, Cisco, Nike, Benetton, Yahoo that rely heavily on ICT networks and innovative uses of information gained increasing prominence as examples of the new way to do business in the 21st century.

This chapter introduces the concept of the information based enterprise which, for convenience, we call a virtual enterprise (VE). In doing so we:

- define the VE,
- describe its typology,
- identify its distinguishing characteristics,
- note its limitations and advantages, and
- discuss the issue of virtualisation.

3.2. Virtual Corporations, Virtual Enterprise, Virtual Organisation

Although in this chapter we speak about virtual enterprises, in the academic and practitioner literature there is some vagueness and ambiguity about virtual corporations, virtual enterprises and virtual organisations and virtual organisation. An organisation can be defined as a group of people coming together in a structured way for a common purpose (Intona 2001). Virtual organisations do not exist in a common space and can exist across a wide spectrum of commercial and non commercial networks types and locations. Shown in Figure 7, they can be:

- virtual communities sharing a common interest such as an environment lobby group or citizen's product group or;
- virtual teams of intra-enterprise groups of individual employees located in different locations but sharing a common goal such as a new car design; or
- virtual enterprises comprised of inter enterprise organisations working collaboratively

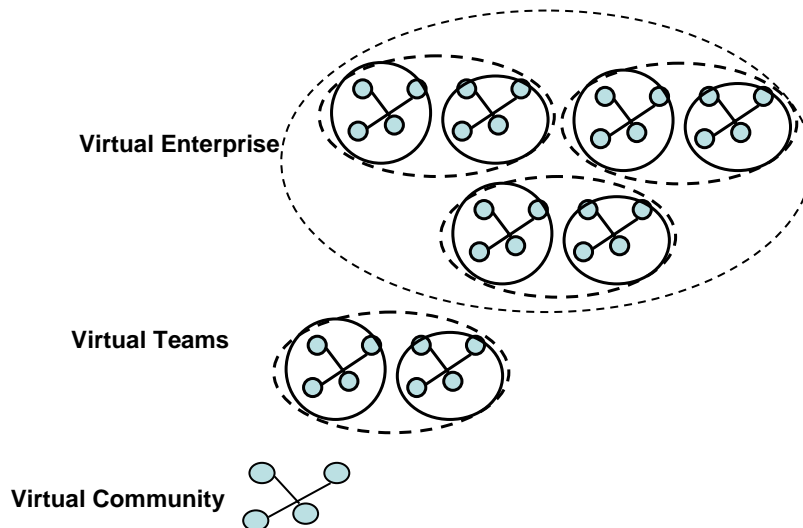


Figure 7 Virtual Groupings

The terms virtual organisation, virtual enterprise and virtual corporation are often used synonymously. Virtual organisation can mean any electronically mediated organised group, commercial or otherwise, whereas virtual enterprise and virtual corporation are taken to mean a commercial venture. In this thesis we have opted for virtual enterprise (VE) to describe all commercial ventures, as opposed to virtual corporation which implies a particular corporate form. This distinction also simplifies the terminology when, later in chapter 4, virtual organisation will be used as a verb to describe an act of organising.

3.3. Definitions

Defining the VE has proved to be a challenging task and after a decade or so the VE remains an ambiguous entity. The following sample of definitions, taken from a literature survey that yielded over seventy different definitions, illustrates the point.

...a virtual corporation (VC) is based on the production of a virtual product that is produced instantly and customised to reflect customer demand... (refers) to any new very broad interorganisational form linking customers, manufacturers and suppliers in an enduring relationship of trust. What will the VC look like? There is no single answer (Davidow 1992).

... a temporary network of independent companies linked by the free flow of information. There is no hierarchy, no central office and no vertical integration: just the skills and resources needed to do the

job...The companies quickly unite to exploit a specific opportunity and disperse afterwards... the key is the use of ICT which will be used to forge the alliances... and harness the intellectual power of the employees (Byrne 1993).

... a temporary network that exists through telematic networks that aims to share skills, resources, costs and benefits to achieve one or more projects answering to market opportunities for products and services (Pallot 1998)

...an opportunistic alliance of core competencies distributed among a number of distinct operation entities within a single large company or among a group of independent companies (Goldman 1995)

There are several reasons for the diversity of viewpoints but researchers frequently point to the imprecision of the meaning of 'virtual'. What does virtual mean? There are at least four broad concepts.

The conventional meaning is something that is lacking in substance or without equivalent reality. This could mean a conglomeration of firms that gives the appearance of a unified single enterprise. Davidow and Malone adopted the word from its use in computer technology where it describes a type of computer memory whose size adapts to meet used needs and so appears larger than it is (Davidowe 1992). This could be applied to a loosely structured organisation whose size and membership constantly changes in response to market needs. 'Virtual' has gained wide currency where it refers to existence in a purely digital environment, for example in virtual reality games, or where a firm exists only on the internet and has no physical presence. Another common contemporary meaning is that virtual simply implies any presence on the internet, so a conventional firm with a website is considered virtual.

Another reason for the confusion is that the speed of technological change is driving organisational change so quickly that attempting to define an organisation that is reliant on ICT becomes increasingly difficult, especially if the organisation is, by its own definition, constantly changing. Under these circumstances long term studies are unlikely to be available and researchers often note that there either there are remarkably few firms that come close to complying with all of the definitional criteria or that the criteria are so broad as to include almost all firms.

3.4. Typology

Notwithstanding the absence of an accepted definition, several typologies have been developed and a selection are summarised as follows.

Palmer and Spier described virtual organisations as being either temporary or permanent (Palmer 1997). Temporary virtual organisations are similar to project based enterprises that disband after having met particular tasks or market opportunities. They are similar to models by Davidow and Malone and Byrne (Davidow 1992, Byrne 1993). Permanent organisations are designed from their inception to bring together market players in response to market opportunities or the potential for cost savings or improved revenue. Within a permanent virtual organisation all operations are conducted electronically.

Bultje and Van Wijk proposed dynamic virtual organisation, web companies and stable virtual organisations (Bultje 1998). Dynamic virtual organisations are characterised by large scale temporary interactions with other organizations based on opportunism and flexibility Web companies are agile, temporary networks of specialist organizations mediated by the internet. Stable virtual organisations are based on the co operative relationship of a principle organisation with a collection of committed partners performing non core tasks.

Burn et al built a task and relationship based taxonomy (Burn 1999). A virtual face is firm that uses a website as its customer interface. A co-alliance is an alliance between equally represented partners. A star-alliance is a core organisation surrounded by a cluster of partners whereas value-alliances are organisational networks connected by their value or supply chains. A market alliance serves as an intermediary for its members and exists only in cyberspace. Burn et al also included brokers as designers of virtual networks.

Harbison et al also described an alliance based taxonomy featuring, franchises, portfolio cooperatives and constellations of cooperating enterprises (Harbison 2000).

Miller described the various configurations under three types. Type One views the virtual organisation as an online organization designed from the outset to operate and exploit the capabilities of the internet Type Two organisations comprise a collaborating groups of firms sharing competencies, skills and resources to achieve a common aim. ICT is a key but not distinguishing component. Finally, Type Three organisations assume elements of the previous two but consist of a transient online network.

The above taxonomies describe various configurations of collaborating networks. Several included virtual teams which have been omitted from consideration here because they are outside the scope of this thesis. Of the various types of virtual organisations that remain there are two broad groupings. The first group consists of temporary virtual organisation (Palmer 1997), dynamic virtual organisation (Bultje 1998) and Miller's Type Three (Miller 1997). These describe a loose dynamic alliance of independent specialist partners coming together temporarily in response to a market opportunity. In concept, these are most closely aligned with the original concept of a VE as a temporary opportunistic gathering of partners (Davidow 1992; Byrne 1993). We have called this group, dynamic virtual organisations.

The concept of the virtual organisation as a temporary and voluntary federation of independent peers, without hierarchy and built on trust and ICT tends to reflect a somewhat uncommon and possibly unrealistic perception of business relationships as they presently exist. This type of organisation echoes that described by the MIT group in their 'small companies large networks' scenario. It is nonetheless difficult to visualise an organisation where there is no 'first among equals' (Laubacher 1997) and structure or hierarchy is unnecessary. Whilst speculation about the possibilities of such an organisation are interesting, that original and idealistic concept has given way to a more pragmatic, identifiable structure that is perhaps more amenable to conventional business wisdom.

The stable VE closely identified with Palmer's Permanent virtual organisation, Bultje and Van Wijk's stable virtual organisation, Miller's Type 2, Burn's star alliance and Harbison et al's portfolio alliance, has become the emergent perception of the VE (Turban 1999; Laudon 2002; McNurlin 2002). It consists of a lead organisation or broker that coordinates and orchestrates the activities of a longer term constellation of collaborating partners. The VE represents a compromise between the MIT group's 'large networks' and 'virtual countries' scenarios. It suggests that large corporations may continue to exist, but in a reduced form that retains their essential strategic functions but uses the services of external specialists to perform all others through networked arrangements.

Both the dynamic and stable VE have particular interest for Small and Medium Enterprises (SME) because it provides an avenue for them to act collectively and compete as group against much larger firms.

These differing conceptualisations go some way to explain the generally accepted view that because conceptualisations differ markedly there is no commonly accepted definition of a VE but a simply a list of working definitions (Mowshowitz 1997), to which we add our working definition of the virtual enterprise which we believe represents the consensus view.

3.5. Working definition

The virtual enterprise is a loosely grouped network of collaborating independent firms surrounding a lead firm with executive functions and operationally linked by extensive ICT to exploit a business opportunity by optimising the value added processes.

3.6. Common characteristics of the Virtual Enterprise

Most of the different configurations described above are similar, differing only in detail. Two forms of VE, the stable and dynamic, have been crystallised from the range of different conceptualisations. These have essentially the same overall structure shown in Figure 8. Organisationally, the VE appears as a network of specialist partners surrounding and interacting with a central executive. The executive is frequently a customer facing entity whose main role is to orchestrate the activities of the entire enterprise. From the customer's perspective the VE appears as a single entity, from the partner's viewpoint, the organisation appears as an intensely customer focussed collective. This operational arrangement requires close collaboration, integration and a heightened degree of trust between partners as well as advanced ICT competence.

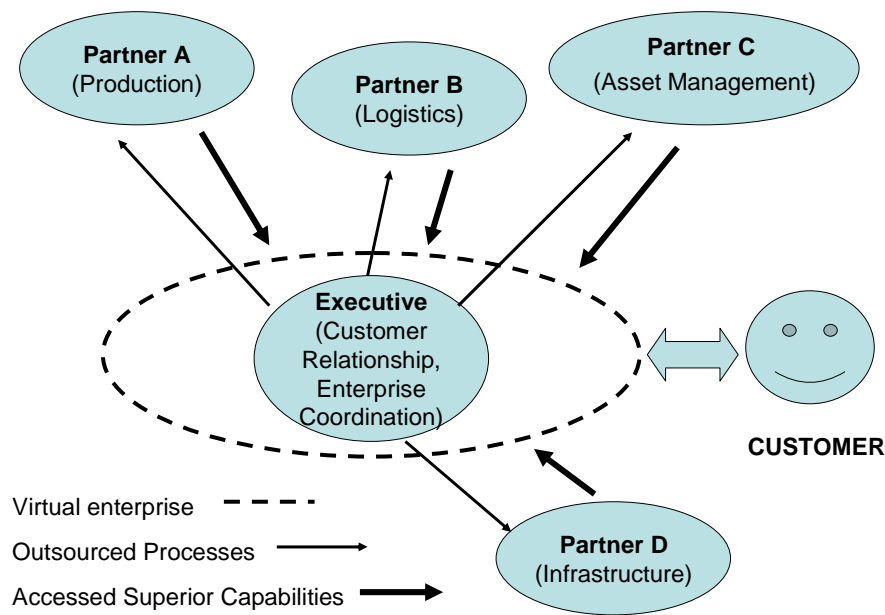


Figure 8 Generalised model of the Virtual Enterprise

Although differences of opinion still remain about the details, there is a degree of consensus as to the VE's distinguishing characteristics. These include; network structure, geographical independence, duration, focus on core competence, trust and common purpose and a strong reliance on ICT.

Network Organisation

Almost all writers agree that the VE is a form of networked organisation consisting of constellation of independent suppliers, such as Puma and Nike's independent footwear and sports apparel manufacturers, that provide the operational support to Puma and Nike's leading design and marketing efforts (Boudreau 1998), or associations of firms coming together for single, one of a kind ventures such as civil construction works or aerospace projects (Tapscott 1995). However, such arrangements are not new, having existed for centuries as partnerships, strategic alliances, consortia, joint ventures to cooperatively produce goods and services (Magda 1999). The VE networks differ from earlier networks by their greater degree of collaboration and integration.

A particular feature of the VE network is the blurring of organisational boundaries described as "internalising the external" (Sorensen 1996). This occurs when a single firm extends its association with others to access and internalise their superior or

complimentary capabilities. The result is that the firm assumes the appearance and competence of a much larger firm but without the capital expenditure and administrative overburden associated with larger integrated firms. For example, Nike is perceived to be a sports clothing manufacturer. However, in reality, all its manufacturing is done by its independent manufacturing partners leaving Nike to concentrate on its design and marketing activities (Christopher 1998). VE networks are characterised by strong collaboration amongst the various players. Conventional networks are often underlined by cooperation enforced by formal agreements conducted at arms length. But the fuzzy boundaries and organisational intimacy of the VE's distributed partners complicate such strictly legalistic relationships.

Geographic and Temporal Independence

Some writers consider that ICT has freed the enterprise from geographic and temporal restraints. This is often interpreted to mean that the various elements of the VE should be widely dispersed, like Nike's far flung manufacturing partners or Sun Microsystems technical support systems in the USA, UK and Australia (Boudreau 1998) or international call centres located in India. Distributed networks such as these are considered to be one of the defining characteristics of a VE (Cairncross 1998).

However, closer examination confirms Davidow and Malone's assertion that 'the virtual corporation will abhor distance' (Davidow 1992) and that physical proximity will continue to play a defining role in the operational life of the VE (Mol 1999). Distance is certainly inconsequential for the movement of information and digitised products, but it imposes logistical constraints on the movement of raw material and goods. Some organisations, like Nike, operate well orchestrated global supply chains. Others, such as Dell computers, insist that their suppliers are located in close proximity to Dells' assembly plants in the USA, Malaysia and Ireland to ensure JIT based delivery of components (Magretta 1998). And the component suppliers to the European Smart Car are co-located within the same fabrication facility as the prime equipment manufacturer (Ewing 1999).

The VE's distributed partners are only completely geographically independent when they use digitised material, such as designs for the European Airbus which were are executed using CAD technologies and global networks of engineers. In other circumstances, the locations of the various players are dictated by strategic issues such as the migration of labour to low cost locations and overall logistics costs.

Duration

Many writers characterise the VE as a temporary enterprise designed to meet emerging and presumably short-lived market opportunities (Byrne 1993; Jagers 1999). From this perspective, the dynamic VE appears as a project based organisation, such as civil engineering or movie making that exists until project completion and then disbands. However, in reality all enterprises are bounded by time and market needs. Some are explicitly project or time based, while others, such as large corporations, exist for years and decades continually adapting to changing circumstances and markets.

In relatively predictable conditions the stable VE may maintain close collaborative relationships with a consistent group of partners for a considerable time. But when conditions change the VE demonstrates its inherent flexibility by rapidly reconstituting its partners mix, by dropping some and adding others to form a 'new' organisation (Mowshowitz 1997). In this sense the organisation is simultaneously permanent and temporary.

Mowshowitz suggests that VEs exist because their low ICT enables them to change, or switch, partners and organisational configurations at lower costs than conventional firms (Mowshowitz 1997). Switching costs are an electronic addition to Coase's transaction costs (Appel 1998) which, as noted in chapter 2, strongly influence organisational relationships and provide the logic for particular structural arrangements. Low switching costs enable flexible structures, however, it should be noted that excessive switching imposes additional costs so a balance between flexibility and cost must be struck.

Focus on Core Competence

Each enterprise possesses a set of competencies that define the central reason for its existence, plus a set of non-core competencies that support the enterprise (Prahalad 1990). Intensive focus on core competencies is a characteristic of the VE. Outsourcing non-core business process, such as asset management and Human Relations, is a relatively common business practice, but VEs not only outsource non-critical processes, they also outsource critical processes where they do not enjoy superior expertise. Properly managed outsourcing is critical to the success of the VE (Kalakota 1999).

An important aspect of outsourcing, more properly called strategic sourcing, is that rather than simply assigning functions and processes to others, the VE actually accesses the superior competencies of external specialist and others and draws them to itself to

capitalise on their strengths. Thus, the VE sources the superior competence of others while minimising its investment in permanent staff, fixed assets and freeing its own working capital. This is known as internalising the external (Sorensen 1996).

Intense focus on its own competence and garnering the superior competencies of others is a characteristic of the VE. In the ideal VE, all partners contribute their core competencies to assemble a collection of competencies that will achieve the goals of the organisation. By using ICT to interconnect allies and partners, the VE leverages information to access the competencies available in its extended network when and only when they are required. The resulting synergy arising from this Just-in Time (JIT) assembly of competencies maximises the VE's capabilities while simultaneously freeing it from some of the physical and financial constraints that face new and expanding enterprises (Cahill 2000).

Trust

In market based organisations, price is regarded as the coordinating agent. In effective hierarchies, coordination is controlled through frameworks of authority, however in networks, such as the VE where controls are less formal, trust is regarded as the coordinating agent (Bauer 2001). High levels of trust between collaborating partners are thought to be fundamental to the success of the VE (Handy 1989; Davidow 1992). In concept, all of the partners in a VE have a sense of shared destiny and common purpose. To do this successfully they must adopt a holistic view of the supply chain and work together as if they were a single enterprise (Hammer 2000). Under these circumstances there is a greater degree of interaction and trust amongst partners and closer strategic and collaborative relationships than may have been possible, or even advisable, under the traditional arms length arrangement that characterise conventional business relations (Nottingham 1998). Interestingly however, in a survey of virtualness in Austrian firms Bauer observed that trust exists in degrees in all business transactions, however there was no significant relationship between high levels of trust and virtualness (Bauer 2003), suggesting that, in practice, firms still rely on the traditional formal mechanisms to ensure compliance and self protection.

Information and Communications Technology

Prior to the 1990s, electronic business applications such as Electronic Data Interchange (EDI) and transaction based financial and manufacturing systems had been progressively adopted by business (Schneider 2000). However, in 1993 the internet immediately

overcame many of the communications limitations imposed on these early systems and fostered the explosive growth of e-commerce, which later became e-business, and the multitude of advanced business applications that support them. In the light of subsequent advances in networking and integrating technologies, the internet is now widely accepted by many firms as an indispensable business tool capable of creating and disseminating large amounts of digitised information quickly and accurately to wherever it is required across the world.

Technological change has had a profound effect on traditional industry and organisational structures. For example, banking was once characterised by networks of branches and face to face relationships. But now the physical face of banking has been changes as many branches have closed and been replaced by the widespread deployment of ATMs and online banking facilities. Not only is ICT impacting industries but the speed of its development and penetration is also causing significant structural change as well. Film making is cited as an example of an industry where project based, dynamic VEs have existed for years without the benefit of intensive ICT (Travica 1997; Nixon 1998). However, within the past five to ten years or so developments in digital imaging, computer aided design have hastened construction design and today few films are made without world class, computer generated special effects that in some cases eliminate the need for real film sets and even real actors. Researchers now consider that the electronic component of business networks to be an essential prerequisite of the VE (Speir 1998).

The VE needs to combine the flexibility and responsiveness of a decentralised organisation with the market strength of a much larger firm. This requires an inter-enterprise system capable of providing the distributed partners with a transparent, coherent view of all relevant information (O'Brien 1998). Transparency of information is largely a matter of connectivity and protocols, but relevance is a matter of enterprise requirements and is driven by managerial strategy (Boudreau 1998). The object is to distribute and process essential customer and supplier information in real time throughout the entire value system, thus ensuring timely, coordinated action and decision making. An effective ICT system binds the VE's partners and strengthens its collective identity by providing a conduit for the opportune passage of essential production and corporate information that facilitates effective coordination of enterprise operations. Extensive, system-wide information flows that facilitate greater coordination and flexibility are the

major differences between the VE network and traditional outsourcing arrangements (Domberger 1998).

The dynamic nature of the VE requires standardised communication and interoperable 'plug and play' systems across its supply chain. Inter enterprise application integration is crucial for planning, coordination and control, decision support and document exchange. The internet and its related standards provide the base platform for many of the technologies essential for today's business, such as e-mail, web browsers, and secure networks that allow direct real-time collaboration between distributed workers and access to partner's diverse privately owned data bases. In the immediate future, wireless application protocols (WAP) promises to provide even greater mobility and flexibility to the VE. Additionally, emerging artificial intelligence technologies, such as intelligent agents for example, are anticipated to automate many routine negotiation tasks (Finnie et al 2000).

Rapid integration of information flows and process is an essential e-business issue and considerable research has been undertaken into its execution. However, in the VE rapid disintegration and reintegration are equally as important. The VE's dynamic constituency requires incoming or new partners to be quickly and seamlessly integrated into the network to replace those that are leaving. Dynamic switching of partners has the potential to hopelessly disrupt supply chains and place sensitive trade secrets, information, technology and intellectual property at risk. Security measures, standardised across the entire network, are necessary to prevent disaffected partners and others from gaining unauthorised access to confidential information (Grabowski 1999).

3.7. Limitations of the virtual enterprise

Although there is considerable academic and practitioner support for the concept of the VE, a number of researchers have highlighted the following limitations and disadvantage that attend the VE (Chesborough 1996; Christensen 2000; Christensen 2001).

Access to Technology

Although ICT based connectivity is essential to the function of the VE, network connections alone will not guarantee its success. VEs require the combination of web based enterprise applications, extensive middleware and high speed infrastructure, communications and networking technologies to ensure the seamless transfer of

information across the system. Effective orchestration of the VE's distributed activities is highly unlikely without the support of a battery of middleware applications. Furthermore the lack of appropriate ICT or inadequate functionality in any part of the network will significantly degrade the effective functioning of the entire enterprise.

Trust and Openness

Trust and openness exist in all business relationships to a limited extent (Bauer 2003) but they are expected to exist in greater abundance in the VE (Handy 1989). Bauer's research suggests that this may not be the case but that so called normal formal structure will continue. There is also the likelihood that, over time, the distribution of information will change and alter relative influence and the political structure of each of the partners, and they will progressively begin to act exclusively in their own interests unless restrained by the lead firm.

Managerial Skills

Virtual enterprises have an extended strategic reach that enlarges their operational scope and scale so the managerial skills required for their effective operation differ from those in classical management hierarchies. In hierarchies command and control flows from top to bottom, in VEs command and control is replaced by orchestration across a horizontal network that is separated by time and place. Teamwork and leadership are more crucial in a VE because the partners are independent entities that bring specialist skills to the network, so leadership has to be more collaborative and less directive. Effective information systems (IS) are essential for VEs because they enable the extensive processing and timely distribution of large amounts of information required for orchestration, communication and coordination. Consequently, VEs require very effective IS and staff that can not only operate them, but are able to use the technologies as platforms on which additional value can be created (Miller 1997). VE management also requires a multi disciplinary understanding of the central core functions and requirements as well as an appreciation of the processes and differing approaches of the enterprise's partners.

Product Limitations

VEs will succeed because of incentives and responsiveness (Chesborough 1996). Incentives are the benefits such as access to larger markets, higher levels of technology

and other rewards that generally enhance a partner's position. Responsiveness comes from the VE's capacity to acquire competencies and market access through its dynamic organisational structure (Chesborough 1996). Outsourcing, a key characteristic of the VE, is most successful when applied to standardised, modularised products (Hoogeweegen 1999), But it is less successful when cutting edge innovation that exceeds current levels of technology is required (Welch 2001). Christenson cautions against adopting a doctrinaire approach to going virtual by reminding us that competitive advantage is predicated on economies of scale and scope that are rooted in prevailing market conditions not structural arrangements (Christensen 2000).

Most of the firms that are referenced as being virtual are, to a large degree, in two industries; electronics and fashion. These firms such as Apple, Cisco, Dell, Motorola, Oticon, Nike, Puma, Benetton, and Zara have much in common. They need to manage short product life cycles, short delivery times and product variety. Although these time-based competitive environments seem best suited for networked operations (Ranta 1998), other industries are also moving towards the virtual model. In the automotive industry Ford, Toyota and BMW have adopted the network mode, complete with significant outsourcing (Economist 2001; Mello 2001; Turrettini 2003). Banking and financial service enterprises have also opted for on line service delivery and have outsourced numerous internal functions such as customer service call centres (Kotler 2003).

Despite this there appear to be few companies that are either capable or willing to adopt the VE model in its entirety. There is evidence however, that continued developments in computing power and capability are enabling significantly more business processes, products or parts of products and services to be digitised and therefore come within the orbit of e-business. Some of these are completely new, 'born to the web' businesses such as Google and Yahoo, while others such as Amazon Books and eBay have taken well known concepts and applied them in a digital context.

Legal Limitations

Like a strategic alliance, the VE is not a recognised legal entity and its distributed structure raises numerous complex legal questions. Many of these, such as protection of intellectual property, security of trade secrets, anti-competitive issues product warranty and liability, taxation and labour laws, are common to any web based business that operates in a global environment. However, while a stable VE represents a larger more or

less stationary legal target for these issues, the dynamic VE's s loose, dynamic, essentially stateless structure imposes a new layer of complexity on these already difficult questions. The complications that issues such as these create have the potential to inhibit or dissuade firms moving towards a virtual model.

3.8. Benefits of the virtual enterprise

The VE is purported to possess a number of significant advantages over its conventionally organised competitors principally reduced costs, increased flexibility, improved asset utilisation and scalability.

Reduced Costs

The VE is built on inter-organisational ICT networks that improve operational effectiveness by speeding and simplifying the exchange of information across the entire value chain in real time and at minimal cost. Although ICT is often considered to be the catalyst for the VE's development, the real driver is the conviction that internet technologies reduce the cost of operations and facilitate a closer relationship with suppliers and customers. Success is attributed to reduced transaction and switching costs, which enhance agility and flexibility and more than offset the benefits of scale available to larger integrated firms (Miers 1999).

Increased Flexibility

Lower transaction costs facilitate relationships with potentially more responsive and expert partners with leading edge competencies, thus allowing firms to concentrate on developing their own competencies while accessing the strengths of others (Hagel 1999). The VE's ability to identify market opportunities, assemble the required set of competencies to match the market requirement and then, just as quickly reconfigure its resources to meet a new opportunity sets it apart from its more formally organised and less flexible competitors (Ratcheva 1998).

Improved Asset Utilisation and Scalability

The combination of specialisation and outsourcing not only makes the VE more flexible, it also allows the enterprise to avoid having to undertake additional capital commitments, such as new plant and infrastructure, that are not directly associated with its core business. The VE is scalable in both directions because it is not limited by

physical boundaries or scarce resources that constrain expansion in times of prosperity and hinder contraction in times of hardship (Walton 1996; Harbison 2000; Leliaert 2001).

With the possible exception of scalability all of the benefits noted above can also be attributed to e-business. However, the critical success factors the VE are that it can acquire the 'best of breed' capabilities of outside specialists to create value in the form of customised products or services and rapidly scale up or down or change direction to meet market requirements.

Despite these promises, examples of firms that are sometimes considered to be VEs are only found in a remarkably small circle of companies such as Dell Computers, Cisco, Nike Amazon, Yahoo and Airbus. However none of these enterprises show any signs of being 'temporary'. Surprisingly, there has been little research to confirm a positive relationship between 'being virtual' and firm performance (Burn 2002; Bauer 2003).

3.9. Virtualisation

It is clear from the research that completely virtual firms are rare (Bauer 2003). However many firms exhibit at least some of the characteristics of a VE so, given the potential benefits of going virtual, there is some interest in 'virtualisation' or the process of becoming a virtual organisation.

There are two distinct approaches to virtualisation. The first, regards the process as an evolutionary outcome of management trends, such as Business Process Reengineering or Supply Chain Management, that, when combined with developments in ICT, inevitably result in flexible, networked organisational structures. The second approach considers virtualisation to be a purposeful act of management creation underwritten by management theories such as of resource based view or transaction cost theory (Bauer 2003).

The evolutionary perspective suggests that firms follow a pre determined path through different stages moving gradually from the non virtual to the virtual. Models of evolutionary development are based on a variety of criteria such as ICT complexity, integration and design (Tapscott 1995, Nolan 1974, Bernus 1997). Figure 9 illustrates virtualisation as a function of integration

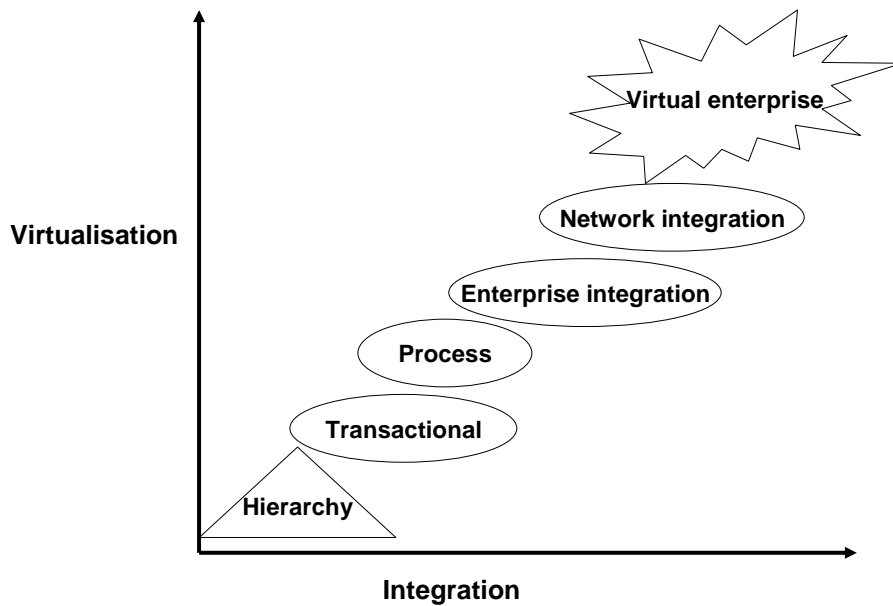


Figure 9 Evolutionary stages of virtualisation through integration

Arnold's different, multi dimensional, model of virtualisation, shown in Figure 10, features some of the known characteristics of the VE and describes the conventional firm's journey to the VE in four stages. In the first stage the conventional firm's takes advantage of ICT to optimise internal processes. In stage two the firm begins a program of outsourcing parts of the supply chain. In stage three it commences to redesign and integrate its supplier and customer networks with itself. In the fourth stage the firm uses a broker to perfectly configure a VE to the needs of the market (Bauer 2001).

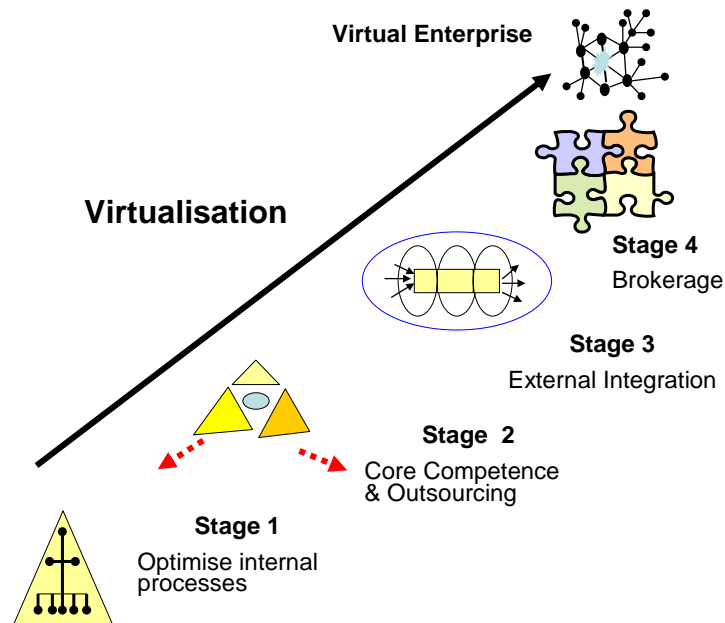


Figure 10 Virtualisation

In both the uni-dimensional and multi dimensional approaches, measurement of virtualisation is achieved by mapping the organisation against the various stages of the model.

In contrast to these evolutionary, bottom up approaches, Katzy proposes a deliberate, top down approach to virtualisation (Katzy 1999). The deliberate approach envisages a management initiated VE motivated by either an emerging opportunity or an unmet market demand. Whereas the evolutionary model appears to move towards a pre set structural conception; the deliberate model assumes that the new organisation will ultimately conform to the virtual model after undergoing several stages in design and construction (Katzy 1999; Franke 2001; Saabeel 2002). As illustrated in Figure 11, the deliberate approach however, assumes a virtual web of pre-qualified potential partners (Franke 2001), from which a lead individual or firm assumes the role of broker and selects the firms with the most appropriate competencies and assembles them into a coherent group capable of satisfying the market's need.

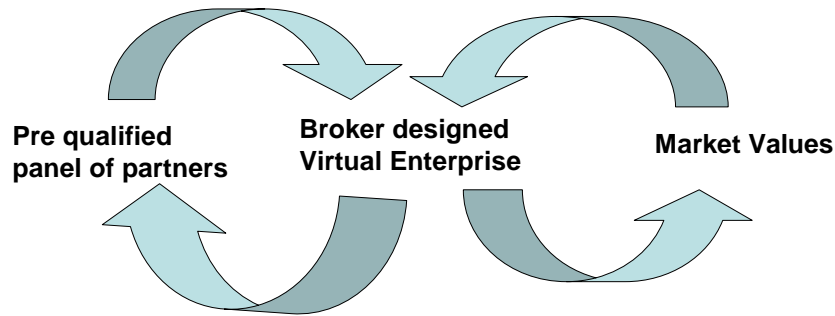


Figure 11 Market driven virtual enterprise

Both the evolutionary deliberate perspectives share the structural view of the VE. However, they approach it from different directions as shown in Figure 12. The evolutionary perspective sees it as an inevitable consequence of the interaction of contemporary changes in the global markets, advanced management theories and rapidly increasing ICT capabilities. In contrast, the deliberate perspective is strategically driven in response to market forces, but it also remains focussed on the VE structure and its attributes.

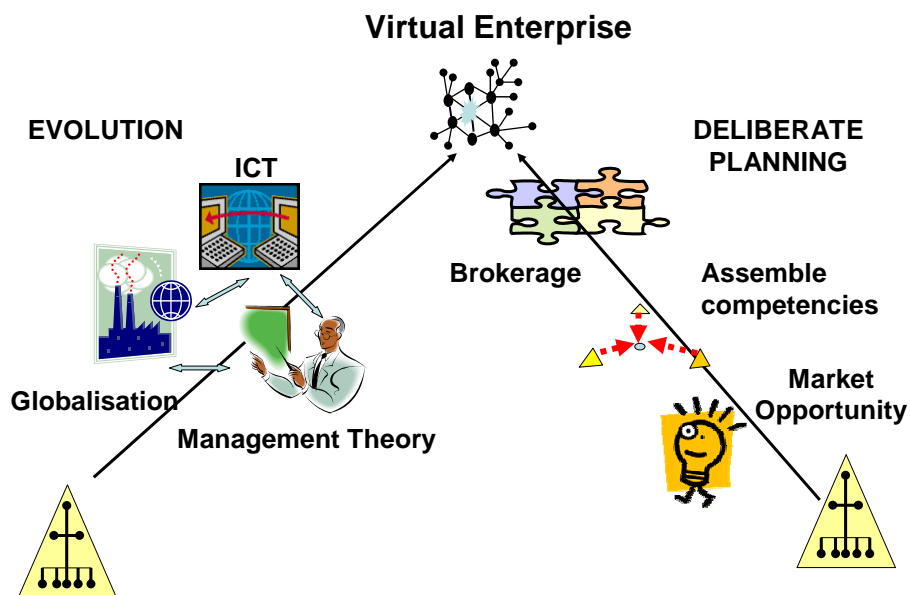


Figure 12 Evolutionary and Deliberate paths to the Virtual Enterprise

In their paper Bauer et al examined the theories behind the VE and virtuality to conclude that although some elements of virtuality can be explained in general terms, as we have

done here, analysis of the motivation for a VE lacks a satisfactory underlying framework. The question whether discussion of the VE as a new organisational form is appropriate, given the diversity of perspectives and the limitations attendant to the structural viewpoint (Bauer 2003). A small group of researchers (Mowshowitz 1997; Venkatraman 1998) reject the structural perspective altogether and adopt the view, also taken by Katzy (Katzy 1999) that the VE is a strategic issue associated with value creation. Burn made a similar point to observe that identifying the structural stages of virtuality does not help determine which virtual qualities can be turned to the task of value creation or even when it might be appropriate to do so (Burn 1999). Focus on the structural issues runs counter to Chandler's famous quote, "unless structure follows strategy, inefficiency results" (Chandler 1962) which encapsulates accepted organisation theory that structure needs to mirror strategy.

3.10. Discussion

The VE is a theoretical organisational concept arising out of changed market conditions and advanced ICT capabilities. VEs are characterised by networks of collaborating partnerships and intensive ICT linkages. Models of the VE range from the dynamic to the stable. The dynamic VE model consists of temporary, extremely fluid alliances of independent specialists coming together, often through the agency of a broker, to exploit fast moving market opportunities. The stable version is similar, except that it is lead by a lead firm that orchestrates the activities of its long term partner relationships. Structurally both forms are similar.

Although very few enterprises can be considered as entirely virtual, the concept is gaining support and a number of variant structures and forms have been identified. Many high profile firms such as Dell, Nike, Apple, Cisco, Zara and others, already exhibit some of the characteristics of the VE, namely:

- Collaborative networks,
- Geographic and temporal independence
- Limited duration,
- Trust,
- Focus on core competence, and a

- Strong reliance on intensive ICT networks

Of these, trust and limited duration are the most idealistic and remain the subject of continued academic debate. A modified form of stable VE is acknowledged as the most likely organisational structure to succeed conventional hierarchies.

Numerous advantages have been attributed to the VE. These relate mainly to operational efficiencies, organisational flexibility and improved customer and supplier relationships brought about by advances in ICT and the enhanced use of information as a competitive resource. Nevertheless, thus far, only firms in fast moving industries such as electronics or fashion have adopted some of the attributes of a VE. However, other industries such as financial services, banking and the automotive industry are moving towards the virtual model because it appears to optimise enterprise operations more effectively than any other currently available model.

Continued research focus on structural issues and the path to virtualisation has proven to be problematic due to the differing perceptions of the VE and the paucity of examples of an entirely virtual enterprise. To date, there is little empirical evidence to demonstrate the relationship between a truly virtual organisation and value. Furthermore, identifying the extent of virtualisation has not shown to be useful in explaining why, how or under what circumstances a firm should 'go virtual' (Burn 2002).

The evolutionary perspective of virtualisation is that the VE is an inevitable result of economic and technological change, whereas the deliberate approach is based on market forces, but both assume a common structural outcome.

Mowshowitz, Venkatraman and Henderson and others constitute a small a small group of researchers who reject the emphasis on structure in favour of a market based, strategic view of virtualisation (Mowshowitz 1997, Venkatraman 1995). This perspective, called virtual organisation, presented as a meta-management principle for value oriented organisations, will be taken up in chapter 4 which examines the theoretical foundations of value creation from the perspective of strategic management and ICT.

Chapter Four Strategy, and Virtual Organisation

4.1. Introduction

Chapter 2 demonstrated how the information age has irreversibly changed the economics of information and in so doing has changed way that information is both valued and used to create value. It outlined the changes in terms of information as:

- the pre-eminent factor of production
- a product, and
- the determinant of business relationships and organizational structures

Chapter 3 described the virtual enterprise (VE) as a particular type of organizational networked structure that emerged in response to the changes in information and presented two explanations of its development. The first, describes virtualisation of existing enterprises as an inevitable evolutionary consequence of the combined effects of globalization, management theory and developments in ICT. The second, views the VE as the outcome of a deliberate management response to the market (Bauer 2003). Both approaches share a common perception of the VE as a structure consisting of a lead enterprise surrounded by a network of collaborating partners. However, the deliberate approach originated with a small group of researchers who rejected the VE as a structural issue and approached virtualisation from a value based strategy, sometimes referred to as 'virtual organisation' (Mowshowitz 1997).

Strategy refers to the development and execution of ideas and plans that enable the enterprise to develop competitive advantage. The foundations of most classical approaches to strategy pre-date the internet and, although their objectives remain unchanged, their theories and explanations struggle with the changed nature of information and its impact on competitive advantage. This chapter expands the notion of virtual organization as an information-based strategic paradigm. But to do so it first overviews strategy theory and its explanations of competitive advantage and then it examines the impact of the information age on those explanations.

4.2. Strategy

Strategy is the enterprise's plans to gain and sustain competitive advantage.

Competitive advantage is achieved when an enterprise performs its activities more distinctively or effectively and efficiently than its rivals (Porter 1985).

In most contemporary enterprises there is a hierarchy of corporate, functional and operational strategy. Corporate strategy is long term and applies to all parts of the enterprise by providing corporate goals, values and general direction and outlining the enterprise's competitive stance. Functional strategy is limited to the domain of each of the enterprise's functional divisions with the emphasis on mid to short term issues. Operational strategy has a narrow focus and applies to the day to day issues (McNurlin 2002). Traditional strategy theory regards ICT as a tool for optimising enterprise performance through the execution of corporate directions but with little input to actual strategy development (Appel 1998).

4.3. Strategy Development

Early approaches to the formal study of strategy were associated with Ansoff and others in the 1960s (Ansoff 1965; Pettigrew 2002). Corporate strategy was initially perceived to be a strictly rational, somewhat mechanistic, process directed at analysing clarifying and developing objectives and then laying out a clear course of action to achieve them (Kay 2003). Functional and operational strategies were then carefully aligned with corporate direction and executed. Analysis of opportunities and threats in the external environment and strengths and weaknesses of the enterprise's internal environment (SWOT) and subsequent long term planning were some of the popular outcomes of the rationalist school.

Detailed long term planning however, had several weaknesses. Firstly, it did not and could not, anticipate future events, such as the oil embargo of the 1970s, globalization, deregulation (Hedman 2002) and the explosive technological developments in ICT. Strategy's failure to anticipate these changes and the increasing turbulence and unpredictable markets that followed caused considerable corporate disquiet and raised the question of whether or not strategic planning, with its emphasis on an uncertain future, was indeed a futile exercise (Porter 2001; Sawhney 2001). As a result, long term strategic planning lost much of its appeal and corporate focus

shifted towards shorter time-based alternatives such as agility and speed as competitive issues (Stalk 1998).

In his defence of the relevance of strategy in an information age, Porter argues that the internet's greatest impact has been to enable the restructuring of industries previously constrained by the cost of communication, information gathering or affecting transactions (Porter 2001). Overall, he contends that while the internet has expanded the market, it has simultaneously made information more readily available, reduced marketing and distribution costs and connected buyers and sellers, all at the expense of average profitability. In such an environment he argues that enterprise strategy is more important than ever. However, long term strategy's most glaring weakness was not so much its inability to predict the future, but rather its inaccurate portrayal of strategic planning practice.

Mintzberg and Walters proposed that the rationalist approach be replaced by one that incorporated a process of progressive trial and error modifications that adapted long term planning to current and changing circumstances. The resulting pragmatic 'emergent' strategy was more likely to be 'crafted' than planned (Mintzberg 1985; Mintzberg 1987). Other subsequent research further expanded Mintzberg's adaptive perspective further to include the actual processes of strategy development. Strategy became seen as a combination of rational, incremental, evolutionary and cultural factors (Faulkner 2003; Kay 2003). Most enterprises employ a rational planning process based on analyses of past performance, market trends and estimates of the future. However, plans are implemented incrementally and progressively adapted to the constraints and opportunities of the prevailing conditions. In the present environment of rapid global technological and economic change, Mintzberg and Walter's approach remains the dominant and most reasonable approximation of the process of strategy development.

An evolving enterprise strategy has significant ramifications for ICT. Implicit in an evolving strategy is the idea that the enterprise will change to meet the prevailing circumstances. While enterprise agility and speed have been recognized as sources of competitive strategy for some time (Stalk 1988), ICT applications are based on stable sets of user requirements and typically have long gestation periods and established development processes such as the software development life cycle (Hoffer 2002), which are inimical to change. As will be discussed later in chapter 7, limitations on

ICT's speed of development and capability can frustrate corporate strategies for desire for speed and agility.

The assumption that strategy should contribute to the enterprise's economic performance and provide a roadmap to achieving competitive advantage over its rivals is central to strategy development (Porter 1985). However, just how this is to be accomplished is the subject of considerable debate between two economics based traditions; industrial organisation (IO) popularised by Porter's theories and the resource based view (RBV) of Penrose, Wernerfelt, Barney and others (Penrose 1959; Wernerfelt 1984; Barney 1991). More recently, growing emphasis on strategic networks has revitalized another, older, theme of structure as a source of competitive advantage

4.4. Industrial Organisation

The industrial organization (IO) view of strategy is that it describes the enterprise's response to competitive forces that impact its industry. The IO perspective was championed by Michael Porter in his landmark publication 'Competitive Strategy' (Porter 1980). Porter's '5 Forces' model, shown as Figure 13, is one of the more enduring conceptual frameworks used to assess the competitive environment of an industry. The framework identifies the interaction of the threats posed by substitute products, potential new entrants, the relative bargaining strengths of suppliers and customers and the rivalries amongst existing enterprises in the same industry as key industry based determinants of enterprise profitability.

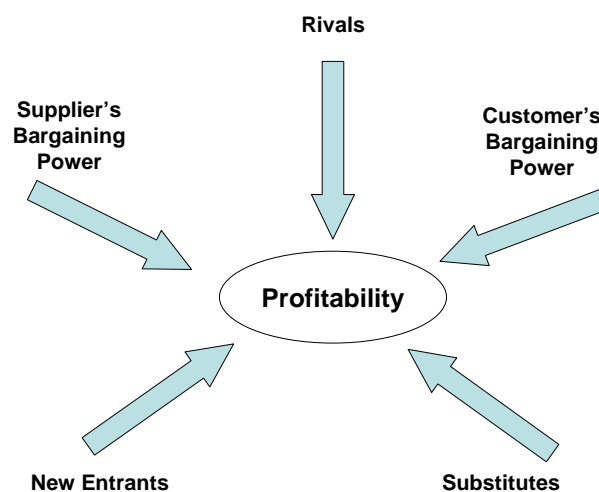


Figure 13 Porter's 5 Forces model of industry profitability

IO considers that the enterprise's success is tied to its ability to respond to these external environmental pressures and that industry structure and positioning will dictate the enterprise's profitability. Profitability of the average enterprise operating within an industry is, according to Porter, influenced by the enterprise's choice of one of three generic strategies. An enterprise can choose to be a price leader and compete on the basis of its ability to offer lower prices. Alternately, the enterprise can differentiate itself from its competitors by offering a different product with, for example, higher quality or more functionality at a higher price. Finally, the enterprise can opt to focus on a particular market niche and achieve a dominant position using either price leadership or differentiation strategies. Any compromise position is predicted to weaken the enterprises competitive potential. Porter and Miller suggest that information technology creates value by supporting differentiation strategies (Porter 1985).

Although the 5 Forces model has been used extensively by academics and practitioners (Turban 1999; Laudon 2001; McNurlin 2002; Pitts 2003), it is not without its critics. The model's focus on externalities is criticized because it pays little regard to the enterprise's internal resources and the different resource configurations of competing enterprises (Pritkethly 2003). The model also portrays competition between enterprises with fixed boundaries engaged in zero sum contests against competitors, suppliers and customers (O'Keefe 2002). However, businesses now often operate as parts of larger informal, networks comprising many suppliers and customers where the emphasis of competition is between collaborating networks than on competition between individual enterprise (Normann 1993). Most importantly, empirical analysis has demonstrated that although the external environment exerts considerable influence on the enterprise's potential profitability, far more influence is exerted by other factors from within the enterprise itself (Volberda 2003).

4.5. Resource Based Economics

In the light of these developments, an alternative, resource based view (RBV) of the enterprise emerged. Originally foreshadowed by Penrose (Penrose 1959), the RBV was developed by Barney, and Wernerfelt and subsequently enlarged by others (Wernerfelt 1984; Barney 1991; Rumelt 1991). By the mid 1990s, the RBV had overtaken the research agenda on strategic management from the IO perspective. The

RBV postulates a strategy that exploits the enterprise's unique bundle of services and resources to develop competitive advantage.

The list of resources available to any enterprise is likely to be a long one. Resources can be classified as tangible or intangible assets or capabilities. One of the insights of the RBV is that not all resources are created equal and attention has been focused on certain key resources having the characteristics of value, rarity, inimitability and non-substitutability (Barney 1991). For a resource to be a potential source of competitive advantage it must either represent intrinsic value or enable the creation of value in terms of efficiency or effectiveness in meeting the needs of customers. In the RBV meeting customer defined value is an essential element of competitive advantage.

As the RBV has developed it has come to include sub-theories such as innovation, core competence, outsourcing and the value chain that individually hold that superior competitive advantage stems from a value creation strategy based on enterprise-owned resources and capabilities.

Innovation as Value

Schumpeter was amongst the earliest proponents of enterprise as a source of value creation. He identified innovation through technology and 'novel' combinations of resources as the foundation of new products and services. These, he asserted, would initially yield higher returns to innovators but eventually these 'rents' would inevitably self-destruct through a process of 'creative destruction' as innovations became established industry practice (Schumpeter 1934). Ongoing innovation is, in Schumpeter's view, a source of value creation and he highlighted the contributions of entrepreneurs who were willing to undertake the risks new ventures required.

The number of new technologically innovative products and services and the speed at which they are released is increasing. Product life cycles are shortening and driving consumer appetite for more and different products. However, competitive advantage from innovation is not confined to new consumer products. The innovative use of technology in production, such as Mustang Cruiser's use of a CAD and CNC milling machines to precisely create fibreglass molds faster and more accurately than traditional wooden molds, can also provide value and competitive advantage (Hales 2004). However, while constant innovation is difficult to maintain, but some

companies such as Apple Computers have successfully achieved customer recognition and competitive advantage through its reputation for innovative design and products.

Innovative ideas, concepts, techniques and applications can only produce value for the enterprise through their execution. Today, much of the enterprise's capacity to execute innovative ideas and concepts is driven by its own capacity to exploit its key human and institutional information resources and ICT capabilities.

Competence and Value

Building on works by Penrose and Wernerfelt, Barney identified resources, as sources of competitive advantage (Penrose 1959; Wernerfelt 1984; Barney 1991). Amit and Schoemaker (Amit 1993) coined 'strategic assets' to describe the set of specialized resources and capabilities that are; difficult to trade, imitate or appropriate and create competitive advantage. A general distinction can be made between resources, capabilities and competencies. Resources are human, physical, financial tangible and intangible assets that can be freely acquired in the market. Capabilities are skills possessed by individuals. Understanding these is the central interest of the competence perspective of management articulated by Prahalad and Hamel as core competencies (Prahalad 1990; Prahalad 1993).

The competence perspective looks towards enterprise competencies that are organizationally based capabilities as the fundamental sources of value.

Core competencies are collections of interrelated capabilities that are distinctive and unique to the enterprise. They are defined by three attributes; they should:

- provide potential access to a wide variety of markets,
- make a significant contribution to the perceived customer benefits of the end product (s), and
- be difficult for competitors to imitate (Hamel 1994).

Core competencies are built through a process of continuous improvement and enhancement. They should constitute the focus for corporate strategy. At this level, the goal is to build world leadership in the design and development of a particular class of product functionality. Core competence is the collective learning in the organisation, and result from the way an enterprise uses its resources to create knowledge and skills, especially those that relate coordinating production and

integrating streams of technology (Prahalad 1990). Deployment of ICT alone is not a core competence or source of competitive advantage unless its unique capabilities or its intellectual properties are rigorously protected.

Outsourcing or strategic sourcing is the reciprocal of focus on core competence. When enterprises focus on their core competencies they frequently outsource processes where they do not have first class skills or interest, especially if the tasks can be accomplished more economically elsewhere. For example, less than half of the value of Chrysler vehicles and only about ten percent of Boeing 767 aircraft are produced in house. The rest is made up of inputs from specialist manufactures and assembly plants (Gilley 2000). Outsourcing allows the enterprise to concentrate its resources on the areas where it has particular competence. In doing so it frees capital and improves asset usage and, by accessing the core competencies of others, it becomes a more capable enterprise at lower cost than would have otherwise been financially possible. However, outsourcing does carries significant risks, such as loss of skills and the potential for an unacceptable level of dependence on partners. In the case of Nike sportswear, the enterprise has successfully managed these risks and outsourced all of its manufacturing to specialist manufacturers to allow the parent enterprise to concentrate on design and marketing (Christopher 1998).

Cisco Systems is well known for its outsourced business model and almost total reliance on its suppliers and manufacturing partners to build test, and deliver Cisco's entire line of products. By delegating its manufacturing Cisco is able to concentrate on its core product development and customer relationship capabilities to design new generation of networking equipment faster than its rivals. These arrangements have also reduced Cisco's fixed costs and delivery times (Kraemer 2002). Cisco's entire operation is facilitated by an extensive ICT network that connects its customers, partners and suppliers. Customers can interact with Cisco engineers online to co-design their requirements then, Cisco uses the internet to communicate these specifications to its partner's facilities. Cisco orchestrates and oversees production, conducts quality checks of Cisco products at its partner's sites and coordinates customer deliveries through its ICT network (Pitts 2003).

The RBV has more recently been expanded by the dynamic capabilities perspective that investigates how valuable resources are acquired and developed over time (Teece 1997). Dynamic capabilities are associated with the enterprise's managerial processes

that not only integrate, coordinate, and transform its resources, but also enable new product development, creation of business alliances, knowledge creation and transfer (Quinn 1992; Teece 1997; Eisenhardt 2000). The knowledge based view of the enterprise is a contemporary development which recognizes the increasing contribution of information, as knowledge, to competitive advantage (Grant 1996). In particular, some theorists have suggested that competitive advantage rests in the enterprise's ability to integrate the knowledge of different individuals in the production process of goods and services. One of the propositions of the knowledge based view is that competitive advantage depends on the effective integration of enterprise processes (Ghoshal 1996).

Increasingly, enterprises are now beginning to realize that enterprise –only information is insufficient for success. Now they must rely on strategic alliances or other networking arrangements to capture, organise, distribute and reuse information (McNurlin 2002). Drucker predicted that the “typical business will be knowledge based, an organization composed largely of specialists who are self directed but discipline their own performance through organized feedback from customers, and colleagues” (Drucker 1988). The ICT tools necessary for enterprise knowledge management include information repositories in the form of expert systems comprised of document management systems, large data repositories and data mining facilities that capture and distribute information on the enterprise.

4.6. Value Chain

Although Porter is famously associated with ‘5 Forces’ model and the IO view of the enterprise (Porter 1980), it is ironic that his equally famous ‘Value Chain’ model (Porter 1985) is extensively used by in the RBV. Unlike previous functionally oriented models, the value chain shown as Figure 14, describes the enterprise as an integrated system of a series of primary and supporting activities. Competitive advantage, represented by the profit margin, is achieved when the value adding contribution of each activity is performed more cheaply or better than its competitors and the activities of the enterprise are optimised across the system rather than by individual activities.

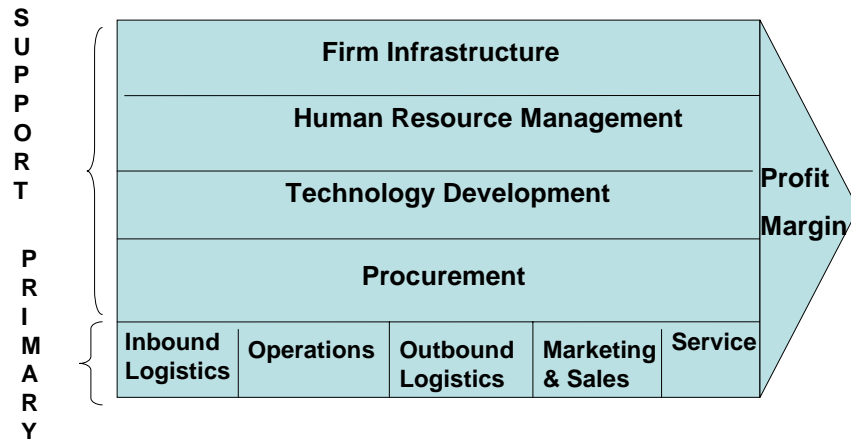


Figure 14 Value Chain

Unlike the 5 Forces model which focuses on an industrial perspective, the value chain is focused on the enterprise and its internal mechanisms. The value chain is almost universally recognised as the premier tool for value analysis but it is not without its critics. Many of these argue that it reflects the industrial production model of the 1980s and not the predominant service industry models of the present. More importantly, from an ICT perspective, the model does not take into account the disintermediating impacts that information and ICT have on intra enterprise and industry relationships and the subsequent move towards networked structures. Neither does it consider the changed emphasis and influence of information on the enterprise. In the original model information was used for control and coordination whereas now information is increasingly used as a substitute for physical activities as well as still being used in the traditional roles. Despite these criticisms, the model does provide management with an effective tool and a rationale for examining enterprise activities. One of its more valuable contributions is that it encourages a process based focus. Chapter 5 gives a more detailed account of the value chain.

The RBV's principal contribution is that it identifies the possession of scarce resources that enable value creation as the source of competitive advantage. The RBV acknowledges the impact of external forces on the organization and the enterprise's strategic responses. But it emphasises the characteristics of the resources of the factors that underlie low cost and differentiation. The resources are the enterprise's physical and human assets, organizational capabilities, organizational processes, information and knowledge and so on (Wernerfelt 1984). The RBV asks the strategic questions, what does the customer actually perceive as value and what processes and

resources are critical in helping deliver it? (Bowman 2000). The RBV's focus on understanding and delivering customer value sets it apart from the IO perspective which focuses on profit.

The RBV predicts that enterprises will use information and ICT to enhance their existing resources for competitive advantage. Information technology itself does not materially contribute to sustainable competitive advantage (Porter 2001). However, as shown in Figure 15; when information technology and information are embedded in other resources they enable the development of innovative strategies, products and process and open up future opportunities to enhance the organization's effectiveness and long term competitive advantage.

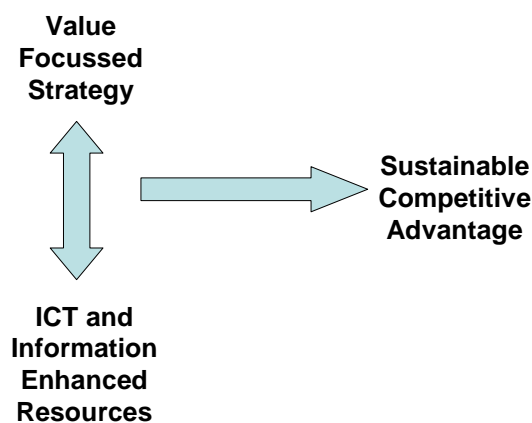


Figure 15 Resources, value and strategy relationship

Like the IO view, the RBV of strategy has its critics who point to its neglect of the impact of competitive demand for resources and the minimal attention paid to process (Hedman 2002). Furthermore, although resources are quite reasonably considered to be sources of competitive advantage, the task of determining exactly what is unique to the enterprise and the extent of its contribution remains a challenging exercise (Chatterjee 1998).

4.7. Structure

Globalization, increased competition and technology have flattened hierarchies and reduced the overall size of many organizations (Whittington 2003). However, until recently, the IO and RBV view of strategy and competitive advantage have overshadowed the contribution of organizational structure to strategy and value. The

decline of hierarchies and the emergence of networked organizations, particularly those enabled by ICT, has revitalized interest in structure and its strategic contribution to value (Shapiro 1999). Successful strategy implementation is predicated on an effective organizational structure that formalizes and optimizes the working relationships between employees and business units. Organizational structure has three dimensions: specialization, standardization and centralization. Specialization ensures that tasks are assigned to those best equipped to complete them.

Standardization ensures that work processes and processes can be repeated at a given performance level and centralization indicates the distribution of decision making authority. The right combination and interaction of these ensures that the enterprise's strategy can be executed with the right balance of stability and flexibility.

Traditionally organizations have been organized along functional groupings, product or strategic business unit divisions, geographic areas or as a matrix which combine some of these groupings.

Vertical Integration

In the past, enterprises sought competitive advantage and internal stability by adopting vertical integration as a competitive strategy. Vertical integration is designed to enable an enterprise to take control of its supply chain and thus ensure a reliable and predictable flow of resources. This was particularly important where any irregularity or disruption to supply has the potential to endanger the enterprise.

Enterprises can adopt varying degrees of vertical integration. Complete integration is exemplified by Fords Motors which, in the early part of the 20th century, owned almost all activities used to produce and sell cars, from steel mills that made the components to dealerships that financed and sold the cars to customers. Instead of attempting to own everything an enterprise can selective seek to control only those parts of the manufacturing process that it considers critical. Automotive companies such as Ford, Saab, Mercedes Benz and BMW have gradually sold off many of their manufacturing operations and outsourced others to allow the parent companies to focus on their competitive strengths. Backward integration refers to the enterprise's strategy of bringing supplier's activities under its control to guarantee ongoing supplies of critical resources. Enterprises that wish to capture some of the value and profit lost to distribution activities may adopt a strategy of forward integration by acquiring wholesale and retail outlets that interface with their product's consumers.

Vertical integration strategies of all types are motivated by the desire to ensure continued supply and control of vital resources, reduce the risks and uncertainties associated with dealing with intermediaries and capturing additional sources of value. However, the disadvantages of vertical integration are that the enterprise has to develop or acquire leading skills in a variety of often disparate areas and spread its capital and resources across activities such as procurement or distribution, where it may lack expertise. Vertically organized enterprises often lack the flexibility to quickly adjust to market fluctuations. Networked enterprises on the other hand have greater flexibility because they are better placed to acquire additional resources or cut back on resources with less administrative effort and cost because they have fewer ongoing fixed costs.

Transaction Cost Economics

Structure was also of concern to Coase (Coase 1937), but for different reasons. He examined why certain activities are undertaken internally by the enterprise while others are undertaken (outsourced) by the market. His explanation was that the costs of these transactions determine what activities the enterprise would accept and what it would externalize, thereby establishing the enterprise's boundaries. Transaction costs are the costs associated with: searching, information making, decision making, bargaining, cost control and handling, financial adjustment, and execution (Appel 1998). According to Madhok, Williamson extended Coase's work on transaction costs to explain the choice of the most efficient organizational form in terms of risk, exchange frequency, asset specificity and the costs associated with planning, executing, and monitoring the task (Madhok 2002). Thus while the RBV defines the enterprise's boundaries in terms of its unique resources that allow it to perform tasks in a unique way (Teece 1997), transaction costs economics (TCE) uses transaction costs to delineate organizational boundaries. Information and ICT have the capacity to reduce transaction costs significantly. For example, in 1998, Booz Allen estimated that the cost per bank transaction conducted in a bank chamber was approximately US\$1.07 while the same transaction on an ATM cost US\$0.27 (US Department of Treasury 2000). Reduced transaction costs drive make organizational networks viable alternative to hierarchies and are the main reason for the growth of E-business (Appel 1998). However, TCE's focus remains on the enterprise, not on its interactions with the wider value system even though its impact is felt through the network.

Networks

Network theory suggests that there is no universal, ideal structural model and the best structure is one that matches the particular demands of the organization's operational, technological and organizational environment and strategy (Donaldson 2000).

Although network theories are not well developed, they anticipate that future organizational structures will be dynamic networks of enterprises, increasingly centred around knowledge creation with a focus on communication rather than control (Whittington 2003). Chandler's quote "unless structure follows strategy, inefficiency results" (Chandler 1962) encapsulates the accepted wisdom that structure needs to match strategy

As alternatives to vertical integration, business networks have long been an established part of the commercial landscape and take the form of strategic alliances, joint ventures, and various buyer/supplier relationships (Faulkner 2003). Although enterprises form these relationships for a variety of reasons their motivation is usually some form of risk reduction. By associating with others enterprises can ameliorate risks involved in apply new technologies, enter new markets or expanding product ranges.

The idea of strategic networks emerged in the strategy literature in response to Porter's value chain. Normann and Ramirez's value constellation model shifted the focus of strategic analysis from the individual company or the industry, to a value creating system of suppliers, business partners, alliances and customers working collaboratively to create value. In a network, mutual value is developed as a consequence of reciprocal interactive relationships between organizations (Normann 1993). Enterprises such as Dell computers and Li and Fung achieve considerable market presence through their global operations through ICT intensive supply networks (Kraemer 2000; Chow 2001).

Highly networked organizations are considered to have a number of advantages over traditional organizational forms, namely increased flexibility, speed and capacity, improved access to resources and capabilities and reduced exposure to risk (Faulkner 2003). They exist in a range of structural configurations (Burn 1999), across a continuum bounded by stable networks of lead enterprises that dynamically and extensively outsource their activities to increase flexibility and performance, and dynamic networks composed of a lead enterprise that identifies business opportunities

and assembles a complementary but temporary network of enterprises whose assets provide the required business system to meet the market needs (Snow 1992).

4.8. Virtual Organisation

The origins of the VE can be traced to ICT developments and the internet (Davidow 1992). Most references imply that adoption of a networked structure will result in increased flexibility, wider marketing reach, reduced cost and improved leverage of scarce resources (Clark 1998). In the previous chapter, we described the VE as an information-based network of interdependent enterprises that emerges either as a result of organisational evolution or deliberate planning. However, the notion of the VE as a deliberate management response to market conditions is, to date, reported in only a few publications and there have been even fewer attempts to combine both the evolutionary and deliberate approaches (Katzy 1999; Franke 2001; Saabeel 2002). Both perspectives emphasise structure. In contrast, Mowshowitz and Venkatraman and Henderson explicitly rejected the concept of the VE as a particular structural form and adopted strategically based perspectives they called; ‘virtual organisation’ (Mowshowitz 1997) and ‘virtual organizing’ (Venkatraman 1998).

Mowshowitz spoke of virtual organisation as a process to structure and manage any enterprise by matching particular tasks with the appropriate elements of satisfying them (Mowshowitz 1997). Virtual organisation involves four management activities:

- formulation of abstract requirements
- identification of concrete satisfiers,
- dynamic assignment of satisfier to requirements, and
- analysis of the criteria for satisfier selection.

Mowshowitz regarded ICT as crucial to the process because of its particular capacity to facilitate rapid selection and de-selection of potential satisfiers at low cost, a process he called ‘dynamic switching’. By explicitly separating requirements from satisfiers, management can identify, select and switch to the most appropriate satisfiers and so optimise performance.

Mowshowitz’s concept of virtual organisation is as an ICT enabled decision making strategy that is completely responsive to market conditions. In operational terms this

means that any organisation with clearly identified tasks or goals and the means of satisfying them can, through ICT, acquire the best solution for the time. ICT also enables it to quickly change to another solution when the need arises, even if the solution is a potential partner external to the enterprise. Virtual organisation promises similar benefits to the VE, namely greater flexibility and responsiveness, improved quality, lower costs and better resource utilisation because of its explicit goal formulation and systematic switching. Although low switching costs can drive costs down, excessive switching can drive costs up because the savings will be more than offset by the cost of 'resetting the system' too frequently. Task performance and location is based on who is best equipped to perform the task either within or outside the enterprise.

Of particular interest here is that virtual organisation does not presuppose any particular structure or functional arrangement. Indeed, Mowshowitz makes the point that virtual organisation is a meta-management tool that is explicitly goal oriented, empowered by ICT and structurally independent.

Venkatraman and Henderson explicitly rejected the structural perception of a VE in favour of virtual organising that they regard as a strategic paradigm and 'virtualness' as a strategic characteristic applicable in greater or lesser degree to every organisation. They place ICT as the enabler of virtual organising (Venkatraman 1998). In their model, shown below as Table 1, virtual organisation is developed along three interdependent axes; customer interaction, asset configuration and knowledge leverage and through three stages focused on tasks or business units, organisations, and inter-organisational groups consecutively.

In the first stage ICT of the model, shown at Table 1 is used to redesign business processes, in the second stage the organisational structure is reconfigured and in the last stage the scope of the business is redefined with inter-organisation networks to create value and growth. Traditionally, these vectors, represented by marketing, procurement and human relations, respectively operated in isolation. However a series of information technologies have progressively integrated these into the virtual organising business framework that supports and shapes organisational strategy.

Vector & Characteristics	Stage 1	Stage 2	Stage 3
Customer Interaction (Virtual Encounter)	Remote experience of products and services	Dynamic customisation	Customer communities
Asset Configuration (Virtual Sourcing)	Sourcing Modules	Process interdependence	Resource coalitions
Knowledge leverage (Virtual Expertise)	Work Unit experience	Corporate Assets	Professional community
Target Locus	Task/work unit	Organisation economic value	Interorganisational network
Objective	Improved efficiency (ROI)	Enhanced economic value	Sustained innovation and growth

Table 1 Virtual Organisation

Venkatraman and Henderson's multidimensional model is a major departure from the staged models of virtualisation in chapter 3 and share Mowshowitz's view of ICT as the essential enabler of corporate virtualisation. No particular structure is prescribed and the organisational changes that result from virtualisation allow the enterprise to gather and coordinate competencies that culminate in the creation of superior value. However, Stage Three of the model, with its ICT enabled inter-organisational communities of suppliers, professional and customers, strongly resembles the concept of the VE that is, a collaboration of specialists interacting directly with customers to create value. For convenience we have combined Mowshowitz's virtual organisation and Venkatraman and Henderson's virtual organising under the label of 'virtual organisation'

The idea of value as a motivating force for the creation of VEs is only implicit in most references to the evolutionary perspective of virtualisation. The benefits, which motivate the structural approach are outlined in chapter 3, mostly relate to operational efficiencies and improved marketing through extended market reach. The deliberate approach however, is driven by market forces.

Virtual organisation is driven by the information and ICT to create value by satisfying unmet opportunities in new and innovative ways. In chapter 2 we described three strategies; value maintenance, value adding and value creation. As illustrated in

Figure 16, the first two stages of Venkatraman and Henderson's model target improved efficiency and improved economic value as their objectives. According to our classification these are value adding strategies. Only in Venkatraman and Henderson's third stage, when new products and relationships are developed is value truly created. For example, Swatch and Mercedes Benz combined to take the initiative and develop the Smart Car to fulfil a need for a new concept of automobile transport (Ewing 1999).

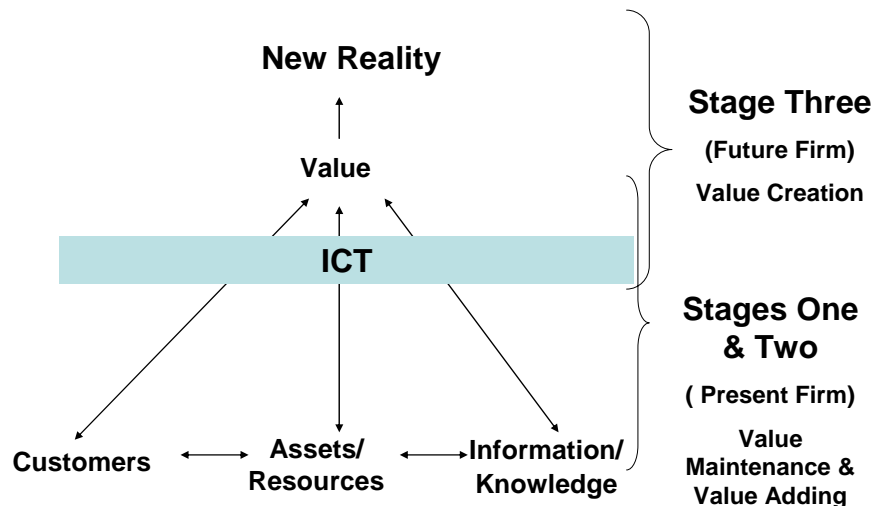


Figure 16 Virtual Organisation

4.9. Discussion

Research into strategy necessarily covers an understandably broad but fragmented area. Each of the three fields of IO, RBV and structure are juxtaposed because they address competitive advantage from different perspectives. IO is concerned with industry environment, RBV with internal resources and Structure with organizational form. Although their common thrust is to improve corporate performance by creating competitive advantage, all perspectives have differing views on how it is to be accomplished. The IO school sees value in the form of profit as a result of strategic positioning within an industry. From the RBV perspective, competitive advantage is derived from customer value which is built on the enterprise's resources and capabilities such as innovation or the interaction of the enterprise's internal activities within the value chain. Within the structural perspective, competitive advantage results from minimised transaction costs and the synergies flowing from collaboration with networked partnerships.

The information age has compromised the previous clarity of each of the classical models of value creation so that their explanations no longer reflect the information environment in which all enterprises now operate. The IO perspective's reliance on environmental forces is under question as information has blurred industry relationships and made the competitive landscape more difficult to define. Similarly ownership of resources and core competencies that lead to competitive advantage is becoming more difficult to sustain as ownership is diluted by more mobile information-based resources and competencies. Structural sources of value such as integration are also under question, as networks replace hierarchies and organizational boundaries become less well defined.

The strategic impact of ICT and information on competitive advantage and value creation has not been well researched in strategy literature and the gap in organisational theory remains largely unbridged. In 1986, Bakos observed that much of the work on the strategic impact of ICT made little reference to the body of knowledge about strategy and competition (Bakos 1986). In 1998, Venkatraman and Henderson complained "current models of strategy and structure are woefully inadequate to meet the imminent challenges of the information" and noted the absence of a framework to understand the potential contribution of ICT in new organisations (Venkatraman 1998). Appel observed that although organisation theory recognises ICT as a tool for optimising organisations, much of the work on strategy neglects the strategic impact of ICT (Appel 1998).

Amit and Zott examined value from the strategy and entrepreneurial perspectives in enterprises active in the e-commerce space and concluded that existing strategy theories did not explain value creation in electronic markets (Amit 2001). However, the distinction between enterprises that operate in electronic markets and those that do not is rapidly disappearing as ICT becomes all pervasive. Even those not traditionally associated with e-commerce are active in the e-business space where they employ commonplace technologies such as web sites, e-mail, electronic banking, client databases and electronic accounting applications in the routine conduct of their business.

It is now clear that although the various impacts of ICT and information on competitive advantage and value are well recognized in practice, they have not been adequately incorporated into existing strategic theories all of which have difficulty in

explaining value creation in an electronic context. The principal cause of these shortcomings is that the accelerated, free flow of information within and without the enterprise disturbs the economic and behavioural assumptions on which many strategy theories are built. Nevertheless, the IO, RBV, and structure theories continue to make valuable contributions about the sources of value and should in no way be discarded. For example, the value chain may now have some weaknesses, but its focus on value remains crucial to enterprise success.

A particular feature of information is its capability to precipitate integration. This characteristic has flowed over into the enterprise's strategic considerations where it is no longer desirable to segregate the internal affairs of the enterprise from those of its suppliers, customers and competitors. Therefore, we would expect that any strategic analysis of the enterprise should explicitly incorporate the activities of these external players. However, an integrated approach to explaining value strategy in the information age is yet to be developed in strategic management (Amit 2001; Hedman 2002).

The notion of virtual organization as an ICT enabled strategy was largely developed in the IS discipline which has a multi-disciplinary perspective. Virtual organization addresses the enterprise's external environment of competitors, customers and suppliers against the backdrop of its own resources. The strategy of virtual organization is founded on an intensive application of ICT and an information based perspective of the enterprise and its relationships. It sees value creation as the locus of enterprise activity. By nature, virtual organization is integrative in its approach and cross functional in its application. As such it does not fit well with the single focused strategic explanations of value creation. Nevertheless, its information based explanation of value and its use of ICT legitimately sets it apart from the other strategic perspectives on competitive advantage. We propose that it should be regarded as a new explanation of value creation in the modern enterprise, see Figure 17.

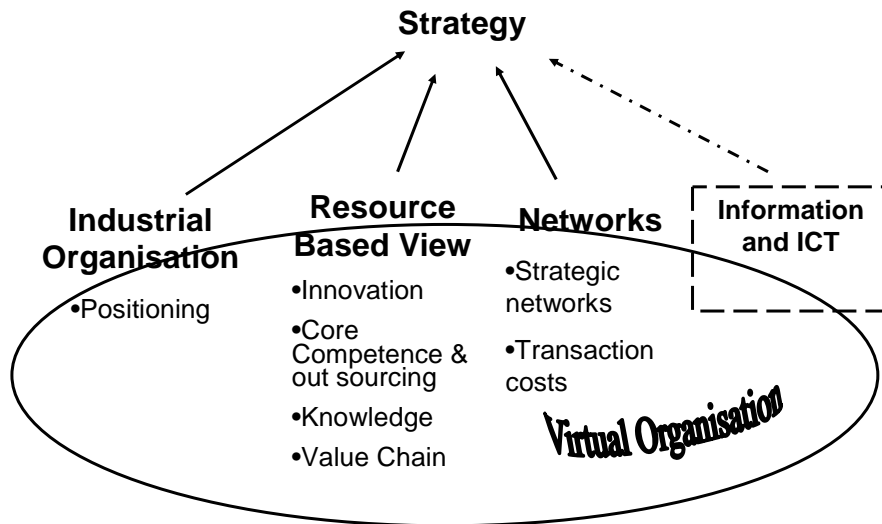


Figure 17 Strategic sources of value

Virtually organized enterprises rely on ICT and information for their operation. Their success depends on their ability to visualize the logic of their business and leverage information to create an appropriate organizational arrangement to support it (Venkatraman 1995). Successful virtual organization strategies will incorporate ICT with existing sources of value and create value in contexts that were previously unavailable or uneconomical (Feeney 2001; Porter 2001).

Value creation is the objective of all strategy, including virtual organization. Drucker presciently observed that the purpose of the enterprise in the electronic age is to create value and wealth. The question however is, for whom (Drucker 1998)? Chapter 5 examines the issue of value creation from the perspective of the enterprise's shareholders, customers and stakeholders.

Chapter Five Value and the firm

5.1. Introduction

Chapter 2 of this thesis described the impact that advances in ICT have had on the uses and value of information. Chapter 3 discussed the emergence of the VE as an information driven structure. Chapter 4 discussed value from the perspective of strategy theory and concluded that extant theories do not adequately address the impact of ICT and proposed adding virtual organisation as an ICT dependent, value oriented strategy to the existing body of strategy theory.

In recent years, few management articles or texts have been complete without at least passing nod to the concept of value, or reference to the value chain and value adding activities as popularised by Michael Porter's Value Chain model (Porter 1985; Porter 1998). The firm is a creative entity that produces value (Normann 1993), and value creation is addressed by all business disciplines. However, 'ownership' of this fundamental concept is principally divided between finance as 'shareholder value' and marketing as 'customer value'. In the past, the firm's operational activities were in a constant state of dynamic tension as the demands of the shareholders and customers are contested by champions from both finance and marketing. Now that contest is even more complicated with the emergence of ICT and its impact on finance, marketing and operations.

Peter Drucker asked for whom does the enterprise create wealth and value in the information age (Drucker 1998)? Popular and academic literature identifies the firm's stakeholders as those who are directly affected by or who can affect the firm's activities namely owners, or shareholders in the case of publicly listed firms, customers, employees, suppliers and society at large. All have interests in the operation and value creation capability of the firm. This chapter recognises the claims that suppliers, employees and the community have on enterprise performance, but specifically omits them from this discussion in order to concentrate here on the two larger groups: shareholders and customers. This chapter explores the opposing demands of shareholders and customers and in doing so it addresses

- shareholder value,

- customer value,
- the value chain, and
- illustrates how ICT can harmonise the competing demands of customers and shareholders.

5.2. Shareholder Value

The 1981 corporate view of the role of business, as represented by the Business Roundtable a group representing the United States' largest corporations, was that corporations would best serve their shareholders by enlightened consideration to balancing the legitimate claims of all its constituents (Mintzberg 2002). Peter Drucker observed, the reason for the firm's existence is to create a customer and satisfy customer needs better than its competitors (Drucker 1986). By 1997, the corporate view had changed and limited the role of business to "...the paramount duty of management and boards of directors is to the corporation's shareholders." (Mintzberg 2002). This reflected economist Milton Friedman's 1970s dictate that the firm's single and only responsibility is to increase its profits (Friedman 1970).

Perceptions of the firm's success or failure and its value are based largely on publicly available measures of profitability, growth and its competitive position in the market. The value of the firm, especially if it is publicly traded, is critical in attracting investor capital and retaining existing investors. Shareholder value represents the portion of the company owned by the shareholders as defined by the market value of the shares. Traditional, generally accepted accounting practice (GAAP) based approaches to calculating company value produce profitability ratios such as earning per share (EPS), return on investment (ROI) and others. These practices calculate accounting profit as total revenue less all accounting costs.

However accounting profits are not readily correlated to share value. Some empirical evidence suggests that the share price or value has a stronger correlation with cash flow than earnings (Cooper 2002; Keong 2002). Accounting costs include current or historically explicit costs, but exclude implicit costs such as opportunity cost so a share price to book value ratio may not be so meaningful if a company has a large percentage of intangible assets such as valuable global brands which are difficult to evaluate. Reported profitability can also vary from country to country according to

different national accounting standards on such issues as depreciation of fixed assets and taxation. For example, when Daimler Benz registered on the NYSE in 1993 it went from a US\$733 million profit under German rules to a US\$589 million loss under US GAAP rules although the business fundamentals remained unchanged (Jackson 2003). Accounting profits are also subject to manipulation as evidenced by recent scandals at Enron and Worldcom (Reimann 1986; Smith 2003).

In 1986, Alfred Rappaport suggested that the appropriate goal for corporations is to maximise shareholder value through the distribution of dividends and increases in the market price of the company's shares (Rappaport 1986). Expressed formally shareholder value is the net present value of the firm's future cash flows over a defined lifetime, discounted by the cost of capital appropriate for the business. This relationship is well recognised in corporate finance theory (Pareek; Rappaport 1986; Rappaport 1997; Clarke 2000; Wasmer 2000; Moyer 2003). The first principle of shareholder value is that cash not profitability, is the basis of value. The second is that the shareholder is placed at the forefront of company goals, ahead of other stakeholders.

As described by Rappaport, and illustrated in Figure 19, shareholder value is driven by timing and time horizons, sales growth and operating margins, management of fixed and working capital and the cost of capital itself.

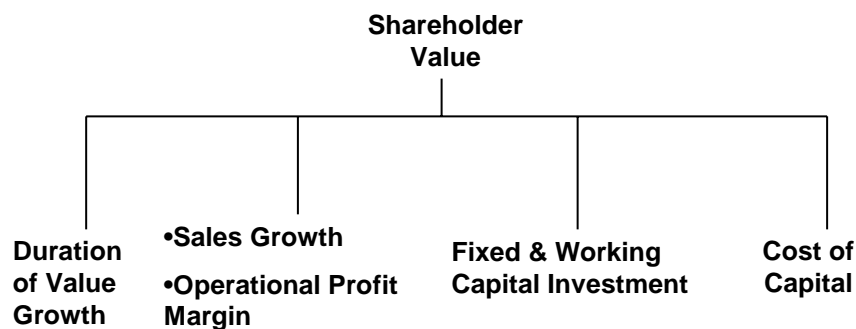


Figure 18 Drivers of shareholder value

Shareholder value can be increased through one of two primary strategies; increase net cash flow or reduce the cost of capital. Cash flow can be increased either through revenue growth or reduced expenses, or a combination of both. The cost of capital can be reduced by lowering risk, reducing the cost and levels of debt and optimising the capital structure of the organisation (Wasmer 2000).

The concept of shareholder value falls under the general heading of Economic Profit (EP) and often includes techniques such as , shareholder value increase (SVI), value added measure (VAM) and economic value added (EVA) (Aggarwal 2001; Cooper 2002; Pettigrew 2002). Economic profit is total revenue less all economic costs which include the resources supplied by the firm's owners (Osborne 1997). For example, EVA is based on the notion that a business runs at a loss until it returns an after tax profit that is greater than its cost of capital. If the EVA is positive, the company creates shareholder wealth; if it is negative shareholder wealth has been destroyed (Roztocki 1999). By factoring in opportunity costs, economic profits are theoretically more closely aligned with the shareholder's viewpoint and are therefore of greater interest to shareholders than traditional accounting measures. Interestingly, according to Peter Drucker, few US businesses have been profitable in the EVA sense since World War II (Drucker 1997).

Whilst there has been considerable academic and practitioner interest into the comparative merits and effectiveness of the Economic and Accounting Profits as performance measures there has, as yet, been no resolution (Worthington 2000; Cooper 2002). So, firms tend to continue to opt for a combination of EP concepts and accounting measures. One positive result of EP measures however has been to widen the finance function's focus beyond its strictly technical role and to align the enterprise's decision maker's perspectives with the long term interests of the shareholders (Aggarwal 2001).

5.3. Operationalising Shareholder Value

The concept of shareholder value has been operationalised as value based management (VBM) where strategic objectives are linked to resource allocation, performance measures and rewards and external reporting (Ping 2000). The broad methodology is as follows.

Initially, companies determine which activities create most value. The enterprise must provide the resources and managerial incentives to ensure that their value is exploited and appropriate cross functional performance measures such as the Balanced Scorecard (Kaplan 1996) are deployed to monitor their performance. As a consequence, established practices and long standing organisational processes and

structures may have to be revised in order to complete the alignment of operational and strategic goals (Marsh 1998; Ping 2000).

In an economy that is increasingly based on services, intangibles, such as brand names and information stored in the form of customer and supplier relationships, need also to be recognised as sources of value. Shareholder value analysis (SVA) is based on cash and the firm's effectiveness in exploiting its intangible assets, which are not reflected in standard accounting conventions (Doyle 00). SVA's relationship to GAAP has not been properly resolved (Clarke 2000). SVA does not instruct managers on how to identify and develop the value drivers that accelerate growth, increase profitability; this is the province of the marketers. But SVA does focus on competitive advantage. In competitive markets the firm can only achieve profits above the cost of capital, that is, create shareholder value, by meeting customer preferences at lower cost or offering superior products and services.

Proponents of the primacy of shareholder value base their arguments on the following propositions:

- Shareholders exercise ultimate control over their company;
- They are residual claimants to its assets after all other creditors have been paid off;
- They bear the risk of management decisions; therefore
- Shareholders are the only true stakeholders in a company (Pareek 2003).

Their argument does not deny the existence of other stakeholders such as customers, employees, suppliers, government institutions and others, but it places shareholders first. Central to the argument is the issue of commercial risk. It is argued that since shareholders underwrite the company, they bear the risk of its successes and failures directly and therefore should be rewarded for accepting the attendant risks. The relationship of the firm with other stakeholders, employees, suppliers and customers relationship's with the company are strictly short term commercial relationships involving the exchange of labour, goods and services for payment, which do not imply ownership of the company.

According to the argument, a company that performs poorly in respect to revenue generation and ongoing profitability will not survive. If the enterprise fails, it is the

shareholders bear the brunt of the losses; no matter how well an enterprise treats its employees or how well it serves its customers. Therefore, the argument concludes, creating and maintaining shareholder value and wealth over the long term must be the goal of business managers (Wasmer 2000) and, by extension, what is good for the shareholders is ultimately good for the other stakeholders and society as well.

The emphasis of cash flow is not new. What is new, however, is the realisation that management can only create shareholder value by addressing the value drivers across a particular planning horizon. Management only creates value if it develops and executes a strategy that generates a return on capital that is greater than its cost over the long term (Clarke 2000).

The debate between shareholder and customer value has not yet concluded. However, management and popular literature seems to suggest that the presently prevailing view is that creating and preserving shareholder value is the overarching goal of management (Rappaport 1997; Pareek 2003).

5.4. Customer Value

In sharp contrast to financial management's views of shareholder primacy, marketing's proponents consider that satisfying the customer is the prime objective of the enterprise (Pitts 2003). This was not always the case, since marketing was formalised in about 1910 (Jones 2002) three distinct concepts have emerged; selling, marketing and customers (Nigel 2002; Kotler 2003).

5.5. The Selling Concept

As illustrated in Figure 21, the Selling concept endeavours to modify demand for existing products by adding features, reducing price, or varying promotional technique.

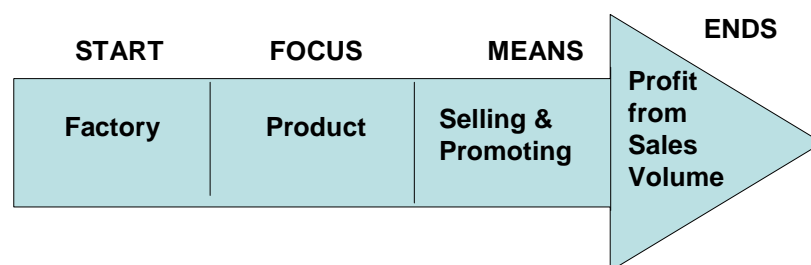


Figure 19 Selling Concept

The focus of the Selling concept, also known as Push Production, is to take mass produced products and push them to consumers through aggressive selling and promotion. In order to profit from the economies of scale necessary for mass production, products must be standardised with as few variations as possible. Customer input is subordinated to production requirements. Mass production is an effective strategy to meet growing consumer demand and it remains the manufacturing paradigm for almost all goods and services particularly those in commodity markets (Turnbull, 2001).

5.6. Marketing Concept

Since the early 1970s Marketing has spoken of the marketing concept, shown as Figure 22, as the key to achieving organizational goals. It consists of determining the needs and wants of target markets and then designing, producing and delivering a product to satisfy those needs more effectively and efficiently than competitors (Drucker 1974; Kotler 1994). Therefore, the first task for business is to determine the needs of the marketplace and then design and produce a product to satisfy them.

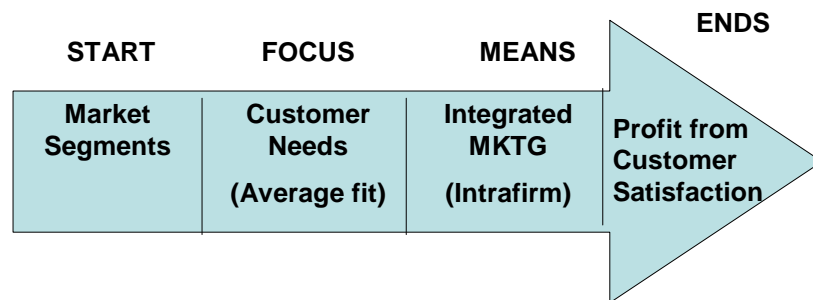


Figure 20 Marketing concept

The marketing concept stimulated market researchers to devise new investigative and analytical tools such as life style, socio economic or psychographic analysis as a basis for market segmentation and demand analysis. The marketing concept is driven by the value of marketplace segments, rather than by the production abilities of the firm. The marketing concept is considered a major reorientation in business philosophy because it represents the antithesis of the push production, and selling concepts by positioning the consumer as the pivotal point for all business activity.

The difference between the selling and marketing concepts is best typified by the automobile industry. Henry Ford developed and refined the concept of automobile mass production, and it is reported that he offered his customers 'any colour as long as it is black'. Today's automobile manufacturers offer large ranges of automobiles aimed at particular market segments such as; families, off-road enthusiasts, young singles and many others. Market segmentation and the production of differentiated products to fit the 'average' consumer within the segment remain central to the marketing concept.

A commodity is a product or service that has become so standardised and well known that buyers find it difficult to differentiate it from competing products and so make purchasing decisions based on price (Christopher 1998). As competition drives manufacturers to emulate the successful product attributes of their more successful competitors, many products such as banking, financial services and airline tickets have lost their distinctive individuality to become commodities. The sale of most commodities is well suited to the internet (Schneider 2003), so it is unsurprising that online financial and travel services should be so prominent on the internet. Marketers strenuously strive to prevent commoditisation of their products by adding distinguishing features. However, customer perceptions and expectations are not static and attributes such as quality and timeliness, which previously defined winning products, have quickly become industry standards such that consumers now actively look for additional attributes such as customisation to help them distinguish between competing products.

5.7. Customer Value Concept

Rather than attempting to satisfy all of the customer's expectations, some enterprises now target the key attributes that their customers value above all others, (Kim 1997). Such customer perceived value (CPV) is a refinement of the marketing concept and has its roots in customer satisfaction, quality and service related approaches, (Payne 2001). CPV is the difference between the customer's evaluation of all the benefits and all the costs of a product compared to those of its alternatives (Kotler 2003). It is not the sum of all customer desires. CPV requires a trade-off between benefits and costs and a ranking of important values (Payne 2001). CPV identifies product or service attributes that are the most important to the customer and are therefore the most

highly valued. Value for the customer therefore is a subjective issue and even for the same products no two customer will have exactly the same value requirements. In the past customer satisfaction has been used as an overall indicator of consumers' perceptions of the purchasing experience. However, customer satisfaction does not reveal purchasing intentions, nor does it reveal which product or service attributes customers actually value most.

As shown in Figure 23, the customer value concept begins with the individual customer and attempts to identify those product attributes that reflect each customer's unique collection of needs and most highly valued attributes. CPV implies an implicit ranking all of a product's benefits and costs. The focus is on customer benefits and the difference between benefits as perceived by the customer versus the product and service features offered by the firm and its competitors.

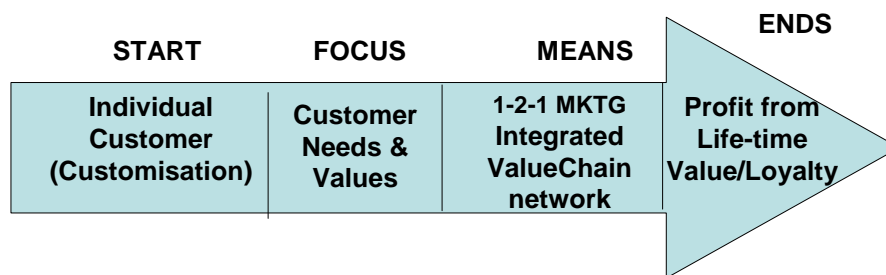


Figure 21 Customer Value Concept

The totality of the firm's offering, which includes product, price, service, warranties, acquisition, training and disposal costs and all other attributes that the firm assembles and offers to its targeted customers constitute the firm's value proposition (Walters 99). The offering will be successful if it delivers value to the consumer summarised as the value triad, Figure 24, of product quality, service quality and value based price. CPV is said considered to increase with quality and service and decrease with price. Timeliness is an important factor but it is often included under service or quality.

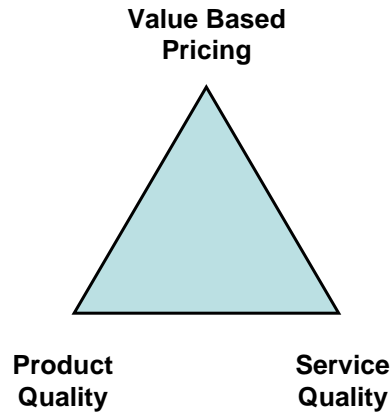


Figure 22 Value Triad

CPV are not static and are greatly affected by evolution and innovation. In the 1980s quality was considered an order winner. Since then a procession of new order winners: service, responsiveness, flexibility and information attributes have progressively been added. But as each has appeared and gained customer acceptance, it has been immediately demoted from order winner to order qualifier so that now customers now expect all products to exhibit all of the attributes once considered order winners. For example, static websites, once valued for their billboard capabilities are no longer as highly valued when compared to dynamic interactive websites posted by many large enterprises. Websites and email have become an accepted and expected part of the business landscape so the value that once accrued to them has diminished. When highly valued products succeed in the market, the value that they represent becomes the driver for raising consumer expectations and the basis for comparing the next round of products.

Normann and Ramirez advocate a flexible collaborative approach to value creation by advocating that suppliers, customers work together with the firm to co-produce value (Normann 2001). The result is a highly customised product produced at the end of an integrated, collaborative supply chain connecting the company with its customers to its network of suppliers. The goal of production is to use mass production techniques to produce individualised, customised products.

Traditional value creation begins with competencies, assets and raw materials to produce standardised goods and services and push these to customers. The Customer concept begins with customer segments and attempts to provide them with products and services that satisfy their unique requirements so that the customers 'pull' the

product through the system. The central idea behind CPV is to identify, understand and satisfy the requirements of individual customers. When the firm consistently meets individual customer's needs for superior value at lower costs, increased sales and loyalty follow resulting in higher profitability and shareholder value (Deise 2000).

5.8. Value Chain

In chapter 4, we discussed Porter's value chain model in respect to its contribution to enterprise strategy. In this chapter we examine the value chain more closely as a contributor to customer value. Popularisation of the notion of value creation in business can largely be attributed to Porter's writings on strategy, competition and to his value chain model (Porter 1980; Porter 1985). In Porter's words, "Every firm is a collection of activities that are performed to design, produce, market, deliver and support its product. All these activities can be represented using a value chain. A firm's value chain and the way it performs individual activities are a reflection of its history, its strategy, its approach to implementing its strategy, and the underlying economics of the activities themselves (Porter 1985). In the value chain, shown as Figure 25, the primary activities of the firm are viewed as a series of interdependent process, each one sequentially adding value as material inputs are added to transform raw 'material' into a product. A collection of value chains is called a value system. The object of the value chain is to produce a desirable product at a cost that will yield a profit. Value chain analysis examines each link of the chain to ensure that economic value or transformational value is added. Information in Porter's model is used for control and coordination.

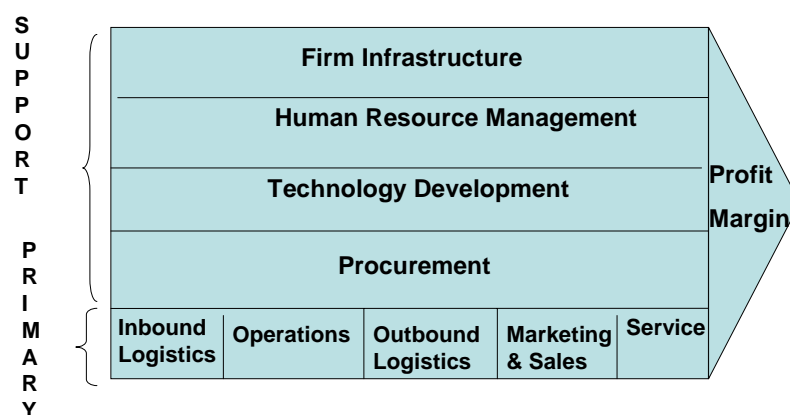


Figure 23 Porter's Value Chain

Porter saw ‘value adding’ as means of achieving profit and competitive advantage at the strategic level. However, the various business functions and disciplines often have different, and frequently conflicting, perceptions of what constitutes value and how it is to be created (Tzokas 1998). Finance tends to see value at shareholder value, marketing as customer value, operations executives seek value in efficiency and information systems see value in information systems alignment with corporate goals. Later chapters will return to the value chain to address the value chain and information.

Porter’s Value Chain presented management with a new perspective of the enterprise. Unlike the traditional vertically integrated organisation with its functional, organisationally independent silos, Porter depicted a system of interdependence between the silos with the clear objective of developing sustained profitability by providing value for the customer (Meredith 2002). As illustrated in Figure 26 the value chain reflects a traditional production based organization.

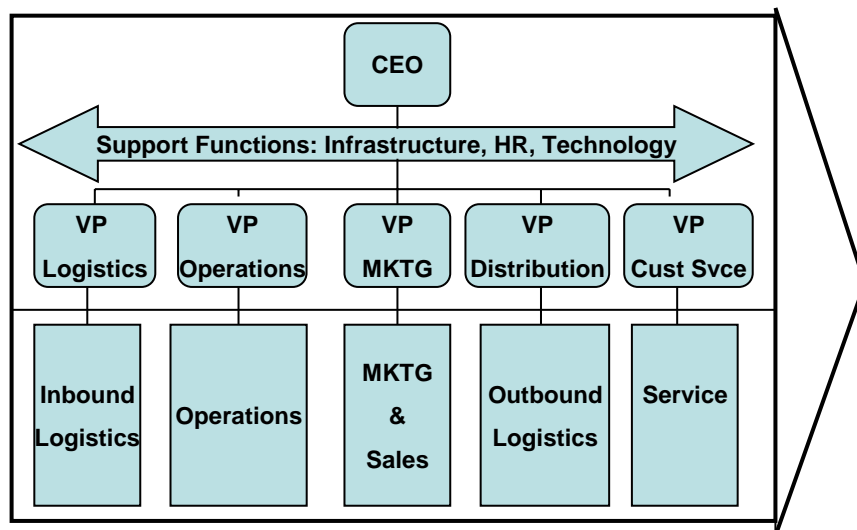


Figure 24 Value chain and enterprise functions

The model is widely used as an analytical tool to examine the coordination and ‘value adding’ activities of the various functional groups of the enterprise. All of these activities can be analysed individually or collectively to assess their value-adding contribution to the enterprise and to uncover redundancies and inefficiencies that may then be eliminated or reduced to add value for the customer and develop competitive advantage for the firm (Gooch 2001; Porter 2001; Chaffey 2002). Firms can develop

competitive advantage by completing the primary activities less expensively or more effectively than their competitors, as well as improving the interactions at the interfaces between the primary and supporting activities. Competitive advantage can be increased further if the linkages between the various elements are exploited.

Who is the Customer?

Serving the customer, customer satisfaction, customer focus are familiar expressions that signal the firm's intention to meet customer needs. Such intentions are commendable and recognized by leading business thinkers such as Drucker, Porter, Handy and many others as the ultimate sources of corporate survival.

In value chain analysis the customer is the next business unit in the production sequence. This concept is often confusing because it merges customers and end users. Value chain analysis suggests two classes of customers. Internal customers are those individuals or groups that receive value inputs from others within the same organization, while external customers are those who receive inputs from the firm. Depending on the firm's position in the supply chain, external customers can be any of the numerous intermediaries such as wholesalers, manufacturers, distributors, service providers and such like that occupy the numerous nodes in the value net that separate the providers of raw material from the consumers, or it may be the consumers themselves. Identifying the firm's customer is essential if strategies such as 'superior customer service' are to have any meaning.

Serving the customer poses some problems for intermediaries. In an effective value net all of the activities performed by its members contribute essential value to the final product, even if their contribution is invisible to and therefore unacknowledged by the consumer. From the traditional perspective their customer is the next member of the value net; the consumer may be a distant and shadowy figure with little obvious influence on the job at hand.

Electronically driven value systems alter this relationship in contradictory ways. Firstly, ICT causes disintermediation which shortens and simplifies the value net exposing more firms to increased consumer influence. The closer the firm is to the consumer, the greater the consumer's influence becomes. Secondly disintermediation of the internal value chain facilitates the development of networked organizations and subsequent reintermediation which adds to the size and complexity of the value net.

Value chain analysis also gave rise to the term ‘value added’ as the additional value created by each of the enterprises activities. The objective is of value analysis is to optimise the entire value system. For this to be accomplished each member has to have a clear understanding of his contribution to the consumer as well as his contribution to the customer, the next player in the system. This requires direct feedback about the firm’s products and services as they are perceived by both customers and consumers as well as more timely visibility and understanding of customer demand. As all members of the value net gain a clearer understanding of consumer requirements the system becomes more responsive and demand driven. Integration of information is a key requirement for value system integration. If no value is added at any stage of the production sequence, that activity or stage immediately becomes a candidate for deletion or outsourcing.

When extended to suppliers and customers outside the firm’s boundaries the Value Chain links with their Value Chains to form the Value System, Industry Value Chain or extended Value Chain (Porter 1985; Alter 2002; Chaffey 2002).

The terms value chain and supply chain are often used interchangeably. However, the value chain is an enterprise based concept, whereas the supply chain is an inter enterprise concept as shown in Figure 27.

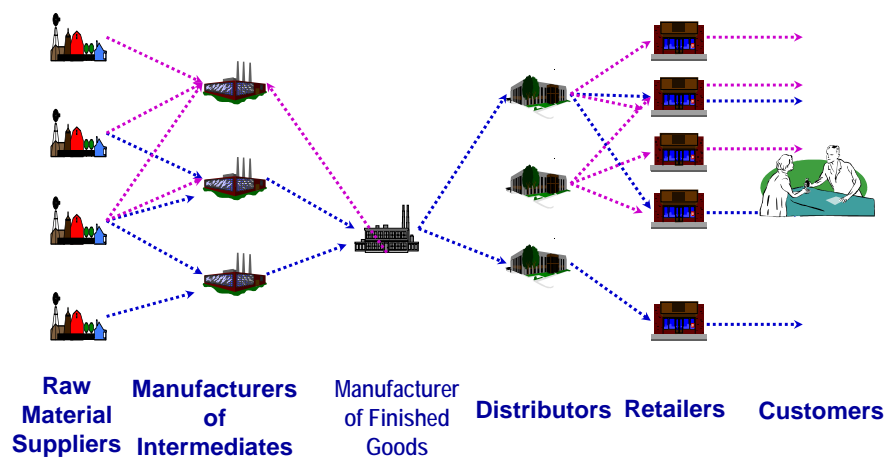


Figure 25 Supply Chain

Within the enterprise, the supply chain includes the value chain’s primary activities. So, leaving aside the value chain’s support activities, comparing the supply chain with the value system results in a closer match as both the supply chain and the primary

activities refer to the same groups of players, information and monetary flows. Figure 28 illustrates the relationship of the Supply Chain, the Value Chain and the Value system.

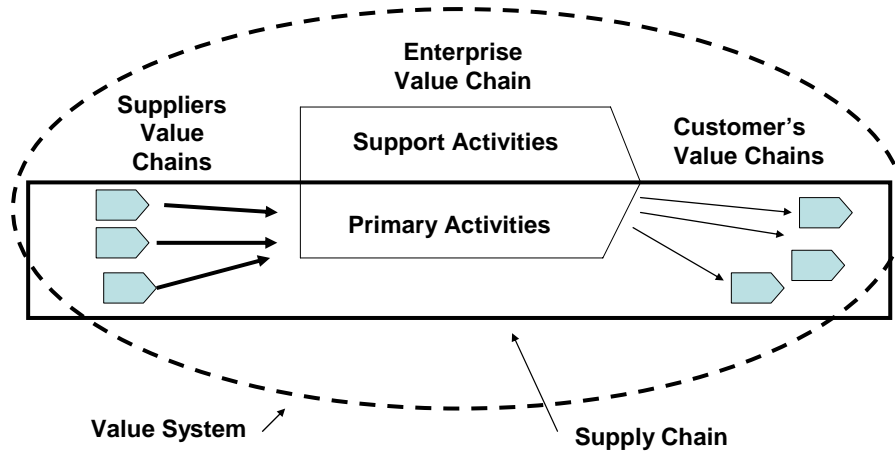


Figure 26 Value chain, supply chain and value system

Despite their similarities the supply chain's focus is to create value by integrating and synchronising the network's physical activities (Christopher 1998), whereas the value system's objective is to optimise the total value contribution to the customer. Successful achievement of both is necessary for a successful enterprise.

The value chain model has proved enormously successful and is recognised internationally as the starting point for any value based analysis of the enterprise's cost- revenue relationships, operational effectiveness, supply chain analysis, and also as a point of departure for Quality and Business Process Reengineering activities. However, increasingly analyses such as these are being widened to include the enterprise's value systems.

5.9. Information and the Value Chain

Since 1985 major changes in information systems and technology have altered the environment of the value chain. However, although there have been few major objections to Porter's model, it does have its critics and there have been attempts to refine and align it more closely with contemporary business conditions.

5.10. Virtual Value Chain

Rayport and Sviokla noted that Porter's model uses information for coordination and control and not as a asset and source of value (Rayport 1995). They proposed a Virtual Value Chain, shown as Figure 29 which outlined a three stage methodology for companies to turn raw information into new, unique information based products and services.

The first stage is visibility, in which enterprises use information systems to 'see' and understand the physical processes in the physical value chain with complete clarity. The second phase uses information to mirror the physical activities in a digitised space, and the third stage uses information to develop new customer relationships and products that provide value in new ways.

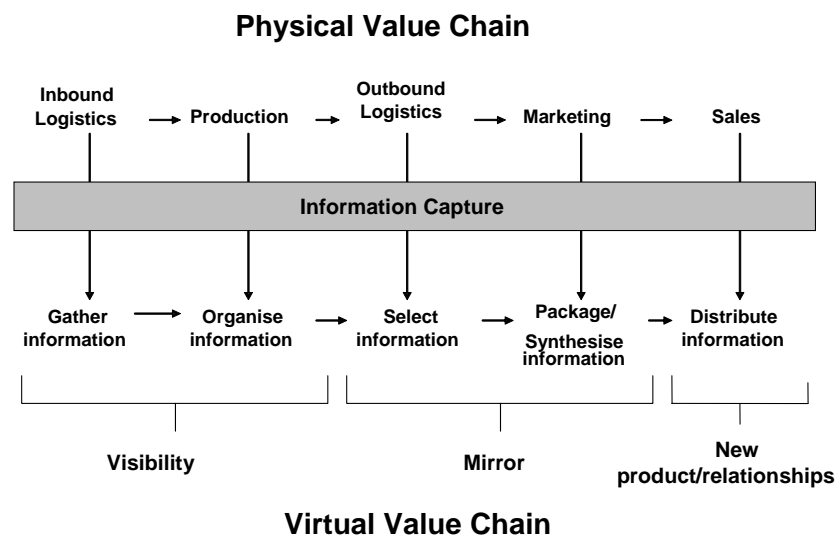


Figure 27 Virtual value chain

An example of value chain migration is Ford Motor Company's use of computer aided design and manufacturing (CAD/CAM) technologies that by-pass traditional physical modelling and thus speed up the design process at reduced costs. Boeing has used similar technologies in developing and testing its aircraft in virtual wind tunnels (Ramirez 2000).

5.11. Information based services

The value chain is based on a production system, but most modern economies are established on services not production. Services are generally considered to be intangible and are associated with a high degree of customer contact. Table 2 compares the characteristics of products and services.

Characteristic	Product	Service
Value	Value is added during manufacture	Value is delivered at the time of purchase
Tangibility	Tangible	Intangible
Customer Contact	Minimal contact with customer	Extensive customer contact
Design and Delivery	Can be produced remotely from customer and	Designed to be produced close to point of consumption
Production	Capital/labour intensive	Labour/information intensive
Location	Located to minimise logistics costs	Must be located near customer
Consumption	Can be used at any time	Designed for immediate consumption
Quality	Easily measured by objective means	Mainly subjective evaluation

Table 2 Comparison of Services and Products

However, in reality, most products are a combination of physical and service elements which can be classified by their information content. The organisations providing them can be classified by their degree of customer interaction as shown in Figure 30.

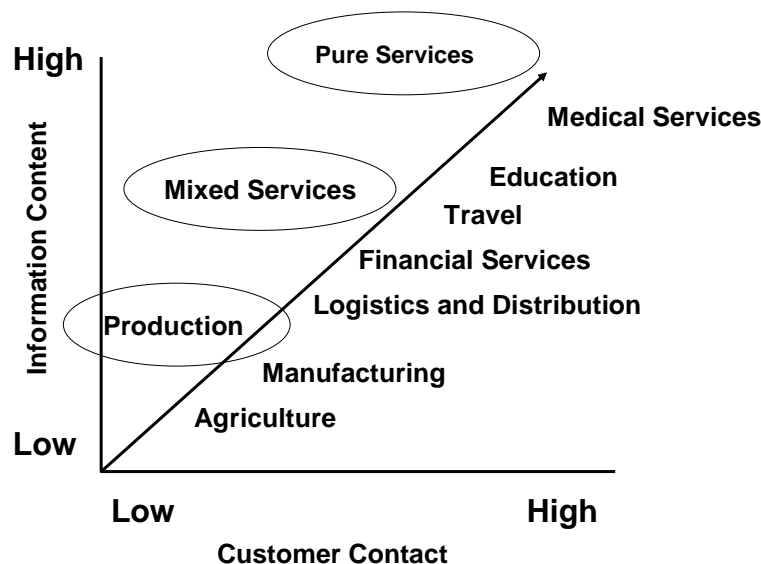


Figure 28 Customer contact and information content

Although, the essential elements of Porter's transformational activities remain unchanged, that is raw material is acquired and transformed into a product or a service. The transformational processes in service industries follow a different sequence. Information based industries operate in the market space using a value chain comprised of content, infrastructure and context as shown in Figure 31.

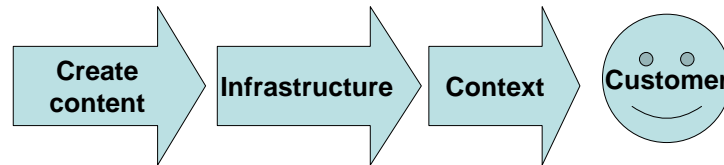


Figure 29 Generic service industry value chain

Content is what is offered. It includes services such as financial or medical advice, account details, or software applications. Infrastructure is the physical structure necessary for delivery. These might include head office functions, enterprise operations or ICT networks. Context refers to the overall value proposition and customer interface and may include levels of service and support, pricing, branding, the look and feel of a particular interface and numerous other issues relative to changing customer needs and the competitive environment. As an example, Figure 32 illustrates the value chain for a multimedia and publishing enterprise market that has been reorganized to reflect the different production sequence that includes the addition of multiple new cells after the material production of the media product (Saukkonen 2002).

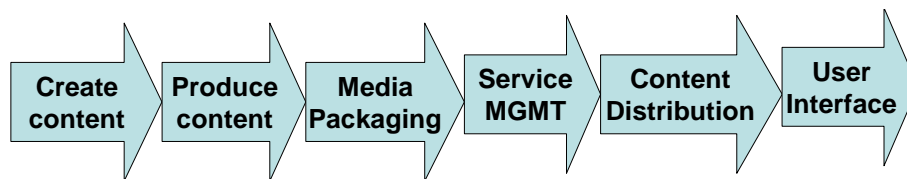


Figure 30 Revised value chain for multi media industry

Only the first two stages of this value chain belong to the value adding activities of the Porter model. The activities that follow are extensions to the chain brought by new companies capable of delivering new value in the form of electronic distribution.

5.12. Customer Focus

The increasing emphasis on customer value, as discussed earlier in this paper, reverses the flow of the value chain. Instead of beginning with production based activities to push products to the customer, One to One Marketing or Pull production establishes the customer's value requirements first, and then reverse engineers them through the production process. New, net based communications now enable the enterprise like Dell and Cisco to collaborate directly with individual customers to design or configure customised products which are then produced in flexible high speed manufacturing plants. Hines revised and refined the Porter model in his Integrated Materials Pipeline shown as Figure 33 to reflect this change of orientation (Hines 1993).

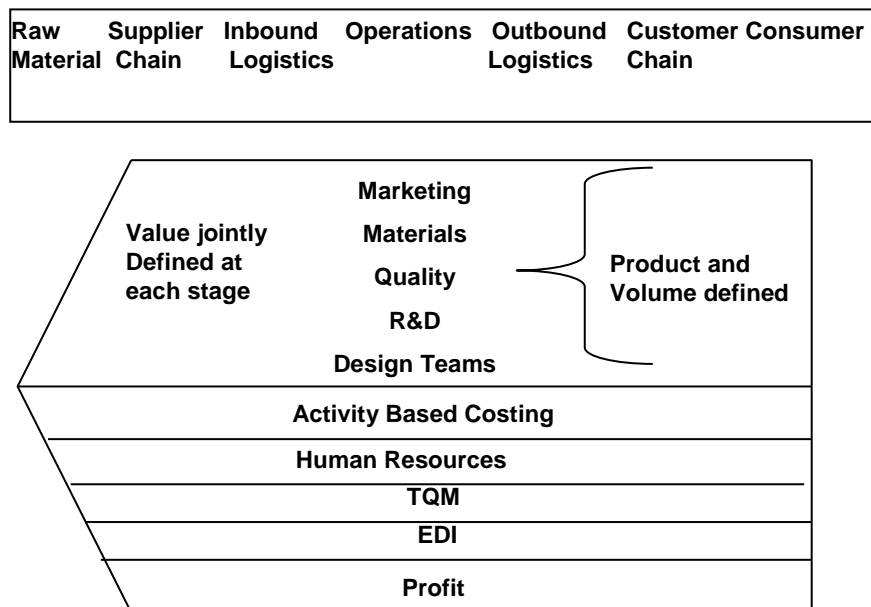


Figure 31 Integrated Materials Value Pipeline

Hines model differs from Porter's most notably in that it begins with the customer and shows one large product development related flow pointing from consumer to raw material source. This is because Hines saw customer defined products as the objective of the process, and the key to value, and sustainable competitive advantage. He reasoned that profits would follow customer defined value creation, unlike Porter who saw profit as the main objective (Gooch 2001).

Christopher (Christopher 1998) and Deise et al (Deise 2000) suggested a similar adaptation to Hines. As shown in Figure 34, the model begins with research analysis

to determine consumer demand and the need for new product development. When customer needs have been clearly established, procurement of materials and processes necessary to manufacture and distribute the new product are marshalled and then the product is produced and distributed.

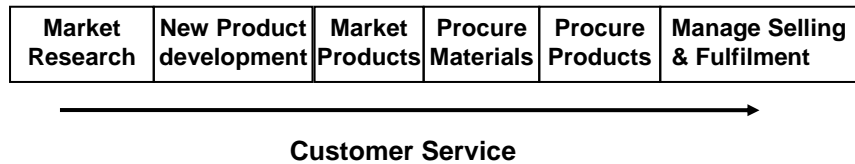


Figure 32 Revised value chain

5.13. Network Enterprises

The traditional value chain does not accommodate the reduced transaction costs and changes to organisational structures and processes caused by the changes in information economics. ICT has disintermediated value chains by enabling some enterprises to bypass traditional partners whilst simultaneously promoting strategic outsourcing with others. In nascent virtual enterprises, ICT enables the discrete value chain activities of some partnering enterprises to be so closely integrated, that their ownership cannot be easily identified. Consequently, the value chain's physical activities are simultaneously distributed amongst specialists and integrated by the use of shared information. Arrangements such as these require ICT applications that can both enable the creation and orchestration of networked organisations, but these activities cannot be easily mapped onto the conventional value chain model.

Electronically mediated information impacts the classic value chain at every level. Automating and integrating software has smoothed out many organisational structures, improved operational efficiency, and facilitated online connections with customers and suppliers alike to enable the creation of information based products and processes. The classical value chain, which represents supply driven, push systems aligned with traditional manufacturing processes, is becoming increasingly remote to intensely customer focussed, demand driven contemporary networked enterprises that use pull systems to produce customised goods and services. However, we would suggest that although the services orientation of modern economies is well documented, networked enterprises do not yet represent the norm so both supply and demand driven approaches to the value will remain in use for the foreseeable future.

Despite the criticisms about the value chain, the enduring contribution of Porter's concept lies not in its 1980s form, but in identifying value as the source of sustainable competitive advantage.

5.14. Discussion

Value creation is the undisputed cornerstone of commerce. The firm exchanges value, in the form of dividends, for shareholder equity and exchanges products and services with its customers for revenue. The task of the enterprise is to create customer value in the form of customised product and service combinations, at an affordable price and in a productive way, which create the returns necessary to attract and retain capital investment and not ruin the firm. Excellence in both forms the foundation for sustainable competitive advantage. The two requirements appear so closely interrelated and the requirement to balance both groups' interests seems so obvious that debate about the primacy of one or the other seems nugatory. But this is evidently not the case and finding a balance can be a dilemma.

For example, many Australians with shareholdings in the major banks are also customers of the same institutions. So they were delighted when the share prices for Australian banks tripled between 1996 and 2000 accompanied by healthy dividends. At the same time, the banks closed 24% of their branches. Meanwhile customer dissatisfaction with the service provide by banks remains an area of concern and there is some movement of customers from the major banks to local banks and credit unions (Bullock 2001). It appears that in this case the larger banks have clearly placed shareholder value in the forefront of their strategic objectives, ahead of customer values. It is interesting that although 'customer focus' receives considerable public support from business leaders and theorists, in practice the interests of shareholders, who are not identified in the value chains, are vigorously extolled and defended at corporate annual general meetings.

All purchasers, whether potential shareholders or customers, look for value. However economic changes and developments in ICT have given value a sharper customer focus. Shareholder value, once seen in terms of accounting profit is migrating towards economic profits which are more closely aligned with the shareholder's view of enterprise performance. Customer value is moving from mass production values towards individually customised products and services and business strategy is being

redefined as the business environment evolves away from technologically efficient production to a more customer focussed, information and information technology intensive setting (Slywotsky 1996).

The migration towards customer satisfaction however, does not necessarily resolve the shareholder versus customer argument. Nevertheless, it is increasingly apparent that ITC is driving higher levels of customer expectations of value through customisation and improved design and productions which in turn increase sales, improve operating margins and enhance shareholder value. Intense customer focus and effective execution are the hallmarks of numerous successful global corporations, such as General Electric and Dell. Many of these enterprises are demand driven with processes and modified value chains that resemble the pull systems mentioned earlier in this chapter. These explicitly put customer value first and then organise the enterprise and marshal its resources to effectively produce and deliver customised products and services.

To the extent that shareholder's requirements for short term performance can be put aside, sustainable competitive advantage lies in efficiently creating customer value. We suggest that the long term satisfaction of both shareholders and customers can be harmonised through virtual organisation. Chapter 4 discussed virtual organisation as a value based strategy that uses information intensively to satisfy market demands. A virtually organised enterprise uses ICT and advanced manufacturing techniques and systems to develop operational superiority. These facilitate product customisation and together improve sales growth and reduce operational cost. Almost inevitably the virtually organised enterprise will outsource non essential functions or functions where it lacks superior expertise to become part of a network. Business networks effectively spread and therefore minimise commercial risk and allow their members to employ their capital resources more effectively and less expensively. As illustrated in Figure 35, virtual organisation directly connects customer value with the financial elements supporting shareholder value as defined by Rappaport (Rappaport 1997).

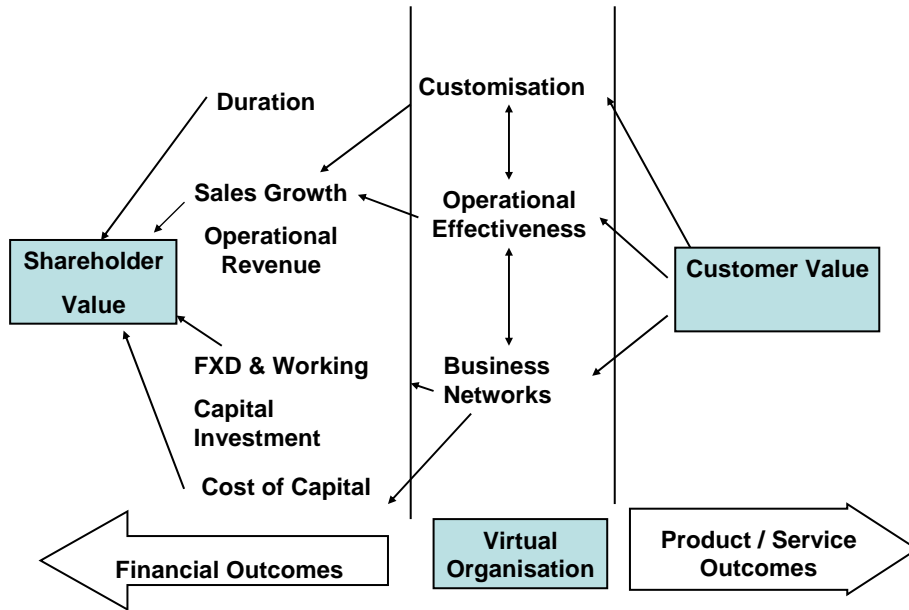


Figure 33 Harmonising shareholder and customer value with virtual organisation

Product customisation is an important element in virtual organisation. Chapter 6 examines customisation from the concept of mass customisation as an enterprise strategy designed to satisfy individual customer's demands for value.

Chapter Six Mass Customization

6.1. Introduction

Chapter 4 noted that mainstream strategy theories do not adequately explain value creation in the electronic business environment because they do not address ICT and information as enabling resources. Virtual organization, as a value based, ICT enabled strategy, was proposed as an addition to the extant body of theory. Chapter 5 examined value from the opposing perspectives of shareholders and customers and concluded that both could be harmonised through virtual organisation and product customisation.

Until the Industrial Revolution of the 18th and 19th centuries, manufacturing was largely the province of skilled craftsmen who fashioned goods for individual customers. For the most part, each piece was unique and handmade by one person. The invention of a reliable steam engine shifted production from cottages and customized, 'one off' products to factories producing large quantities of standardised products (Taylor 1995). Industrial technology created the modern industrial enterprise and made capital, in the form of fixed assets and equipment, its most important economic input. Mass production, as developed and refined by Henry Ford in the early 20th century, is the most effective strategy for producing large quantities of standardised goods and it continues to be the standard paradigm for production in industrialized nations (Turnbull 2001).

Globalization and advances in ICT in the late 20th and 21st centuries changed the industrial landscape and since then information has replaced capital as the prime driver of economic activity. Information technologies, especially the internet, have given corporate and private customers access to global markets. The same technologies have empowered buyers and as they have become more discriminating and demanding, in response competition amongst sellers has intensified. Large mass producers discovered that in with this aggressive marketplace, mass production strategies lead to corporate inflexibility, inertia and potential market failure (Davidow 1992). Decades ago, Tofler and Davis foresaw this circumstance and foreshadowed the need to customize products with mass production efficiency, a process which Davis called mass customization (Tofler 1970; Davis 1987). This chapter provides an overview of the concept of mass customization as a source of competitive advantage from the perspectives of marketing, operations and ICT and places it in the context of virtual organisation.

6.2. Mass Customisation Defined

Customisation is often confused with personalisation. The latter refers to the use of information resources to match selected, categorized content, with different end users based on pre selected business rules. For example, advertising literature is now commonly personalized by being addressed to individuals by name rather than by generic title. There are several definitions of mass customization. Davis described it as the ability to provide individually designed products and services to every customer through high process agility, flexibility and integration (Davis 1997). Pine defined the concept as the mass production of individually customized goods and services (Pine 1993). Hammer and Champy described mass customization as mass production plus quality, selection and price (Hammer 1994), while Hart saw it in individualized products and services at mass produced prices (Hart 1996). Finally, Da Silveira et al described it as a system of ICT driven flexible processes and organizational structure to deliver products and services that meet specific customer needs at a cost near mass produced items (Da Silveira 2001).

Pine et al noted that a potential mass customiser must be adept at eliciting customer information, which is a marketing process, as well as producing individualized products, which is an operations task (Pine 1995). However, to date much of the academic and popular literature on the subject has been biased towards the operational issues surrounding the production of goods and services. To redress this imbalance Wind and Ramaswamy recommend combining 'customised marketing' with operationally driven mass customisation as 'mass customerisation' (Wind 2001). Customised marketing was identified in chapter 5 as the Customer Concept (Kotler 2003) in which value is seen from the customer's perspective as a set of valued attributes known as customer perceived values (CPV) (Payne 2001). Operational mass customization is the use of flexible mass production techniques to produce customized products. For the sake of clarity, this thesis uses the term 'mass customization' in its broadest context which includes both marketing and operations.

A major distinction between customerisation and other marketing issues such as customer satisfaction, personalization and one to one marketing is that the latter are initiated by the enterprise and do not integrate marketing and production processes. In contrast, so called customerisation focuses on uncovering customer needs and designing and producing an individualised product.

6.3. From Product to Representation

Davidow and Malone predicted that markets in the 21st century would require the ability to deliver a large variety of customized products co-designed by customers and differentiated by form, function, and services. Such products, they believed, would be manufactured by a complex network of collaborating producers suppliers, customers, and service providers, in other words, a virtual enterprise (Davidow 1992). Pine originally identified four customization strategies which are focused on products and their attendant services:

- customize services around a standard product,
- create customizable products and services,
- point of delivery customization, and
- quick response (Pine 1993).

Gilmore developed Pine's work further to propose four broader strategies for mass customisation; collaborative, adaptive, cosmetic and transparent (Gilmore 1997). We have added an additional application under adaptive strategy to account for 'intelligent' products, such as digital movie cameras that automatically compensate for user's unsteady hands, that can either learn user behaviour patterns or may even require user interaction before they can be operated (Oliver 1998). Summarised in Table 3, Gilmore's adapted Pine's narrow view of customisation to include strategies associated with the product's representational attributes. Representation, according to Gilmour, describes how the product or service is portrayed to the customer. Product representation can be customized on the basis of packaging, marketing materials, placement or delivery, payment terms and conditions, product name or stated use without actually changing the product itself.

Customisation Strategy	Application	Customisation Target	Example
Collaborative	Help customers articulate needs and develop precise product to match their needs	Product and its representation are changed	Through its website Dell computers assist customer to configure PCs according to their needs
Adaptive	Offer a single standardized product that customers can alter to suit their needs	Neither product nor representation is changed – the customer has the ability to change both to meet their particular requirements	Software that users configure to their own requirements.
	standard products with built in intelligence capable of learning		Intelligent sound systems can learn the acoustic qualities of their owners rooms
Cosmetic	Standard products are presented differently to different customers	Products are unchanged , customisation is through representation	Wineries can offer the same wines in different containers with different labels
Transparent	The firm provides individual customers with unique products or services without letting the customer know the products have been customized for them	Both product and representation are customized but the sources are concealed	Online media services can track their readers preferences and present online content to match their behaviour

Table 3 Mass Customisation Strategies

The totality of a product's physical, service and representational attributes that the firm offers to its customers is the so called 'value proposition' (Kotler 2003). Figure 36 illustrates the relationship between the customers perceived value set and the enterprises value proposition.

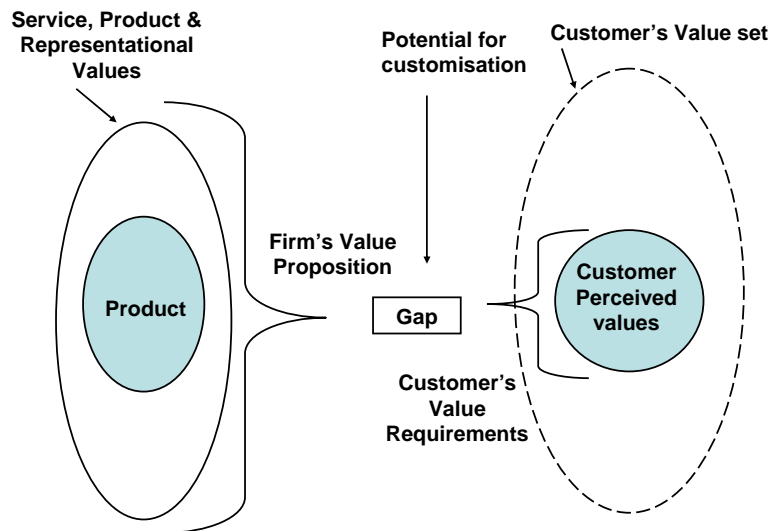


Figure 34 Enterprise value proposition and customer perceived value

However, the value proposition is essentially designed for the ‘average’ customer and so is unlikely to match the specific value requirements of individual customers. Some enterprises address the discrepancy between the firm’s value proposition and individual customer values by customizing their offerings. The value proposition of almost any product or service can be customized to a greater or lesser extent by strategically changing the product, its representation or a combination of both (Gilmore 1997; Piller 2000). Even commodities such as flour or sugar or household appliances which are sold on price can be customised with a cosmetic customisation strategy that uses different packaging, names or advertising media to present the same products to different markets.

The concept of customized products and services has intuitive appeal, but it is not new and many enterprises routinely and pragmatically adopt different strategies to meet their own circumstances and capabilities. For example, Lutron, a lighting manufacturer predominantly uses an adaptive approach but then collaborates with its clients to match its product colours with their décor (Gilmore 1997). Unsurprisingly, there is no dominant way of mass customization. The strategies listed above address the issue of co-opting the customer into the production and distribution process, but they do not address the difficult operational issues follow which are considered later in this chapter.

6.4. Drivers of Mass Customisation

Mass customization is driven by the confluence of 4 forces: globalization, business process improvements, increased customer focus and improvements in ICT. Globalisation, has simultaneously expanded and fragmented mass markets while inducing higher levels of

competition (Hart 1995). Increased competition leads to increasing similarity in competing products and a tendency towards commoditisation (Porter 2001). As products become similar, enterprises strive to avoid product commoditisation and price based competition by continually adding additional product and or service attributes that they believe will differentiate their products from those of their competitors. Previous chapters noted the numerous effects of ICT on the enterprise. One particular impact is that although production has become more efficient and flexible and customized products are brought to market faster than before, they now have shorter life cycles (Furst 2001). An enterprise cannot begin to move toward mass customization without effective information systems in database management, procurement, operations, scheduling and supplier and customer relations.

6.5. Mass Customisation versus Mass Production

Large scale mass production is a hallmark of 20th century manufacturing. Mass production systems typically require large capital investment to generate economies of scale so that operating costs can be spread over large volumes of standardised products to reduce unit prices and achieve volume sales. Traditional mass production systems typically offer little opportunity for product customisation. In these systems products are designed and produced with production efficiencies in mind and then ‘pushed’ to the customer via aggressive selling. Modern mass production systems can be adapted to accommodate some product variation, such as different engine sizes in cars or different presentation in consumer goods, but the systems are designed to function best when product variation is limited. Mass production functions well in situations where demand is predictable, price sensitivity is high and where products have few substitutes, long life cycles and low rates of technological change. Therefore, mass production is unsuitable for contemporary turbulent marketplaces characterized by strong competition, high rates of technological change and constantly changing products.

Customisation implies a single, or a limited number of unique products designed for individual customers. Because they are manufactured without the benefits of scale customised products typically cost more to produce and sell. Customised products are ‘pulled’ through the manufacturing and sales systems by their future owners (Kotler 1994). Mass customisation attempts to achieve the same financial results as mass production by applying advanced manufacturing systems to achieve economies of scope which yield economies through flexibility and variety instead of volume (Meredith 2002). Mass production and mass customisation are fundamentally different approaches to the strategic problem of profitably meeting customer needs. Mass production is product focussed whereas

mass customisation is customer focussed. Mass production systems focus on production efficiency while mass customisation systems require effectiveness and flexibility. The differences between mass production and mass customisation are summarised in Table 4.

Mass production	Mass Customisation
Low cost, consistent quality standardised products	Competitively priced, high quality customised products
Homogenous markets	Fragmented markets
Stable long term demand	Rapidly changing patterns of demand
Long product lifecycles	Short product life cycles
Economies of scale	Economies of scope
Long production runs	Lot sizes of one
Little production flexibility	Flexible production
Make to stock	Make to order
Push production	Pull production

Table 4 Comparison of Mass production and Mass Customisation (adapted from Pine)

6.6. Mass Customisation and Strategy

Although mass customisation first received serious attention in the 1990's early attempts were largely unsuccessful resulting in higher costs and increased inventories. For example, when Toyota experimented with the concept of a custom built 'five day car' by offering a wide range of options for each model, production costs and inventories soared. Toyota quickly discovered that 20% of the possible variations accounted for 80% of the sales and quickly reduced the number of options on offer (Pine 1993). Now, with improved information technologies and manufacturing systems, other car manufacturers such as Ford, General Motors, Nissan, Honda and others are actively pursuing the concept of 'build to order' (BTO) vehicles in projects such as the 'three day car' that seek to produce customer specified vehicles in three days in a similar fashion to Dell computers' well known direct ordering system. It is estimated that a BTO or 'make to order (MTO)' system that produces cars on demand could save the automobile industry US\$80 billion per year on over production (Economist 2001). More and more firms such as Nike, Proctor and Gamble and Mattel are experimenting with customization as a way to differentiate their products from their competitors in increasingly crowded markets.

In his seminal works on strategy and competition Porter identified value as the source of competitive advantage. He suggested that an enterprise could respond to external forces by

and achieve sustainable competitive advantage by adopting one of three generic strategies: cost leadership, differentiation or focus on a niche market (Porter 1980). The enterprise creates value by optimising the combined activities of the value chain in ways that are more effective than its competitors (Porter 1985). In their respective literature reviews of value in strategic management and marketing Amit and Zott and Payne and Holt reinforced the concept that value creation is the key to competitive advantage (Amit 2001; Payne 2001).

In 2001, Porter observed that value and competitive advantage are found in operational effectiveness and strategic positioning, both credible responses to competition. (Porter 2001). Operational effectiveness means performing similar activities better than competitors, for example, reducing defects in products or developing better products faster. Strategic positioning means performing activities differently from competitors or performing similar activities in distinctive ways to differentiate products, services and enterprises from each other. Differentiation, niche positioning, personalisation, and customisation are all well known marketing strategies (Kotler 1994).

Competitive advantage based on operational effectiveness tends to be transitory because of operational enhancement are difficult to control and contain and rapidly become standard operating procedures in an industry. ICT and the internet can provide competitive advantage by boosting operational effectiveness, but according to Porter the overall impact is to increase competition and reduce profitability. Strategic positioning is a more robust source of competitive advantage because it offers differentiated products or operating procedures that provide value to the customer and are difficult to emulate. Strategic positioning or customisation has broad intuitive appeal because it matches the product to the customer's perceived value specifications rather than matching customers to existing products (Alter 2002). The capability to cost effectively treat customers as individuals is now regarded as a competitive advantage (Alfnes 2000).

Until recently accepted business wisdom was that the production of low cost standard products and high cost customized products required different kinds of productions systems. Efficiency and flexibility were considered to be inversely related. Consequently, business strategy was typically biased towards either high production, low cost or low production high cost (Christopher 1998). In today's competitive marketplaces, bargaining power lies with the buyers so, while competition tends to contain prices, sellers must find other ways in which to compete. As sellers offer more inducements to buyers, buyers expectations rise and they expect higher standards of quality, greater variety and more functionality at competitive prices. However, empirical studies have shown that enterprise capabilities can be enhanced

by information intensive operations so that enterprises can successfully and simultaneously achieve the twin objectives of large scale operational efficiency and customisation (Glazer 1999; Piller 2000; Franke 2003). While this is at variance with past wisdom, a successful mass customization strategy creates value for individual customers and enhances the firm's competitive advantage because competitors find it difficult to replicate both production and marketing based elements of the overall strategy simultaneously (Porter 2001). Figure 37 illustrates the relationship of operational effectiveness, strategic positioning, mass customization, value creation and competitive advantage.

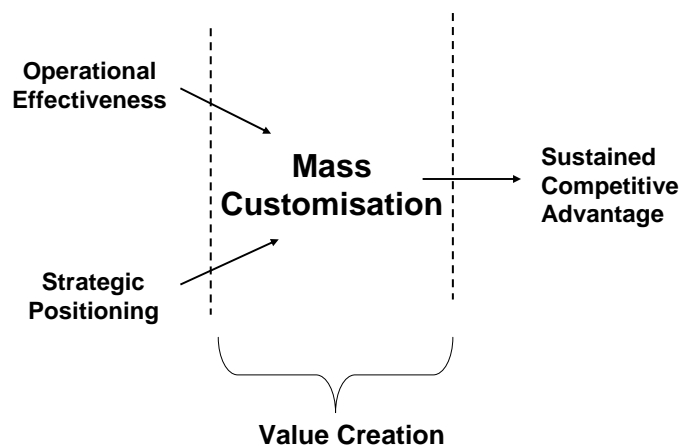


Figure 35 Enterprise strategies and value creation

6.7. Elements of Mass Customisation.

To succeed, a mass customising firm must have superior capabilities in eliciting and managing customer information, flexible manufacturing, and a fast, precise supply chain (Zipkin 2001; Pitts 2003). Creating and distributing valued products requires a global view of the firm and close integration across functional boundaries. These are not insubstantial challenges.

Marketing

While the narrow view of mass customisation is usually associated with flexible manufacturing strategies and operations, our perspective also includes flexible marketing methods such as customising the non product elements of the value proposition. A mass customising enterprise must be able to identify customers precisely and elicit from them exactly what they want and value. Since customers may not consciously know what they want, or may not even be able to articulate their needs, careful measures must be taken to discover the relevant information and translate it into unique products that are valued by the customer above competing products. Customer perceptions of value, are based on their own

unique summations of the costs and benefits associated with each product and its representational values (Payne 2001).

For decades the customer/firm interface has been the province of market researchers who have segmented target markets using variables such as geography, demographics and psychographics (Kotler 1994). Information systems have increased the personalization of business and finer and finer segmentation has led to the concept of 'one to one marketing' or market segments of one. Mass customization extends the customization concept from small market segments to individual customers.

Information technology has introduced a number of new online communications channels such as search engines, electronic billboards, websites, personalized communication, telemarketing and others (Mohammed 2002). Research suggests that although customers are increasingly confronted and often confused by the large volumes of available information, their behaviour is based on two expectations: freedom of choice and help in making choices (Glazer 1999; Franke 2003). Consumers expect firms to continue to treat them as individuals by providing greater freedom of choice in products and services. However, to reduce the risk of incorrect or inappropriate choices, customers also expect help in processing all the information about product options and alternatives when making purchasing choices (Slywotsky 2000).

Rather than attempt to anticipate customer preferences, some enterprises prefer a more direct approach and use interactive customer interface systems to actively engage the customer in product design and configuration. These systems, known as configurators, choiceboards, design systems, or toolkits, enable customers to select and customise products from a wide selection of attributes including price (Slywotsky 2000). The role of the configurator is to provide an interface between the enterprise and its customers. When a customer uses a configurator to define a product, the set of selected attributes are signalled to the firm's manufacturing system and set the design, procurement, assembly and delivery activities in motion (Pine 1993). Motorola's Pager Division's configurator system guides telephone customers through a menu of 29 million possible permutations of pagers and it takes less than two hours to progress from ordering to shipping. When customers are involved as 'prosumers' (Prahalad 2000) or 'co creators' of their own products the role of the firm changes from supplier to customer's agent and a closer 'customer' relationship is formed (Ahlstrom, 1999). Engaging customers in the production process is increasingly seen as a source of competitive advantage (Prahalad 1990, Oliver 1998). Indeed, some firms are

developing 'smart' products such as which are not considered complete until they have interacted with the customer (Glazer 1999).

Customers, empowered with 'own design' capabilities are a substantial asset to the firm. Firstly, they provide the firm with immediate information about the market and customer values. Secondly, by only accepting direct orders the enterprise minimises the risks attendant in forecasting future sales and the consequent acquisition of resources required to produce them.

Operations

Once customer requirements are known, operations must be equipped with advanced design and production capability and flexibility to transform individual customer requirements into final products of acceptable quality and price. Computer aided design (CAD) systems enable increased customer interaction with designers and greatly simplify product design processes. ICT also makes it easier for remotely located designers and customers to work collectively and simultaneously on particular projects. Digitised final designs can then be readily transferred to computer aided manufacturing (CAM) systems that automate production processes. For example, Japanese customers of National bicycles sit on a computerised bicycle in the dealer's showroom that takes their vital statistics; height, weight and leg length, and relays the data to the factory where a customized bicycle is manufactured in three minutes from more than one million templates based on data collected from customers (Spring 2000).

The operational aspects of customisation are not new issues in manufacturing. Operations practitioners have been long recognised the distinctions between the operation of job shops which produce low volume customized products, and high volume mass production. However, until recently mass customisation per se received little attention in production management texts and literature (Pine 1993). Instead, for the past two decades or more, a procession of concepts, tools and techniques, shown in Figure 38, designed to improve operational efficiency and effectiveness manufacturers have been steadily moving manufacturing towards more effective production of smaller and more varied batches of products.

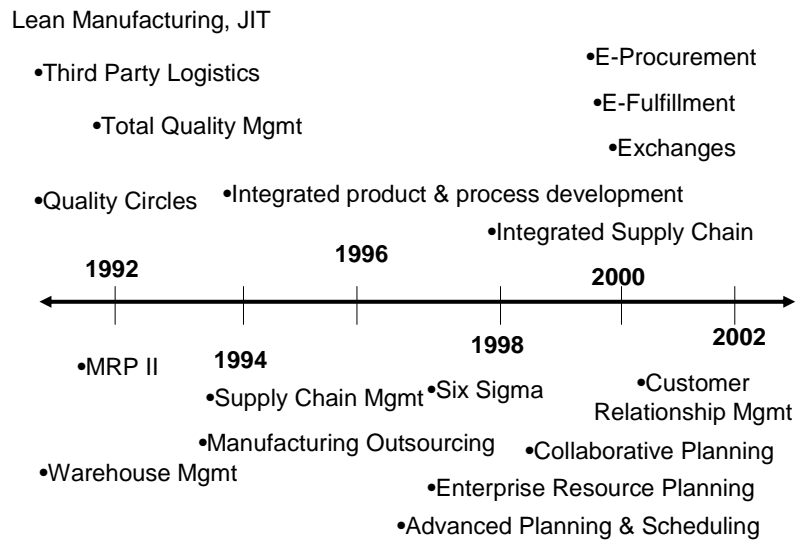


Figure 36 Business Operation’s tools and techniques

Some, techniques such as the quality movement of the 80’s have a clear customer focus, others such as Business Process Re engineering (BPR) and Lean manufacturing are more intensely focused on processes and streamlining the manufacturing process. However, all have been directed to making operations more efficient, flexible responsive and effective. Table 5 contains a non-exhaustive list of some of some of the major techniques and tools and their focus. Most of these have relied upon ICT’s constantly evolving and expanding capabilities as a means of analysis, design, control, coordination and integration.

Technique	Focus
Quality Management	Product and process quality
Value Chain Analysis	Process coordination and value adding
Lean Manufacturing	Elimination of wasteful practices and unnecessary activities, staff and material
Just in Time (JIT)	Minimise inventory and resources
Agile Manufacturing	Rapid adaptation to environmental change
Business Process Reengineering	Improved business process performance through process redesign
Theory of Constraints	Balance material flows to maximize throughput and minimize inventories

Table 5 Business Operation’s techniques and focus

Mass customization requires operational speed, flexibility and cost efficiency. Two of the most commonly employed production strategies for mass customization are modularization and postponement (Feitzinger 1997). Modularisation refers to a product design approach that creates different products or versions of similar products using common modules or components, such as engines, electronic circuitry or software components that can easily, inexpensively and rapidly be interchanged to customize the final product. The manufacturing processes must be so designed that installation of these differentiating features can be postponed until as late as possible in the manufacturing process. In this way the basic, undifferentiated, products may progress unhindered through most of the manufacturing processes without undergoing changes that will slow production until the last possible moment when the differentiating features must be added (Feitzinger 1997).

The point in the production process that separates manufacturing planning and control from the customer's direct influence on production processes is called the decoupling point. As shown in Figure 39, as design systems progressively move from 'make to stock', (MTS) to 'engineer to order' (MTO), the decoupling point moves deeper into the production process. This calls for product modules, which are produced without customer specifications up to the decoupling point, after which the products are finished to customer specifications. MTO implies customer input deep into the production process. However, by using modular designs and postponement, the decoupling point can be moved back towards the 'assemble to order' point. Postponement strategy requires that the decoupling point should be as close as possible to product completion so that the differentiating parts of the product can be added as late as possible in the process (Alfnes 2000).

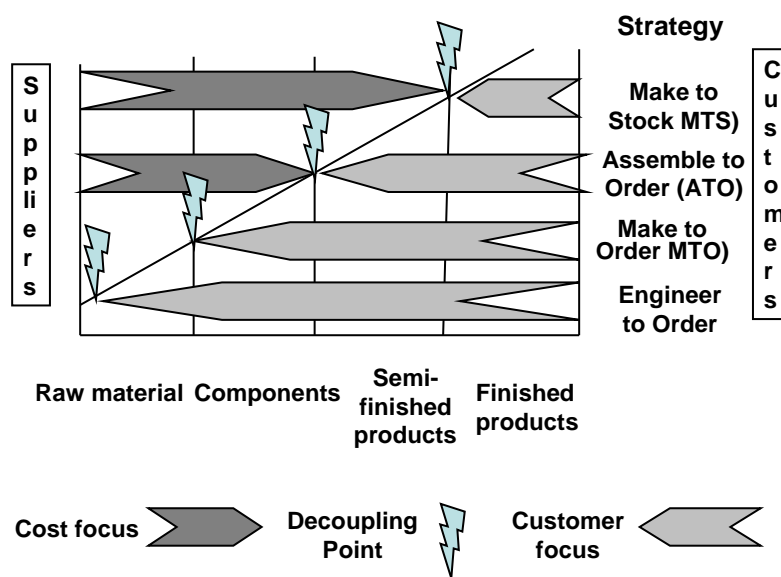


Figure 37 Enterprise decoupling points and production strategy)

Although most mass customization requirements are noted at the configuration stage, modularisation and postponement increase production flexibility as well as reducing production and customer lead-times. True mass customization is difficult to achieve. Most enterprises such as Dell computers, that are known for their 'mass customisation' and MTO strategies, do not give unfettered choice. In Dells' case customers specify their PC's configuration on the enterprise's website and receive their new PCs in a few days of ordering. Dell manages this by restricting its computers to a few key modules and stocks a wide variety of each to allow customers a wide selection. Dell PCs can be assembled in about four minutes with a further 90 minutes for loading the software. Most of the customization comes from the software (Economist 2001).

The essence of effective MTO is to have products designed to utilise pre assembled modules that can that can be incorporated late in the production process. Modular production outsourced to specialists, JIT logistics, and postponement are key enabling developments that have changed operations methodologies. One consequence of modular MTO may be the development of clusters of smaller enterprises assembling pre fabricated modules or , as the case of Mercedes' Smart Car plant in France, the suppliers are incorporated within the assembly plant itself (Ewing 1999).

Supply Chain

Mass customization requires supply chain systems to be sufficiently flexible and responsive to be able to accept individual orders, supply the raw materials, work in progress and the differentiating modules or components to the appropriate location for rapid cost effective assembly and then deliver the customized goods in a timely manner (Lau 1995)

Mass customisation's multiple option approach to manufacturing causes exponential increases in the complexity of the firm's supply chain. Firms typically address this dilemma by either rationalising their supplier base, adopting modular production methods, limiting the options available to customers or shortening the supply chain. The first two strategies are relatively common business practice. Restricting the number of available product options is a compromise between the ideal offering of unlimited options and the realisation that a limited number of options will satisfy the majority of customers, as was the earlier cited case of Toyota. However, shortening the supply chain is only possible through vertical integration or disintermediation where ICT enables intermediaries such as distributors to be by-passed

Supply chain management (SCM) is driven by the search for efficiency. Information networks facilitate the seamless, swift and economical transfer of information that is used to

inform and coordinate the activities of all stakeholders. Dell's computer business and Cisco's server business are exemplars of this integrated approach, often known as virtual integration. The benefits of this approach are that transaction costs are reduced, inventories are lowered, time to market is reduced and greater flexibility and responsiveness to stakeholder requirements is induced throughout the system (Davidow 1992; Christopher 1998; Kathandaraman 2001; Amor 2002).

Mass Customization and ICT

The role of ICT in mass customization occurs at two levels: close integration of customer requirements with flexible production systems and a responsive supply chain (Turnbull 2001).

Mass customization begins with direct, purposeful and efficient interaction with the customer. Every customer order requires specific identification of the customer and coordination in the product design process. The key issue is to help customers better identify or define for themselves what they want. Elicitation, either through conventional market research or choice boards, requires comprehensive data collection and data warehousing. When aggregated, this data becomes a significant cache of information about the customer's valuation of a product and an extremely valuable asset to an astute producer. The information can be exploited to facilitate accurate design, manufacture and delivery of customized products when and as required. When customers use interactive configurators the information resource cost can increase dramatically as dynamic information is passed between the customer and the firm and the firm's suppliers (Barker and Finnie 04). Because the information demands for such an operation are so high and constitute a large proportion of the customisation cost, effective information management is essential if costs are to be minimised and benefits optimised (Piller 2000).

Presently, the internet has all the theoretical capabilities and tools necessary for an enterprise's data gathering activities. However, many firms fail to capture the available information available from customers or simply fail to use the information enterprise databases contain (Piller 2000).

Despite its seemingly physical orientation, mass customization has advanced more quickly in service industries, such as banking and financial services, because the production and logistical issues attending material goods are absent. Service based products can be more easily customized because they are generally information intensive. In highly competitive markets, physical products tend to become increasingly similar so customization often

centres on the product's service and representational attributes. Since these many of these have high informational content they also can be readily digitized and customized. There is a positive link between the digitization of the information content of the product, its production and representational attributes and customisation (Mello 2001). Information richness in the value proposition and production processes are strong indicators of their 'digitisability' and hence the potential for mass customization.

6.8. Limitations

The key issue in mass customization is whether there is sufficient demand for customized products and whether customers are willing to pay a premium for them. Current research suggests that customers are uninterested in customised commodities (Jiang 2002). Other products, such as those manufactured for specific orders or in limited numbers, may offer little possibility of variation in any aspect that will add value to the customer. Customers appear unwilling to pay more for customized goods, particularly if waiting time is involved or a premium price required. However, customers who receive customized products appear more satisfied and are more likely to repeat purchase (Pitts 2003).

Simply adding variety to a product range is unlikely to be successful. Indeed early attempts to customize products by increasing the number and variety of options failed. However, the main stumbling block for the manufacturer is that existing supply chains are designed for the push production model. Furthermore, customisation efforts are likely to founder without integrated ICT capabilities to facilitate and manage customisation's considerable information requirements. A number of other practical issues have also to be addressed. As increasing amounts of information are amassed about individuals and their behaviour privacy issues can become a concern. Mass customization requires customer specific information but customers may object to its collection and storage. Mass customization also leads to increased customer expectations of the firms and its products, which sometimes may either be unrealistic or beyond the firm's capabilities. Failure to meet these may have an adverse impact on future sales. Returns and subsequent disposal of faulty or unwanted merchandise is increasingly an issue in many industries and unique products may prove to be more difficult to dispose of than are mass produced items.

6.9. Discussion

New information based technologies in product design, marketing, manufacturing, distribution and communication enable enterprises to meet individual customer values quickly and effectively (Zipkin 2001). However, the success of mass customisation depends

on a redefinition of traditional organisational functions. It requires direct, often electronic, interaction between customers, producers and suppliers, together with highly efficient and flexible manufacturing facilities and supply chains. The ultimate goal is to be able to modularise the entire manufacturing process within a dynamic network of skills and capabilities so that customised products and services can be economically produced. Fast and flawless fulfilment is the hallmark of a successful mass customisation strategy. Speed is necessary because consumers are unwilling to wait longer for a customised product than they will for an off the shelf version of the same thing. Precise fulfilment processes are absolutely necessary because the entire concept depends on the enterprise being able to meet customer needs exactly as the customer has specified them. ICT plays an essential part in the production of mass customised goods and services. However, to be completely effective it must be broadened to enable interaction with customers and suppliers so the information necessary for customisation is available when and where required in the supply chain (Lau 1995). Nevertheless, mass customization is only viable if customers value the additional utility that customization brings (Franke 2003).

Presently, customisation appears most likely to succeed in industries whose product's are subject to high rates of obsolescence such as those in electronics or clothing (Powell 1998; Ranta 1998). But many other industries such as cosmetics, car manufacturing, industrial cleaners and solvents are actively moving towards customisation as a differentiating strategy that customers will value and support.

Customisation is not always initiated by the consumer. As noted earlier, an enterprise's immediate customers are those responsible for the next process in the value chain, so many value chain players may be separated from the consumer by one or more intermediaries each of whom will have specific, unique requirements of the incoming partially completed product or service. Research suggests that power in the supply chain is less about size and more about proximity to supply chain resources or to the customer (Sawhney 2001).

Consider suppliers to Wal-Mart the US retail giant, well known for its innovative use of ICT in its supply chain. Wal-Mart can and does require its suppliers to customise their products in terms of pack sizes, delivery times and marketing in ways that fit Wal-Mart's operation. A customizing manufacturer faced with this situation is obliged to attempt to match end user identified value attributes in its value proposition as well as satisfying the representational expectations of Wal-Mart, its immediate customer. Operating through an intermediary especially one that has a strong market position clearly complicates the notion of mass

customization. Despite challenges such as this, mass customisation remains a goal of many organisations who seek to use it to create customer value and loyalty.

The major obstacles to mass customization are the inability of enterprises to capture and exploit relevant customer information and supply chain structures that are unsuitable for a pull system. An understanding of customer requirements is integral to the customisation of products and their representational attributes. However, the mix and composition of product and representational values is subject to change as the product moves from one stage to another in the supply chain so there is a danger that unless the requirements of the consumer are kept in view by all supply chain participants the efficacy of the supply chain will become sub optimal.

In chapter 4, virtual organisation was introduced as a strategic concept based on ICT's unique communication capability to bring about an integrated enterprise focus on customer value. Chapter 5 built on the concept of virtual organization and identified customer value as the foundation for achieving competitive advantage. In this chapter we have shown that customer value lies in customized products that incorporate direct customer input into their design, manufacture and delivery. In concept, this requires reconstruction of the value chain by placing the customer at the beginning of a series of activities that uncover customer values and then design, manufacture and deliver a valued product or service. The strength of the informational content and its potential for digitization, in the product, its production and in its representational attributes is a strong indicator of customisability. Virtual organisation has particular relevance to mass customisation because its strategic use of ICT enables enterprises to customise their value propositions to match customer's value sets more closely than conventional enterprises.

Every aspect of mass customization, value elicitation, flexible modular production and rapid response logistics is information intensive so effective management of the firm's information systems is essential. The development and scope of information systems' contribution to value creation is the subject of the following chapter.

Chapter Seven Information Systems and Business Models

7.1. Introduction

A constant theme throughout previous chapters has been that pervasive ICT has enabled the unfettered flow of information across the enterprise and beyond. In so doing ICT has changed the economics of information and dramatically lowered transaction costs. As we noted earlier, these reductions impact the development of enterprise strategy and structure.

Information has also become a valuable enterprise asset and the most important resource in the manufacturing process. In the face of a more competitive, globalised marketplace, many enterprises are using information as a source of customisation to gain competitive advantage and differentiate their products from those of their competitors.

Chapter 6 described effective mass customization as the outcome of ICT's integration of operational effectiveness and differentiation. ICT is shorthand for all computer related applications, but here we must make the distinction between information technology (IT) and information systems (IS). IT refers to hardware and software components and their associated infrastructures. Electronic information systems (IS), are the collections of hardware, software, databases, telecommunications networks, procedures and people that enable business to exploit information (Stair 1999). The evolution of IS has been both enabled by improved computational power and new technologies such as the internet and driven by market demand for greater capability.

In the late 1990s, large numbers of so-called e-commerce enterprises were set-up to exploit the internet. The novelty and mystique of the internet and a general ignorance of IS on the part of business gave rise to the notion that electronically enabled businesses were intrinsically different to traditional non-electronic businesses. A complete understanding of how an internet based enterprise operates requires an understanding of how information is used within the enterprise, so the explanations of how these e-commerce enterprises operated often fell to IS specialists who developed the idea of the business model. The distinction between electronically mediated enterprises and non electronically mediated enterprises has faded considerably, but the concept of the business model has spread across the entire business landscape where it is often used as a synonym for strategy.

Modern enterprises are completely reliant on information, so it is important to understand the information systems that enable them to operate and create value. Information systems make up the enterprise's nervous system. Poorly conceived, partially deployed or incomplete information system cannot fully support enterprise management and limit the enterprise's

capacity to its capacity to create value. This chapter provides an overview of the development and deployment of information systems, their contribution to value creation and their relationship to business models.

7.2. The Development and Deployment of Information Systems

Information systems may be classified in term of organisational support or function.

Organisational IS can be either stand alone or interconnected systems designed for either individual departments or the enterprise as an entity. The evolution of these systems from relatively unsophisticated, transaction based systems to large, multi-function, enterprise wide applications is inextricably interconnected with expanded ICT computational capability and organizational change.

Support Systems

Supporting IS's assist employees across the enterprise regardless of their location in functional areas The major support systems include transaction processing (TPS), management information (MIS), office automation (OAS) (Turban 1999). Mainframe based, transaction processing systems (TPS) were amongst the first computer systems in business and they processed large quantities of operational transactions such as payroll, inventory and sales data. Most operational processes are relatively simple and rule based, so TPS and their supporting databases were used as the foundation for automating operational processes. Over time, TPS' capabilities increased and they were increasingly tasked used to gather and maintain large amounts of data on customers, suppliers and internal enterprise functions. These collections of data remain at the core of every business information system.

Management information Systems (MIS) use data extracted from the TPS data bases to provide management with standardised customer specified reports. The goal was to provide management with sufficient, relevant information for their managerial roles (Stair 1999). Decision support systems (DSS) began to emerge in the 1970s to address the perceived inflexibility of TPS and MIS reporting. DSS employ a range of techniques including simulation, optimization, online analytical processing (OLAP) and data mining that rely on information consolidated from several databases to solve unstructured managerial problems that require judgment and experience. Other DSS techniques such as expert systems, fuzzy logic, neural networks, case based reasoning and intelligent agents use concepts based on artificial intelligence and are sometimes not associated with DSS although they support it (Stair 1999; Turban 1999). Executive information systems (EIS) or executive support systems (ESS) were also developed from MIS in response to management's need for relevant usable

information across wide performance parameters. EIS rely on regularly updated data extracted from intra-enterprise and external systems (Stair 1999; Turban 1999).

Office automation systems (OAS) also have their genesis in MIS. They include a large array of systems that use spreadsheets, word processors, presentation packages, image processing and administrative databases. They are used throughout the enterprise to automate and support administration in a relatively unstructured environment.

In distributed enterprise environments, information sharing in real time is a critical issue. Group support systems (GSS), also known as groupware, is a class of software that enables groups of individuals to collaborate more effectively. GSS software includes support for activities such as email, work flow coordination, electronic white boards, video conferencing and others that enable collaborate across different geographic and temporal zones (McNurlin 2002).

Although treated separately here, TPS, MIS, DSS, OAS and GSS have overlapping functionality and provide support for complementary functions. All of these systems have broad enterprise-wide application and, in some instances use common databases. There is however, an additional class of information systems that are functionally specific but interconnected with other systems. Many of these are deployed in operational areas such as procurement, inventory management and distribution.

Functional Systems

Functionally based IS are specific to enterprise functions such as accounting, manufacturing or human resources and support business processes, decision making and strategy at the tactical, operational and corporate levels. Computerisation of operations began early in the history of computing and has gathered pace during the past two decades or so. During that time, enterprises exploited ICT's constantly expanding capabilities to make their functions more responsive, flexible and effective. Commencing in the 1980s, numerous discrete systems were designed to support management in areas such as finance, inventory, procurement and manufacturing. Over time, disparate legacy systems evolved, merged and were integrated into larger systems. In operations, early materials requirements planning (MRP) systems which addressed Bill of Material (BOM) and material ordering issues, were developed and then superseded by manufacturing resource planning (MRP II) systems which added resources and production capacity to the production equation. More recently, MRP II systems have themselves been integrated within enterprise resource planning (ERP) systems which seek to progressively integrate and coordinate all of the firm's internal production, procurement, financial, human resources marketing and distribution systems ((Meredith

2002). In addition, many production processes employ computer aided design (CAD) systems linked to computer integrated manufacturing (CIM) systems that rely on ERP systems for internal coordination. The effort and cost required to plan, develop and deploy ERP systems is considerable, but to date the results have been mixed (Frenzel 1999; Stair 1999).

As enterprises began to look outside their own boundaries for efficiencies and additional value, supply chain management (SCM) and customer relationship management (CRM) systems were developed to link the enterprise with its suppliers and customers respectively. Because ERP systems are internally focused enterprise systems, major ERP vendors are moving to integrate SCM and CRM systems with their own in order to offer complete supply chain wide coverage. Much of these inter-functional linkages have been designed to operate in the internet space. The SCM, ERP, CRM relationship is shown in Figure 40.

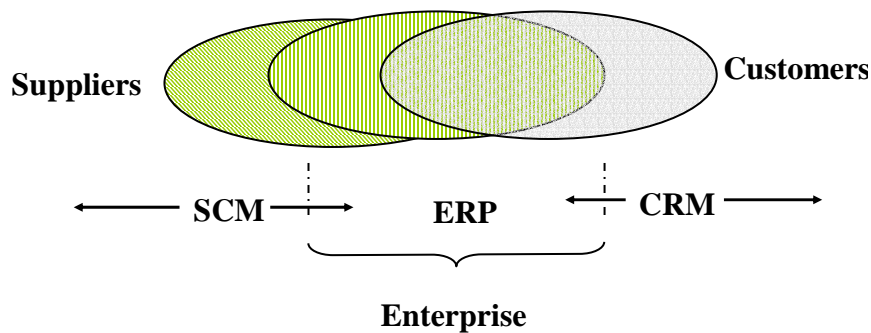


Figure 38 SCM, ERP, CRM relationship

To illustrate the ubiquity and interconnectedness of ICT in an enterprise, Figure 41 illustrates a sample of ICT applications as they are deployed across the value chain’s supporting and primary activities and beyond to the value system.

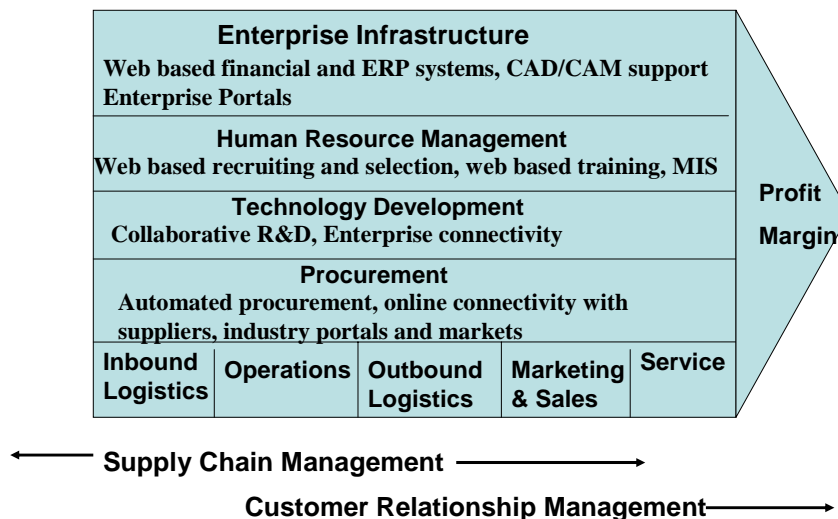


Figure 39 ICT applications in the value system

Technology, information applications, enterprise structure and enterprise performance constitute a virtuous circle in which changes in one domain interact and affect all of the others, see Figure 42. The inter dependence of ICT and business has developed to such a degree that it is difficult to imagine any business operating without some form of ICT even if only electronic banking and the internet. Once information is captured on enterprise databases and effectively used across the firm, the urge to continue to gather digitised information from different aspects of the enterprise can be seductive and irresistible.

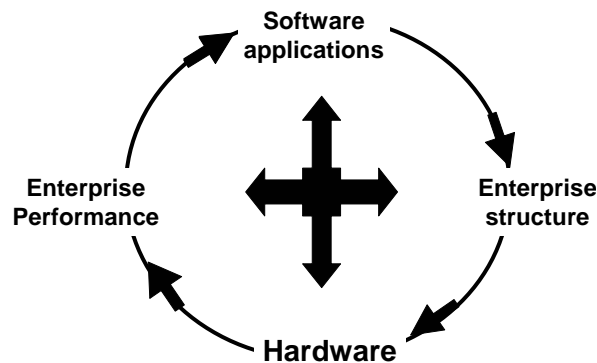


Figure 40 ICT Virtuous Circle

7.3. ICT Trends

A feature of the virtuous circle relationship is the speed at which new technology is developing. ICT has rapidly moved from centralised mainframes to client server architectures which enable individual and corporate networks. The present major developments are wireless computing and convergence. Telecommunications, formerly based on fixed telephone lines, has now moved into the wireless arena which provides users with high speed mobile computing capability. The internet is the enabling communications infrastructure so many of the applications on devices such as laptop computers, mobile phones and PDAs are fully or at least partially web based. Wireless computing is driving the development of mobile commerce (m-commerce) and building on new infrastructures such as radio frequency identification (RFID) which is the information intensive, 21st century equivalent of the ubiquitous bar code.

Convergence is the merging and integration of several different technologies into a single application or device. In many cases functionally based legacy applications employed in areas such as accounting, HR, sales and procurement are being interconnected by middleware to give management a complete view of the enterprise. Many such arrangements have completely given way to large integrating ERP systems that are themselves being connected with those of suppliers and customers. Technological convergence in physical devices is

driven by increased computing power and miniaturisation. For example, third generation (3G) mobile phones now come equipped with digital cameras, fully functioning PDA applications, full internet access for connection to the WWW and SMS capability in addition to their original voice communications functions. Enterprise or industry portals are now commonplace and data management is rapidly moving from static data stores to dynamic online management. The expanding reach of the internet is driving the development of many new network and communications applications that facilitate sharing of all digitised data, text, graphic and multi media based information.

7.4. Strategic Information Systems and Value

Definitions of IS vary (Stair 1999), but three dimensions are apparent. The first refers to IS's as systems of combined technologies and human interaction, the second refers to the organization of activities within an information systems function (Davis 1985) and the third is that the IS discipline is an evolving mix of technological capabilities, organizational processes, behaviour theory and management practice. In terms of application to the enterprise, IS is significantly different from IT. IS is driven by demand for information and applications to meet business objectives, whereas IT is supply focused concerned with specifying the technology to deliver those applications (Hackney et al 2000). Both are required for the acquisition, free flow and manipulation of information.

Since the 1980s, business literature and research, has noted the positive link between IS and corporate success (Chan 1997; Hackney 2000; Salmela and Spil 2002). Alignment of IS with corporate strategy is the major objective of the strategic information system planning (SISP) process. SISP, sometimes called e-business strategy, describes a planning approach that brings ICT support and influence to bear on corporate strategy (Chaffey 2002). The desired outcome of SISP is a portfolio of systems that will materially support and assist an organization to achieve its strategic goals. The twin objectives of support and competitive advantage were described in Pant and Hsu as alignment and impact (Pant 1996). As shown in Figure 43, alignment methodologies, are used to determine how IS can be used to directly support business strategy, while impact methodologies focus on ICT's capacity to identify and execute information based business possibilities and deliver competitive advantage (McNurlin 2002). To date, most of the formal methodology for formulating IS plans has concentrated on the analytical task of deriving IS strategies that are aligned with and support formal, received business plans (Salmela 2002).

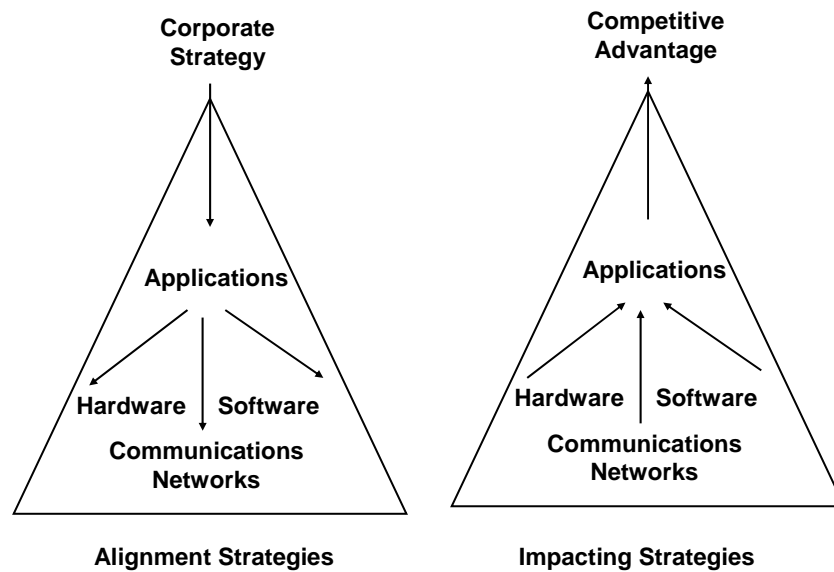


Figure 41 Information systems alignment and impacting strategies

Alignment

Different terms such as strategic alignment, coordination and linkage (Coakley 1996; Henderson 1996; Henderson 1999) have been used to describe the concept of alignment. The guiding principle is that low level activities should be subordinated to high level planning. The assumption is that if lower level activities are consistent with higher level strategic plans, the resulting alignment should ensure that the enterprise will receive the appropriate and required levels of ICT support.

The SISP approach to strategic planning, like that of corporate planning, is based on the formal identification of needs or priorities, determining courses of action, resourcing and strategy execution (Pant 1995). As doubts about the effectiveness of the formal long term planning approach to corporate strategy arose, so too did concerns about the efficacy of SISP and its contribution to business strategy. Researchers such as Hackney and Salmela began to examine SISP assumptions (Hackney 2000; Salmela 2002). They concluded that, amongst other issues, SISP's requirement for a stable and predictable environment is inconsistent with the current, dynamic business environment. Furthermore, the time taken by the conventional software development life cycle (SDLC) to implement new ICT projects is incompatible with and the dynamic strategic requirements of contemporary enterprises. Moreover, the speed at which new technologies continue to develop and converge makes successful alignment of IS

with contemporary business goals an increasingly challenging, critical and intense requirement.

Both Hackney and Salmela noted that the SISP processes continue to focus on alignment and execution of strategic goals rather than integration of the total business process. However, alignment of ICT only has meaning where the firm has a clearly articulated business strategy with which ICT can be aligned, which prompts the question as to whether or not enterprises have such clear and unambiguous strategies in place.

Impacting

The second part of SISP, the task of informing business strategy of potential sources of competitive advantage, is less well accepted (. Impacting strategies are more challenging than alignment strategies because they do not fit into the rationalist strategy school but require a mind set that is more amenable to Mintzberg's concept of an emergent strategy (Mintzberg 1987). Impacting strategies employ a bottom up approach to focus on the potential impact of emerging IS on enterprise processes and how this may positively impact organisational change, corporate competitiveness and strategy (Chaffey 2002). Value chain analysis is an example of the impact approach. Impacting IS strategies have the benefit of not only examining both internal and external IS, but also their integration with external organisations such as suppliers. Impacting only has value where IS has the recognized potential to shape, as well as support, the business.

King and Teo suggest that that SISP evolves through four stages, shown in Figure 45, that progressively draw SISP into the orbit of corporate strategy (King 1997). In the separate planning stage, IS is somewhat autonomous and remote from corporate strategy. During one time planning, IS planning broadly aligns itself to given business plans. In the third stage; two-way linked planning, ICT has some input into the formulation of the planning process and business plans are coordinated with the ICT function and capabilities. In the final, integrated planning stage; integrated planning, ICT is an integral part of business planning. As illustrated in Figure 44, the potential for ICT to add value increases with the integration of IS and business skills.

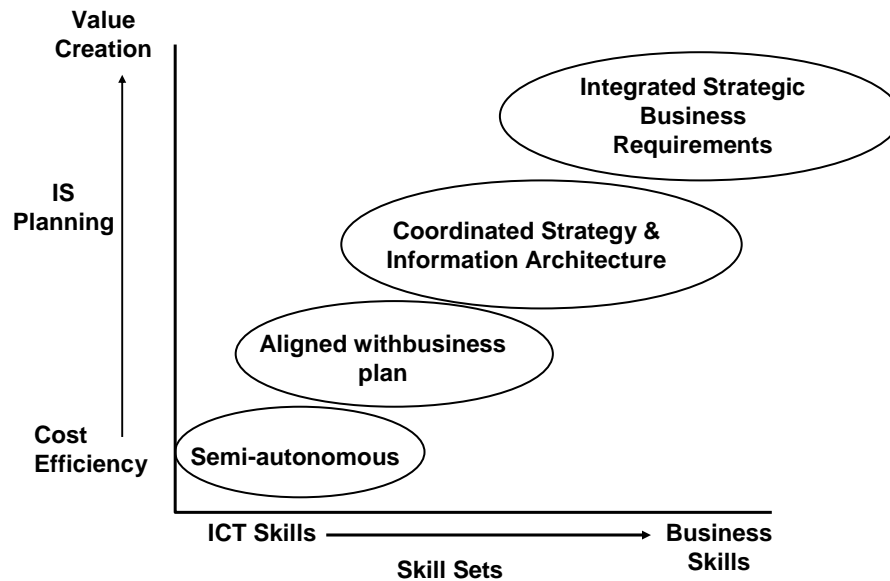


Figure 42 Information systems planning and value creation

King and Teo's framework suggests that enterprises adopt corporate-directed, alignment strategies that are cost and efficiency focused in Stages One and Two before moving on to the impacting, value creating strategies of Stages Three and Four. In concept, alignment strategies are simpler to enact because ICT strategies are developed to support directives from the executive suite. However, as noted above, impacting strategies assume and require clearly articulated direction if they are to be effectively enacted. Impacting strategies are more difficult as they require greater ICT participation in strategy development and an appreciation by senior management of the potential impact of emerging ICT on value creation (Hackney 2000).

Alignment and impacting IS strategies are not mutually exclusive and we would expect that an enterprise would intuitively employ both in its strategic considerations. IS strategy's multi dimensional parameters include role, sourcing arrangements and structural components. Role reflects the way the IS function is viewed by the organisation's senior management. An organisation will follow the alignment model if it intends to use ICT for connectivity and efficiency. However, it will follow the impact methodology if it intends to develop alternative ways of doing business (Pant 1996). Competence to exploit an IT opportunity is a function of prevailing management culture, experience, and satisfaction with ICT. The relationship of impact, and alignment strategies with ICT, IS and business strategy is shown in Figure 45.

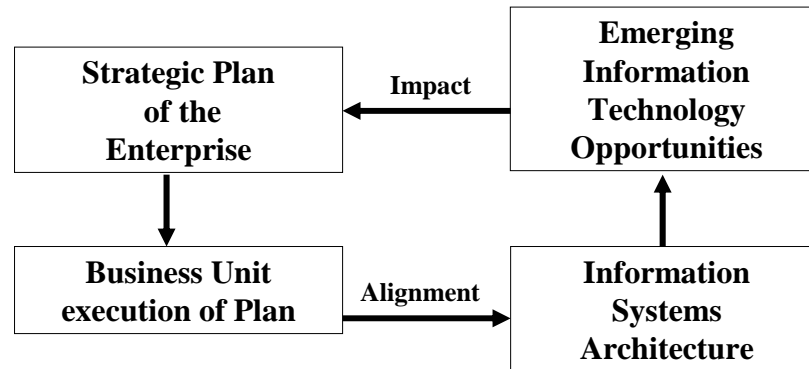


Figure 43 Impacting and Aligning strategies, with IS, IT and Business

7.5. Information Systems Contribution to Value Creation

In response to Solow's famous quip that ICT is seen everywhere except in productivity Brynjolfsson and Hitt undertook an investigation into the relationship between ICT and productivity (Brynjolfsson 1993). Surprisingly, they found that there was no correlation between IT expenditure and business productivity, a situation they described as the 'productivity paradox'. Their findings brought the value of ICT and value into sharp public focus and prompted further investigation. The apparent paradox has since been explained in terms of ICT's positive impacts on important, yet intangible, business benefits, such as improved processes and heightened customer satisfaction, that are not factored into productivity calculations, as well as the lagged impact of ICT as it permeates the business arena generally (Brynjolfsson 1998).

Follow up studies demonstrated that on average ICT has a positive and significant impact on firm output but that there are significant variations on its effect on individual firms (Strassman 1997; Brynjolfsson 1998). The reasons appear to be that IT is most beneficial when it is employed in conjunction with complementary activities such as new strategies, new processes or with new management practices such as decentralisation and higher quality information utilisation (Strassman 1997; Brynjolfsson 1998). In the late 1990s, Allan Greenspan, Chairman of the US Federal Reserve, observed that ICT had "begun to alter the manner in which we do business and create value often in ways unforeseeable even five years ago..." and as a consequence has apparently added to the growth of multifactor productivity" (Simon 1999). Kraemer also reviewed the productivity question and came down on the side of ICT as a spur to productivity, concluding that, on average, ICT expenditures have positive returns (Kraemer 2001). Nevertheless, suspicion about the efficacy of ICT investments remains, and with more than 50 percent of capital equipment investment in the United States now being devoted to information technology, anxiety about ICT's contribution

to sustainable competitive advantage continues to be an issue (Porter 2001; Carr 2003). The 'dot com' crash of '00 where so many technologically driven businesses spectacularly failed is still a living memory which only exacerbates these concerns.

Eminent business academics, Michael Porter and Michael Carr critically examined the effect of ICT on strategy and competitive advantage (Porter 2001; Carr 2003). Porter observed the internet as an evolutionary technology that had enabled the reconfiguration of existing industries that had been previously constrained by high communication, information gathering and transactions costs. He concluded that the overall impact of the internet was to increase competition and depress profitability. In the face of the internet's inevitable spread across the business landscape he recommended that businesses concentrate on the strategic application of internet technology as part of corporate strategy and not as a separate strategy in itself. Carr argued that ICT has become so commonplace in commerce that it has become an essential commodity that is affordable by all, and therefore a diminishing contributor to competitive advantage. Instead of seeking advantage through technology with its diminishing returns, he argued that enterprises should manage IT defensively by emphasising cost and risk management. Both Porter and Carr regard IT as an enabling tool for new business similar to electricity and other technologies that were revolutionary in the past but whose impact was eventually neutralised.

Understandably, both articles drew wide ranging responses from leaders in the ICT community. A detailed analysis of the responses is unnecessary here. However, most agreed that ICT by itself rarely confers strategic advantage. ICT's proponents argued that Porter and Carr's narrow and static view of ICT neglected issues such as ICT's constantly changing nature and convergence and its effect on innovation and consequently yielded incorrect conclusions. They suggest that the future economic impact of ICT is most likely to come from incremental innovation and integration of IT. They argued that ICT is inherently a strategic issue because it affects all of business indirectly and creates options and possibilities that did not exist before (Tapscott 2001). Many businesses recognise the positive impacts that ICT have had on their general operating environment but many continue to question the 'value' of ICT in their particular circumstances. However, an emerging perception is that it is the management and innovative use of information, not technology, which enables corporate goals and provides a source of advantage in the information economy.

A recent survey on the relationship of ICT and productivity in twenty industries in the United States, France and Germany revealed little correlation between ICT investment and productivity (Farrell 2003). Although most industries had invested significantly in ICT, the

productivity gains were concentrated in only six of the 20 industries surveyed: retailing, securities brokerage, wholesaling, semiconductors, computer assembly and telecommunications. These successful industries had leveraged ICT capabilities to create new products, refine processes and increase efficiencies. But, as Porter had predicted, competitive advantage was often eroded. In Farrell's study, overall productivity gains from ICT applications were driven in the first instance by increased competition. Industries with highly complex operating processes, heavy transaction costs or technically sophisticated products gained the most benefit from technology. Farrell's findings validate much of what was already known. That is that the technology alone does not guarantee value creation, but value is created when ICT is used to transform existing information in creative ways.

The current debate, which reflects the earlier discussions on alignment and impact and the value of IT, hinges on perceptions of what constitutes ICT. Those who take the narrow technologically based view of ICT as the latest business tool will inevitably adopt the alignment perspective and focus on efficiencies and processes within the enterprise and across the value systems. This appears to be Porter and Carr's basic position. Those who take the wider, information based impacting perspective see ICT as a major strategic resource driving and enabling information to be used strategically on issues such as organizational change, new products and service development and value creation. However, both sides agree that the competitive advantages arising from information technologies will not be long lasting because new successful technologies spread rapidly amongst competing enterprises and quickly become industry standards.

More than a decade before the current debate, David predicted that ICT would not have significant impact until it developed a critical mass of diffusion and experience (David 1990). Citing the electric motor as an example, he observed that the major productivity gains from its use did not occur until almost 40 years after its introduction when factories were redesigned and laid out in with workflow logic instead of proximity to the older steam driven power sources (Brynjolfsson 1998). The consensus is that, notwithstanding the extremely fast global adoption of ICT, the major impacts are still in the future.

7.6. Business Models

One early and immediate impact of ICT and the internet was that many enterprises raced to embrace the concept of operating in a virtual space free from the encumbrances of physical assets. Some start-up enterprises, like Amazon Books, were designed specifically with the internet in mind; others like Schwab migrated to the internet form existing businesses. The

idea of online businesses, as e-commerce, caught the public imagination and helped fuel the 'dot com' boom of the late 1990s. The idea that e-commerce businesses used ICT to operate in different and unfamiliar ways from conventional enterprises was a novel concept that new required new explanations. So the term 'business model' was adopted from the information systems community to describe how these new internet based enterprises were supposed to work. The assumption was that somehow e-commerce was fundamentally different from 'ordinary' commerce. Models of business, such as Porter's value chain have existed for some time (Porter 1985), but, business models for e - businesses were regarded as the digital equivalent of strategy for traditional businesses, and therefore different.

A large number of so-called business models have since been identified. Yet, a cursory examination of e-business texts, journals and practitioner publications demonstrates that there are wide ranging perceptions and only a fuzzy understanding of what a business model is supposed to be (Alt 2001; Rappa 2002). Many early models were developed by writers to explain the rise of electronically mediated business structures such as electronic shopping, virtual enterprises, supply chain reconstruction and knowledge management (Bakos 1991; Venkatraman 1998; Shapiro 1999). However, it is now almost impossible locate a business that is not electronically mediated in some way, so, the distinction between e-commerce and ordinary commerce has all but disappeared. Business models have come to be associated with business strategy generally, often as a substitute and sometimes in combination with it (Magretta 2002).

Definitions and Classifications

Numerous alternate definitions of the business model have been offered. A sample of these follows:

... a description of the value a company offers to one or more of its segments of customers and the architecture of the firm and its network of partners for creating, marketing and delivering this value and relationship capital (Osterwalder 2002)

... an architecture for product, service and information flows, including a description of the various business actors and their roles; and a description of the potential benefits for the various business actors; and a description of the sources of revenue (Timmers 1999),

... a set of planned activities designed to result in a profit in the market place (Laudon 2002),

... roles and relationships among a firm's customers, allies and suppliers; flows of product, information and money; the major benefits to participants' (Weill 2001), and

... a summary of how a company will generate revenue identifying its product offering, value added services, revenue sources and target customers' (Chaffey 2002).

Despite these attempts, and those of others, there is no generally accepted definition of the business model (Alt 2001; Bouwerman 2002). There are however, several taxonomies of business models based on different types of categorisation. Of these, Applegate's, Timmers' and Rappa's are probably the better known. Applegate's detailed classification presented five general categories of business models and 22 specific instances based on generic market roles: suppliers, producers, distributors and customers and digital business where the enterprise is based on the internet, and digital business platforms where the enterprise is an infrastructure provider for internet-based enterprises (Applegate 2001). Timmers' classification, shown in Figure 46 provided a broad description of eleven models: E - shop, E - procurement, E - auction, E - mall, Third - party marketplace, Virtual communities, Value - chain service provider, Value - chain integrators, Collaboration platforms and Information brokerage classified on the basis of their innovation and functional integration (Timmers 1998).

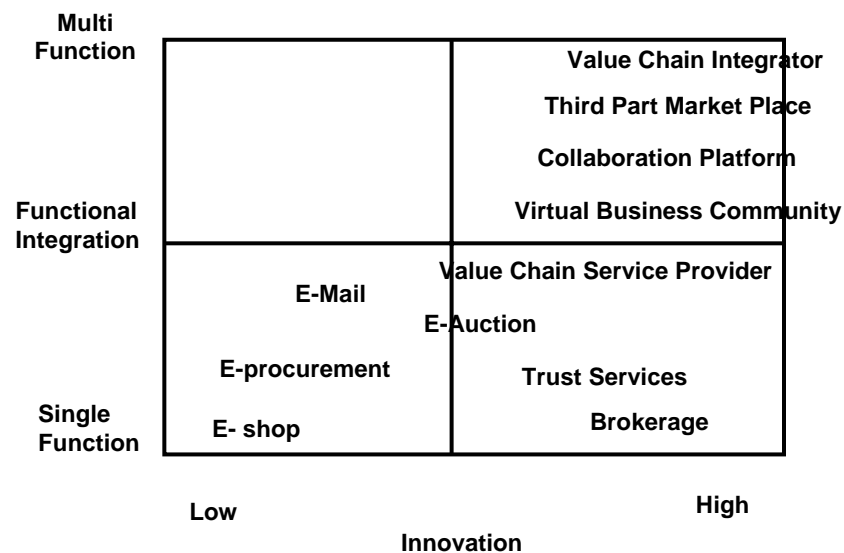


Figure 44 Timmers' business models

Rappa published an extensive list of nine types: Brokerage, Advertising, Infomediary, Merchant, Manufacturer, Affiliate, Community, Subscription and utility and 23 sub types

(Rappa 2002). Others have classified business models by their aggregating capability, industry dynamics market type and transaction or content focus (Kaplan 2000; Mahadevan 2000).

Despite their differences, the models do contain some common elements. Firstly, the models are multi-disciplinary in their outlook, identifying diverse elements such as structure, product, information, integration, benefits and value. Secondly, the models are implicitly associated with ICT and the growth of electronically mediated firms and business networks. Finally, they are dynamic and non exclusive and many business use combinations of models, for example Amazon Books' model combines elements of Rappa's E-Shop, affiliate and community models.

Strategy and Business Models

Strategy deals with how the enterprise plans to achieve its objectives by adjusting its direction and methods to take advantage of changing circumstances (Faulkner 2003). Magretta notes that, unlike strategy, business models do not address competition but do answer the questions: "Who is the customer, what does the customer value, and what is the underlying logic of our business?" (Magretta 2002). In his defence of strategy, Porter is less generous suggesting that business models are : "murky, loose conceptions of how a business does business and generates revenue that fail to address strategic issues such as industry structure and the essential business of creating economic value" (Porter 2001). Tapscott concurs, in part, but portrays the business model as the 'core architecture of the firm and its use of relevant resources, not just those within its corporate borders, to create differentiated value for customers (Tapscott 2000). Others adopt a simpler view of the business model as a description of where the enterprise sits in the value system.

Some researchers consider the business model as being midway between the firm's outwardly facing strategic considerations such as competition, and industry structure and the internally focused, functionally based processes, such as marketing or production. The approach is interdisciplinary and integrative. Magretta and Osterwalder and Pigneur take the view that strategy position the company's competitive stance by defining and formulating goals, while the business model is the missing link between strategy and business processes (Magretta 2002; Osterwalder 2002), shown in Fig 47.

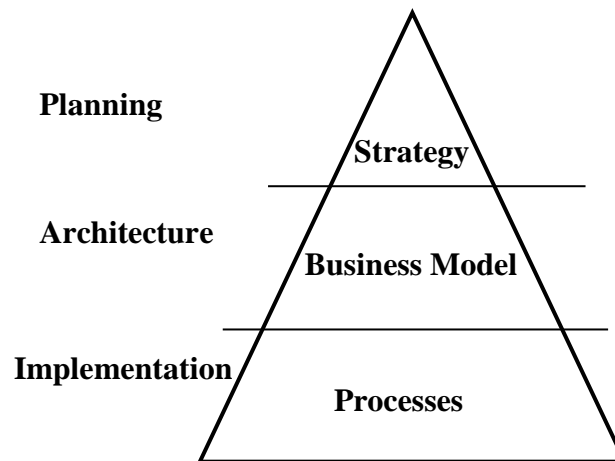


Figure 45 Relationship of business models with strategy and process

Although this perspective is intellectually appealing, in practice, the line separating the business model from strategy is blurred with both using many of the same or similar elements. However, in spite of the apparent overlap, there is also an instinctive understanding that business models are different from strategy in its accepted sense and that they are more closely related to ICT and value creation and enterprise operations (Alt 2001; Amor 2002; Madhok 2002; Gagnon 2003). Effectively delineating strategy and business models, if possible, remains a future research task.

Research Streams in Business Models

Gagnon identifies three distinct research streams attendant to e-business models (Gagnon 2003). The first, attempts to classify the various models by their activities such as Timmers' and Rappa's classifications. The second, associates the models with strategy and design methodologies based around different ICT strategies such as those offered by Venkatraman and Henderson and Pant and Ravichandran (Venkatraman 1998; Pant 2001). The third and most recent stream is one that is of most interest to us because it focuses on synthesizing the principles of value creation and delivery that guide successful e-business (Venkatraman 1998; Amit 2001; Pant 2001; Hedman 2002).

The value creation stream is the most recent development and has its intellectual roots in the dynamic capabilities and resources based view (RBV) of the firm (Madhok 2002). The RBV identifies the firm's resources, capabilities, knowledge, value chains and extended partnership arrangements, as sources of value and thus competitive advantage. The value creation stream uses ICT to integrate elements from both strategy and implementation into what, in chapter 4, we called virtual organization to identify the various players and the point of convergence where value creation occurs.

Generic Elements of a Business Model

A value stream business model describes the architecture through which the firm creates, appropriates and delivers value to its stakeholders (Gagnon 2003). Several researchers have developed generic business models comprised of a variety of different elements. Amit and Zott identified content, governance and structure as core elements of their business model for electronic marketplaces (Amit 2001). Mahadevan used three streams of logistics, revenue and Value (Mahadevan 2000). Alt and Zimmerman used a combination of mission, technology, process, revenue, structure and legal element as the key constituents of their model, while Hedman and Kaling used customers, competitors, product, organisation, resources, and production as essential elements in their model. (Alt 2001; Hedman 2002).

The business model is sometimes called a business design. Each business model should identify how the enterprise achieves some form of sustainable competitive advantage. But successful enterprises must constantly rethink and revise their business models to reflect changing conditions and the migration of value from one source to another.

7.7. Discussion

Information systems support all enterprise activities. From their beginnings in operations automation IS now incorporate enterprise wide applications that coordinate all enterprise activity and connect these with the activities of customers and suppliers across the wider value system.

Despite the ubiquity of information systems (IS), their contribution to productivity and value creation has been a source of controversy. To date IS has been most effectively deployed in operations where it automated numerous business processes and reshaped organizational structures. In these, IS planning and execution has been aligned with received corporate strategy objectives. However, alignment is often problematic because the time and cost taken to develop and deploy new increasingly complex ICT projects is incompatible with increasingly dynamic and time sensitive corporate environments. Impacting strategies offer more utility and value to the firm because they are integrated with corporate strategy making and contribute pro actively to corporate goals. Research suggest that IS' greatest contribution to corporate effectiveness lies with impacting strategies. These allow both new and old businesses to leverage information assets to create more compelling value propositions, operate more efficiently and increase shareholder value. However, the results of these are difficult to capture in conventional accounting procedures and so the contribution of ICT to the enterprise can easily be questioned. Effective business strategy decisions have to be

informed by the impact of new digital opportunities and technology decisions need to be aligned with the strategic intent of the enterprise.

The business model is a developing concept from IS that is largely applied in the electronic business arena. Conceptually, business models draw from the BRV of strategy to describe the architecture of the firm and its value creation processes. As such, they are integrative and interdisciplinary in nature. Business models are unique to each firm and reflect the firm's competitive stance. Some generic elements such as the firm's competitive outlook, value proposition and operational arrangements should be included in the model. The model should describe how the firm plans to achieve its goals business through its organisational structures, and relationships with its suppliers and partners. At the process level, the model should address customer orientation and process coordination and at the revenue level, the model should address the business logic. Information technology plays an underwriting role throughout and should be recognised in the model.

Business models encompass the totality of how the enterprise defines its differentiated products, value proposition, the configuration of its resources, operational tasks and how profit is to be generated.

In chapter 4 we described virtual organisation as an important organising paradigm and strategy. Virtually organized enterprises rely on ICT and information for their operation. Ultimately their success depends on their ability to visualize the logic of their business and leverage information to create appropriate organizational arrangements that match their customer's priorities. The business model represents the enterprise's visualisation of its strategy, business logic and architecture. In the following chapter we introduce the virtual value creation (VVC) model as a general framework of virtual organisation that provides an explanation and guidance for the enterprise in its value creation efforts.

Chapter Eight Virtual Value Creation

8.1. Introduction

Up to this point, this thesis has described a wide ranging research effort focused on the expanded role of ICT and information in value creation. Specifically, value creation has been examined from perspectives found in mainstream strategy, marketing, finance, operations and information systems theory. All of these have provided valuable insights into corporate behaviour, but some, single focussed explanations do not fit comfortably in the current integrated, information driven business environment. In this chapter, mainstream value creation theory is integrated with developing, information based strategies and concepts to form a novel, coherent, overarching model that explains value creation in the contemporary digital environment. To achieve this, this chapter begins with a brief recapitulation of the differing concepts of value creation and then introduces and explains the Virtual Value Creation model. The term virtual is used to denote the present contemporary business environment which is to all practical purposes completely reliant on ICT.

8.2. Value Creation Revisited

Previous chapters described the impact that information has on value, organizational structure, strategy, customer and shareholder value, customization and business models. Chapter 2 established that value is a subjective, dynamic concept that guides buyer and seller relationships. In commerce, the value of information is directly related to its supply and utility. Revolutionary advances in ICT, notably the internet, have increased the supply of information by many factors, whilst increased computational capability has enhanced its utility. The present stage of the information age is characterised by increasingly pervasive ICT and sweeping changes in the way information is gathered and used. Information is now the pre-eminent factor of production and it dictates how physical assets and capital will be employed (Drucker 1993). Information has also become a product in its own right. Changes in the economics of information have greatly reduced transaction costs and redefined the balance of power in commercial relationships causing enterprise and industry restructuring and the flattening of traditional hierarchies.

In chapter 3, we examined new information driven, organizational structures, such as virtual enterprises, that are comprised of extensive, dynamic networks of collaborating firms. We noted that while few enterprises conform completely to the structural concept of virtual enterprise, many organizations do possess elements of virtuality such as intensive use of ICT, focus on core competencies and outsourcing. This led to the realization that virtuality can

also be considered as a characteristic of virtual organization. Virtual organisation is an ICT based, organising principle focused on value creation. While the virtual enterprise concept is confined to a particular range of structural relationships, virtual organization applies to all contemporary enterprises because of the pervasiveness on ICT.

In chapter 4, we investigated strategy further and examined the established strategy theories contained in the industrial organization, resource and network based perspectives. We concluded that none of these adequately addressed the expanded roles that information and digital technologies play in creating value in an electronic environment. Virtual organisation is not included amongst mainstream strategy perspectives. However, its reliance on extensive ICT and the use of information to integrate enterprise activities and create value do set it apart from the existing body of strategy theory. Virtual organisation, as a new strategic paradigm, integrates many of the other value theories and appears to offer a better overall explanation of value creation in the present information rich environment.

In chapter 5, we turned from strategy to focus on the enterprise as an entity whose purpose is to create value for its stakeholders. We directed our efforts to examining the notions of shareholder and customer value. In recent years, the corporate goal of improving shareholder value has been increasingly and strongly emphasised. However, we concluded that the key to sustained competitive advantage begins by understanding customer's unique perceptions of value (CPV) and crafting customized value propositions that match them. A customer can be either the next player in the value system or the consumer, or both. Shareholder value and customer value need not be mutually exclusive and increases in both shareholder value and customer value are necessary for sustainable competitive advantage and the long term survival of the enterprise. ICT creates increased customer value and competitive success by enabling the effective combination of operational excellence and customisation.

Chapter 6 explored mass customization as a value strategy where customised goods are produced with mass production efficiency. Competitive pressure in the marketplace and advances in ICT drive enterprises towards mass customisation as they endeavour to meet customer demands for both competitively priced and customised goods and services. Competitive advantage accrues to enterprises that effectively execute mass customisation strategies because it simultaneously integrates and optimises operational excellence and customisation in ways that are difficult for rivals to replicate. Products and services can be customized to meet individual customer's value requirements through different combinations of product, service and representational attributes. We noted that effective execution of a mass customisation strategy requires precise understanding of individual customer's

requirements combined with a flexible manufacturing system. Both require extensive ICT intervention.

Chapter 7 noted ICT's contribution to value firstly, through automation and integration of enterprise operations, then through increasingly complex enterprise systems and finally through supply chain integration. However, ICT's contribution to the enterprise is only maximised when ICT considerations are integrated with corporate strategy formulation and implementation of corporate policy. We previously described virtual organisation as an ICT based organising paradigm. Within that perspective, the business model encompasses enterprise strategy, enterprise architecture and the processes that enable it to develop customer value. Value creation has been explained in numerous strategies examined in this thesis, these are summarised in Table 6, as follows.

Theory	Unit of Analysis	Source of Value
Industrial Organisation	Industry	Industry structure; competitors customers, substitutes, new entrants and inter-firm rivalry
Value Chain	Internal and external integrated value chain	Value from analysis of value contribution of linkages, elements and processes of the value chain
Schumpeterian Innovation	Firm	Value from innovative use of technology and resources.
Resource Based View	Core Competence	Value derived from focussing on the unique resources and capabilities of the firm
Strategic Networks	Business Networks	Value is created synergistically from networks of collaborating partners, including customers.
Transaction cost Economics	Transaction	Value is derived from transaction cost efficiencies associated with outsourcing and strategic networks
Customer Perceived Value	Customer	Value is derived from providing customers with carefully constructed value proposition that conform to their perception of value.
Mass customisation	Value proposition	Value is derived from producing customised product using mass production techniques
Virtual organisation	Enterprise	Value is derived from intense customer focus enabled by the use of ICT to integrate customer value demands, enterprise assets and information
Value based management	Enterprise	Value Based Management is a management approach that ensures corporations are focussed on maximising shareholder value).
Strategic Alignment	ICT systems	Value is derived from ICT systems alignment with corporate objectives and their execution.
Supply Chain integration	Supply Chain & Operations	Value is derived from operational efficiencies and coordination of supply chain activities
Enterprise Integration	Enterprise	Value is derived from efficiencies from enterprise wide process coordination

Table 6 Value creation theory

8.3. Virtual Value Creation Framework

In the preceding chapters we established that value creation is the legitimate focus of all enterprises and the source of sustainable competitive advantage. Here we propose a Virtual Value Creation (VVC) model that integrates existing and emerging theory to describe the strategic processes and conditions necessary for enterprises to fully exploit information, create value and survive in the electronic age.

The VVC is comprised of functional and foundational drivers of value creation. As depicted in Fig 48, the functional drivers include a customised value proposition, strategic sourcing, core competencies and an integrated value network. The foundational drivers include digitisation, infrastructure and environment.

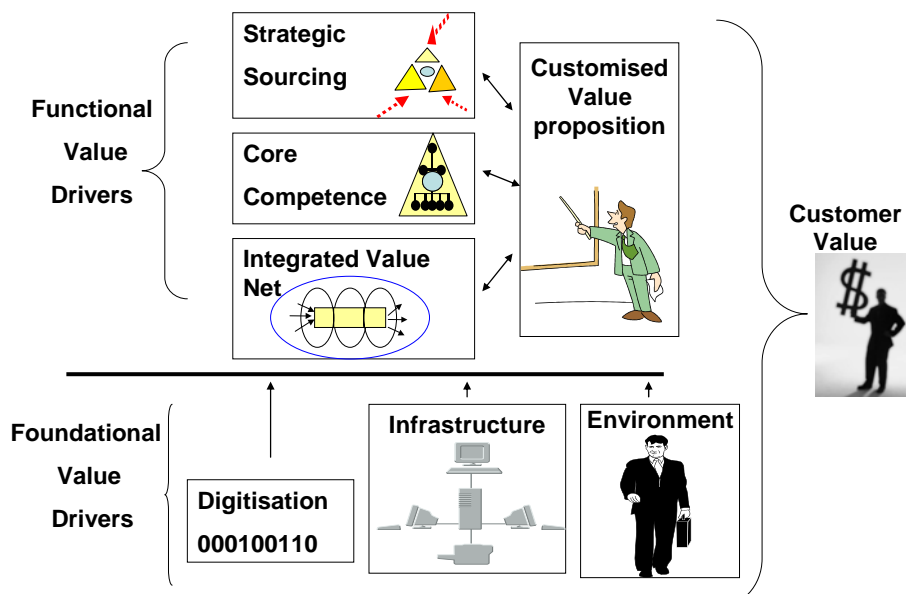


Figure 46 Virtual Value Creation Framework

Although the customer is not explicitly included in the VVC, the framework assumes a strong customer focus and we begin by restating our view of the customer and customer value. Our reason for this is to confirm the reason for the enterprise's existence and then to ensure that the enterprise is properly oriented and well positioned in the broader commercial landscape to achieve its aims.

As we have previously established, the prime task of the enterprise is profitable creation of customer value. We have also established the identity of the customer as the recipient of valued products or services, either as an intermediary or as the consumer and we have also confirmed that customer value is represented by a subjective collection of attributes based on based on the perceptions of individual customers.

We understand value creation to begin and end with the customer in a virtuous circle as shown in Figure 49. Conceptually the value circle is based on Porter's ideas of value. However, as we have noted the value chain has evolved into a value system representing a network of suppliers and customers. The sequence of activities in the value chain has also been reversed to reflect marketing's customer concept that places the customer at the beginning of the production process and not at the end. In our adaptation of the revised value chain, we have moved the concept from a network of partners to a series of activities that begin and end with the customers and which may be completed by either the enterprise or its partners. This concept is enabled by ICT's capacity to target individual customers and supply their needs. The idea of the circle reinforces the perception of customer focus.

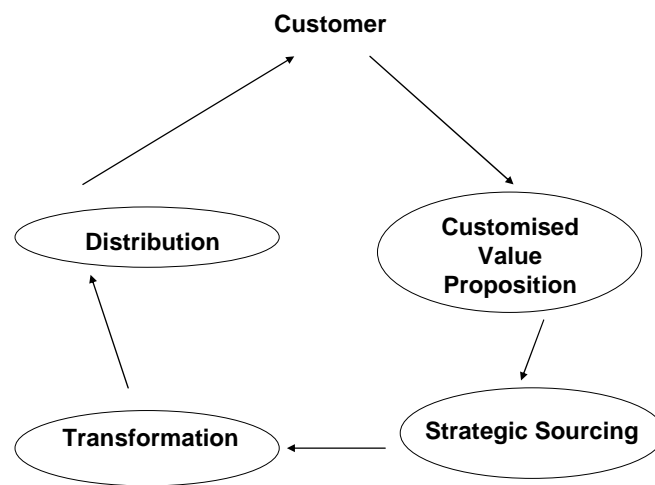


Figure 47 Virtuous Circle of Value Creation

The following discussion, which explains the VVC's Functional Value drivers, presents each driver as part of the logical sequence represented by the value circle.

The VVC's functional drivers include a customised value proposition (CVP), strategic sourcing, core competence and an integrated value net. These elements capture and integrate the value creation considerations that were discussed in earlier chapters. Their inter relationships are now explained in some detail.

Customised Value Proposition

As discussed in chapter 5, the marketing concept aims to economically produce a value proposition customised to individual customer's requirements. The value proposition includes the product, its attendant services and representational features that the firm offers its customers. As noted earlier in Chapter Six, the value proposition can be customised in any or all of the product features, service or representational components. Customisation may be

initiated directly by a customer request, indirectly through perceptual elicitation or by offering innovative products and services. Customisation is entirely centred on the value requirements of individual consumers or value system customers. So merely offering multiple features in an unstructured manner is unlikely to succeed unless they represent attributes which customer recognise as valuable.

In principle, all products and services are customisable. In practice however, demand, cost, and productive capability may preclude large scale customisation. Some products such as commodities or mass produced consumer products may not be customised in ways that consumers recognise. Their service/representational attributes are customised to meet the requirements of value system intermediaries. For example, in-store presentation of commodities such as flour and rice can be customised to meet the retail supermarket's requirements for a house brand that differentiates its brand of commodities from its competitors. Wal-Mart, the US retail giant, pioneered use of ICT to customise aspects of its supplier's logistics operation so that deliveries could be when the stores required the stock and in the quantities and packs that individual stores required. As a result inventories and handling were reduced, the financial gains supported Wal-Mart's overall low price strategy and the consumers gained by having continual access to required products. In this instance customisation benefited both Wal-Mart, as the customer and the consumer as end user.

The ability of the enterprise to achieve sustainable competitive advantage depends on its capacity to consistently develop a value proposition that consistently matches CPV over the long term more effectively than its rivals. Therefore, a clear understanding of the consumer's value requirements is a vital element for product development and sustained competitive strategy. Knowledge of customer requirements is gained through two avenues: market research and co-creation. These were addressed in chapter 6. Today, more customers are taking the initiative to use the internet as a research tool to actively determine what, they will buy and how and in what form they will buy it. Some enterprises invite direct customer participation in product design through the use of configuration software that is integrated with manufacturing systems. However customer demands for value can remain unsatisfied unless the co-design process is supported by flexible, agile production and back end support systems.

Strategic Sourcing

Having defined the required product, the firm must then set about assembling the required resources with which to produce it. As noted in chapter 4, acquisition and management of the firm's resources is the subject of the resource based view (RBV) of the firm which regards

the firm's internal resources, processes and capabilities as critical sources of value creation. Strategic sourcing is based on the concept that processes should only be performed by those who are best capable, regardless of location or corporate identity (Quinn 1999). Since very few companies are sufficiently skilled to undertake all aspects of their business internally, they must either buy the assistance of 'outsiders' to improve their performance, or accept the risks of sub optimal operation. The outcome of the 'make or buy' decision is largely determined by transaction costs (Coase 1937; Williamson 1985). ICT significantly reduces transaction costs and better positions enterprises to consider buying the services of external specialists who have superior expertise than is available to the firm internally.

Outsourcing non-critical functions such as asset management and security poses little strategic risk to the enterprise. However, many firms now rely on external specialists for critical business processes such as production. For example, IBM, Hewlett Packard and Apple employ Solectron, as a contract manufacturer for their products. Nike, Reebok, Addidas, and Puma are major competitors in athletic footwear but they both outsource manufacturing to specialist plants in South East Asia and the management of logistics to third party logistics (3PL) providers (Christopher 1998).

Cisco Systems, a provider of internet networking equipment, is noted for its extensive use of outsourcing. Cisco uses a combination of a build to order model, a high level of production outsourcing and strategically selected supplier relationships as a key drivers of its competitive advantage. Using the internet, Cisco customers collaborate with Cisco engineers to configure their orders, which are then distributed via an intranet to Cisco's network of contract manufacturers and supply chain partners. Contract manufacturers independently see the incoming customer orders, then build test and ship the ordered product directly to the customer. Cisco itself is not physically involved in about 65% of customer orders, until a completed order triggers an accounts receivable entry on Cisco's books.

The major drivers of outsourcing for these firms include; continuous market pressures to shorten time-to-market, enhanced asset utilization and the increasing complexity of process technologies. Outsourcing gives enterprises the opportunity to develop their core competencies, such as research and development or sales and marketing, while simultaneously accessing cutting edge expertise of other specialists in other areas without the need for additional capital investments.

Successful strategic sourcing requires a clear understanding of an enterprise's goals and an appreciation of its own capabilities, compared to what are available elsewhere. Strategic sourcing incurs additional organisational overheads and additional capabilities are required to

regulate and support multiple service providers, manage processes, organizational roles and responsibilities, and oversee service delivery. However, when firms actively collaborate with their partners and suppliers not only do they gain access to otherwise unobtainable skills, the synergies enhance total capability and operational flexibility at lower cost. Outsourcing tends to insulate the firm from fluctuations in demand which can be ameliorated by increasing or reducing the number of partners without the need for additional capital expenditure or severe staff cutbacks. Furthermore, the total risks attendant to new product development can be more easily absorbed by spreading the risk amongst the partners.

Extensive, careful outsourcing gives rise to enterprise restructuring and the development of strategic networks, another recognized source of value. A direct consequence of strategic sourcing is that it encourages modularisation and functional and process specialisation.

Core Competence

As described in chapter 4, the obverse of strategic sourcing is focus on core competence. Popularised by Prahalad and Hamel, core competencies are also part of the RBV of value creation and are described as the organization's collective knowledge in production or integrating technologies that increase customer value (Prahalad 1990; Christopher 1998; Walsh 2001). Competence in areas which are critical to the firm's success, such as order fulfilment, but are not considered as exceptional are not considered as core competencies since they do not differentiate the firm from its rivals. Core competencies are distinctive, unique, difficult-to-copy processes or resources that create customer value and therefore lead to superior enterprise performance.

Treacy and Wiersema and argue that enterprises can achieve leadership positions by strategically focusing on one of three "value disciplines"; operational excellence, customer intimacy, and product leadership (Treacy 1995). Once an enterprise has identified its particular competencies it should focus on these and outsource the other business functions to specialists and continue to focus its own specialization.

For example, as noted earlier, Nike is able to concentrate its attention and resources on its design and marketing competence by outsourcing its entire production and logistics functions to others. Mustang, an Australian manufacturer of pleasure boats, has expertise in manufacturing but outsources its design work to specialist marine designers and architects. Canon's particular expertise in developing innovative optics and miniaturization in cameras has been applied to expanding its range to include other products such as computer printers, copying and fax machines. Similarly Honda's expertise in small engines has been widely applied in diverse markets ranging from garden equipment to automobiles, and TNT, a major

international logistics specialist undertakes complete responsibility for logistic support to major international enterprises.

Core competencies are not fixed. As an enterprise evolves and adapts to new circumstances over time, so too will its core competencies adapt and change. As firms increasingly focus on their own competencies and outsource other functions, they tend to change organisationally from vertically integrated hierarchical structures to collaborating networks of specialists. Orchestrating and coordinating the activities of these is a demanding task. We have already noted the high informational demands required by networked organizations and the additional managerial skills needed to coordinate the activities of these value systems. However, despite these costs, we predict that network orchestration will become an essential core competency and a considerable source of value.

The combined effect of strategic sourcing and focus on core competence is to enable the firm to focus its energies on the competencies where it has the most expertise and value creating potential. Value creation is derived from the most efficient utilisation of the firm's information and other resources. Value to the customer is increased because the network presents a more capable image and is better placed to satisfy customer demands. ICT plays a crucial role in developing and maintaining the communications network that enables the rapid transmission of information vital for collaboration, coordination and overall management.

Integrated Value Net

Value net integration is the process in which the firm and its suppliers and customers cooperatively plan, and physically and electronically manage the flow of goods, services and information from the point of origin to the point of consumption. Balancing supply and demand across the network is a major and difficult organizational task that requires integration of supply and demand related information. Although varying in detail, integrated operations incorporate world class business manufacturing and support processes; particularly customer relations, supplier management, new product design and core value chain and logistical operations.

Dell Computers, the world's largest PC manufacturer, is the exemplar of value chain integration and has a reputation for mass customisation. Approximately 80% of Dells sales originate from its interactive website which enables customers to research, configure and order computers, make payments and interrogate Dell's systems for delivery status. Dell's direct relationship with its customers ensures that subtle changes in customer demand are quickly detected and fed back to the suppliers and appropriate adjustments made to Dell's product offerings.

Dell does not begin to assemble computers until a customer order is received, so it is not burdened with high inventories of completed stock. Dell currently works on approximately 6 hours of on hand inventory, including work in progress. Suppliers use an internet portal to view Dell's requirements to ensure that they meet Dell's JIT requirements. The close linkage between Dell and its suppliers ensures that advances in technology, design, and production scheduling are shared and incorporated into processes and products. Peripheral devices such as keyboards, mice, printers as well as software are shipped directly from their manufacturers to Dell's logistics providers for consolidation with Dell's computers into a complete single shipment for dispatch to the customer. The time from order placement to customer receipt is reputed to take eight days (Magretta 1998; Govindarajan 2001; Stapleton 2001).

There are several significant benefits from what Dell calls 'Virtual Integration'. Dell's Build to Order model substitutes information for inventory, a considerable benefit in an industry where obsolescence is rampant. By concentrating on assembly and using a small number of modules from a limited number of suppliers, Dell has gained greater production efficiency. Dell's direct sales to via the internet customers removes distributors and retailers from the value chain and because Dell's customers pay for their orders in advance, Dell has a negative cash to cash cycle and excess cash reserves to satisfy its creditors (Govindarajan 2001).

Integration in this sense is not to be confused with vertical integration which implies ownership of upstream and downstream processes and functions. In an integrated value network, information replaces inventory and synchronises all the processes of the value system. Information is still used for coordination and control, as Porter originally envisaged, but ICT provides all players with relevant close to real time information that eliminates or reduces lead-times and the whiplash issues that bedevil supply chain operators. Moreover, when customer demand is visible to all members of the supply chain, resourcing, production and inventory decisions can be made with less fear of stockpiles or backlogs. Information makes just in time (JIT) production systems a reality and increases margins.

An integrated value network uses information extensively to achieve value system transparency, operational effectiveness and synchronization. During the past decades many ICT and information based techniques, such as quality, lean manufacturing and process re-engineering have been put in place to improve manufacturing efficiency. The evolution of manufacturing systems from MRP, to ERP systems that integrate all of the internal functions of the enterprise illustrates the increasing influence and scope of ICT. More recently the extra connectivity offered by the internet and the addition of SCM and CRM applications has made

it possible for information to be shared throughout the enterprise and between its customers and suppliers.

A customised value proposition, strategic sourcing, core competence and value chain integration are the principal drivers of the value creation process. Customer value provides the focus for the design and development of customised products. Strategic sourcing and core competence enables the enterprise to effectively assemble the required set of superior capabilities and competencies necessary for the production of a value proposition that offers maximum value to the customer. Value chain integration creates the seamless flow of information that connects customers and suppliers to the firm and synchronises the rapid production of mass customised products. The widespread application of ICT and judicious use of information is crucial to the effective execution of all of these activities

When these interrelated activities are undertaken collectively, the result is a blending and optimisation of customised marketing and customised production values that move the enterprise towards mass customisation and greater value creation as shown in Figure 50. This portion of the VVC framework is a reflection and practical extension of Porter's ideas on operational superiority and strategic positioning as sources of sustainable competitive advantage. It also conforms with the notion of virtual organisation described by Ventrakaman and Henderson as "...the ability to consistently obtain and coordinate critical competencies through its design of value adding business process and governance mechanisms involving external and internal constituencies to deliver superior value to the market place" (Bauer 2001).

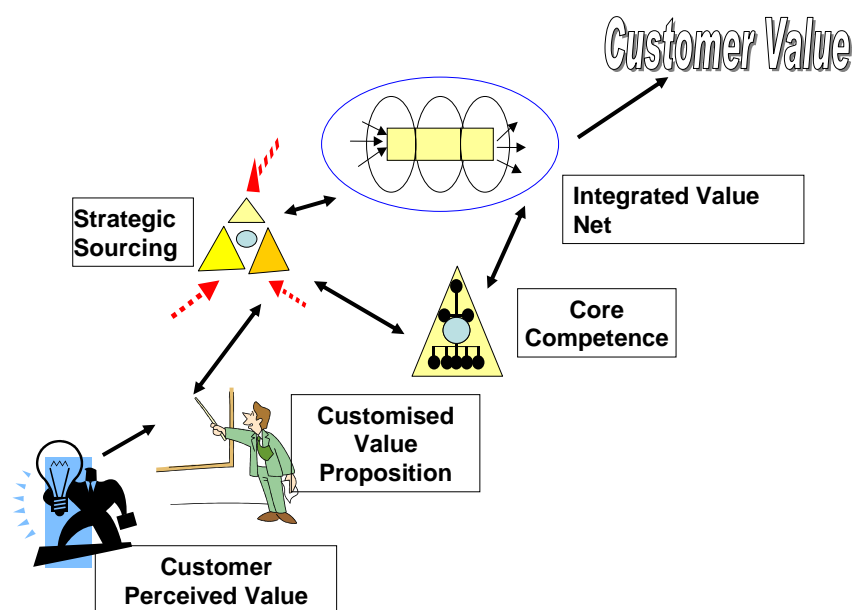


Figure 48 Functional drivers of Virtual Value Creation

8.4. Foundational Value Drivers

Although a customised value proposition, strategic sourcing, core competence and value chain integration are the principal drivers of the value creation process, they cannot operate without the supporting foundational drivers. Foundational value drivers include digitisation, infrastructure and environment which collectively constitute the network's operating environment. The following sections examine these in some detail.

Digitisation

Digitisation is the process that transforms information and tangible assets into a form that can be accessed, manipulated and communicated by ICT. It is the foundation of ICT's utility and converts information into a strategic resource.

Digitisation of processes, products and services is moving quickly and the impacts on traditional industries are far reaching. For example, the development of inexpensive digital cameras with still and movie outputs that can be downloaded and manipulated on domestic PCs has created enormous disruption to the century old film industry. Demand for paper based film from firms like Kodak is falling rapidly and the effect is being felt by suppliers of paper, chemicals, silver and their associated forestry, chemical and mining industries. The ongoing impact that digitised music is continuing to exert on the music industry is well documented. Innovative products such as Apple's iPod, that can contain up to 1000 individual MP3 digitised music tracks, not only affect the way that music itself is recorded and marketed, but deeply impact other associated industries such as packaging and distribution. Digital technology is also impacting industries such as agriculture, which are not normally recognised as 'high tech'. For example digital technology is being used to monitor soil and crop conditions to ensure that planting, fertilising and harvesting occurs at the best possible times and production is maximised. In industries where information itself is a product, such as in financial services, the flawless access, storage and manipulation of digital data are vital prerequisites for success.

Porter's value chain model used information for control and coordination. However, Rayport and Sviokla's Virtual Value Chain used digital replication of value chain activities to create faster, more economical processes and products. Digitised information also facilitates value chain disintermediation and reintermediation to bring products to market faster and substantially improving enterprise financial performance.

As more and more products becoming functionally and visually similar, customisation takes the form of information based attributes such as service, product information. The combined

information intensity of a product's physical and information/representational attributes, production processes, distribution systems dictate the extent of possible digitisation which in turn points to the extent that the firm can extract value electronically. All other things being equal the greater the degree of digitisation, the greater the capacity to directly engage customers and suppliers in value creation. Enterprises that use information successfully understand that digitisation is not about technology per se, but it is about processes and execution.

Infrastructure

If contemporary organisations rely on digitised information for their operation, they are equally reliant on the availability of a reliable, inexpensive and secure infrastructure as a conduit for it. Together, the enterprise's information systems and infrastructure form the enterprise's essential nervous system.

The ideal infrastructure is that it provides customers, suppliers and collaborators with on-demand access to all relevant information in a format that is readable and applicable to their circumstances. The infrastructure requirements for virtual value creation include low cost high bandwidth, access to secure world wide networks, fully functional, dynamic websites and portals, standardized web based formats, such as XML, for information exchange and real time access to all organizational, process and transactional information (Amor 2002).

Security is perhaps the most important issue for enterprises that use network technologies such as the internet. The enterprise must protect its own physical systems as well as its electronic assets such as intellectual property from authorised access and vandalism. Firstly the enterprise should use firewalls to separate its own trusted internal systems from outside networks. Secondly, authentication and other access control procedures should be in place to protect enterprise information. Finally, encryption techniques should be employed to ensure the secrecy and privacy of sensitive information.

As enterprises become more reliant on ICT to run their operations they must ensure that the information technology and the information systems are completely reliable and capable of providing 24/7 performance. Therefore measures must be taken to ensure continuity of operation during periodic maintenance and system upgrades. Back up systems must also guarantee that enterprise functions are protected in times of natural disaster such as flooding or loss of power.

The increasing volume and complexity of data used by modern enterprises has outstripped the analogue capabilities of standard telephonic services for internet use. Access to a

broadband connection is essential for most enterprises. There are several broadband options of varying bandwidth that ranging from asymmetrical digital subscriber line (ADSL) which is carried on installed telephone lines, to cable, leased private lines and satellite systems.

Enterprises that require direct communication with customers and suppliers are significantly disadvantaged if they are located in areas outside broadband coverage because of the time and sometimes inability of standard internet connections to accommodate their business needs. Limited broadband access can also be an important restraint on commercial development of industry clusters and other enterprises in remote areas.

Most middle to large enterprises have their own websites. However, to be completely effective websites must perform several functions. Firstly, they must inform potential customers about the enterprise and its offerings in a straightforward coherent style that is free from cultural and national ambiguity. This type of clarity is important because the internet's global presence enables web sites to be accessed from almost anywhere. They must observe a range of national and international legal and ethical issues such as contracts, intellectual property and privacy. Finally, they must be dynamic so that visitors can access additional data or interact with backend applications such as order placement or payment for purchases.

Network technologies are not confined to the internet and many enterprises use them for their own intranets, which use the same protocols and browser as the internet to distribute enterprise files, documents drawings and other information within the enterprise. Internal connectivity is extremely important for process coordination and enterprise wide applications such as ERP. Networked organisations can use the internet for communication, but some use extranets which extend the reach of enterprise intranets to business partners for security and privacy reasons.

Generally most of the infrastructure requirements for enterprise support are available and most large firms have them in place. However, second tier firms and SMEs in particular, are less well equipped to meet the requirements of an electronic environment. Reasons for this include the limitations and cost of infrastructure, limited ICT competence, and disinterest and, as noted in chapter 7, uncertainty about the business case for the deployment of ICT.

The continued growth of computing power and software tools and communications technologies has seen the convergence of different technologies, best typified by the latest generation of mobile phones that are in effect voice activated mini- PCs with internet access that can read hand writing, transmit and receive colour digital photographs, text messages, emails and so on. These are one manifestation of mobile computing where connection to the internet is made via networks of transmitters. Mobile commerce (m-Commerce) enables

direct communication between individuals and enterprises from locations without the need for physical connections. Other, related infrastructures such as radio frequency identification (RFID) will eventually replace and extend the uses of static bar-coding and enable a completely new generation of tracking devices and applications. Developments such as technology convergence, wireless computing and RFID are examples of advances in infrastructures that will continue to intensify enterprise reliance on information and enable even more extensive inter enterprise and enterprise to consumer interaction. As attractive and exciting as these devices and technologies are, the reality is that many of them are still perceived to be outside the immediate sphere of interest of many enterprises. However, thoughtful executives intent on developing sustainable competitive advantage are steadily adopting new infrastructures and technologies to support their business strategies. In the future, executives will have to become as adept at managing ICT and information as they are in managing finance and marketing.

Environment

The final, but perhaps most important requirement of virtual value creation is an internal environment and industry environment that is open to ICT. Electronic value creation requires a willingness to utilise ICT within and without the firm. It is a reflection of the mind set of senior management. If senior management does not regard ICT and the changed role of information as having strategic worth, its contribution to value creation will be minimal. If senior management considers that ICT can be strategically deployed to improve operation practice and organisational effectiveness then its value creation potential is enhanced. These positions reflect the impacting and alignment positions described in chapter 6, and a combination of both is required for success. However, while it is generally accepted that ICT's prime task is to support and execute company policy; however few firms have yet to fully understand the potential strategic contribution of information. The value of ICT and its contribution to competitive advantage remains a controversial issue. However, ICT's increasing ubiquity will ensure that its contribution to the enterprise will continue to receive intense management scrutiny

Value creation in the electronic age invariably means that the firm will be part of a value network. It may be part of a virtual enterprise. However, neither is possible without the existence of a panel of suitably qualified and willing partners. Strategic outsourcing is naturally contingent upon the existence of suitably qualified potential partners. Even when these do exist, the degree of outsourcing and collaboration may be limited by the availability

of online connectivity, process integration, physical distance, commercial caution general ICT awareness, competence, and overall interest.

Industry leaders, such as Wal-Mart, Ford, Coles Myer BHP-Billiton and others like them, can play a significant role in establishing value networks by leading and coercing or simply mandating that suppliers adopt standards or practices if they wish to be considered as potential suppliers. The potential to initiate change usually lies with enterprises who can wield the most influence across the value net. These are usually close to the end user, such as major retailer, or close to raw material suppliers or value net orchestrators.

8.5. Discussion

The VVC framework addresses the creation of customer value and shareholder wealth. Enterprise practice and the research literature on value creation, point to the need for an integrated approach that combines conventional existing theories from strategy, marketing, information systems and finance with new perspectives that recognise the ubiquity of information resources. The integrated VVC framework is a response to this need.

The VVC framework, shown as Figure 51, is a strategic appreciation of value creation that includes the customer, and customer value. It describes the interconnectedness of customer value and a customised value proposition and identifies the essential functional and foundational drivers required for value creation.

Customer value, customisation, strategic sourcing, core competence and the integrated value chain constitute the functional drivers of value creation. Supporting these are three foundational drivers; digitisation, infrastructure and environment. Together, the functional and foundational drivers constitute a strategic framework that may be used by the firm to determine its value creating capability. The VVC integrates major elements of business theory in its functional drivers with major elements from information systems and technology. The underlying stream is the enterprise's use of information. The model does not attempt to replace the contributions of other researchers in strategy and value creation but integrates these into a new approach that is suitable for an information rich commercial environment. Because the model is intimately associated with information and ICT it is necessarily built on technological issues such as digitisation, infrastructure and the prevailing ICT environment. As far as is known, other models have not taken this integrating path.

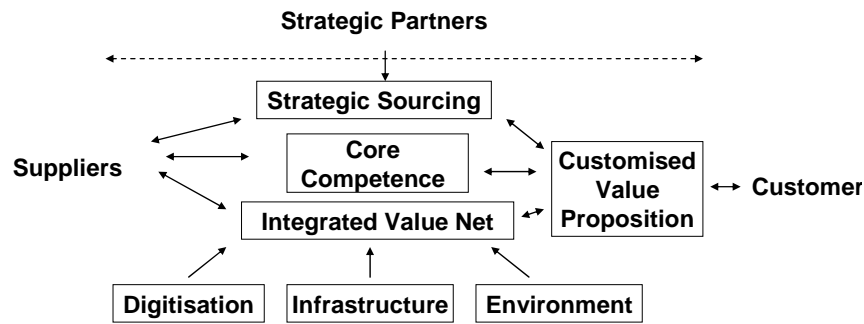


Figure 49 Virtual Value Creation framework

The VVC framework is unashamedly customer centred. It is so because without customers the firm cannot exist in the long term. Short term competitive advantage is possible without a customer focus, but the long-term goal of the firm, which is to develop sustainable competitive advantage, demands satisfied and loyal customers. Successful value creation is essential for building sustainable competitive advantage and its success is directly contributes to the shareholder's valuation of the firm.

Depending on the position of the firm within the value system, the firm's customer is identified as either the occupant of the next node of the value system or the consumer. The consumer is at the epicentre of influence and all value chain players should be focussed on their value relationship with the consumer. Value is a subjective issue described as customer perceived value which identifies the attributes of a product or service that are the most important and therefore the most highly valued by the customer. The firm's value proposition should reflect each customer's set of perceived value requirements. By directly involving the customer in the process of product development and production the enterprise will be able to tailor its value proposition to closely match customer requirements and reduce the risk of producing unsuitable products. The task of the firm is to make that match more consistently and profitably than its competitors.

Strategic sourcing and core competence are necessary if the firm is to acquire the best possible collection of resources and competencies. An integrated value chain uses information to integrate both customers and suppliers into the transformational and logistics processes so that mass customised products may be efficiently produced and delivered. Virtual organisation uses ICT to integrate these sources of value creation into a single coherent strategy which is the basis of the functional drivers of Virtual Value Creation.

However, the value creation process is contingent upon the existence of three essential foundational issues. Firstly, digitisation of the firm's value proposition and its

transformational processes set limits to the extent that information can be used to create value and gain competitive advantage. Secondly, adequate ICT infrastructures must be in place to ensure that the requirements of connectivity and high speed transmission of information across the value networks occurs in a timely and secure manner. Enterprise and inter network based applications must also be in place to ensure that information is captured stored and manipulated effectively and information integration occurs swiftly and seamlessly. Finally, the extent that information and ICT can contribute strategically and operationally to value creation is a matter of managerial attitude within the enterprise, the value chain and industry. It is essential for VVC that management be attuned to the strategic capabilities of ICT. However, successful value creation also requires an integrated network of clients and suppliers to ensure that the best possible combination of resources are used to produce only what the customers consider to be best value for money at all times.

This chapter commenced by reviewing the theory surrounding value creation in an information rich environment. In this new setting, information is more influential than before in determining commercial relationships, defining organisation structures, developing information based products and creating a new business environment generally. Therefore, a new set of management concepts is required to explain the creation of value. Virtual organisation is one such new explanation and the VVC model sits comfortably within that paradigm. Although the VVC is somewhat speculative, it is soundly grounded in existing theory and practice and it provides a rational description of the enterprises immediate capacity to create value as well as a prescription of its value creating potential. The next chapter describes the application of the model in a small sample of firms from the primary, secondary tertiary and quaternary industry sectors.

Chapter Nine Case Studies

9.1. Introduction

In earlier chapters we explained how almost three decades of ICT developments have radically changed the utility and value of information with far reaching effects on commercial relationships, products, enterprise structures and enterprise performance. As the new and dominant factor of production, information, enlivened by ICT, has a major bearing on the enterprise's capacity to produce value and competitive advantage. Many firms have achieved success by exploiting the traditional factors of land, labour and capital to create value and will, doubtless, continue to do so. However, as digitisation of the economy continues enterprise success is increasingly associated with the acquisition, manipulation and use of electronic information. The divide between e- business and non e-business is quickly fading as the electronic environment becomes an unremarkable fact of business life. Under these circumstances, enterprises are being forced to revise their strategic and operational perspectives.

Chapter 8 described the development of the Virtual Value Creation (VVC) framework as part of a virtual organisation strategy. The VVC framework identifies the functional and foundational drivers of value creation. The former include a customised value proposition, strategic sourcing, core competence and an integrated value net. These encapsulate the value creation theories previously explored. The foundational drivers include digitisation, infrastructure and environment which underwrite all ICT activities within the enterprise and its environment. The VVC is descriptive in nature but by default it is also prescriptive in that it identifies areas where the value creation capability of information is being underutilised

A model or framework should offer a reasonable approximation of reality demonstrate integration or logical coherence, practical and theoretical relevance and explanatory power. We have demonstrated that the VVC is soundly grounded in existing theory and practice and satisfies the first of the integration and theoretical requirements. We now move to the issues of reality and explanatory power.

Business literature is replete with examples of enterprises that have successfully employed particular techniques, theories and strategies. In the preceding chapters we also cited numerous examples of enterprises that have successfully employed various strategies such as value chain management or focus on core competency to create value. However, explaining enterprise success in terms of a single strategy is somewhat unrealistic because success is usually the result of the interaction of numerous tangible and intangible factors. Intangible

factors such as innovation, information content and branding are difficult to quantify so establishing a causal relationship is unlikely. The VVC is not intended to comprehensively explain enterprise success or failure but rather it offers a methodology for examining the enterprise's use of information to create value. For these reasons we have elected not to conduct a quantitative demonstration of the VVC's explanatory utility but propose to illustrate implementation of the VVC model by using a case study approach. Accordingly, as listed in Table 1, we have arbitrarily selected a purposive sample of firms from the primary, secondary tertiary and quaternary industries. In each instance, material was gathered using a combination of semi- unstructured interviews based on the outline, shown at Appendix A, empirical observation and publicly available information.

Industry	Firm
1. Primary	Winery (ARW)
2. Secondary	Bakery (BF)
3. Secondary	Real Estate Development (RCG)
4. Secondary	Manufacturing (TW)
6. Tertiary	Advertising (MJQ)
7. Quaternary	Software developer (ACNX)
8. Quaternary	IT Faculty (ITF)

Table 7 Case Study enterprises

The structure of each case study is as follows: firstly the enterprise, its products, transformation processes and value networks are described. Then each of the VVC elements is used to explain how the enterprise uses information to create value. The conclusion summarises the enterprises present and potential use of information to create value.

For the reader's convenience we reproduce the VVC here as Figure 52

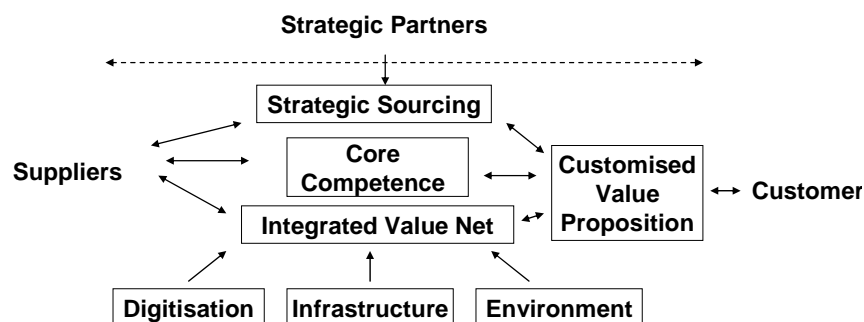


Figure 50 Virtual Value Creation framework

9.2. Case Study 1. Primary - Industry Winery

The Enterprise

Albert River Wines (ARW) is one of several boutique wineries situated in South East Queensland. With annual production of less than 5000 cases, ARW is numbered amongst the 732 small wineries that operate in Australia. ARW commenced life as a winery; growing grapes, bottling its own wine and selling direct to the public but, like many of its contemporaries, ARW has expanded into the wine tourism market. It continues to sell from the 'cellar door' but approximately 50% of total annual sales now come from winery tours, and its on site function centre and restaurant. The wine tourism industry is unique in that it straddles the primary (wine growing) secondary (wine making) and tertiary (wine marketing, and tourism) sectors. However, for the purposes of this exercise we have artificially separated the wine making from the restaurant and reception business.

The Product

ARW specializes in producing a range of red wines with a smaller number of blended white wines. Currently the range includes seven red wines and five white wines. Since 2002 ARW wines have won medals and prizes in numerous prestigious local, regional, national and international competitions plus a number of favourable press reviews.

Transformation Process

ARW grapes are grown on site then shipped to a contracted wine making facility some 80 kilometres distant where the grapes are pressed and the wines blended. The wines are then aged for up to four years in wooden or stainless steel casks. The mature wines are then bottled, and returned to ARW for labelling, capping and sale directly through the 'cellar door', to its restaurant patrons or to a small number of local restaurants.

Customised Value Proposition

Given the complexity of the wine making process; batched production, long lead times and the economies of scale that are necessary to produce wines in profitable quantities, complete product customization is not feasible. However, although the wine itself may not be customisable the informational content of its service and representational attributes are.

However, ARW's main task is to attract customers to its cellars at the vineyard or to its virtual cellars on the World Wide Web. These are marketing issues and ARW's continued success is strongly dependent on its skills as a tourist operator and its ability to craft a value proposition that matches the values of its potential consumers. Accordingly, ARW presents

its cellar as a congenial location where customers can feel comfortable about sampling and purchasing wine. ARW endeavours to ensure that its staff is well informed, willing and able to provide personalized service and information about all aspects of winemaking generally and about ARW's wines in particular. Working on the value triad of price, service and quality ARW is aware that in addition to quality and service they must remain price competitive with other vineyards competing on the wine tourist trail. The enterprise has a well developed website that promotes ARW as a tourist destination for wine tours and a function centre. The site provides complete information about ARW's wines. However, no attempt is made to further personalise the customer relationship over the web beyond a periodic news letter. ARW's value proposition is only generalised in terms of presentation and customer service issues.

Strategic Sourcing

As noted earlier wine making spans primary, secondary and tertiary industries, but not all wineries are skilled in all three. ARW operates its own vineyard and grows its own grapes. However, depending on the size, condition of the harvest and the type of wine to be produced additional quantities of the same or different grape varieties may be purchased from other vineyards. ARW has joined with other vineyards to outsource the blending of the grape juice to a specialist wine producer who works with a specialist wine producer who crushes the grapes and stores the wine for aging in the production plant. When mature, the wine is bottled and returned to ARW where it is labelled capped and presented for sale.

ARW outsources hosting, and general management of content and performance of its website to a specialist internet service provider (ISP).

Core Competence

ARW management comes to the industry with well developed marketing skills that they have applied to ARW both as a winery and as a tourist destination. From the perspective of the winery they have outsourced all the processes where they lack specialist skills or capabilities, and acquired the expertise of others to develop an enhanced overall capability. Management has set about exploiting their own marketing expertise to focus on ARW's presentation and customer interaction at the cellar and on the website while relying on others to provide the specialist inputs.

Integrated Value Net

As shown in Figure 53, ARW has a relatively uncomplicated value network that operates without an extensive distribution system. ARW is its own marketer and distributor. As noted

above, ARW has outsourced wine making/blending and production and website design and management.

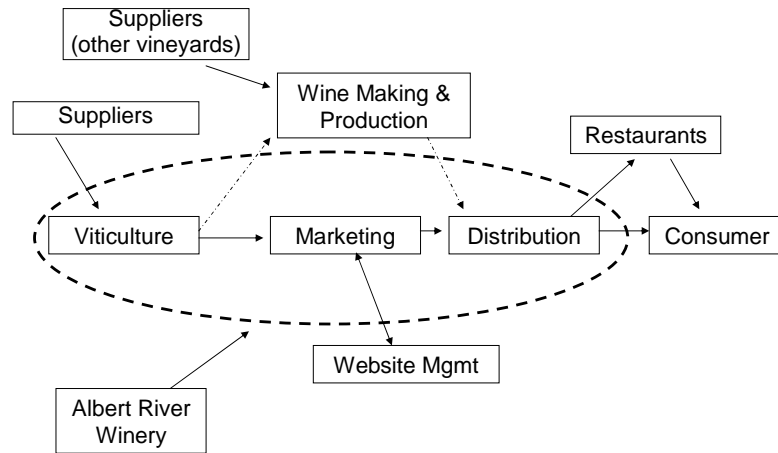


Figure 51 ARW's Integrated value network

There is little electronic integration of information about customer demand and production across the value net. Wines are blended two to four years in advance in anticipation of customer demand. In these circumstances the production processes are fixed and flexible production in small lots is difficult so, so individually customised wines are not economically practicable. Consequently, the process operates as a push system driven by guesstimates of future customer demand and production values which are dependent on the quality and size of the grape harvest. Therefore, marketing assumes considerable importance.

Digitisation and Infrastructure

Electronic technology can be employed in viticulture to monitor soil moisture levels, determine the state and quantity of the expected harvest and its wine making potential and so on, but apart from monitoring moisture levels these are not employed at ARW due to cost. There is no direct electronic link between the vineyard and the wine producer. ARW has little direct input into the wine producer's operation, so any information based control and monitoring technologies which may be used in wine production remain outside ARW's control. However, the production details of each vintage are recorded so that successful vintages can be reproduced; provided a suitable grape harvest is available.

ARW uses a proprietary enterprise wide business application for its accounting, inventory and internal administration. ARW has an extensive website that advertises ARW as a wine tourism destination, reception centre, and a boutique winery. The site enables users to book weddings, receptions, purchase wines and make email enquiries, it also features links to other related sites. The site has e-commerce functionality for taking orders and making online

payments but there is no connectivity between it and the enterprise business application. Broadband connectivity is desirable but unavailable due to ARW's country location.

Environment

ARW management understands and appreciates the internet's reach and ease of use as a marketing tool. However, most website activity is associated with weddings, tour bookings and restaurant related activities. Very few orders for wine are placed via the website. Interestingly, ARW management's observation is that customers use the site as a source of information. Phone and fax orders increase following web advertising, but customers appear to be reluctant to use the online ordering facility. Consequently, there is presently little need or inclination to extend the website's interface with back end functions such as order fulfilment. Similarly there appears to be little obvious need, inclination or opportunity for collaboration with other wine producers in the region, although there are moves to engage other winemakers in cooperative tourist activities.

Conclusion

ARW is a small enterprise in an industry dominated by large wineries and powerful retail outlets. ARW operates outside of this environment relying instead on direct sales to wine tourists and customers using its reception facilities and a small number of restaurants. Viticulture, wine making and wine production require high levels of technical skill most of which cannot be readily digitised. ARW has outsourced wine making and wine production to specialists, and retained responsibility for viticulture and marketing. Commercially produced wine is produced to appeal to an anticipated market demands for certain broad varieties of red, white and blended wines. Small quantities of individually blended wines are not commercially feasible, although individual can purchase quantities of wine bottled under their own labels. Customization of ARW's value proposition must therefore be effected through its information and representational attributes. ARW has direct interaction with its customers at the vineyard and its website. Both channels offer opportunities to gather data about visitors and individual customers and buying habits so that future visit could be profitably. However, thus far, ARW have not sought to develop or capitalise on its capability to target individual customers either through its direct sales or internet channels in any way beyond an online newsletter.

The VVC, shown in Figure 54 illustrates the current extent of ARW's current use of electronically enhanced information. The framework identifies that information is generally used to support strategic sourcing and core competence as shown by the shaded boxes. ARW

does not have access to broadband because of its somewhat remote location and its products and external environment limits its strategic use of information. However, there is potential for greater value creation through greater use of available information to more pro actively engage customers with ARW through the development of a value propositions communicated directly to individual customers either on site or electronically.

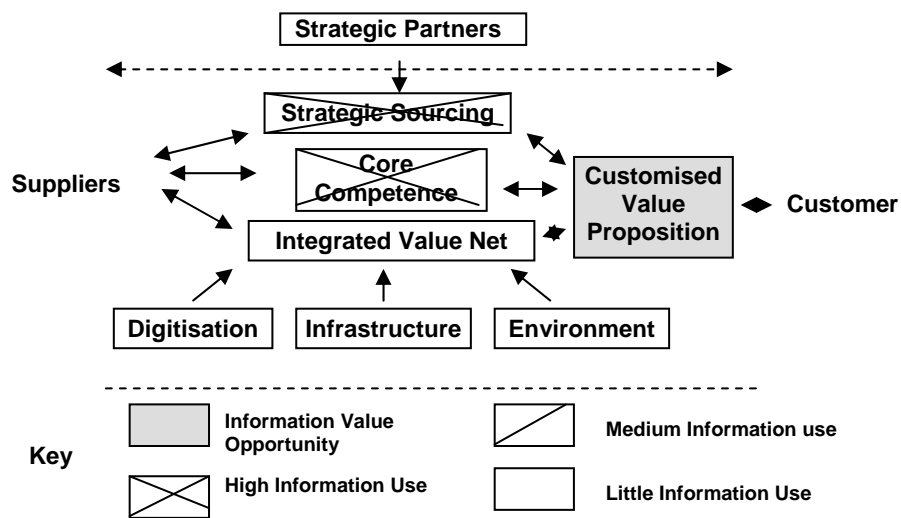


Figure 52 Information based value creation at ARW

9.3. Case Study 2. Secondary Industry - Bakery

The Enterprise

The Bread Factory (BF) is a family owned and operated bread bakery that has operated for the past 50 years. The company supplies bread and bread products to supermarkets, small stores and caterers across a large regional area. BF employs 90 employees and operates from a single site. Its competitors are a small number of rival regional bakeries and two major national bakeries.

The Product

BF makes and sells 50 different standard and specialty bread products such as white, wholemeal, fruit, soy breads and rolls and 200 different variations of these, such as white sandwich sliced, white toast sliced or unsliced. The bread is distributed by 48 contracted vendors. Although the vendors buy and on-sell BF bread products, BF considers its customers to be the large collection of supermarkets, convenience stores that the vendors service daily.

Transformation Process

The processes involved in bread making have changed little over the centuries. Flour and yeast are mixed with other ingredients and set aside to proof or rise. The mixture is then moulded into individual loaves or rolls and set aside again and then baked, packaged for distribution. At BF these processes are fully automated. BF bread is distributed by BF's vendors, who deliver the fresh bread, pack store shelves and return unsold bread to BF for credit. Most importantly they take daily customer orders and relay these to BF where they are aggregated to form the basis of the batched bread production schedule. Daily production is scheduled to ensure that the bread is available for delivery to the stores at nominated times. However, since the bread is baked in daily batches there is a physical limit to the quantity and variety that can be produced and delivered to the stores by the required delivery times. Returned bread, which can account for up to 15 percent of daily production, is sold as breadcrumbs or farm feed.

Customised Value Proposition

BF has little interaction with individual bread consumers, however it has responded to market, that is store based, demand for variety by producing 50 or so different types of bread products with approximately 200 variations. But its capacity to further customise its value proposition is limited by its batched production facility. Without extending its production facilities it has little additional capability of producing a greater variety without incurring efficiency losses and significant price increases. BF markets its products under its own brands and does not package its products as supermarket house brands. Since BF has no direct interaction with bread consumers its value proposition is focussed on the requirements of the supermarkets and other stores which emphasise price and vendor service.

Strategic Sourcing

BF does not have the opportunity or a perceived need to develop particular relationships that might result in better financial terms with its suppliers as ingredients are purchased in bulk and supplied on a JIT basis.

Core Competence

BF's competence resides in its bread making skills which have been based on its automated plant and its ability to control costs. However, these issues are related to scale and BF now finds it difficult to match the scale of the national bakeries and meet the increasing demands from the supermarkets for cheaper products.

Integrated Value Net

As shown in Figure 55, BF has an uncomplicated value net. Flour, the major ingredient, is sourced from a single flour miller. But apart from this arrangement, there are no alliances or special agreements in place with other suppliers and ingredients are purchased under normal commercial conditions. On the distribution side, BF's vendors operate individual 'bread rounds' as micro businesses on five year contract to BF. The vendors are BF's principal points of daily contact with its customers.



Figure 53 BF's Integrated value net

There is no electronic integration of the value net. Communication and information transfer between BF, its vendors and customers is largely based on personal, telephone or fax contact. Preparation of the daily production schedule is a computerised process with a manual interface with the automated bread making systems. Daily production operates as a pull system based on daily orders from BF's vendors. Thus BF has no direct control over demand for its products and any product that is unsold is returned to BF for credit. Presently, there is little incentive for the vendors or stores to attempt to manage demand since competitive pressure from BF's rivals ensure that the 'returns' systems remains in place.

Digitisation

BFs products and processes are relatively unsophisticated and produce an uncomplicated physical commodity. Consequently, beyond the automated production system, digitisation has little bearing on the product, its productions or its distribution.

Infrastructure

Any electronic infrastructure needs that BF may need now or into the foreseeable future are available. Production is automated and proprietary applications support BF's administration and email. Action is underway to automate the production scheduling and production interface. Additional requirements for bar coding have been mandated by the supermarkets, but these are not considered to have an appreciable impact on BF's value creating capability.

Environment

The environment of the bakery is neither information intensive nor information extensive. Beyond the order consolidation and production process ICT is not a major player in BF. BF's

major customers already order directly and unless there are changes in marketing or distribution strategies there is no known or anticipated need to extend the electronic environment further.

Conclusion

BF is a commodity producer whose value creation capability was derived from its market position and efficient production. Now, both of these are under threat. Its prime customers are national supermarket chains that use white sliced bread as promotional items and its major rivals are national bread bakeries who have access to greater economies of scale. BF is typical of a commodity producer caught between giant competitors and equally large customers. This illustrates Sawhney and Pakrikh's contention, that in a digital environment, the greatest potential for value creation lies at the ends of the value chain (Sawhney 2001). BF is caught between the two.

BF's operational efficiencies are centred on the cost of ingredients and the efficiency of the automated production processes. Automatic aggregation of daily orders and integration with the production system may save time and therefore give BF some additional flexibility. But replacement of the existing ovens with more efficient, perhaps marginally more intelligent, ovens is a major capital expense which is unlikely to produce the economies of scale necessary to compete with the national suppliers unless BF expands its market. There appears to be little incentive for the vendors to exercise care in their daily orders because there is no incentive to reduce the rate of returns which constitute as much as 15% of sales. Faced with fine margins from the supermarkets, high product returns and the potential for diminishing sales through convenience stores BF faces a perilous future.

The VVC in Figure 56 identifies BF's core competence as a source of value. Except for the possibility of some improved information integration in its value net there is little apparent scope for better utilisation of information to be further employed to create value.

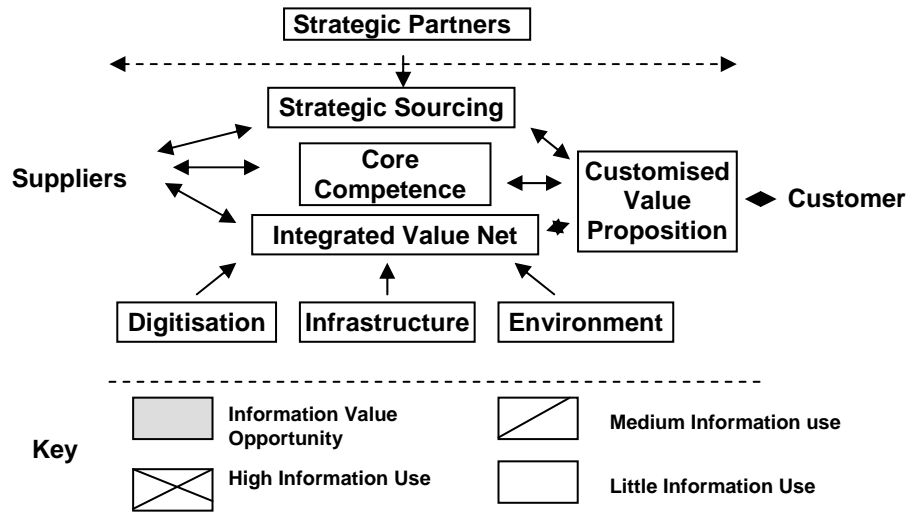


Figure 54 Information based value creation at BR

9.4. Case Study 3 Secondary Industry Real Estate Development

The Enterprise

RG is one of Queensland's larger real estate development companies. Operating on Queensland's coastal strip RG commenced operations in 1973 and now specialises in high rise residential and commercial developments.

The Product

RG has three major products: property development, construction, and post completion property management. Of these, property development is the largest and is the subject on this analysis.

Transformation Process

RG's transformation processes often take several years from commencement to completion. A typical transformation sequence, shown in Figure 57, commences with a development concept, and moves through various stages from feasibility studies development proposals, property acquisition, construction marketing and property management. Marketing commences early during the construction phases with sales to future owners and investors being made 'off the plan' before the project has been completed. When construction has been completed the project is handed over to RG's property management group to administer the on going marketing and management issues until the management rights are themselves sold off. When all the units and the management has been sold RG's involvement with the projects ceases except for on going property warranty issues.



Figure 55 RG's value net

RG however, is not a construction company. Its principal activities are in concept design, feasibility and project management. All other activities associated with construction are outsourced.

Customised Value Proposition

RG's property development value proposition is partially customised to the value requirements of at least three groups of customers; owner occupiers, investors and commercial property managers. The interests of each are somewhat different. Residential purchasers seek value for money, quality and location, whereas the investors look for the same value set, plus the potential for an acceptable ROI based on occupancy rates and capital appreciation. Purchasers of management rights also require an acceptable ROI with the additional consideration of maintenance and management costs.

RG's management designs real estate developments in using a variety of performance based metrics, historical data market research and inputs from major partners. Once project concepts, floor plans and the range of interior fitout options have been set, there is little opportunity for purchasers to change the product to suit individual tastes and the commercial imperative is to push the sales of the building to the market. RG marketing utilises different strategies in their advertising which feature, lifestyle, convenience, quality and financial returns to customise the product's representational attributes to attract individual and commercial purchasers. However these are targeted at market segments not individuals and RG does not propose a customised value proposition.

Strategic Sourcing

As noted above RG is not a construction company. RG initiates and develops concepts and then sources and oversees the specialist inputs from architects, financial institutions, construction companies and a host of supporting contractors and subcontractors and marketers and, to ensure timely completion of its projects.

Core Competence

RG's competencies are intertwined within concept development, project management and marketing skills. Of these, RG's core competency is associated with project management which requires the orchestration and coordination of the thousands of individual tasks that are necessary to complete a project on time and within budget.

Integrated Value Net

Like many enterprises involved in building and civil engineering RG is a type of virtual enterprise. As shown in 58, RG is comprised of a small executive tasked with developing concepts, feasibility studies, development proposals and project management and a customer facing marketing and sales group. Surrounding the 'executive' is a constellation of specialists who undertake all the other activities associated with development; architectural inputs, construction, landscaping, and sales. Each of these activities is outsourced to a major contractor who is supported by tiers of contractors and subcontractors. Throughout the construction phases RG's major task is project management.

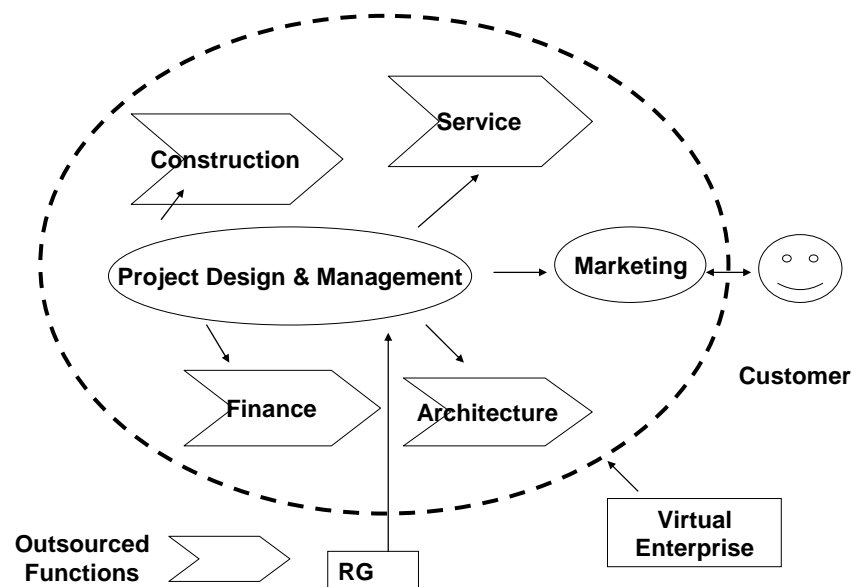


Figure 56 RG as a virtual enterprise

Digitisation

Project management in property development involves the oversight and coordination of the activities of large numbers of contractor and their subcontractors each working to drawings, plans and contractual specifications as passed down from RG. Although the administrative structure is based on contracts that may number in the hundreds, RG has little executive control on individual subcontractors except through its immediate major contractors.

Managing these majors and, through them, the numerous subcontractors to ensure a successful timely completion is a major task made even more complex by the hundreds of original drawings and associated documents and their constant revisions. Traditionally, the currency of project management has been personal interaction and paper based drawings, diagrams, instructions, contracts and numerous other technical and legal documents. Now RG digitises almost all paper based activities and uses web based technologies for their rapid and efficient transmission from its head offices to the building sites to help reduce misunderstandings and improve process coordination.

Infrastructure

The required level of ICT infrastructure is available within the RG office environment and between RG's office and its building sites. RG uses standard office automation software for administration plus proprietary CAD and project management software for architectural design, drawing and project management respectively. RG also uses specialised document control software to manage the information and document flows generated during the entire lifecycle of each project. Contractors, subcontractors and construction sites are interconnected to RG's office via internet links to ensure that RG project managers have close oversight of project progress and that contractors have immediate accesses to contract changes and variations. Efficient document control is not only necessary for effective management of the construction phase of the project but also for its proper handover to incoming building manager. Document control, also includes archiving of all relevant documents for future reference by planning, public safety and legal authorities should the need arise.

RG also has an extensive website for marketing that offers information including floor plans and sales availability of RG current developments, plus online booking for accommodation at RG's managed complexes.

Environment

With out evidence to the contrary it would appear that RG have adopted ICT as a sensible means to control, coordinate and market their various activities. The operating environment of large architectural and construction is based on documents; drawings, plans, specifications and contracts which are all amenable to digitisation and ICT processing Although the industry is characterised by large numbers of skilled tradesmen not traditionally attracted to ICT, its use amongst major contractors and some subcontractors is becoming more common.

However, for these micro businesses cost, connectivity and ICT skills remain a major impediment.

Conclusion

As noted earlier RG is a virtual enterprise. In keeping with the general definition of the VE RG has a small executive devoted to concept design and marketing with oversight for the coordination of construction. As expected in a VE, RG's focus is on design and project management. It outsources almost all other aspects of the business to external specialists. ICT plays an important part to the effective project management and as a means of communication between RG and its partners and customers. The VVC, in Figure 59, illustrates RG's effective use of information to create value by maximising its core design and project management competencies. The concept of a VE is built upon the idea of customisation and marketing pull. However, while RG's value proposition is generally customised, it does not fully accommodate full customisation for the customer and so does not exactly meet the VE requirement of a pull system. There may be opportunities for RG to engage customers more closely and establish 'ownership' of its properties by offering drawing customising tools through its web site sales. Most of GR's activities can be digitised and sufficient infrastructure exists to accomplish this. The building industry environment is not completely supportive of extensive ICT but RG's larger partners use it where possible.

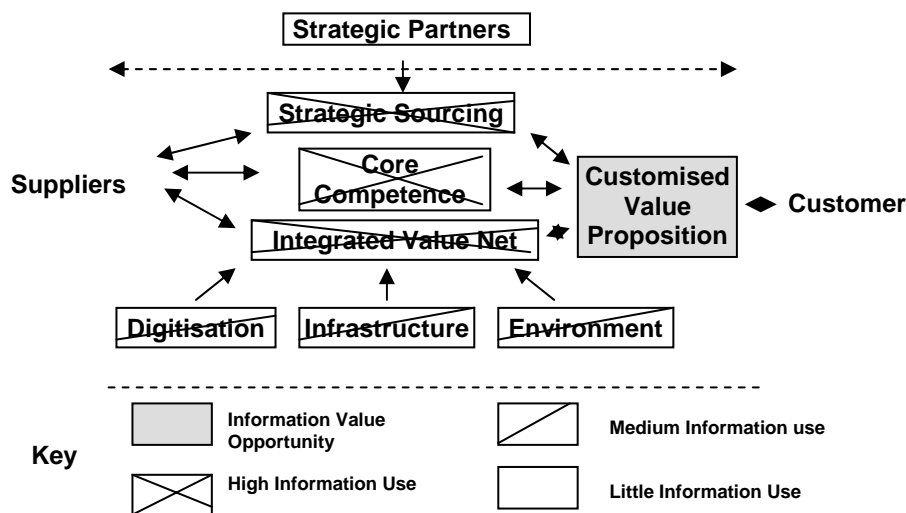


Figure 57 Information based value creation at RG

9.5. Case Study 4 Secondary Industry - Engineering

The Enterprise

TW is Australia's largest manufacturer of aluminium recreational boats and it currently enjoys an estimated 50% share of the Australian market for aluminium boats in the 2.4 to 6.6 metre size. All boats are fabricated at a single, purpose built site which is reputed to be as the most advanced aluminium boat building facility in the world. Finished and pre fabricated boats are distributed through an extensive dealer network throughout Australia and overseas.

The Product Range

TW manufactures over 100 different types of based on two ranges of aluminium boats. Each range has a selection of hull sizes and shapes, options and accessories. Each boat can be customised from a selection of up to 40 different optional features such as special carpets, dashboards and canopies, plus a various combinations of colours in the upholstery and external paintwork. TW does not make boat trailers, motors, accessories or provide finance, but customers can specify these when ordering and TW will arrange their delivery directly through strategic partnerships.

Transformation Process

Both ranges are manufactured in three separate fabrication lines based on hull length. However, the manufacturing processes are similar and each commences with the respective dealer networks. All dealers are encouraged to provide 12 monthly forecasts of their expected sales for production scheduling and order placement for long lead time items. Dealers then 'firm up' their estimates 60 days in advance of delivery so master production schedules can be developed. Firm orders with complete details of each boat's options and accessories are required 30 days in advance of fabrication.

Firm orders drive the development of a master production schedule. Production is scheduled for weekly batches; however because of the customised nature of each order, TW actually produces lot sizes of one. Individual orders are electronically tracked through each production stage and as each order passes from one process to another, the relevant databases are automatically updated.

TW uses computer aided design (CAD) and computer aided manufacturing CAM technologies to control its presses and plasma cutters. Teams of welders then complete fabrication of the aluminium hull and decking. Wooden floors and carpets are fitted, then the boat is painted and windows, trim, options and accessories installed. Fabrication takes approximately one to five working days depending on the size of the boat and the extent of its

ordered fitout. On completion the boat is shipped to the dealer for collection by the new owner.

Customised Value Proposition

TW's dealers are its customers, however TW's strategy is to simplify the entire boating buying and selling process for both the boat buyer and dealer. TW's value proposition for the boat buyer is based on an extensive range of completely customisable boats, complete with trailers, motors, financial arrangements. TW offers its dealers a customised value proposition comprised of a large range of customisable, and therefore readily saleable, products backed up by a flexible manufacturing system that ensures delivery as required and an enterprise portal that gives dealers access to online ordering and all relevant, financial and manufacturing data.

Strategic Sourcing and Core Competence

TW has approximately 150 suppliers but retains most of the production process in-house. Outside of the production process TW has strategic alliances with finance providers, motor manufacturers, trailer manufacturers, freight companies and its dealer network that provide products and services outside of TW's own business scope.

TW has a number of superior capabilities. However, its core competencies appear to lie in its aluminium stretch forming techniques, flexible manufacturing and its dealer management. The first, which provides an operational competitive advantage through a unique technique of stretch forming aluminium sheets for hull construction. The second provides competitive advantage through flexible and efficient manufacturing which enables dealers to operate on short lead times and fast fulfilment of customised customer orders. TW practices mass customisation. Few boats are built for stock so production is a pull system driven by actual dealer demand. The last competency is TW's ability to manage and support its dealer network.

Integrated Value Net

As shown in Figure 60, TW's value net is not extensive. Boat buyers purchase boats and accessories from dealers who place orders for customised boats directly from TW. TW only manufactures boats, but arranges delivery of finance, motors, trailers, accessories and actual transportation of the boats to the dealers through partner companies. Heavy use supplies such as aluminium sheeting are purchased in bulk from original manufacturers, other parts and components are ordered from a network of suppliers operating in the conventional manner.

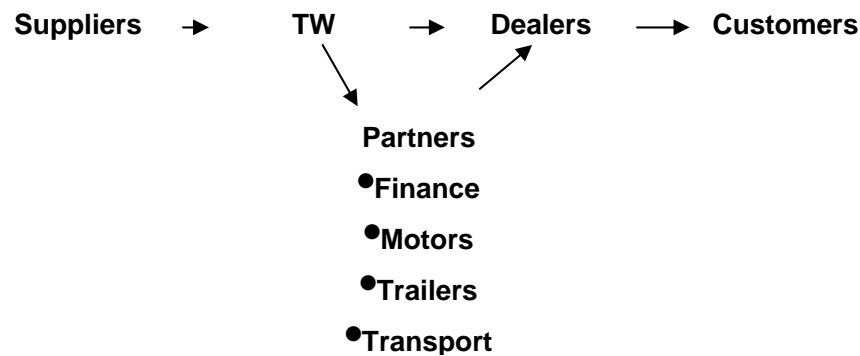


Figure 58. TW's Value Net

TW's dealers are the customer facing component of TW's value net. Apart from direct interaction with the public at boat shows, TW has little direct interaction with its public. TW's designs are the result of collaboration between its design, production and marketing staff and dealers.

Digitisation

In addition to electronic maintenance of office systems, digitisation is used effectively in the development of orders through dealer operated choice boards and the digitisation of designs in the CAD/CAM environment.

Infrastructure

TW's information systems are deployed over an intranet using a combination of proprietary and in-house developed software to integrate its marketing, production and finance functions. The system is based around partial deployment of an MRP II application linked to enterprise databases in finance, HR and marketing and an enterprise portal on an intranet.

TW's dealer portal adds value to the dealers by providing a tool to enable customers to directly select, configure and order a boat on line. TW's intranet and dealer portal enable information to be effectively passed across the enterprise and between its and dealers so that production can be closely coordinated with dealer requirements. Transparency of information further enables dealers to directly track customer orders through the production and delivery processes as well determine their own financial status. This frees TW's administrative staff for other tasks.

TW has used information to integrate the dealers and customers, into its production systems so that they effectively become part of TW's manufacturing system. Integration of the production with accounting and human resources ensure almost real time updates of material usage, billing and workers performance based salary information.

Although the production information is available to suppliers, so far only one has taken advantage of it to coordinate his production of components with TW's production schedule and affect a JIT delivery system. TW manages its own dynamic portal which provides dealers with access to all customer information and configuration, purchasing, manufacturing and delivery data. TW websites also offer considerable extensive customer and marketing information about each boat, and available options plus appropriate usage with links to services such weather, boating licences and boating tips.

Environment

Clearly TW's management supports the strategic use of ICT within the organisation. However TW had to exert its influence with its dealers to ensure widespread take up of its enterprise portal so the front end to the information system could achieve the levels of effective information transfer required to support its internal systems. TW has so far been unsuccessful in its attempts to establish similar links with its suppliers and partners most of whom prefer phone and fax communication. The portal is also capable of providing connectivity with TW's strategic partners, including banks, but for various reasons unrelated to TW's technology thus far, none has opted to make use of the capability. TW management is not optimistic about extended B2B applications with its suppliers in the immediate future.

Conclusion

There are many factors that contribute to TW's success. However, when viewed from the VVC perspective, TW's use of information to integrate a flexible manufacturing system with customised products and its dealer network has enabled it to successfully come close to mass customisation. TW's flexibility in manufacturing allows its consumers to become superficially involved in the design process, similar to Dell's on line ordering system and its strategic use of information has created value for its customers and competitive advantage for itself.

Porter predicted that operational excellence, can be replicated, however, TW's operational competence has so far, not been copied successfully, and its economies of scale now give it efficiencies that tend to protect it from its rivals. Integration of TW's supply side activities with its production system has not been completely successful. As the VVC framework illustrates in Figure 61, TW does not been able exploit the value creating potential of strategic sourcing and integration of the value net and infrastructure. However, TW's use of information to customise its value proposition and exploit its core competencies appears to set it apart as an industry leader and value creator and it is progressively moving to address

the opportunities offered by strategic sourcing and integration – within the context of its own strategic goals.

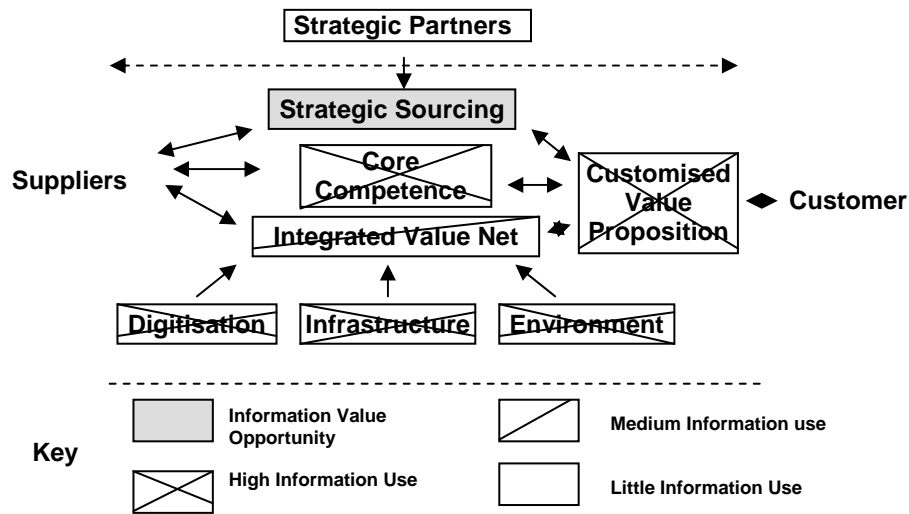


Figure 59 Information based value creation at TW

9.6. Case Study 5 Tertiary Industry Advertising

The Enterprise

PM is one of Australia's larger advertising agencies with offices in all of the eastern seaboard's capital cities. Its Queensland office, (PMQ) which employs 60 staff, is typical of the other offices in operation and scope and is the subject of this analysis.

Product

PMQ offers its clients the 'traditional' range of advertising agency range of products and services; client services, creative services, art studio and media planning and purchasing. In addition, PMQ offers a number of services usually offered by specialists in internet marketing strategy, website design, in-house photography, post production digital editing facilities, public relations and sales promotions campaigns. PMQ also hosts a dynamic website for a major national real estate franchise.

Transformation Process

PMQ's customers are medium to large corporations and government agencies who engage PMQ to publicise, promote or communicate certain issues. PMQ's account managers work with their clients to develop an advertising message and campaign. Once a marketing objective has been defined, the task is passed to the 'creative'; copy writers and graphic artists and others involved in the production process. After the copy writers and artists have developed a product, teams of finishing artists complete the detailed format. When product

development is complete and the client has signed off on the finished product, it is transmitted to selected media channels; radio, television or print, for distribution.

Customised Value Proposition

PMQs value proposition is comprised of an information-based product and its delivery system presentation to consumers and its presentation the clients. PMQ's value proposition is to offer its clients a skilled, creative and integrated in-house capability that can craft and competitively deliver an effective message to a target audience. By their nature PMQ's products are a combination of message and delivery system. However, the products are collaboratively developed by PMQ and its clients to conform to the client's value requirements.

Strategic Sourcing and Core Competence

As a matter of strategy PMQ has gone against the trend towards outsourcing, opting instead to build a comprehensive in-house integrated marketing communications capability. It has done this by using a portfolio approach to acquire additional competencies in specialist areas such as, photographic and post production studios. By combining a flat organizational structure with fully integrated capabilities PMQ has sacrificed access to highly skilled external specialists on an as required basis for improved, direct in-house communication between the various creative players to gain faster production time.

Integrated Value Net

PMQ's value net is shown in Figure 62. Depending on the product or service being advertised, PMQ's consumers can either be the public at large or particular market segments. However, PMQ's customer's are unequivocally its clients; those who purchase advertising services to communicate particular messages to a target audience. Therefore, PMQ's corporate task is to meet the needs of both client and consumer.

As a strategy, PMQ has endeavoured to develop competitive advantage by developing a comprehensive multidisciplinary, multi-media capability including web site hosting and design, rather than allying itself with external specialists. Even so, PMQ still has to seek input from outside specialists for areas such as market research which is beyond its own in-house capability. As part of a service industry, PMQ uses few material inputs to produce its products which are almost completely composed of digitized information so PMQ does not need extensive partnerships with specialist suppliers. Furthermore, since the media options are relatively few there is little opportunity for close, exclusive media relationships.

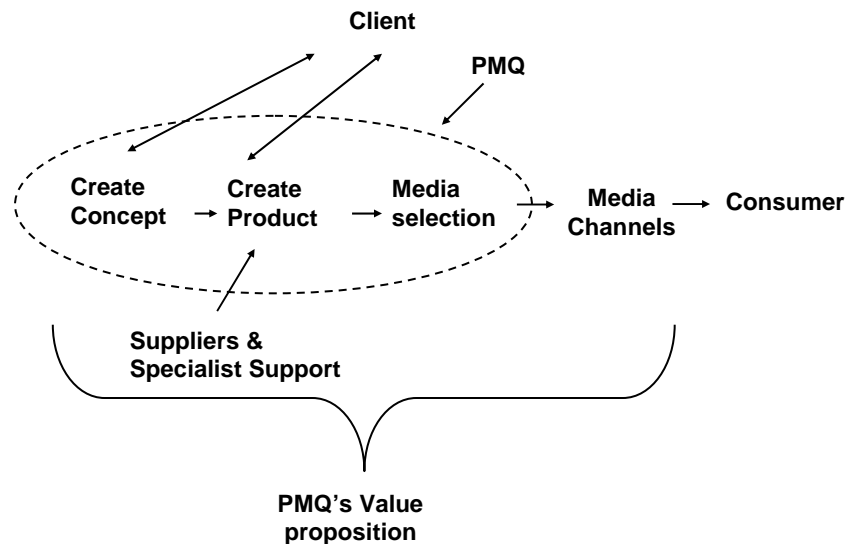


Figure 60 PMQ's Value Net

Digitisation

PMQ's product is the outcome of several creative processes that can be digitized when they are articulated. For example, the art director's task is to create a concept involving graphics and text which undergoes several multi media based transformation processes before it is completed as advertising material. The concepts and ideas are transferred digitally between concept designers, specialist writers, graphic artists and communications staff until the product is completed and approved by the client. At the conclusion the completed advertising material is digitally transferred to the targeted distribution channel.

Infrastructure

Since advertising material is information based it is unsurprising that extensive infrastructure and software facilities are available to facilitate the movement of partially complete and completed digitised material between internal processes, between the agency and the client and between the agency and the distribution channels.

PMQ's information infrastructure is based on an extensive intranet hosting using a combination of administrative and specialist multi media applications. All work and text is developed in digital format and is progressively passed between sections over the network. After completion and client approval, finished products are transmitted electronically to the appropriate media channels using a proprietary application designed for high speed transmission of large high resolution multi media files over broadband links. MJQ has a digital editing post production facility to create TV commercials and promotional material which is also distributed to television networks using the same high speed digital links.

All online communication between PMQ and external organizations is routed through servers located at PM's Sydney office which also captures accounting data for subsequent accounting support to the State offices using proprietary financial and administrative and applications.

PMQ hosts a national real estate portal that allows individual franchisees can log onto the site and create their own newspaper advertisements, billboards and flyers from a selection of templates using their own text and uploaded photographs. PMQ exercises content and quality control over the final outputs which are then transmitted to the appropriate media channel for production and distribution.

Environment

ICT plays an important part in advertising and PMQ has embraced digital technology in its internal processes and within its value net. But, beyond hosting the real estate site, PMQ's approach to digital technology is one of caution. Without wider investigation it is difficult to determine if MJQ is leading or following its rivals in the adoption of ICT. Nevertheless, as electronic graphics capabilities continue to expand, PMQ's designers and ICT technicians will have to work ever more closely to keep pace with the changes.

Trends such as direct marketing, e-commerce, customer relationship management (CRM), data mining, and the increasing use of the internet and third generation mobile devices as additional marketing channels pose ongoing challenges to advertising agencies. While the effectiveness of online advertising itself is yet to be determined, consumer use of the WWW as a source of information is rapidly increasing and advertisers are looking for innovative ways to deliver their messages.

As more detailed information about individual customers and the means to communicate with them is becoming readily available, advertising agencies must adapt and learn how to exploit these new sources of information in both creative and technologically based ways.

Conclusion

Given the information content of PMQ's product it is unsurprising that PMQ has adopted ICT technology within its own operations and with those of its immediate associates in the various media. The result has been more capable production values, improved and faster communication and perhaps more effective products. PMQ's traditional three cornered relationship with client and consumer remains intact.

Although PMQ's strategy to present its value proposition as an integrated communications enterprise runs counter to outsourcing trends in other industries, it does have the advantage of

presenting a comprehensive immediate inter disciplinary multi media capability to the consumer. The VVC framework, shown as Figure 63, identifies PMQ's current use of information as a resource for core competence and competitive advantage. PMQ's core competencies are to be found in the combined efforts of its creative staff and the supporting technologists who craft persuasive advertising messages. The support of digitisation and electronic infrastructures is critical in the production process. Integration of technology and creativity makes a significant contribution to the value creation process. There is no evidence that PMQ' is in a strategic partnership with another enterprise, nor does it have any significant outsourcing arrangements in place. PMQ's future capacity to create value will continue to be impacted by the expansion of multi media and communications capabilities. These will facilitate more customer interactivity with the WWW and probably divert attention form conventional media channels. The VVC framework identifies this last area as a having some potential for additional value creation.

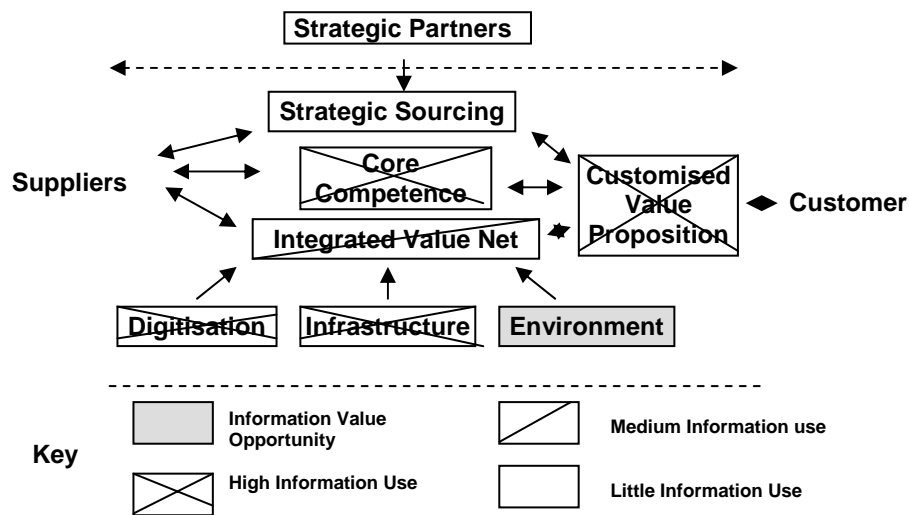


Figure 61 Information based value creation at PMQ

9.7. Case Study 6 Quaternary Industry - Software Developer

The Enterprise

ACNX is a privately owned Australian based software developer specialising in document control software for the construction, asset management and print industries. These industries are characterised by hierarchies of developers, project managers, contractors and subcontractors using large volumes of dynamic, technical, legal and procedural documents to coordinate and control the initiation, progress and conclusion of large products.

The Product

ACNX has developed three variations of its documentation control software for the construction, property management and print industries respectively. Each version employs a web based service that stores all documents and drawings generated by a project as it progresses through the concept, development, tendering, construction, project completion and facilities management stages. Initiated by the project developer or leader, all authorised partners such as contractors and sub contractors, who are involved in the project have access to all the documentation in its original, amended and current forms. ACNX produces a searchable documentation trail for the entire life cycle of a project supplemented by email and fax functions for communication between participants.

Transformation

Development of the ACNX software took six months followed by acquisition of servers for document repositories and data distribution. As a pure information product, the use of information and resources to produce a base product occurs only once and is invisible to users. However, ACNX software is subject to ongoing revision and modification to meet customer requirements. Delivery is instantaneous over the internet.

Customised Value Proposition

ACNX's product is a net delivered service, enveloped in a value proposition that includes customisable software, substantial free on-site training and service supplemented by a 24/7 help desk. As part of the value proposition ACNX maintains all documents in an active and accessible form for 12 months following project completion after which they are archived onto CDs and returned to the client. The product software has limited client based customisation but ACNX's in-house programmers can further customise the product to meet individual customer requests.

Strategic Sourcing and Core Competence

The company is self contained. It owns its own servers and infrastructure, employs its own help desk staff, trainers and programmers. Consequently, it has little need to acquire additional skills or enter into strategic alliances with others.

ACNX's basic software appears to have little unique intellectual property or technological advantage over existing or potential rivals. ACNX competence lies in its capacity to add value to its customers through customisation, user training and on – going support.

Individually these are not unique competencies, but collectively they contribute to the value proposition in a way that is difficult for rivals to match.

Integrated Value Net

Although the value net is uncomplicated it is tightly integrated. As shown in Figure 64, interaction between clients and ACNX is direct and to a large extent electronically mediated.

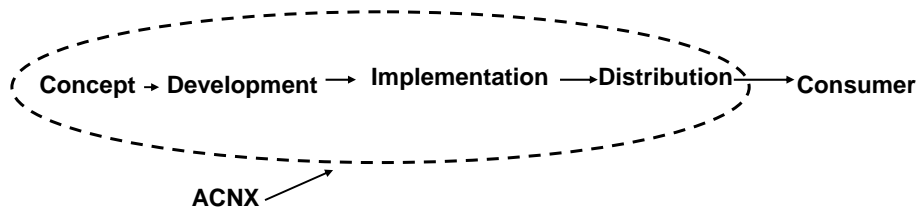


Figure 62 ACNX's value net

Digitisation

ACNX is an information product designed for internet delivery. As such it exists in a market space in which all corporate and customer inputs and almost every output is digitised.

Infrastructure

The entire infrastructure required for ACNX's own operations is currently available. The only limitation may be the cost of ACNX's storage requirements. However, it can be reasonably expected that that infrastructure costs will continue to fall and capacities will continue to rise, in accordance with Moore's Law, into the foreseeable future. ACNX is currently developing LANs and Virtual Private Networks (VPN) on high-speed internet connections between ACNX servers and its major clients' head offices. Since ACNX relies on the internet the speed, cost and bandwidth limitation of that medium may limit ACNX's utility in remote areas. Generally, ACNX appears to operate optimally on existing and readily available infrastructure.

Environment

ACNX internal environment is completely ICT dependent. Its external environment and capacity to deliver its services are limited by cost and the ICT environment of its clients. ACNX's market is characterised by hierarchical organisational structures composed of several layers of smaller and smaller subcontractors. To be completely effective any client that creates or receives drawings or documents of any kind must be able to read, reproduce and render them in a digital format. The costs and skill sets required to do this limit the depth

of the subcontractor hierarchy to which ACNX is able to penetrate. Large developers may be able to mandate its use to larger contractors and partners but its take up will depend on the cost benefits available to individual sub contractor. Anecdotal evidence from ACNX suggests as broad band connections become less expensive the market for ACNX products is expanding.

Conclusion

ACNX is a pure information service. It receives digitised documents and drawings as inputs, catalogues each document linking them to any predecessors or associated files and stores them for client access. User access for these services is via a web-based front end that allows full interrogation and retrieval facilities and an email application. ACNX’s central repository adds value to clients by making document control more efficient by maintaining a set of documents that are always current, facilitating their rapid distribution and reducing the risks and costs attendant to delays caused by lost or delayed documentation.

ACNX’s present competencies and infrastructure are sufficient for its present needs but as the enterprise assumes a more global stance the infrastructure requirements may require expansion and consequent partnering with others to provide additional data storage. The VVC model shown in Figure 65, shows ACNX’s value creation capacity as a function of its core competence and its reliance on digitisation and infrastructure and customisable value proposition.

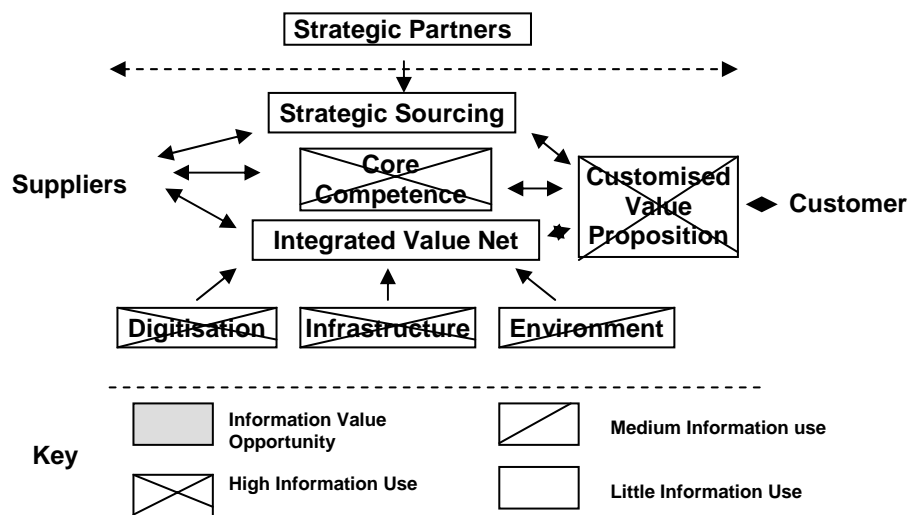


Figure 63 Information based value creation at ACNX

9.8. Case Study 7 Quaternary Industry - Tertiary Education

The Enterprise

ITF is the information technology faculty of a tertiary institution. ITF employs full and part time academic staff and a small number of support staff to serve several hundred fulltime students. ITF offers three undergraduate and six postgraduate degrees,

The Product

The complete nature, extent and intent of the tertiary experience is beyond this thesis, however, for the purpose on this analysis we believe that it can be legitimately considered as a process within a value net. ITF's internal processes produce three distinct products; IT undergraduates and post graduates and research. This case study focuses on undergraduate and postgraduates. From the supply side perspective ITF's situation is different from other services in that incoming students are both customers and process inputs, as they progress through the education process they change from customers and inputs to products and outputs. Identifying graduates as products can be controversial, but from the market perspective graduating students are considered products of ITF and ICT employers in the market place are its customers.

Transformation

ITF draws its undergraduate and post graduate students from national and international catchment areas. Recruiting, admissions and registration processes are generally completed by the university administration and only referred to ITF on borderline cases. The educational process undertaken by ITF is similar to other tertiary institutions in that students attend lectures, tutorials and workshops to learn ICT principles and skills. ITF is different from its competitors in that it offers an accelerated three full time semesters per year program, so students may complete their degrees in approximately one third less time that that required elsewhere. As in other universities, graduating students have access to placement assistance from dedicated university staff.

Customised Value Proposition

Considering the two or three year 'production' time, creation of a customized value proposition is problematic. Presently, ITF's value proposition is presently geared towards meeting the value perceptions of incoming students as customers. Their value requirements can be defined in terms of quality, cost and time. Quality relates to the overall educational experience and graduation with a well recognized academic qualification, Cost and time

relates to the cost-benefit of completing a degree faster than in other institutions. As is the case in all tertiary institutions, all degrees are structured around a core of required subjects plus a selection of subject related to the major area and a small number of electives. Thus, the institution actively collaborates with its customer students to design a product that meets the student's desire for customisation and the university's academic regulations.

However, if the student is considered a product and the market and society are considered consumers, the value proposition offered by ITF to its market customers should be based on different values. Presently, beyond general expectations of particular skill levels there is no well defined mechanism for detecting market values and rapidly translating these into a customized value proposition.

Strategic Alliances

ITF draws its students from national and international institutions. A number of arrangements are in place to offer scholarships to small numbers of students from designated 'feeder' high schools but these do not appear to be actively pursued. International students tend to come from targeted regions such as Asia, North America and Scandinavia.

ITF staff numbers are constrained by the number of student enrolments and the need to maintain a minimum core of qualified tenured and non tenured academic staff. Although there is some provision for faculty exchange with other universities this does not appear to be utilized.

Each ITF staff member has a specific skill sets that collectively provide ITF with the resources necessary to deliver its value proposition. However, it is difficult to determine if ITF has a particular core competency that sets it apart from its rivals.

Integrated Value Net

The ITF value net is unique in that its prime raw materials are incoming students that interact with ITF's faculty to gain skills, knowledge, and experience and in so doing are transformed into graduates. Our assumption is that ITF's goal is to produce eminently employable graduates. ITF's value net is not electronically enabled. Applications, admissions and registration are separate entities to ITF and are only partially automated and integrated. Some aspects of subject delivery are electronically enabled, but generally ITF's administration and pedagogy follows the traditional model of lectures and tutorials delivered to students on campus by lecturers and tutors. There is no linkage whatsoever between graduating students and the market. ITF's value net, shown as Figure 66, operates as a push system.

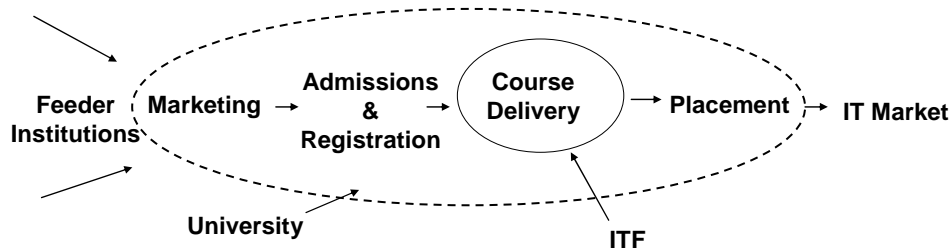


Figure 64 ITF's value net

Digitisation

All of the material presented in lectures, workshops and tutorials can be readily digitized.

Infrastructure

The existing infrastructure as provided by the university is nominally adequate for ITF's present operations. ITF is supported by a university wide network that carries administrative systems and proprietary software required for the various university faculties. In addition ITF has its own IT support section that maintains specialist hardware and software.

Environment

ITF's internal environment is peopled by ICT experts and enthusiastic students. The external market for ITF's graduates is governed by supply and demand. ITF also competes with numerous other tertiary institutions, technical colleges and specialist IT education centres. Many of these use e-learning techniques to extend their market reach. Although the technology is readily available, for the moment ITF has opted not to venture into the 'e-learning' environment.

Conclusion

ITF is in the business of ICT education. It conforms to the traditional model of educational delivery which is the push model of production and marketing. Incoming students are 'educated' and pushed to the market place as ITF's products. Analysis of the VVC framework shown in Figure 67 suggests that ITF has full access to the foundational drivers of value creation, but its access or utilization of the functional drivers is problematic and do not take full advantage of the digital environment. This could partially be attributed to a blurred view of who are customers. Without clarity on this issue, it is difficult to develop competencies and strategic networks with which to build a customized value proposition. A faculty can only offer subjects from within its own skill set, so a small faculty is a limitation. In a manufacturing environment, the networked or virtual enterprise overcomes this

limitation by establishing links with specialists that compliment and this overcome its own limitations. ITF has little capability to influence demand and so the system remains supply driven.

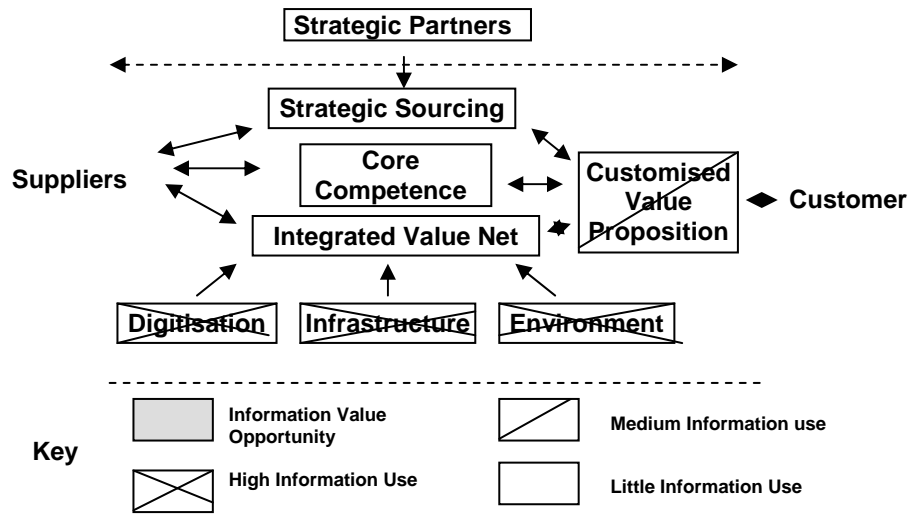


Figure 65 Information based value creation at ITF

9.9. Discussion

The objective of the VVC model is to provide a methodology that can be used to examine and explain how an enterprise uses information to create value in an information rich environment. In this chapter the VVC was applied to a small sample of enterprises in the primary, secondary, tertiary and quaternary industries to demonstrate its utility. However, while the framework is descriptive, by default it also provides insights into how the enterprise might use information more effectively to create additional value, or not.

In each of the seven enterprises examined the VVC effectively described how the enterprise was using information in its current processes to create value. Each case was situated in a different industrial and competitive environment and consequently used information in a unique and different way. Although each of the VVC elements was examined individually, the absence of a suitable method to quantify them emerged as task for future refinement of the model. As a pointer for future quantification we converted the observations of the various attributes of yes, no or partial to a nominal scale of between one and two and mapped them as shown in Figure 68. By graphing the scores for each enterprise we compared each enterprise present and potential future use of information. Although conclusions should not be attempted to be drawn from such a small sample it is possible to make the following observations.

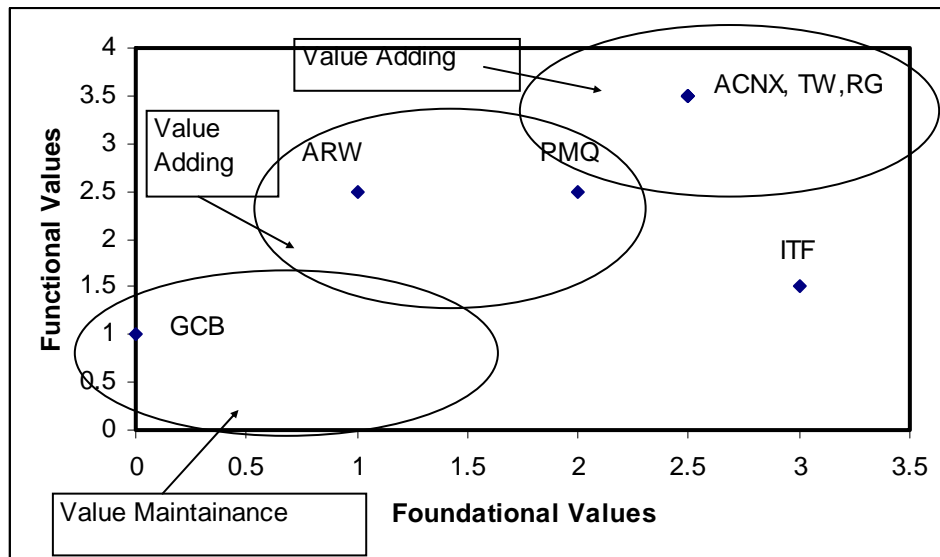


Figure 66 Value Creation capabilities

There appears to be a positive correlation between the combined foundational and functional values and the ability of the enterprise to use information to create economic value. This is to be expected because the foundational attributes provide the technological and environmental underpinnings for strategic sourcing, networked organizations and value net integration. However, a low score does not necessarily imply greater opportunities for value creation. For example, in the case of the bakery, low scores simply indicate that while the enterprise is utilising available information to the best of its ability, its processes are simply not information intensive so there is little room to improve in the current strategic climate. The VVC suggests that additional technology will provide little additional value adding information to the bakery's existing processes. In the case of the IT faculty, the foundational factors are in place but greater attention to the functional attributes may improve value creation. The boutique winery is an example of an enterprise capitalizing on its own competency but overlooking the possibility to exploit existing information from its own data that may be useful in further developing customer relationships.

VVC mapping of RG as a type of virtual enterprise illustrates its complete reliance on effective information systems to ensure value is added by all of its outsourced partnerships. Both PMQ and ACNX deal in information based services and products. However, while the VVC identifies PMQ's strategy to provide a comprehensive service it also identifies changes in PMQ's external environment that will affect its future value creating capacity. As a 'child of the internet' ACNX is presently sufficiently self contained to terms of competence and technology to meet existing demand. However should demand increase, particularly in global markets, ACNX may be obliged to reconsider its strategic sourcing arrangements. In contrast

to the information based advertising and software enterprises, TW is a traditional manufacturer dealing with physical inputs to produce physical goods. However, its comprehensive use of information throughout its upstream and downstream processes is a source of value that successfully sets it apart from its rivals. We would have expected that ITF, as an educational enterprise dealing with ICT and information, to exploit information most successfully. Ironically however, ITF appears to be the least well adapted to the new environment. The reason is that while it deals with a highly technological subject and has the foundational elements in place, its operations are conducted in a traditional manner.

In chapter 2 we suggested three likely value postures; value maintenance, value adding and value creation. Value maintenance implies that information is used in its traditional application as a means of control and coordination with little change to the way the enterprise operates. The bakery certainly fits this description. Although the bread production process is automated, information is not used to improve that process but rather to ensure its continued effective operation. Value adders use information to improve existing processes. Although the winery and the advertising agency are at different ends of the spectrum in terms of information content of their respective products, both only use information to improve or automate existing processes such as customer interaction through ARW's website and MPQ's extensive use of digitization in its production process. Value creators use information in new and novel ways to create value. TW, ACNX and RG all use information extensively to create new applications or to exploit existing possibilities for create additional value. TW and RG operate in traditional industries but their use of information enables mass customization, in the case of TW, and virtual enterprise in the case of RG, which set both enterprises apart from their peers. ACNX's position as a value creator is to be expected considering its use of information to create a novel, information based, product in an entirely digitized marketplace. ITF is the anomaly in that it addresses cutting edge ICT and information usage but it operates in an entirely traditional manner.

This chapter has made no attempt to correlate scores from the VVC framework with conventional measures of past or future enterprise success in the marketplace. The reasons for this are twofold. Firstly, limitations of sample size preclude any objective conclusion being drawn. Secondly, past success is not necessarily a guarantee of future success and finally the constantly changing and expanding influence of electronically enhanced information is a moving target that is extremely difficult to quantify. However, while a low VVC score does not necessarily suggest poor performance or market failure, we suggest that a high score, that indicates information is being well utilized, may be a pointer to future success. This however

is the subject of future research. Chapter10 presents the thesis' conclusions and recommendations.

Chapter Ten Conclusions and Recommendations

10.1. Introduction

This dissertation addresses the interrelationship of information, ICT, and value creation. It was born of the perception that increased computing capabilities transform information into different digital formats that improve its utility and thereby significantly increase its contribution to value creation. Although labour, property and capital have long been regarded as the prime resources for economic activity, information has always been a major contributor. The uneven distribution of information in commerce has formed the basis for commercial trading relationships, organisational structures and of economic advantage. However, information could not be fully exploited until ICT provided the appropriate tools for its inexpensive collection, manipulation and storage. Now, under the influence of ICT, the contribution of information to economic development and value creation surpasses that of the other traditional resources. In addition, in modern economies information has become a valued product in its own right. The impact of these changes on the contemporary commercial climate has been profound and enterprises often find themselves awash with information. Adapting to this information rich environment is a significant trial for most enterprises. Their challenge, and the topic of this dissertation, is how to continue to create new value and sustainable competitive advantage in a digital environment. The specific aims of this dissertation which were enunciated in chapter 1 are as follows:

- Analyse the relationship of information, value creation and sustainable competitive advantage;
- Integrate existing value creation theories from strategy, marketing, finance and information systems with changes in the way information is used; and
- Develop a conceptual framework to be used as a guideline for effective adoption of virtual organization by industry and individual firms

These objectives have been achieved. This chapter summarises the thesis in terms of the achievement of the aims, the development of the VVC, its application and limitations, the contribution of the research, and future research directions.

10.2. Achievement of Aims

It has shown that in today's environment the value of information remains a subjective perception based on its utility. We have demonstrated the relationship between customer value and shareholder value, and established that a successful enterprise must satisfy the

value requirements of both customers and shareholders. However, it remains our contention that delivering value to the customers is the first goal of the enterprise and that the achievement of shareholder value resides in the profitable development of customer value. Finally, we have shown that although sustained competitive advantage is the result of creating new sources of value, many enterprises do not fully exploit the information based resources that are available to them.

We have examined value creation theories from the business and information disciplines. This thesis is not intended to provide an in-depth analysis of all extant value theories but rather it provides an overview of the major schools of thought from marketing, management, finance, operations and information systems. We have observed that many of these predate the internet era and consequently do not reflect the changes in the use and value of information occasioned by improved computation power and high speed, global connectivity. Nonetheless, many of their contributions retain their validity because of their underlying concepts. For example, Porter's value chain, which now attracts some criticism because of its manufacturing orientation, is predicated on the fundamental concept of value creation as the source of competitive. This concept remains as compelling today as it did in 1985. However as the digitisation of information continues, all enterprises find themselves in an increasingly digital environment and have to adapt their value creation strategies in order to survive. In this thesis we have adapted fundamental value and strategy concepts to the new environment and integrated them with new information driven concepts such as virtual organisation.

Virtual organisation is a strategic paradigm that relies on ICT and information to focus the entire enterprise on value creation. We concluded that as firms become virtually re-organised they undergo a process of information and process integration, strategic sourcing and focus on core competence. If these activities are taken to their logical conclusion they inevitably lead to structural change and possibly to a form of virtual enterprise. The networked structure of the virtual enterprise has attracted considerable interest. However, we argue that enterprise restructuring should be motivated by the unambiguous economic imperative of value creation not the desire to adopt a particular organisational structure. By executing a strategy of virtual organisation the enterprise can pursue value creation confident that information is contributing to strategy development, support for enterprise's functions and, where necessary, structural change.

Computerisation is so pervasive that structural change is only one of many changes to an enterprise brought about by virtual organisation. Perhaps the most significant enterprise changes are in the way that the enterprise is enabled to interact with its customers on an

individual basis. The task of the enterprise is to analyse individual customer requirements and design a customised value proposition that matches them within an ICT empowered business model.

The Virtual Value Creation framework is a type of business model that describes how enterprises use information to create value in an information rich environment. A key component of the VVC framework is the development of a customised value proposition. The VVC framework integrates established and new value creation theories and places them in an ICT context that addresses digitisation, infrastructure and environmental issues. We applied the VVC to a small sample of enterprises representing the primary, secondary, tertiary and quaternary industries. All of these enterprises are operating with varying degrees of success and in each case the VVC model illustrated how the enterprise is currently using existing information to create value and, by default, where available information is being under utilised.

10.3. Contribution

The major contribution of this research is that it integrates existing value and strategy perspectives with emerging information driven perspectives of value into a useful model that illustrates an enterprise's current and potential future use of information to create value. The VVC is novel in that, unlike other business models, it combines strategic and operational considerations with a foundation of ICT based issues to present a holistic view of the firm.

Additional contributions

In the process of the dissertation the following additional significant contributions were made.

- The competing demands for customer and shareholder value were harmonised by using concepts of economic profit and customer focus. We saw the latter as an efficiently produced, customised value proposition.
- The concept of virtual organisation was introduced and clarified as a new strategic perspective, based on electronically enhanced information, that should be added to the set of accepted of strategy and value theories
- The development of virtual enterprises was shown to be the legitimate result of virtual organisation where value creation is the driver.
- The concept of the value chain has been extended from the inter-enterprise value system and network where the customer is the beneficiary of the system's activities to

a virtuous value creation cycle that begins and ends with the customer. In the process the enterprise co-opts customers and suppliers in product design, and all stages of the production and delivery processes.

10.4. Application

This research has application at the enterprise, industry and public policy levels. Firstly, as we have demonstrated, it provides individual enterprises with an innovative framework with which to examine their current use of existing information in their own competitive environment. By default, it highlights areas where they might profitably examine the potential for additional value creation in areas of the enterprise where information is not currently being exploited.

The VVC addresses process issues such as strategic sourcing and environmental issues such as infrastructure. Issues such as these have industry wide implications and although we have not attempted to apply the VVC model to an industry, we believe that it could canvas the general state of an industry in respect to its potential capability to operate collaboratively or its amenability to current information technology. Finally, the VVC could be used either by industries or regions to examine or inform public policy issues such as the provision of infrastructure. For example, the lack of affordable broadband infrastructure is a significant deterrent for establishing industry clusters in remote areas and a considerable limitation to those that already operate in these areas.

10.5. Limitations

As the major outcome of this research, the VVC framework integrates a number of major concepts for various business and ICT disciplines. Many of these involve intangible issues such as perceived customer value, the information content of a product or its production or industry attitudes to computerisation. Issues, such as these, are topics of ongoing research, but as far as is known, general standards and quantifying methodologies have yet to be established. Quantification of these and similar elements would enable a more objective application of the model. When applying the VVC framework we noted that it appeared to be most applicable in enterprises that produce a single range of products or services such as an advertising product, or a range of boats. This is principally because the model requires a customised value proposition which raised the issue of scalability. When a firm offers different ranges of products, such as an engineering firm that produces a tangible products as well as engineering consulting services, the VVC framework would expect to see customised value propositions for each range of products. This is consistent with industry practice,

however it was not anticipated when the model was being developed. The model was first conceived as an enterprise based instrument to be used at the strategic level so issues of granularity were not factored into its development. In its present form the VVC identifies 'Environment' as a Foundational driver. This is the enterprise's and its industry's willingness to adapt to a digital environment. Although the issue of enterprise strategy has been raised in several parts of the thesis, it is not explicitly incorporated in the VVC. Its inclusion as an additional Foundational Driver will highlight its importance and add utility to future versions of the model.

10.6. Directions for Further Research

Each chapter of this thesis contains a number of important concepts and the intent of each chapter has been to integrate these from the perspective of value creation and information. Some of these chapters could be used as the basis for future research. The concepts of the VVC and value circles have already been presented at international conferences to facilitate further discussion.

Other research issues suggested by this research include:

- Further implementation of the framework across a wider sampling to determine its application, and possible limitations, in different industries;
- Further consideration of the customised value proposition in commodity markets;
- Further investigation of the value creation cycle as customer focused model as a unit of analysis;
- Further investigation into the impact that stakeholders such as employees or community members have on the enterprises value proposition;
- Further research to investigate the market performance of our three part classification of value adding: value maintainers, value adders, and value creators;
- Further consideration to adding enterprise strategy as an extra Foundational Driver.

Throughout the thesis we alluded to the convergence of technologies and processes that prompted the process based perspective of the enterprise. Information integration and process automation have eroded many of the boundaries that separate functional groupings. As ICT continues to blur functional boundaries, there appears to be a case for claiming functional convergence towards customer based value requirements. This also may be another area of continued research.

10.7. Concluding Statement

As noted previously the purpose of this research has been satisfied. This dissertation is not intended to be a comprehensive examination of all value creation, strategy and information systems theories. It does however, recognise their contributions and integrates them into a novel and unique framework that can be strategically applied to most enterprises. In its present form the framework has some minor limitations, but the application evaluation that we undertook suggests that it does make a significant contribution to management's understanding of the enterprise's use of information to create value.

Appendix A

Framework for Semi Structured Interviews for Case Studies

The Enterprise

- Industry overview
- Enterprise's prominence and position in industry, e.g. Market Share
- Enterprise products/service range, i.e. What does the enterprise sell/produce?

Customer Values

- Who are the enterprise's customers?
- What do the customer's value?
- Timeliness,
- Quality,
- Price,
- Service
- Other

Enterprise Value Net

- Enterprise position in value network
- Major players and their interaction
- Enterprise partner's contribution to the enterprise
- Influence of value net players on the enterprise
- Information flows

Enterprise Value Proposition

- What is the enterprise's value proposition?
- Product
- Service
- Complimentary products
- Customisation
- Value adding opportunities

Value Net Integration

- Supply Chain
- Sourcing and Distribution
- Strategic alliances/partnerships
- ICT capabilities and connectivity
- Information flows
- Cycle time

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