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Key Points of Value In B2B Intermediated Electronic Networks

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Executive Summary

The Internet is an electronic network with open standards that is associated with the exchange of information at heightened levels of reach, richness, transparency, and speed often directly between buyers and suppliers. The growing prominence of the Internet has led to the blurring of industry boundaries, as well as the emergence of new online intermediaries, and the disappearance of traditional ones. Happening simultaneously has been the development of new modes of business such as the B2B (IE) network. When combining the characteristics of these business models with the increased efficiencies and reduced information processing costs associated with the Internet, it becomes important to identify these new value creating opportunities. Though the advantages of the Internet and associated models have been widely espoused, to date there has been scant empirical investigation into these areas. Furthermore, as networked trade grows in popularity, whether entering into online or offline trade opportunities, an ongoing understanding is required of this mode of business. Hence, this thesis has examined the question “Where are the key sources of value in a B2B (IE) network?”

Structuration theory, situated within the mid-range theorising perspective has been used in this thesis as an ontological lens due to its recognition of the duality of structure between man and machine, with the business intermediary and Internet respectively. This lens has served to facilitate an examination of these two brokering bodies in the development of processes, rules, regulations, and relationships that are embedded within this network structure. My analysis and theoretical development attempt to build a bridge between the existing strategy, networks, and B2B (IE) networks literatures through the use of the grounded theory development approach by moving between a skeletal empirical framework and the data from three case studies. The first case study, M-co is a network that operates in the highly volatile New Zealand electricity industry to provide a bid/offer price mechanism. The second case study is Ecomex, a network that is positioned within the more moderately volatile New Zealand timber industry. It offers a range of price mechanisms, of which the negotiated method appears to be the one most favoured by traders. The third case study is EDIS, a network

embedded within a more stable environment, offering a service to general product traders using a fixed price method.

The key theoretical contribution that this thesis makes is the development of a dynamic model that identifies the network as the primary unit of analysis, with three secondary units of analysis: the informational unit, the relational unit, and the central core unit, each with separate underlying dimensions. Though these secondary units are important as individual entities in their own right, what is more important is the understanding of how these units interact in order to realise the full value creation potential in a B2B (IE) network. This interaction process was found to be led by the business intermediary, positioned in the central core.

Acknowledgements

There is a fundamental incompatibility between the simple linear sequence of words that [s]he has set down and the complex web of [her]his thoughts. To meet this difficulty, [s]he combs out [her]his thoughts as best [s]he can into long strands and ties them together in as orderly a manner as possible. While preserving the most important relations in the pattern of [her]his ideas, [s]he sacrifices others. (Simon, 1976, p. xi)

These words of Simon sum up my journey along the Ph.d process with regard to the voluminous range and depth of data available, and the choices and decisions, I was required to make in bringing this thesis together.

This has truly been an inspirational journey of self-development and discovery! In saying this, I cannot neatly compartmentalise this process into stages that reflect the completed chapters that follow since the number of times some chapters have been revisited, in the truly iterative nature of grounded theory analysis, would mean I have lived many lifetimes during the past 3½ years.

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1. Introduction

In post-industrial society, the central problem is not how to organize to produce most efficiently (although still important), but how to organize to make decisions – that is to process information. (Simon, 1976, p. 292)

1.1 Introduction

The Internet, as an electronic network with easy to use, open standards and low associated costs, (Afuah, 2000) has encouraged the emergence of virtual communities (Hagel & Armstrong, 1997) and new networked business models. These models have encouraged the sharing of information and business processes over increasingly blurred industry boundaries (Amit & Zott, 2001). It has been suggested that information can now be exchanged with heightened levels of speed, reach, richness (Evans & Wurster, 1999), and transparency (Lamming, Caldwell, Harrison, & Phillips, 2001), often directly between buyers and suppliers. As a result, many traditional intermediaries have disappeared, while new intermediaries who recognise the value in connecting buyers and suppliers electronically have emerged (Phillips & Meeker, 2000). When the characteristics of these new business models are combined with the increased efficiencies and reduced transaction costs of information processing made possible by the Internet, a new realisation of the value potential to be captured emerges. Despite the fact that the Internet is widely acknowledged to be “an important force that is rapidly changing the business landscape” (Debreceeny, Putterill, & Tung, 2001, p. 1), the ways in which this is happening are not yet fully understood.

1.2 Value of Information Exchange

The popularity of the Internet coincides with the increasing realisation of the value to be leveraged in nonlinear business processes and intangible assets, especially collaborative relationships and information exchange. Some have suggested that the network be adopted as the new organisational unit of analysis with knowledge becoming the key value driver (Venkatramin & Subramaniam, 2002) being dispersed from the centre, as in Quinn, Anderson, and Finkelstein’s (1996) starburst model. Others have suggested that the Internet is a key value

driver (Phillips & Meeker, 2000). However, at this point it is unclear what the relationship is between the two. Furthermore, it is conjectured that new principles of organising are required as firms simultaneously focus on leveraging both current and future opportunities, often in the face of high environmental uncertainty.

One established body of research to begin this investigation is transaction cost economics, with its imperative of rational decision making, in selecting the most efficient governance structure between the market and the organisational form to conduct business. This view has as its starting point a response to information related problems (Fransman, 1998; Williamson, 1998). When information is imperfectly distributed the organisational form, rather than the market, is preferred, with the price mechanism reflecting in symbolised form supply and demand patterns. Situations of imperfect or asymmetrical information exchange are argued to lead to heightened contract or price discovery costs, in terms of search, negotiation, asset specificity, uncertainty, bounded rationality, and opportunism. In recognising the value in using transaction cost economics, critiques suggest this view is still essentially neoclassical in its treatment of economic behaviour. Individuals are assumed to be capable of maximising their utility without moral judgment and to work in the most efficient rational manner. As well as this, individuals are believed to be single units, rendering separate rather than collective decisions (Etzioni, 1988).

Taking a somewhat complementary view to transaction cost economics is network theory. This established research base recognises the value embedded within collaborative relationships. Whereas conventional network theory focused more upon *rational* governance structural arrangements, such as contracts and joint venture agreements to formalise and safeguard information exchange, the more current embeddedness approach takes a somewhat different view. This approach emphasises how individual organisations may leverage opportunities in the form of competencies and capabilities to exchange valued resources, including fine-grained information from the positions, situations and relationships in which they are embedded (Gulati, 1998). Rational and *beyond rational* approaches are used to explain how informal mechanisms of trust and agreed upon expectations of

cooperative relationships can facilitate the exchange of information around the nodal points, including the value contained within the concepts of centrality, and strong and weak ties (Uzzi & Gillespie, 2002). These points are further explained in chapter 4.

It is the supposition of this thesis that man and machine (Internet) are information processing mechanisms. Taking this view, both the intermediary and the Internet within the structure of a business-to-business (B2B) electronic network hold centrally embedded positions in the process and dissemination of information. The linking of the transaction cost economics perspective with network theory, therefore, provides an alternative perspective to examine how value might be created in terms of increased efficiencies and reduced costs within the framework of a socially embedded network structure.

1.3 The B2B Intermediated Electronic Network Context

The B2B intermediated electronic (IE) network provides a framework to systematically examine the dynamics outlined above. The Internet and intermediary organisation are viewed as creators of two network structures that work interdependently to create value. Just how the structure of the Internet as a tool is embedded within the social practices of networked organisations requires investigation. This networked organisational form that centres upon optimising the information flow between buyers and suppliers offers a rich context to examine the centralised brokering roles of the Internet and intermediary. The nature and location of information gaps, as well as the impact of both rational and beyond-rational buyer/supplier decision making, is investigated in both current and future network opportunities. Furthermore, the brokering role is investigated over varying levels of environmental dynamism reflected in the different price mechanisms preferred. Accordingly, the value to be captured in the content of information flow, the governance structures and processes and evolution of this network form are examined. This thesis, therefore, examines the central question ‘What are the key points of value in B2B (IE) networks?’

Three B2B (IE) networks that commenced operation within New Zealand are examined. The first is the M-Co network that uses a bid/offer auction mechanism

for the exchange of electricity. The second is the Global Ecomex network that predominantly uses a bid/offer negotiated price method in the timber industry and the third is EDIS, a general product network that intermediates the exchange of fixed-priced goods and services between traders. These networks have been selected as they all have in common the presence of two central intermediating mechanisms – the Internet and the intermediary; and as points of potential variance, they each use different price mechanisms. Since this research is exploratory within a relatively new area, it is important to investigate for similarities and differences across these areas.

Structuration theory has been selected as a theoretical lens, primarily due to its recognition of the *duality of structure* theorem and the concept that individual choice is likely to be bound by human knowledgeability. The goal of this research is not to test existing theoretical hypotheses but rather to extend and develop theory based on empirical data from a context-rich base. It is readily acknowledged that in the current dynamic electronic environment there is constant change, and that one way to keep abreast of such dynamism is through the development of theory that provides sign-posts of certainty and understanding.

1.4 Thesis Format

There are three sections. The first section presents a theoretical and contextual overview, finishing with a skeletal analytical framework that draws together the aforementioned areas. Chapter 2 provides a brief descriptive overview of electronic commerce, including where B2B (IE) networks are situated within this. Chapters 4 and 5 develop the theoretical base. The current issues within strategic management are examined with a specific focus on the transaction cost economics and social networks literatures. Chapter 5 provides a contextual overview of the key issues, concepts and scope of the literature within B2B (IE) networks. Following this, chapter 6 collates and synthesises the content of the preceding chapters in order to identify a skeletal framework to indicate key areas worthy of further investigation.

The second section outlines the methodological lens taken and the results from the context of the three B2B (IE) network case studies. Chapter 7 describes the

rationale behind selecting a mid-range theoretical approach that uses a structurationist epistemology and grounded theory approach. Chapters 8, 9 and 10 identify the nature and location of value embedded within the rules, processes, and relationships across the three electronic network case studies.

Section three synthesises the above two sections. Chapter 11 provides an integrative analysis of the key findings in the literature and three B2B (IE) network case studies, in order to address the central research question. Finally, Chapter 12 outlines the key theoretical contributions from this thesis and their practical implications.

2. Overview: Electronic Commerce

2.1 Introduction

This chapter provides a contextual overview of the electronic environment in which business is conducted. The Internet, like a number of other information technologies before it, has the potential to influence how organisations communicate, coordinate activities, collaborate, and conduct commerce. The functionalities of the Internet are suggested to greatly elevate its value over other technologies to reduce costs, increase efficiencies, and render firm specific assets less effective, especially in the face of increased patterns in networked exchange. One new and novel method of transacting brought about by the Internet is the B2B (IE) network. In order to investigate the value creation potential of this new transactional form, it is important to explore the electronic environment in which it is embedded. First, the nature and history of electronic commerce is investigated, and second, the key features associated with this form of trade are examined.

2.2 Definition and History

Rayport and Sviokla (1996) suggest that organisations now compete in two interconnected worlds, “a physical world of resources that managers can see and touch, and a virtual world made up of information. The latter has given rise to the world of electronic commerce a new locus of [potential] value creation.” (p. 20) Electronic commerce can be defined as “technology-mediated exchanges between parties (individuals or organisations) as well as the electronically based intra or interorganisational activities that facilitate such exchanges” (Rayport & Jaworski, 2002, p. 4).

The development of the Internet can be traced back to the early part of the 20th century when the United States’ government used a variety of telecommunications devices primarily for defence purposes. In 1969, after a series of modifications, the United States Defense Department recorded the development of the first Internet in its current form (United States Department of Commerce, 2000).

However, it was not until the 1990s that the potential of the Internet expanded in the public arena. This expansion was fuelled by the development of tools such as a global hypertext system, later renamed the World Wide Web and the mosaic web browser, and later called Netscape. The mosaic web browser, developed by a group of university students in the United States, introduced the general public to an electronic graphical interface system that could be used to access information from a variety of public networks. Prior to this, web browser interfaces had mainly been available to those working in the education and government sectors (Borland, Festa, Becker, & Yamamoto, 2003).

2.3 Internet: Key Features

An important feature of the Internet is its low-cost open standard, where no one individual or organisation owns or controls the rules, or Internet protocols for operating it. Consequently, any individual may connect to the Internet as long as she or he complies with the protocols. Prior networks, such as electronic data interchanges (EDI's), had limited the number of potential users due to their proprietary nature and the relatively high costs involved. As an open standard, the Internet displays network externalities, so the more people that are connected to the Internet the more valuable the connections become for each user. Text, voice, and video information can be exchanged between users at minimal cost (Afuah, 2003). When the features such as WWW, e-mail, electronic file transfers and online chat are combined in an open standard, there is the potential to greatly influence the way in which organisations can coordinate their activities and collaborate with one another (Afuah & Tucci, 2000).

A second key characteristic of the Internet is its ease of use, especially with the introduction of the web browser and World Wide Web (Afuah, 2003; Lawrence, Lawrence, Newton, Dan, Corbitt, & Thanasankit, 2003). As a result, an increasing number and variety of individuals and organisations are now able to leverage this feature of the Internet to store, process, retrieve, and exchange vast amounts of information with increased speed and efficiency (United States Department of Commerce, 2000). In addition to the web browser, other electronic interfaces have extended the automation of business, with developments such as automated teller

machines and electronic banking. These mechanisms have taken automation into areas that were once conducted solely via human interaction in a 40 hour working week (Rayport & Jaworski, 2002).

As a result of its open standards, low cost, and ease of use, the Internet has the potential to influence business in terms of intraorganisational, interorganisational, and buyer-seller exchanges in ways that previous information technologies had not (Afuah, 2003). As a result, the scope of electronic commerce may affect both how business organisations relate to one another – with partners, suppliers, customers, competitors and markets, and how they manage and operate their internal processes, activities, and systems (Rayport & Jaworski, 2001). At the intraorganisational level, the intranet has provided business with its own internal version of the Internet, whereby all employees who have permission to access the system may view the same information at any time and location. This centralised and comprehensive information system can improve accuracy and the coordination of activities as it can readily be updated and viewed. Afuah (2003) argues that all of these factors are likely to lead to increased customer value and reduced business costs.

At the interorganisational level, the Internet permits data exchange between any other firms connected to the Internet. This situation contrasts with the *proprietary* electronic data interchange (EDI) system that only permits exchange between members connected to the network. Consequently, the increased connectivity potential of the Internet has fostered the creation of electronic marketplaces where buyers and sellers can exchange information and fulfil transactions (Kaplan & Sawhney, 2000). Data exchange between firms on price, product and service quality, firm characteristics and transaction details has become known as business-to-business trade (B2B). These features have also been extended to the business relationship between firms and individual consumers, referred to as business-to-consumer (B2C) exchange. The Internet, especially with its increased reach, also makes possible the exchange of goods and services between individual consumers, referred to as consumer-to-consumer (C2C) trade. Electronic auction

houses such as e-Bay, provide an intermediated forum that enables consumers to sell directly to other consumers (Turban, Lee, King, & Chung, 2000).

The Internet is also suggested to facilitate the development of virtual communities where individuals and organisations can come together regardless of their geographical location to exchange ideas and solve problems (Afuah, 2003). Afuah and Tucci (2000) argue that this feature of electronic exchange can assist sellers to build virtual communities to develop, build, and sell their products, with the sharing of information, experiences, and preferences inevitably bringing about mutual gain to buyers and suppliers.

Rayport and Sviokla (1996) propose that the *virtual world* is redefining economies of scale. Prior to the introduction of the Internet, large organisations were more likely to have access to, and leverage of considerable physical and financial reserves. Such resources were not always available to smaller organisations. It has been suggested that the Internet has begun to level the playing field between small and large organisations, making it possible for all organisations to transact business and exchange information (United States Department of Commerce, 2000). Weller (2000) reports that small organisations with little initial capital or prior experience are now successfully achieving low unit costs for products and services in markets once dominated by large organisations. As a result, some smaller organisations are now becoming a significant threat to established business.

More recently, Afuah (2003) suggests that the Internet has the potential to both increase and reduce firm boundaries. He argues that whether firm boundaries are shrunk or expanded will depend upon the transaction and production cost determinants, the information dependence and the degree of tacitness of value-adding activities and organisational activity. Therefore, some activities that were performed internally are now outsourced, while other tasks that used to be outsourced are performed internally.

The Internet has been suggested to redefine economies of scope (Gurley, 1999; King, 2000; Rayport & Sviokla, 1996). Prior to the Internet, industry boundaries for organisations and their competitors were typically clearly defined where organisations with similar capabilities and histories usually operated within well-defined rules of engagement (Sawhney & Parikh, 2000). Rayport and Sviokla (1996) report that organisations are now operating across widely disparate markets due to the discovery and utilisation of new sources of value made possible by the Internet. These sources include new virtual relationships, especially with customers, and service opportunities between all those connected in the network economy (Sawhney & Parkih, 2000). Organisations such as amazon.com have used their navigational expertise to expand from book selling to offering a wide range of products and services. In doing so, such company's have evolved into the on-line transaction business (Gurley 1999; King, 2000).

The emergence and diffusion of the Internet, therefore, has brought with it a number of issues to consider when examining how an organisation can retain its competitive position. In understanding the potential impact of technological change, several authors have suggested that the focus of examination should not only be on individual firms but perhaps more importantly on the value creation potential of the web-based network community in which the firm operates (Dyer & Singh, 1998; Gulati, Nohria, & Zaheer, 2000).

2.4 Conclusion

This chapter has provided a context within which to examine the key value drivers in B2B intermediated electronic networks. The emergence and diffusion of the Internet with its open standards, ease of access, and low associated costs has brought with it the need for businesses to investigate new ways of creating and maintaining competitive advantage. When new and novel methods of B2B exchange are combined with the increasing popularity of networked trade, it becomes important to understand the value that can be leveraged from new electronic network forms, especially in light of the fact that there is much descriptive and very little empirical investigation in this area. The next chapter

reviews the strategy literature on organisational values in order to provide a base to examine the value creation potential within B2B (IE) networks.

3. Strategy: Three Eras of Value Creation

3.1 Introduction

This chapter reviews the changing focus on how value is created in business. First, the *industrial era* is examined, where value centres upon tangible asset output from single business units within a specific industry. Second, the *resources and capabilities era* is explored, where the focus is on intangible, as well as tangible resources, across the entire organisation. Third, an *emergent era* of value creation is investigated as intangible knowledge-based assets, networked forms of business, and the Internet become increasingly commonplace. Key issues are identified within this emergent era. Finally, the socio-economic literature field is proposed as a base for further exploration.

3.2 Value: Industrial Era to the 1980s

The industrial era encompassed a time when industry boundaries were clearly defined and competitive advantage was largely based on how an organisation positioned itself within the specific features of an industry. During this time organisations typically strove to secure physical assets that could be used to leverage structural imperfections in a particular industry in order to achieve economies of scale. As a result, competitive advantage chiefly revolved around seeking advantage through economies of scale (Porter, 1985). Hard measures, such as return on investment, were typically used to measure competitive analysis, focusing upon the single business unit, with large multi-business organisations typically aggregating performance levels across a portfolio of individual units. In this era, organisations often concerned themselves with questions such as ‘which products they should sell?’ and ‘which markets they should enter?’ In doing so, organisations quickly became aware of the importance of leveraging their combined learning and experience in order to gain market share (Venkatramin & Subramaniam, 2002).

Porter (1985), whose work is anchored within industrial economics, suggested that since industry boundaries could be clearly identified, it was possible to

analyse perfect market conditions within each industry sector. He argued further that the potential for competitive advantage for individual organisations lay in their ability to identify and then leverage market imperfections in the structural characteristics of an industry. The categories he developed to measure these structural imperfections include degree of rivalry, barriers to entry/exit, degree of substitution, power of buyers, and power of suppliers. As a consequence the competitive focus for organisations evolved into identifying ways to leverage industry imperfections in order to gain monopoly power. The utilisation of learning, and experience curves, across the entire organisation, are identified as two methods that can be used to leverage these imperfections. A measure of how well an organisation leverages market imperfections can normally be gauged by the position an organisation holds within the industry, with those holding important positions being deemed to have been more successful (Venkatramin & Subramaniam 2002).

As well as using learning and experience curves to leverage market imperfections, the industrial era also focused upon an organisation's use of its physical assets. The ownership of physical assets was suggested to be a key tool that organisations could use to increase the likelihood of raised barriers to entry for nonphysical asset holders, and increased economies of scale for physical asset holders. The primary focus in the industrial era, on physical rather than intangible assets, can be traced back to the 13th century, where before assets were deemed to be of value they were required to be described as measurable units (Ramirez, 1999). This view continued to be reflected in the 1863 Marxist (1999) analysis of the relationship between labour and capital, where it was believed that all personal services were consumed into the goods produced and immediately transformed into financial profit. As a result, services were not viewed as an independent source of value (Delaunay & Gadrey, 1992). As well as focusing on physical rather than intangible assets, attention in this era also centered upon the value transfer in linear relationships with upstream suppliers and downstream distributors. The assembly line notion of value transfer, based on the conceptualisation of mechanized assembly lines and the continued focus on physical assets, underpinned the development of Porter's (1985) value chain.

The value chain provides for systematic and sequential identification and analysis of all the critical trading activities, including some reflection on the interactions between trading parties, in achieving competitive advantage (Porter, 1985). This tool implies that value is added at each stage of the process. These value adding stages include identifying the strategic business unit within a particular competitive scope; the discrete activities and linkages between them that lead to the development of a final product, and the economic impact of those activities in creating a basis for differentiation (Porter, 1985). Value chain analysis can assist in identifying what activities an organisation should perform, and how. It also considers what the optimal configurations of those activities are in order to produce products that are competitive within a particular industry. Value, rather than cost, is argued by Porter (1985) to provide a more useful analysis of an organisation's competitive position since organisations may deliberately raise their cost to command a premium price via differentiation. Porter suggests two sources of value creation - cost advantage and differentiation, with a segmentation focus. Porter further argues that, though different industries may favour one value creation type over the other, it is possible for these different types to be happening simultaneously.

3.3 Era of Resources and Capabilities: 1980s to 1990s

Venkatramin and Subramaniam (2002) suggest the industrial era had two key shortcomings. First, they argue that viewing strategy as an aggregate of individual business units was inadequate. Despite Rumelt's (1974) attempt to build a framework to explain the various logics of diversification, Bettis (1981) argued that unrelated corporate diversification across business units was rarely successful. So, as Rumelt (1982) found even when organisations secured strong positions in their individual business units, it did not necessarily lead to success at the aggregate level.

Consequently, the concept of strategy based on positioning failed to adequately address synergies across the entire organisation (Prahalad & Bettis, 1986). The second shortcoming stemmed from a focus on industry structure. Focusing on market imperfections was argued to draw attention to *what* objectives to achieve,

as opposed to *how* these objectives were to be achieved (Venkatramin & Subramaniam, 2002).

A field of research that subsequently took prominence in the strategic arena was the resource based view of the firm. This view focused on how an organisation conducted its activities, instead of on how to secure a product-market position to leverage imperfect market situations. The rationale was that if an organisation's resources and capabilities, when viewed as processes and routines, were valuable, rare, inimitable, and nonsubstitutable this could create sustainable competitive advantage (Barney, 1991; Peteraf, 1993). Following from the Schumpeterian perspective (1950, as cited in Teece, Pisano, & Shuen, 1997) capabilities were viewed as rent-creating mechanisms that deployed resources through tangible and intangible value-creating processes such as product development, strategic decision making, alliance formation, and knowledge creation. Two features suggested to distinguish a capability from other resource types include, being firm specific, and their primary purpose being to enhance the other resources held within the organisation (Makadok, 2001). The key question then centred upon which resources and capabilities to develop and leverage to achieve inimitability. Consequently, the drivers of competitive advantage focused not only on achieving economies of scale as in the industrial era, but also on achieving economies of scope.

Achieving competitive advantage no longer had a single focus on how well an organisation could leverage market imperfections in a single industry. Instead, cross-industry learning began to be shared and transferred. Organisational skills that facilitated the transfer and use of such learnings in the form of processes and routines cross-industry became important for competitive advantage, and so economies of scope hinged on leveraging organisational relatedness (Grant, 1996). Prahalad and Hamel (1990) formalised this view with their work on core competencies. In order to maximise the likelihood of competitive advantage, organisations were required to both leverage their learning to establish inimitable and intangible processes and routines that could not be rivaled, and also to create impregnable product market positions to deter rivalry. They argued that if an

organisation takes a singular, rather than cross-industry focus it may fail to anticipate the potential future actions of competitors (Venkatramin & Subramaniam, 2002).

In order to explain how organisations achieve competitive advantage in situations of rapid and unpredictable change, Teece, Pisano, and Shuen, (1997) developed a dynamic capabilities framework. Eisenhardt and Martin (2000) further extend understanding of dynamic capabilities within the current environment. They acknowledge that while dynamic capabilities are idiosyncratic in nature, and path dependent, they can exhibit similarities across organisations. These authors suggest that in moderately dynamic environments dynamic capabilities are more likely to resemble routines, and therefore, be more imitable, while in high velocity environments they can produce highly experimental and sometimes fragile outcomes producing unpredictable outcomes. Eisenhardt and Martin (2000), therefore, conclude that long-term competitive advantage is more likely to reside in resource configurations rather than in dynamic capabilities.

However, the resource based view has not gone unchallenged, with some arguing that it is conceptually vague, tautological (Mosakowski & McKelvey, 1997; Priem & Butler, 2000), and lacking in empirical grounding with regard to how resources actually lead to competitive advantage. It has also been suggested that the resource based view, like transaction cost economics, focuses upon a single organisation and a single transaction, thus providing less insight in multiorganisational processes (Lorenzoni & Lipparini, 1999). In addition, it has been argued that the achievement of sustained competitive advantage is less likely in dynamic markets (Eisenhardt & Martin, 2000).

3.4 New Value Creating Era: Beyond 2000

As our understanding of how strategy has evolved from product-market positions of business in single industries, to leveraging processes and routines across multibusiness complexes, there is one issue that has remained constant: The key drivers of competitive advantage have depended upon an organisation's *own* ability to secure a strong market position, and inimitable processes and routines

(Venkatramin & Subramaniam, 2002). However, over the past few years, in order to remain competitive, organisations have increasingly sought the capabilities of *others* in pursuing their strategies. This has especially been so with many businesses that are often required to compete in volatile environments with increased speed and efficiency, especially due to the increased functionalities offered by the Internet.

As a result of this activity, the emergent era has been referred to by some as the era of relationships (Venkatramin & Subramaniam, 2002), and by others as the era of co-production (Ramirez, 1999). Whatever term is favoured, it is commonly agreed that as organisations increasingly move toward complementing their internal capabilities with the capabilities of others, a wide variety of complex network structures and processes have begun to emerge (Stork & Hill, 2000). Warnecke, Huser and Kaun (1997) and Normann and Ramirez (1994) suggest the Internet has further served to fuel this complexity, providing for increased opportunity for less sequential work practices, and heightened interactivity between organisations. As a result, Davis (1987) argues that organisations increasingly have the potential to perform more tasks, per unit of time and space, than has ever been possible in the past.

This emergent era has brought with it the realisation that value in terms of reduced costs and increased efficiencies can be achieved by not only by “outsmarting the competition” (Nalebuff & Brandenburger, 1996, p. 3) but also through cooperation, where “creating value, a bigger pie, is fundamentally a cooperative activity involving customers and suppliers that a company cannot accomplish alone” (p. 28). Nalebuff and Brandenburger (1996) identify the requirement to achieve a balance between their competitive and cooperative activities as one of co-petition, and in doing so, signal an extension in understanding of the value creation opportunities in nonlinear and intangible assets.

Nalebuff and Brandenburger developed a *value net* framework based on Porter’s five forces model that shows the interdependencies between customers, suppliers, complementors, and competitors. Complementor is the term given to Organisation

B, when a customer values the product from Organisation A more, when they have Organisation B's complementing product, than when they have Organisation A's product alone. These authors further suggest that winning requires an organisation to understand how to enlarge the size of the pie to feed not only themselves, but also the other parties in the Value Net, and perhaps most importantly, understands how to secure the largest share of the value created in that pie.

Nalebuff (1999) extended the value net concept to focus on the value to be leveraged from *bundling* items (Nalebuff, 1999). This concept, which has become increasingly popular in electronic business focuses on goods as complements rather than as substitutes, and on price rather than on quantity. When items are bundled, buyers are required to determine whether or not to purchase, taking into account the aggregate cost of the items within the bundle. From an organisational perspective the incentives for bundling can include assisting multiproduct monopolists to achieve improved price discrimination, lowering costs, and can also act as an entry deterrence device (Nalebuff, 2000). Nalebuff argues that an organisation that sells a bundle of complementary products has a substantial advantage over rivals who sell the products separately. In addition, Nalebuff (2000) purports that advantages increase with bundle size. Furthermore, it is suggested that product bundling can

raise profits even against established but uncoordinated firms, all while lowering profits of existing or potential entrants and putting these rivals in the no-win position of not wanting to form a competing bundle. (p. 10)

In a further attempt to identify and categorise the value in nonlinear and intangible organisational activities, Cartwright and Oliver (2000) developed the *value cluster* and the *value web*. The value cluster analysis uses clusters of hexagons to identify the core value-adding activities within organisations, with each core activity represented by a single hexagon. The hexagonal pattern is said to reflect both the interconnectivity and flexibility of the relationships between activities, while highlighting the fact that activities are not always carried out in a particular order. The key or central emphasis in the value cluster analysis is on information

sharing, especially around shared technologies. Since an analysis of the nature and quality of the relationships between the internal and external activities provides valuable information, Cartwright and Oliver (2000) extended their value cluster to a value web. The value web graphically illustrates the relationship between the horizontal and vertical relationships within the competitive system including customers, suppliers, competitor's allies, and complementors.

A key focus in the relationships era has centred upon leveraging the knowledge that flows in the complex myriad of relationships, which have begun to appear. Venkatramin and Subramaniam (2002) argue that the knowledge flow is so significant in the relationship era that the value drivers of economies of scale and scope should evolve to somehow be incorporated within *economies of expertise*. These authors suggest that organisations now “require a different set of strengths, both in terms of understanding where the potential sources of knowledge reside and the ability to absorb and deploy external knowledge in their business” (p. 462). As a result, Kogut (2000) suggests the strategic focus has shifted from strengthening internal process and routines to developing a framework that facilitates identifying, absorbing, and sharing knowledge across networks of organisations. Quinn, Anderson and Finkelstein's (1996) starburst model of organisation provides a starting point to understand how intellect can be leveraged close to the source where it is required. Moreover, Eisenhardt and Santos (2002) ask whether we are headed toward a more formalised knowledge based view.

In somewhat of a contrast to those who argue that knowledge or expertise is a key driving force (Venkatramin & Subramaniam, 2002), others (Phillips & Meeker, 2000; Rayport & Sviokla, 1996) suggest the Internet is a key value driver, and potential determinant of organisational structure in much the same way as Woodward (1965) demonstrated the impact of technology upon organisations. Those who argue for the dominance of expertise as a driving force suggest that the Internet is a subset and information conduit within this greater force. Yet, others believe the Internet has made a significant contribution to changing industry boundaries and has encouraged the emergence of numerous new network forms, such as B2B electronic networks (Afuah, 2003). Proponents of the Internet

suggest the virtual world has redefined economies of scale as many small, new start-up organisations quickly supercede the large, established ones. They also suggest the virtual world is redefining economies of scope, as digital assets move quickly to provide value across what were once widely disparate markets (Rayport & Sviokla, 1996).

Amit and Zott (2001) identify four inter-related value creation dimensions within the B2B electronic arena: efficiency, complementarities, lock-in, and novelty. Within the efficiency dimension those e-businesses demonstrating greater transaction efficiencies were found to have lower costs and subsequently greater value transaction efficiencies, consistent with transaction cost theory (Williamson, 1975, 1983, 1989). The value dimension, complementarities, which is based on Brandenburger and Nalebuff's (1996) work, found that those e-businesses with systems devised for the bundling of goods or complementarities could expect increased value. The third dimension, lock-in, which manifests from switching costs, identifies the inherent value in retaining and motivating buyers to engage in repeat transactions with a view to generating increased trading volume. The final dimension, novelty, identifies not only the traditional sources of potential value in this area, such as the introduction of new products, services, marketing and distribution outlets, but also the value to be derived from innovative ways of doing business, connecting buyers and suppliers, and creating entirely new markets such as the online auction system for low-ticket items. In a separate empirical analysis Zott and Amit (2002) provide evidence to support a positive relationship between two dimensions, efficiency and novelty of design in business models and the value appropriated by the focal organisation.

3.5 Key Issues: Emergent Value Creating Era

At this stage the strategic implications of the emergent era appear to be both fragmented and in some instances empirically under-investigated. Venkatramin and Subramaniam (2002) ask whether this proposed new era “simply provide[s] a new context to apply traditional strategic theory? (p. 470), or, alternatively whether it “compel[s] us to rethink how we theorise about strategy” (p. 470) In order to begin to answer these questions several areas require investigation.

Underpinned in part by the work of Venkatramin and Subramaniam (2002), the following four key issues are identified.

The first issue requires the identification of an appropriate *unit of analysis*. The first era saw the business unit, as the unit of analysis, and in the second, the unit was the entire organisation. Venkatramin and Subramaniam (2002) ask whether a new unit of analysis is required now that business is increasingly being conducted in the network form. If this is to be the case, and the network is selected, then succinct and meaningful building blocks or principles are required to shape this unit of analysis. These fundamental building blocks would provide both internal links to the individual businesses involved, including the central organising body, and external links to the myriad of connections in the wider business environment. Such a task would involve linking the value webs and value nets to the structural processes and routines identified in the strategic networks literature at a time that Brandenburger and Nalebuff (1996, 1997) suggest is dominated by dynamic co-competition.

The second issue surrounds whether a new primary value driver(s) is required and, if it is, what it should be, and how it should be conceptualized. In the first era, value was underpinned by achieving economies of scale, and then in the second era, economies of scope took precedence. Now that we have reached the third era, some suggest that the primary value driver should be economies of expertise (Venkatramin & Subramaniam, 2002). The presupposition that economies of expertise should be the next value driver rests on the belief that the Internet is a subset of the larger global drive toward a knowledge and expertise based economy. However, some descriptive accounts suggest that the Internet is a primary value driver in itself, whereby it facilitates the creation of organisational structures, reduces transaction costs, and increases efficiencies (Phillips & Meeker, 2000; Woods, 2000). The extent to which the Internet and/or knowledge and expertise are key value drivers in today's environment requires further investigation. It is only after we have a clear understanding of the relationship

between these two views and how they relate to economies of scale and economies of scope that we can begin to identify any new primary value drivers.

Venkatramin and Subramaniam (2002) have begun to suggest that if the new value driver is economies of expertise, then its primary source might lie in a “firm’s centrality in the knowledge network” (p. 472). This suggestion contrasts with achieving economies of scale advantages through large scale investments in physical assets and resultant increased capacities (Porter, 1985). In addition, it extends the economies of scope concept from leveraging organisational to cross-organisational relatedness. Achieving economies of scope has focused on leveraging communal knowledge across the business units of a single organisation (Prahalad & Hamel 1990) and, therefore, does not address the potential knowledge capture across organisations. However, adopting economies of scope as the new singular value driver may well overlook some potentially important features driving business that are underpinned by the Internet. Such features include the impact of technological convergence on changing industry boundaries, and the speed at which this convergence happens.

The third issue centres upon whether new principles for organising are required. Despite the continued focus on employing organising principles that create efficiency, and continued agreement with Chandler’s (1962) basic treatise that organisational structure should be aligned with strategic requirements in order to maximise profits, what is beginning to change is how efficiency is created. While theorists from Taylor to Galbraith have concentrated on developing work-units to minimise uncertainty, scholars such as Eisenhardt and Brown (1999) suggest that today’s businesses are more likely to thrive as modular units that can more quickly adapt in uncertain environments. Numerous authors (Phillips & Meeker, 2000; Raisch, 2001; Woods, 2000) support Eisenhardt in espousing the potential value, in terms of transaction efficiencies, to be leveraged from the various new Internet network forms. Venkatramin and Subramaniam (2002) support this view reporting:

Competitive advantage may no longer be a function of a fit between uncertainty and information processing capacity as we have traditionally understood - but a function of an organization’s

ability to continually navigate its way into realms of the unknown and concurrently develop requisite new expertise. Newer organizing principles . . . with dynamic capabilities based on increasing absorptive capacities may replace the more conventional structures. (p. 470)

As well as focusing on certainty, businesses have traditionally been rewarded for current earnings in the marketplace. Venkatramin and Subramaniam (2002) suggest that it may be time for forward thinking, promising strategies to be recognised and rewarded as well which would require successfully communicating the strategic logic behind such strategies and then moving quickly to obtain the necessary capabilities.

The fourth key issue surrounds how performance should be measured and then, how it relates to competitive advantage. These are especially important factors to consider if the suggested changes in value drivers, units of analysis, and ways of analysing are adopted. It may be useful to start with one feature that has remained constant since the works of Chandler (1962) that is the focus on efficiency. In the first era, Porter (1985) argued that organisational efficiency was demonstrated by short-term profitability and long-term survival. He suggested that an organisation's market position was a key factor in determining success, whereby an organisation could focus on three generic market positions, low cost production, product differentiation, and segmented focus. Within this view an organisation could favour a particular market type, or choose to focus on all three simultaneously. Then, in the second era, the trend moved toward identifying rare and inimitable resources and capabilities across the organisational setting. While there was somewhat of a move toward value intangible assets, the primary focus over both of these eras has been on the more tangible assets. Furthermore, the value potential to be gained from either *relationship* or *information* exchange has typically been given somewhat of a cursory overview, appearing in the main in the human resource or technology areas within the value chain. Moreover, as the emphasis on the value of knowledge and cross-organisational leverage of capabilities increases, financial performance alone is proving to be an inadequate indicator.

3.6 Platform for Emergent Value Creation Era

Transaction Cost Economics

One established body of research that provides a potentially important link to the current focus on identifying value in maximising efficiency and reducing costs is transaction cost economics (TCE). Transaction cost economics, which is perhaps the most significant economic theory of organisations (Smelser & Swdeberg, 1994), builds on Coase's (1937) original question 'Why do firms exist?' The market and the organisation are suggested to be alternative forms that enable the coordination of activities, where the transaction is the fundamental unit of analysis. The key issue in TCE is whether a transaction can be undertaken at a lower cost and hence generate greater value via a market or within a hierarchical organisation setting (Williamson, 1975). If the cost of conducting the transaction via the market is high then it becomes more economically viable for the organisation to internalise the transaction. Transaction costs include all those costs incurred for general efficiency and routine tasks that are not directly linked with the production of goods or services but which are often time consuming, difficult, and, therefore, expensive, including planning, conducting and monitoring task completion (Ghosal & Moran, 1995; Williamson, 1983).

Not only is TCE concerned with how organisations manage transaction costs, but with how organisational forms vary with the specific types of exchanges they encounter (Armour & Teece, 1978). A second order question then in TCE is "how can existing organisations be structured to economise transaction costs themselves?" (Nohria & Gulati, 1994, p. 530). Davis and Powell, (1990) suggest that TCE research in the main has occurred in two general areas, one relating to the value capture by creating efficient organisational boundaries around make versus buy issues, and the other by focusing on the value of organising efficient internal structures for organisations.

Several critical dimensions have been identified by Williamson (1975) as potentially influencing when value in terms of transaction efficiencies is likely to occur. The view suggests value creation can arise from the attenuation of bounded

rationality, uncertainty, complexity, and opportunism. Williamson (1975) found the *degree of uncertainty*, *frequency of exchange*, and the *specificity of assets* were issues likely to influence the choice of an optimal governance structure in which to conduct transactions (Williamson, 1979). In this context risk and uncertainty may be created by exogenous factors such as market forces, or endogenous factors, such as the decision making process and behaviour of individuals. The transaction cost perspective argues that transactions conducted during high levels of uncertainty may be more efficiently conducted within an organisation rather than in a marketplace.

The attenuation of a further dimension, *information asymmetry* (Williamson, 1975), is also argued to increase transaction inefficiencies. This dimension typically begins with the assumption that the total data set “is closed in that there is a closed set of states and consequences” (Fransman, 1998, p. 148), with information asymmetries arising when this fixed data set is unevenly distributed among members. Coase (1937) argues that asymmetric information may increase the cost of price discovery. According to TCE, when information is evenly or *perfectly* distributed among agents the market mechanism is preferred, with the price system communicating in symbolised form the necessary information for exchange. However, when information is unevenly distributed between members, information asymmetries can arise that may ultimately lead to increased price discovery costs (search, negotiation, asset specificity) and hence be a key reason for internalising activities within the firm (Coase, 1937).

Yet, Williamson (1991) challenges the view that asymmetric information invites problems. He suggests that if individuals were honest, then all information could be presented in perfect symmetry. Instead, he attributes the need for information asymmetry to the potential in individuals for opportunistic behaviour. In addition, Williamson argues that when individuals intend to act rationally they inevitably encounter information related problems due to their own bounded rationality. These limitations encompass the physiological and psychological capacity “of the human mind for formulating and solving complex problems (Simon, 1957, p. 198)

acquiring, storing, processing and recalling relevant information (Fransman, 1998). Simon (1983) suggests that early electronic communication systems were notorious in their design – making more information available, while ignoring the needs and capacity of their end users. He notes that while filters, such as secretaries and automated sorting systems can be installed, a central design criterion in information systems should be one of maintaining a balance between the production and consumption of information.

A key point of value from transacting via the Internet, or any highly networked situation, commonly surrounds the reduced transaction costs it creates (Dyer, 1997). Gurbaxani and Whang (1991) provide a framework that identifies the value capture of information technology from the TCE perspective. They categorise transaction costs into market costs (operational: search, transport, inventory holding, communication, and contractual: cost of writing, and enforcing contracts, and organisation costs: monitoring, bonding, and decision information costs). However, this research is limited to the market and hierarchy only, and not the network structure. Investment in information technology has been linked by Clemons and Row (1992) to reduced risk and coordination costs and by Lucking-Reiley and Spulber (2001) to reduced search, communication, and inventory management costs. Garciano and Kaplan (2000) reported a 50% reduction in transaction costs when using an online rather than offline auction to sell cars. Amit and Zott (2001) provide the example of online meetings bringing about a reduction in direct costs, in areas such as travel and accommodation, and also a reduction in indirect costs, of reduced uncertainty and increased transaction frequency.

Despite the continued popularity of the TCE approach, a number of issues remain. The focus on transaction efficiency may well divert interest away from other potential sources of value such as the reconfiguration of resources, especially business relationships (Nalebuff & Brandenburger, 1996) and innovation (Ghoshal & Moran, 1995). The singular and static nature of cost minimisation can overlook the interdependence between parties and the opportunities for mutual

value maximisation (Zajac & Olsen, 1993). The view that organisations react to nonstatic or uncertain environment situations, by placing the transaction in the hierarchy rather than the market situation, is being replaced with the belief that organisations prefer interaction with others in times of uncertainty, especially to increase transaction volume. In addition, TCE has given limited attention to organisational forms situated between markets and hierarchies, such as networks that are playing an increasingly important role especially in e-business (Amit & Zott, 2001). The limited work on networks within the TCE literature is in part due to the absence of research on the role of interfirm trust and how this might impact upon the social structures in which the ties are embedded (Doz & Hamel, 1998; Gulati, 1998; Lorenzoni & Lipparini, 1999). Furthermore, intangible costs, especially those associated with learning (Ring, 1996) and coordination (Gulati & Singh 1998) are typically overlooked.

Overall, TCE provides a useful lens to begin to explore the value creation potential in terms of increased efficiencies and reduced costs in the electronic transfer of information. However, with the unprecedented number of e-business network forms, together with the increased reach and connectivity made possible by the Internet, the full extent of the value to be leveraged within emergent e-business relationships is not adequately captured by TCE alone.

Economic Sociology

Economic sociology is one particular view “that seeks to understand economic phenomena in their social and cultural contexts” (Guillen, Collins, England, & Meyer, 2002, p. 6). Here, the interest is not only in efficiency, but also in processes, outcomes, and inequality. Economic sociologists believe that all economic action is socially initiated and grounded (Swedberg & Granovetter, 1992) and cannot be assessed “without the shared understandings (culture), institutional structures, symbols, and networks of inter-actor relationships that concretize it and give it form” (Guillen, Collins, England, & Meyer, 2002, p. 6).

Economists typically argue that individuals make conscious, rational-choice decisions via utility driven models. In contrast, economic sociologists dispute this

view, believing instead that both preferences and actions are fundamentally influenced by concepts such as norms, cognitive biases, relationships and role expectations. For example, a close friendship between traders may stop the buyer sourcing cheaper goods from elsewhere (Dore, 1983).

Hence both utility maximization and the isolation of strictly “economic” variables are unacceptable to economic sociologists, since such reductionism necessarily hinders the understanding of economic phenomena. It is not just that these reductionist assumptions include the determination of preferences as part of what they seek to understand. Economic sociologists also recognize that social forces often affect reasoning in ways that defy a strict rationality assumption . . . (Guillen, Collins, England & Meyer, 2002, p. 7)

In addition, economic exchange presupposes stable societal parameters where exchange takes place within a legal, legitimate, and stable state system; whereas, sociology regards the economic process as an organic element of society that is interdependent upon the connections and interactions with the rest of society (Smelser & Swedberg, 1994).

Given the context of e-business with the high level of new, innovative and often interconnected ways of conducting business, it is important to explore in more detail the economic sociology approach toward networks. Hence, the next chapter explores from this perspective the formation, governance, evolution, and performance of the network form.

3.7 Summary

This chapter has reviewed the key themes and unique features of the industrial era through to the resources and capabilities, and the proposed new era of value creation. Key issues identified in this new era include, whether there should be a new unit of analysis, and if so, whether it should be the network. What the value driver(s) should be. Whether the Internet should be subsumed under knowledge or be a separate value driver. Whether there should be new organising principles and how performance should be measured. The research question in this study “What

are the key value drivers in B2B (IE) networks?” draws from the second issue identified above.

4. Networks: A Theoretical Review

4.1 Introduction

This chapter reviews the literature on networks. The purpose of this chapter is to identify and examine the *value* creating features within the *network* as an organisational form, especially from a socio-economic perspective. The first section examines the formation of a network, including an overview of the key motives and processes involved. The second section investigates the architecture or governance of a network, including an examination of how value is embedded within the numerous structural components and relational processes. The third section examines the evolutionary path of a network, including an overview of the various exogenous and endogenous factors that may impact upon this value creating process. Last, the chapter reviews the issue of performance, both from an individual organisation and overall network perspective.

4.2 Network Formation

Background

The rise of organisations from the second half of the nineteenth century was viewed as a way of guaranteeing social order and personal freedom through collective decision making that would serve to reduce the conflict between individual wants and collective needs (Storing, 1962; Wolin, 1961). Early management theorists such as Taylor (1912) and Fayol (1949) argued that organisations could successfully create value by operating as closed systems through the rational structure of coordination imposed by management upon individual work units (Reed, 1999). This view assumed that management could achieve certainty by only focusing on those internal variables positively associated with goal achievement, including administrative processes such as task specialisation and bureaucratic procedures “and then subjecting them to a monolithic control network” (Thompson, 1967, p. 13). Basing their research upon the works of theorists such as Weber who analysed the concept of bureaucracy, closed systems theorists legitimated the exclusion of human values and emotions as well as external environmental constraints (Reed, 1996).

Despite the prominence of this rational framework in organisational theory, scholars such as Durkheim (1984) recognised the interdependence between the social needs of workers and the formal organisation of work efforts. Burns and Stalker (1961), Child (1969) and Emery and Trist (1965) argued that the closed systems approach failed to address “the problem of social integration and the implications for the maintenance of social order in a more unstable and uncertain world” (Reed, 1996, p. 31). There began a move toward complex open-systems theory, whereby organisations began to be seen as complex, social systems equipped with integrative and survival mechanisms rather than with purely goal setting mechanisms (Reed, 1999).

Complex open-system theory also acknowledged uncertainty by recognising organisational interdependence with the external environment (Thompson, 1967). The rediscovery of the importance of social systems and community, between the 1940s and 1960s, converged with other theoretical movements of the time, including socio-technical systems theory (Miller & Rice, 1967) that sought to explain the influence of technology on social processes. However, Reed (1996) argues that it was the structural-functionalist interpretation of the systems approach that gained most prominence in providing an external focus on environmental uncertainty, while retaining an internal focus on organisational design. Structural functionalism emphasised the need for minimum security and stability for long-term survival; while its off-shoot, systems theory, promoted the interdependency between organisational action and environmental conditions that are beyond the control of the organisation (Thompson, 1967). The synthesis of structural and environmental concerns as highlighted above have resulted in a key social science research issue of how to establish such “combinations of internal designs and external conditions which will facilitate long-term organisational stability and growth” (Reed, 1996, p. 32).

Studies on the impact of internal and external factors on organisational stability and growth have been important. However, much of this work has focused on the organisation or dyadic tie as the unit of analysis for creating value; and in doing so it has overlooked the interactive elements within the overall network structure

(White, 1981). Gulati (1998) suggests that network structures provide additional opportunities for the interaction between individual actors and the exchange of valued resources, including fine grained information. Though most of the research has examined these socially embedded ties from a general perspective (Granovetter, 1985; Uzzi, 1996), Gulati (1998) argues for closer inspection of a particular aspect of the social context, in order to increase the contribution to the network literature. A broad classification framework developed by Zukin and DiMaggio (1990) suggests that organisations can be embedded from either a structural, cognitive, institutional or cultural perspective. The structural context is the focus in this chapter.

Network Formation Context

Doz, Olk, and Ring (2000) suggest that tie formation within networks is dominated by three types of initial value conditions, a) the presence and identification of common interests among potential members, b) the intervention of a triggering entity, or c) environmental change that moves towards perceived interdependence. Environmental interdependence in this instance is taken to include both resource procurement and uncertainty reduction (Galaskiewicz, 1985). It is the third condition, that of environmental interdependence that is the most common explanation among organisational theorists in the formation of inter-organisational cooperative ties (Gulati & Gargiulo, 1999) that is of primary interest. The following section examines the different motivating criteria and characteristics at the dyadic level, intra-industry, and industry level (Chung, Singh, & Lee, 2000; Gulati, 1998).

Network Formation Motives

Research on tie formation motives at the industry level has typically examined strategic factors likely to influence this process, such as the level of uncertainty within an industry. Eisenhardt and Schoonhoven (1996) report organisations in highly competitive environments were more likely to form strategic alliances. Those organisations within emergent industries, especially with pioneering technologies were also found to have a greater prevalence toward entering into

alliances (Gulati, 1998; Harrigan, 1985). Shan and Hamilton (1991) examined the extent to which the presence of financial and human capital influenced the formation of inter-firm partnerships. In reviewing the importance of firm size when entering into alliances, research has often been inconclusive due in the main to the complexities associated with the determinants of size (Nohria & Garcia-Point, 1991; Burgers, Hill, & Kim, 1993), so a wide variety of potential formation factors at the industry level have been investigated.

At the organisation level, a number of inducements have been identified that are likely to lead to valued tie formations (Contractor & Lorange, 1988; Hitt, Ireland & Hoskisson, 1997). At this level the formation of dyadic ties has been suggested to reduce partner risk. An organisation may be able to enter and establish a presence in a specific market faster when allying with a partner who already has a strong presence in that particular market (Contractor & Lorange, 1988). So, partnering organisations may experience the potential benefits of reduced political risk and shorter pay back period due to a shared investment. Alliance formation can facilitate the diversification of product portfolio mix where organisations can access a variety of resources and complementary capabilities to create value (Baum, Calabrese, & Silverman, 2000; Dyer & Singh, 1998). The risk of project completion can also be spread over more than one organisation (Contractor & Lorange, 1988) with risk being lowered by combining the expertise and excess capacity of partnering organisations (Glaister & Buckley, 1996), often resulting in a reduction and sharing of research and development costs (Harrigan, 1985; Ohmae, 1989).

Partnering organisations may also form inter-organisational ties in order to seek value from the strategic benefits of their combined skills, technologies, and combined synergies (Harrigan, 1985; Hitt, Ireland, & Hoskisson; Deeds & Hill 1996). Forrest (1990) found that small and/or technical organisations, such as those in the science industry, were likely to benefit from the combined resources and capabilities of larger more experienced partners. There has been considerable research on the benefits of tie formation in the biotechnology industry (Powell, 1998). Organisations have benefited from partnering with others when new

technological developments and innovative processes have been required (Mariti & Smiley, 1983; Pisano, Shan, & Teece, 1988). Glaister and Buckley (1996) demonstrate that tie formation is likely when one strategic partner contributes strong technical skills while the other contributes strong global or manufacturing skills. Ahuja (2000) used the combined synergies of technical, commercial, and social capital to investigate the likelihood of tie formation. Furthermore, Majumdar and Venkataraman (1998) provide a framework to explain the variation in the adoption of new technologies by three network effects, where there is value to be found in a) the conversion effect, driven by increasing returns involved from moving from the old to the new technology, b) the consumption effect, when there is increased interdependence among customers, and c) the innovation effect, when organisations model their behaviour after others who are perceived to be similar.

Value in terms of rationalised production and reduced costs through economies of scale and learning can be brought about by the formation of strategic alliances (Glaister & Buckley, 1996). Partners can derive mutual benefits, for example, when a manufacturing partner is relocated at the site of the partner who has competitive advantage in location. These types of agreements are prevalent in the automobile industry between component and assembly organisations (Contractor & Lorange, 1988). There is much literature on the value of tie formation from the reciprocal flow of knowledge, including learning new business techniques (Baum, Calabrese, & Silverman, 2000; Kogut, 1988; Mowery, Oxley, & Silverman 1996; Powell, Koput, & Smith-Doerr, 1996). Hamel (1991) investigated how the collaboration process enhances organisational learning, while Parkhe (1993a) examined the effectiveness of learning particular skills in purpose built inter-organisational ties.

The formation of inter-organisational ties can be used by organisations to enter into either defensive or offensive strategies (Glaister & Buckley, 1996). Defensive strategies can be of value when firms are trying to reduce competition. Co-option with current or potential competitors can reduce industry overcapacity and subsequent competition. Nevertheless, due to their fragile nature Gomes-

Casseres (1994) cautions against the use of strategic alliances for such purposes, suggesting these configurations are typically not well equipped to manage conflict. Alternatively, partnering organisations may use offensive strategies to enter into alliances in an attempt to apply pressure to reduce the profit and market share of their non-allying competitors (Contractor & Lorange, 1988). An example of the use of an offensive strategy is when Caterpillar and Mitsubishi applied pressure on their competitor, Komatsu to reduce the market share and profit of Komatsu in their home market of Japan initially, with the expectation that this action would reduce Komatsu's competitiveness elsewhere.

The value of inter-country strategic alliances has long been recognised (Beamish, 1988). Often new and significant market share can be captured through the formation of joint venture alliance arrangements with organisations in countries such as China that have operated regulatory controls over foreign entry and/or industry standards (Lyles & Salk, 1997). Ties are frequently formed between foreign organisations and local partners to gain dealer and distribution channels for new products in local markets (Fite, 1996). Local knowledge usually brings with it value in the market entry process in terms of increased speed and efficiency, especially in restricted markets (Hitt, Ireland, & Hoskisson, 1997). The information received from the tie relationship may act as a monitor to environmental changes and further opportunities (Mariotti & Ricotta, 1986). However, there is recognition that the negotiation and establishment of joint ventures can be slower than anticipated (Vanhonacker, 1997).

Network Formation Restrictions

Though many of the above-mentioned reasons for forming inter-organisational ties may be present, they do not address a key question raised by numerous scholars, including Ahuja (2000), Ebers (1997) and Eisenhardt and Schoonhoven, (1996) "Why do some firms form strategic alliances, while others do not" (p. 137)? This question has traditionally been answered from a transaction cost perspective, where the focus has often been on static routine exchange dyads used to predict vertical integration and transaction cost minimisation (Hennart, 1991). However, the TCE perspective has typically overlooked the effect of the entire

network governance structure in resolving issues such as the coordination and safeguard of multi-exchanges. Jones, Hesterly, and Borgatti (1997) combine transaction cost economics and social network theories to explain the value within the formation of embedded ties. They argue that network governance is more likely to be effective when exchange conditions favour the following: asset specificity (customised or asset-specific exchange of unique knowledge, products or processes are exchanged amongst participants); demand uncertainty (environmental uncertainty, where participants cannot predict future events alone); task complexity (the number of different specialised inputs required to complete a task, with increasing complexity creating behavioural interdependence), and frequency (of exchange between participants).

Eisenhardt and Schoonhoven (1996) suggest firms are more likely to find value in forming alliances when they are in vulnerable strategic positions, due to their being in either emergent or highly competitive markets, or they are involved with emergent technical strategies. They also suggest that alliances are more likely to be formed when organisations are in positions of social strength, especially when led by a strong management team. These findings, they argue may be particularly useful in predicting alliance formation patterns in high velocity industries such as semiconductors.

A second key question in relation to tie formation restriction is “Why might organisations form ties with specific others?” The selection of appropriate partners has often been quoted as an important and valued factor in successful tie formation (Harrigan, 1985; Beamish, 1987; Geringer, 1991; Gulati, 1998). Two key selection criteria perspectives are identified (Ahuja, 2000; Chung, Singh, & Lee, 2000). From a resource-based perspective, Gulati, Nohria, and Zaheer (2000) argue that network membership can be viewed as a resource that is nearly always idiosyncratic and, therefore, potentially more inimitable than the network structure that can be copied in certain network types. These unique unisons may then go on to share their resources, creating opportunities that generate value far in excess of their initial contribution (Ahuja, 2000; Nohria & Garcia-Pont, 1991). It is, therefore, argued that in highly competitive networks partner selection,

including buyers, suppliers, and other partners, is undertaken with extreme care. Spekman, Kamauff, and Myhr (1998) argue that the success of the network may well depend on the strength of the weakest link that may in turn expand or restrict the opportunity set, and subsequent value creation potential available to other members (Gulati, Nohria, & Zaheer 2000). Baum, Calabrese, and Silverman (2000) suggest there is value in forming ties with differentiated partners rather than same-type partners, since the later provide access to a less diversified pool of information.

From a social structural perspective, tie formation is suggested to be influenced by the direct and indirect relational experiences of partnering organisations (Chung et al., 2000; Gulati, 1995). Ahuja (2000) acknowledges that while this perspective recognises the value of collaboration, “the structure of the existing interfirm linkage network influences the path of future relationships formation by affecting the set of linkage opportunities available to prospective collaborators” (p. 318), it does have some limitations, since there may be other determinants of collaboration beyond social capital. Also, this view does not explain the formation of linkages between actors with no prior social capital. In addition, Ahuja suggests that both inducement factors and opportunity factors may be operating simultaneously. He offers three forms of social capital likely to influence linkage opportunities: technical, commercial, and social. Later, Tsai (2000) investigated the combined impact of structural, relational and strategic factors, finding that organisations that are rich in social capital and share a high amount of strategic relatedness are more likely to create new inter-organisational linkages and realise their potential synergies.

Chung, Singh, and Lee (2000) extend the potential tie formation drivers from resource complementarity and social capital to include status similarity. The status of individual organisations has been argued to be a determinant in inter-organisational partner selection within a number of industries (Podolny, 1994). An organisation’s status may be based on either prestige, or economic, or political power, with holders of these various sources of power creating status expectations that serve to guide behavioural expectations and future interactions

(Podolny, 1994; Benoit-Smullyan, 1944; Chung et al., 2000). It has commonly been reported that organisations are more likely to form ties with partners of similar status for reasons such as, the common signalling role of social interaction, and the likelihood of compatible operating systems and practices. Chung et al. (2000) found status similarity and social capital had strong effects on inter-organisational tie formation in initial public offerings. These authors suggest that organisations are more likely to engage in inter-organisational ties with other organisations of similar status, especially when markets become uncertain, so highlighting the importance of intangible assets in alliance formation in times of market uncertainty.

In sum, the above section has identified the key value areas within the network formation stage. Overall, within each of these areas there have been numerous reviews from a socio-economic perspective. Perhaps two of the most comprehensive reviews are those made by Gulati (1995) and Jones, Hesterly, and Borgatti (1997). In the next section the various value areas within the structure and processes of the networked organisational form are identified and examined.

4.3 Network Governance

Network Structure

Network theorists with a background in organisational theory or sociology have traditionally focused on the implications of network structure for value creation (Granovetter, 1973, 1985). Interorganisational network structures consist of a webbed pattern of nodal or value points connected by a series of lines or paths (Alter & Hage, 1992). An analysis of the network structure can identify how information is transmitted from nodal positions by actors along a set of paths that form a web of potentially complex and repeated interactions (Burkhardt & Brass, 1990). One of the key purposes of network analysis then is to examine the interdependence between organisations and how positions within the network influence the opportunities and constraints placed on individual organisations and the network as a whole (Madhavan, Koka, & Prescott, 1998).

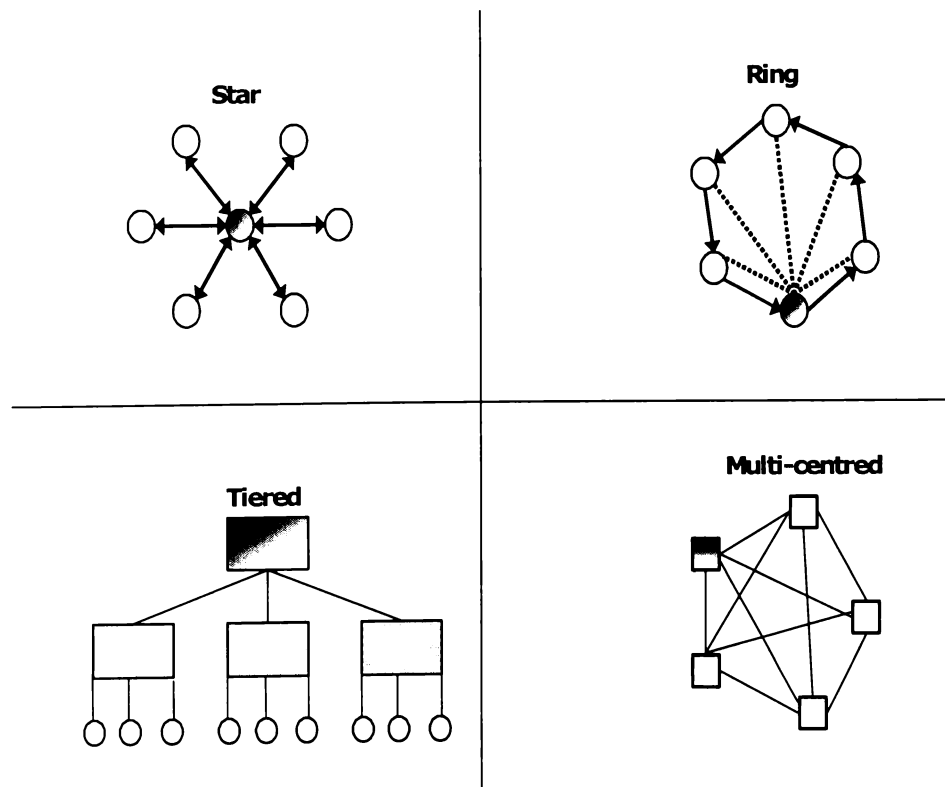
However, before moving on to investigate the value in the links between networked organisational members, it is useful to examine some basic network

frameworks. Several frameworks have been developed in an attempt to explain the underlying structural and organisational dynamics (Alter & Hage, 1992; Liu & Brookfield, 2000). Liu and Brookfield's (2000) framework, which is based on the emergent network forms for suppliers in the Taiwanese machine tool industry, is the one used here. They found three basic network types: dispersed, concentrated, and multi-centred (see Figure 1). Dispersed networks take the form of either *star-like* structures or *ring-like* structures. Most dispersed networks were found to begin as a star-like structure, for example with supplier orders being organised by the *centralised lead* manufacturer that after some time becomes routine, at which time the ring-like structure emerges and the processes are more rationalised. By now the lead figure has moved from the centre, while retaining a coordinating function. Concentrated networks also have a lead organisation with a tiered shape structure. In this network form smaller organisations perform specialised tasks. In contrast, the multi-centred network has no designated figure of control and each organisation is responsible for performing specialised tasks.

After identifying the nature of the nodal points and several generic structural forms, it is important to examine the content that flows along the ties or value conduits that unite these organisations. Ebers (1997) identified three dimensions that describe the content of these relationships. These include: resource flows, information flows, and mutual expectations. From an economic perspective, the flow of complementary resources is a key driver in the formation of dyadic and embedded ties when barriers to full integration exist (Richardson, 1972). Scholars such as Dubois and Hakansson (1997) suggest that the nature of the embedded ties depends upon the properties of the resources that are exchanged between organisational members, in particular, on either their ability to reduce costs or provide differentiation benefits. They argue that the governance mechanism chosen for a particular network relationship depends on the type of resources exchanged, along with the history of the relationship. Furthermore, Lomi and Grandi (1997) suggest that the density and nature of other linkages entered into by an organisation can influence the mode of governance, with specific resource types being more likely to lead to network relationships than other types.

The second of Ebers' dimensions examines the value of information flows. Sampler (1998) argues that information flow is an important intangible resource that serves to bind relationships between actors within dyadic and embedded ties. This resource may vary in terms of its degree of usefulness in alternative contexts and situations. A framework developed by Morrison (1993) identified five specific content areas that individuals who had recently entered into dyadic ties with an organisation typically sought information in. These information types included: technical information; referent information regarding role demands; performance feedback; normative information about expected attitudes and behaviours, and social feedback. While Morrison (1993) provides a comprehensive framework of specific information content areas, neither the potential effects of differing participant responses or the context in which the information is shared are examined.

Figure 1: Network Type Framework



(Adapted from Liu and Brookfield, 2000, p. 331)

Taking a strategic perspective, Sampler (1998) suggests that the contextual characteristics of information include *information separability* and *information specificity*. Information separability refers to the ability to increase the amount of resource information through its electronic capture, store, manipulation and transfer. The information types identified included *knowledge specificity* and *time specificity*. Information specificity is characterised by knowledge specificity that refers to the extent to which the use of information is limited to particular individuals. Time specificity refers to the extent to which the time span for the attainment and/or use of information is limited. As well as this, a number of scholars including Granovetter (1973) and Rowley, Behrens, and Krackhardt (2000) have examined other characteristics of information that include the variation in the quality of exchange over close and more distant embedded relationships. So, the amount, the quality and the nature of information shared along the ties that connect the actors are influenced by a considerable number of variables (Stinchcombe, 1990).

Ebers' third dimension, partner expectation, is suggested by Gulati (1998) to be an important factor in the initial creation process, the evolutionary life, and ultimately in the success or otherwise of alliance relationships. Arino and Doz (2000) in a study on alliance failures found it was more important to consider the real and perceived reasons for the gap between expectations and outcomes, rather than the gap itself. When causes for the gaps were misdiagnosed by partners, this misdiagnosis often led to suspicion and damage rather than positive corrective action. Therefore, what partners expect in terms of alliance payoff becomes an important determinant of individual behaviour and cooperation (Parkhe, 1993b; Gulati, 1998). Khanna, Gulati, and Nohria (1998) argue that individual organisations should begin by comprehending the relative scope of the proposed alliance in relation to the entire market set in which the organisation operates. The external opportunities available to each partner are also likely to greatly affect that organisation's behaviour and the cooperative dynamics within the alliance (Gulati, 1998). Moreover, how each partner views the alliance structure and its economics can also be important determinants for cooperation and

determining ways in which each partner can unilaterally affect the alliance outcome (Gulati, Khanna, & Nitin, 1994).

Inter-organisational Embeddedness

The *embeddedness* concept, which comes from the sociology and economics literatures, argues that value in terms of economic action is embedded or influenced by the social structure in which it is situated (Granovetter, 1992). This concept is central in explaining how networks operate on a different logic of exchange than that which occurs in arms-length, open market situations. Open market transactions have typically recognised value in impersonal exchange ties and the maintenance of loose connections with others, while close relationships with exchange partners have been valued in networks (Powell, 1990). Uzzi (1997) argues that the main difference between market and close exchange relationships is the structure and quality of the exchange ties, referred to as the logic of embeddedness.

The key implication is that the level of embeddedness in an exchange system produces opportunities and constraints that are particular to network forms of organisations and that result in outcomes not predicted by standard economic explanations. (p. 676)

As a result, Uzzi (1997) suggests that embeddedness creates economic opportunities that are difficult to replicate in market situations.

Uzzi (1996) argues that the degree and nature of embeddedness of an individual organisation within a network is influenced by the network type, its structure, the position held by the organisation within the network, and the types of inter-organisational ties the organisation maintains. Organisational networks function within

an embedded logic of exchange that promotes economic performance through interfirm resource pooling, cooperation, and co-ordinated adaptation but that also can derail performance by sealing off firms in the network from new information or opportunities that exist outside the network. (Uzzi, 1996, p. 675)

The variables or mechanisms responsible for creating the embedded interorganisational ties include *structural, relational, and positional*

embeddedness (Gulati & Gargiulo, 1999; Granovetter, 1992; Uzzi, 1996). These different embeddedness mechanisms and the interrelationships between them are now discussed.

Structural embeddedness is described by Uzzi (1996) as, “how firms are linked to their network and the conditions that determine their access to the benefits circulating within the network” (p. 674). So, the central concept within structural embeddedness surrounds the uniqueness of the structural pattern of an organisation’s interrelationships within a network and their potential to provide competitive advantage (Gulati, Nohria, & Zaheer, 2000; Granovetter, 1992). Organisations may benefit from the relationships they develop not only with each other, but also from the ties to other organisations to whom they are connected (Gulati & Gargiulo, 1999). These third parties may then go on to provide indirect links between the original parties, thus promoting the transmission of potentially valuable information and shared views across the entire network (Gulati, 1995; Uzzi, 1996).

Jones et al. (1997) argue that structural embeddedness is a key factor in understanding how social mechanisms influence the coordination and sanction of exchanges within networks. More specifically, Granovetter (1985) suggests that prior knowledge of how members interact is a good indicator of likely future interaction patterns, and so, becomes important in predicting the extent and nature of information diffusion within the network, leading to the development of institutional values, norms and shared behavioural expectations (DiMaggio & Powell, 1983). Organisations then, at the individual level, can decide on the extent to which they want to develop these resultant synergies (Gulati, 1995).

Apart from Jones et al. (1997) and Gulati (1998), research on identifying the points of value within structural embeddedness remains relatively sparse (Khanna et al., 1998; Pavlovich, 2000). Gulati (1998) promotes structural embeddedness from a social network perspective. This view highlights the influence of the social context in which actors are embedded, including the status and position of actors on economic actions and the strategic direction of the network. Gulati

acknowledges the singular focus of structural embeddedness from a social network perspective, while Jones et al. (1997) take an overall view. Jones et al. (1997) identify four components of structural embeddedness. These include: a) restricted access (status maximisation and relational contracting may reduce coordination costs and facilitate the safeguarding of exchanges); b) macroculture (that promotes the sharing of widely held values, beliefs, assumptions and rules between members); c) collective sanctions (which safeguard exchanges, whereby group members punish others who have violated group norms, values or behaviours), and d) reputation (whereby member reputation becomes important for exchanges, especially in times of uncertainty and customisation).

In a further attempt to understand the value in the relational characteristics of structural embeddedness, Rowley, Behrens, and Krackhardt (2000) link this concept to *tie density* and *tie sparsity*. Networks with a large number of interlinking ties are typically referred to as high density (Baum & Oliver, 1996), while networks with few ties are referred to having low density or sparse connections. Tie density has typically been associated with increased levels of trust at the network level, since information flows between closely connected members and mutual third parties share mutual concerns for their reputation (Rowley et al. 2000; Walker, Kogut, & Shan 1997). Dense networks have also been associated with increased trust at the public level, through increased monitoring and linking of organisations within the institutional environment. Coleman's (1988) *closure* theory supports this view. The closure argument basically claims that network members, who can be either individuals or organisations, are more likely to accrue advantages in dense networks than from networks with few members, for the aforementioned reasons.

The second key construct within inter-organisational ties, relational embeddedness, investigates the nature and value of the various relationships between network members, as reflected by the quality and depth of information passed between these ties (Jones et al. 1997). The frequency of partner interaction and their level of resource commitment (Rowley et al., 2000) typically measure the degree of relational embeddedness. Strong tie arrangements such as

with joint ventures usually involve considerable planning and investment of resources, and as a result are more likely to enter into fair negotiation, and the cultivation of long-term cooperative ties. While relationships developed in arms-length situations will typically involve less resource investment; here the focus is often more on immediate economic gain (Uzzi, 1997).

Strong ties have been associated with the value captured within the exchange of high quality, fine-grained information (Uzzi, 1996) that is more proprietary and tacit than the price and quantity data, typically shared in arms-length relationships (Powell, 1990). Such quality information may be used to enter into joint problem solving and shared strategies (Uzzi, 1996). Uzzi (1997) suggests that the sharing of fine-grained information can also lead to a reduction in information asymmetry between parties that ultimately leads to resource maximisation and increased competitiveness. Furthermore, organisations may provide each other with access to privileged or difficult to attain information, building trust, reciprocity and mutual forbearance, while reducing uncertainty within the relationship (Gulati, 1998; Larsen, 1992; Pavlovich, 2000).

Strong relational ties have also been associated with providing value as a social control mechanism to monitor partner behaviour (Rowley et al., 2000). Since the coordination and control mechanisms for guiding dyadic and triadic relationships are usually limited in either their presence or effectiveness, members often develop their own informal behaviour monitoring system. Other group members may punish members who violate the values, norms, or goals established by the network. Since ties between actors facilitate the diffusion of norms, it follows that networks with strong ties are likely to develop shared behavioural expectations more quickly, and at a rate that is directly proportional to the increase in the number of ties (Rowley, 1997).

However, overly cohesive relationships may cause some limitations (Rowley, 2000). Often a lack of coordination and control, that is typically present in hierarchical organisations, may lead to opportunistic behaviour by some participants (Williamson, 1985). Also, it can take considerable time to establish

the trust required to access new resources and reciprocity. During this time organisations may be required to forgo any individual short-term gains (Larson 1992; Rowley, 2000). At an industry level over reliance on strong ties may lead to the generation of potentially redundant information by some, as isolated clusters of organisations exchange similar information (Burt, 1992; Granovetter, 1973).

In contrast to the value creating potential of strong ties, Granovetter (1973) provided evidence in support of the strength and cohesive power of weak ties. Weak relational ties have been found to provide information bridges to distant others, giving individual network members access to new opportunities, ideas, and contacts. As cohesive groups are more prone to knowledge constriction, those organisations joined by weak ties are more likely to expand their individual knowledge base more quickly. Organisations connected by weak ties are also more likely to exchange novel information from divergent parts of the network. Burt (1992) argues that since weak ties provide the only connection between two otherwise separate groups of strongly interconnected organisations, the weak tie argument is just as much about structural embeddedness as it is about relational embeddedness.

Burt (1982) expanded the weak tie concept by theorising about the nature of *structural holes*. A structural hole is defined as the chasm (or buffer) beneath the bridge that supports the flow of information between two non-redundant ties. These ties may operate at either the individual, organisation or industry level. He argues that organisations occupying a position on one side of a structural hole are likely to have strong cohesive links between them, whereby fine-grained, high quality information is shared; however, the information exchanged is likely to be similar, and therefore, ultimately it becomes redundant. Burt argues that information redundancy can come about, for example, from the exchange of same type information between structurally equivalent links, such as that operating between a head office and several regional offices.

Burt (1982) suggests there is value in the form of social capital to be leveraged from the participation in, and control of information diffusion, between these two groups on either side of the structural hole. First, he notes that value can be derived from the brokering role, whereby organisations who occupy the boundary spanning role are argued to derive two kinds of advantages over those organisations positioned within smaller but denser networks. These include access to a potentially greater volume of information, and being better positioned to engage in brokerage that will ultimately have *control benefits* that will influence transaction outcomes (Burt, 2001). Second is the value derived from the *informational benefits* to the individual organisations on either side of the structural hole, as access is provided to a broader range of often more novel, and timely information, especially when organisations are situated in networks with a large number of structural holes. Additional advantages are suggested to accrue to individual organisations on each side of the chasm as they build relationships with multiple disconnected clusters (Burt, 2003). Burt (1992) suggests that building networks with large numbers of indirect ties can be an effective way for some organisations to leverage the benefits of network size without incurring the network maintenance costs associated with direct ties (Burt, 1992).

It is important to note that the presence of a structural hole between two groups does not mean that organisations in each group are unaware of one another. It merely means that each organisation is more focused on pursuing its own activities so that it does not attend to the activities of organisations in the other group. Burt (2003) gives the example of the Xerox company in the 1980s where regional operations had evolved independently but with technological logistics enabling just-in-time production systems, “There was now value in bridging the structural holes between regional operations” (p. 172).

Entrepreneurial brokerage organisations are suggested to leverage situations where groups are known to one another by strategically moving “accurate, ambiguous, or distorted information between people [or organisations] on opposites sides of structural hole[s] in the routine flow of information” (Burt, 2003, p.157), especially in situations of high uncertainty (Burt, 2000). In addition,

Gargiulo and Benassi (2000) note that structural hole theory is well positioned to create value through adaptation and flexibility, while retaining the autonomy of individual organisations. However, Burt (2001) does caution that the value of the broker declines with subsequent entrants down to a point where equilibrium is reached. At the level where

value is marginally higher than the cost of bridging the hole. Regardless of the rate of decline in value, there is no competitive advantage at system equilibrium to a network that spans structural holes because sufficient people have networks across the structural holes so as to eliminate the value of additional people spanning them. (p. 231)

This situation occurs when network entrepreneurs have successfully moved the market toward equilibrium by eliminating value holes in the market. Value accrual in structural holes, therefore, appears to be about short-run advantage on the way toward equilibrium “that is, unless the system is forever on its way to equilibrium. Short-run advantages of brokerage could be a long-run advantage, for example, if information grows quickly out-of-date” (p. 231).

Etzioni (1988) informs the relational embeddedness literature from a slightly different perspective, where he examines the value in identifying individuals as “undersocialised” (p. 13) beings, when compared with “properly associated” (p. 13) individuals who engage in, and benefit from, the collective thinking, values, and norms of others. He gives the terms *I* and *We*, respectively, to these two groups of individuals. Etzioni (1988) then moves on to examine how value might be identified and leveraged, especially at the *We* level by arguing that the commonly held neoclassical perspective on rationality typically overlooks the affective role of values, emotions, and human potential, all features Simon (1959) had intended within his bounded rationality concept.

The third key construct within inter-organisational ties, positional embeddedness, highlights the impact of the positions organisations occupy within a network on their ability to create value (Uzzi, 1996). Positional embeddedness “is rooted in the network models of equivalence and centrality that capture the roles actors

occupy in a system, irrespective of the specific alters involved in playing those roles” (Faust, 1988, p. 316).

Positional embeddedness, therefore, moves beyond capturing the benefits to be derived from sparse/dense ties and strong/weak ties to reveal the informational benefits available to organisations from particular positions within the network. The position an organisation holds within a network may influence its ability to access and leverage potentially valuable streams of information, through either direct or indirect ties (Gulati & Gargiulo, 1999). The impact and implications of the nodal or central organisation become key to understanding the positional embeddedness process (Granovetter, 1992; Jones, Hesterly, & Borgatti, 1997).

The structural positioning of the centralised individual and/or organisation within a network has become a key area for analysis. *Centrality* implies an elevated position and subsequent value for that figure when compared to those occupying non-centralised positions. Centralised organisations may accrue value from either having ownership or access to a higher degree of valued resources than other network members (Tsai, 2000). It is well documented that central organisations often have access to a greater flow of information (Freeman, 1979) that they can leverage to create further value for themselves and their partners. The central organisation is in a position to provide improved and increased access to a greater quantity and quality of information; furthermore, they can play an important role in developing a coordinating function in terms of a shared strategy for peripheral partnering organisations (Powell, Koput, & Smith-Doerr, 1996). In addition, the effective supports and systems provided by the central organisation can provide value in terms of developing an atmosphere of trust and reciprocity (Lorenzoni & Baden-Fuller, 1995; Sydow & Windler, 1998).

The identification of the centralised organisation becomes important in interpreting the behaviour of individual organisations. It is suggested that when a network becomes embedded in a larger network, designating the most central position becomes even more complicated (Brass & Burkhardt, 1992). Of the several different measures of network centrality, Freeman’s (1979) framework

that measures the *degree*, *closeness*, and *betweenness* of the centralised individual in relation to other actors is the most popular. The degree measure of centrality is calculated by counting the number of adjacent links either to or from other individuals. The closeness measure of centrality examines direct and indirect links, by measuring how close an individual is to all other individuals in the network. The betweenness measure of centrality identifies the extent that individuals are positioned between pairs of other individuals on the shortest paths connecting them. This measure is suggested to be particularly appropriate for assessing power in communication networks, where an individual and/or organisation may withhold or distort information while in transition. Though Freeman's (1979) original work focused upon the centralised individual within the social network, his work has been extended to that of centralised organisations (Krackhardt, 1990).

Central organisations have been associated with power and influence (Brass & Burkardt, 1992; Krackhardt, 1990). Building on a dependency framework and the resource dependence theory, power in this instance is taken to mean that A has power over B, by the extent to which B depends on A (Brass & Burkardt, 1992). Centralised organisations are in the privileged position of often having early access to information as well as being closer than many other network members to the source of this information (Burt, 1992). These organisations can leverage their centralised position by acting as brokers or gatekeepers restricting access to information between network members (Jones et al., 1997). Such organisations may strive to build or consolidate their central role and seek further opportunities by filtering the accurate information they have about existing network members through an intelligence web (Krackhardt, 1990). The centralised organisation may also use its position to attract new members and increase the contact between indirect ties (Gulati & Gargiulo, 1999).

Conversely, the central firm is also dependent upon the network organisations to operate. Often the power of the central organisation is derived less by its own set of resources than from what it can mobilise through its contacts. In this instance, the more contacts a central organisation has, the stronger its potential advantage

(Madhavan et al. 1998). Just as the central organisation may exercise power over the resources it owns or has access to, so too may the other network members. Those member organisations that become aware of the value of centrality may continuously attempt to improve their position. They may connect to and choose to share resources with other organisations that they perceive to be more central to their requirements, while simultaneously abandoning relationships with partners who may either be currently central or nearing centrality, but perceived as less valuable, thus reducing the latter's centrality (Madhavan et al., 1998).

Embeddedness Summary

In sum, strong ties and highly interconnected dense network ties have been found to some extent to be substitutes for one another depending upon the industry context. Rowley et al. (2000) examined both types of embeddedness against organisational performance. These authors found strong ties to be less advantageous in dense networks since the network structure already has a set of behavioural norms to guide action. An organisation operating within a dense network may, therefore, be wiser to establish new ties with non-redundant actors, rather than to invest in strengthening its existing ties. Organisations in unstable industry environments were found to be more likely to benefit from weak ties, while strong ties and dense networks were more advantageous to those operating in stable environments.

In reviewing the strong tie – structural hole relationship, there is an increasing body of research that has examined the tension between two opposing views on how networks create social capital. The value maximising potential of Coleman's (1988) closure argument that suggests dense networks promote a cooperative and trusting environment contrasts with Burt's (1992) structural hole theory that suggests cohesive ties are a source of rigidity that stifles the coordination of complex tasks and promotes the transfer of redundant information (Hite & Hesterly, 2001; Gargiulo & Benassi, 2000; Walker, Kogut, & Shan, 1997). Recent efforts have been made in an attempt to reconcile these differences (Rowley et al., 2000).

Walker, Kogut, and Shan (1997) support Coleman (1988) when they argue that social capital in the form of long term relationships is preferable to structural holes in the biotechnology industry. They argue that in such circumstances structural stability is desirable and that any self-interested behaviour by partners is likely to jeopardise the considerable time and effort already invested in the relationship, while those shorter term network relationships are less likely to benefit from any real established structures. Furthermore, they argue that the structural hole theory may be more relevant to those networks of market transactions than to cooperative relationships.

Hite and Hesterly (2001) demonstrate that both cohesive and sparse networks promote organisational performance when they are aligned with the organisations' evolving resource requirements. They found that when organisations first emerge within a network their need is greatest for socially embedded ties positioned within cohesive identity based networks. As organisations grew their networks were found to evolve towards ties based on economic costs and benefits where a balance emerges between embedded and arms length relationships. These authors observed a distinct shift from networks that focus on cohesion to those that exploit structural holes. In a further study on the effects of network evolution, Gargiulo and Benassi (2000) observe that centralised organisations that fail to move beyond the safety of close and cohesive networks in the event of a significant change in the task environment may jeopardise their role and the flexibility provided by structural holes.

In contrast to the evolutionary focus on structural holes, Burt (2000) suggests that the informational and control benefits of brokerage across structural holes is likely to be most valuable to individuals or organisations involved in unique tasks with high levels of uncertainty and few peers, rather than to those individuals or organisations who are involved in tasks with many peers and a low degree of task uncertainty. In such cases closure is more likely to lead to higher levels of performance. So, Burt (2000) argues that depending upon the context under review, both structural holes and network closure can result in the production of social capital.

Overall, the research on embeddedness has often produced findings that have overlapped with regard to how organisations should position themselves within the network, and which ties are likely to bring most value in terms of overall economic gain. Strong and weak ties are both argued to serve as trust based mechanisms and have been positively related to increased organisational performance (Rowley, 1997). Uzzi (1996) suggests that optimal networks are composed of neither strong ties nor arm's length relationships, but rather an integration of the two. The next section moves on to examine the value embedded within the dynamic nature of networks, including the role of the Internet.

4.4 Network Evolution and Dynamics

As organisations enter into an increasing variety of inter-organisational networks, the nature of these networks is becoming more dynamic (Gulati, Nohria, & Zaheer, 2000). Several frameworks have been developed to explain the evolutionary process that dyadic partners move through (Kanter, 1994; Reuer & Zollo, 2000). However, often these frameworks have either not extended their analysis to a portfolio of ties or have been unable to explicitly examine the large number of potentially complex and dynamic exogenous factors such as the introduction of the Internet, and endogenous factors that include the cooperative capabilities of organisations, that come into play in shaping the future direction of a network. Since the evolutionary paths that dyadic and portfolio partners follow may have important consequences for their management, value creation and ultimately competitive advantage (Doz, 1996; Hamel, 1991; Doz & Hamel, 1998) it is important that these factors are examined.

Impact of the Internet

The Internet could arguably be one of the most prominent exogenous factors currently influencing the evolutionary path of the network, making possible new business links such as customer-to-business (C2B) and business-to-business (B2B). As a result, new and novel value drivers within electronic business such as *efficiency*, *complementarities*, *novelty* and *lock-in* have been identified (Amit & Zott, 2001). In addition, new business forms such as the B2B electronic network, connecting buyers and suppliers together via an intermediary have emerged

(Phillips & Meeker, 2000). The B2B electronic network has brought with it promises of increased efficiencies, reduced costs, and enhanced connectivity; however, to date there is scant empirical research in this area.

When focusing on the value creating potential of *Internet technology*, it has been suggested that organisations can now expect enhanced capacity in their ability to capture, manipulate, store, and transfer information (Shapiro & Varian, 1999). Upon further analysis, there appears to be consistency with Galbraith's (1973) insight, where he suggests that technology affects structure by influencing the amount of information needing to be processed during a task. The Internet has the capacity to absorb, store and automate increasingly significant amounts of information, while at the same time it has the potential to significantly reduce or eliminate the need for correspondingly large or complex information processing structures. As well as this, the Internet has the capacity to create or generate new information opportunities. Zuboff (1985) suggests that such capabilities render transparent those "activities that had been either partially or completely opaque" (p. 104), or simply unavailable, prior to the Internet. Depending on which of these effects is highlighted at a particular time, or situation, then the technology may potentially be expected to have very different structural implications (Scott, 1990).

Since the Internet has brought with it new value opportunities in terms of the ability to codify tangible data, Clarke and Clegg (2000) argue that the acquisition and management of intangible data or intellectual capital is increasingly becoming a critical resource as organisations, processes, and products become more knowledge intensive. This is especially so, due to the relatively low marginal costs or technical equivalency (Zuboff, 1985) incurred in the duplication of information, the ease of transferability and the issues arising from increased levels of transparency (Porter, 2001). Potential sources of intellectual capital are suggested by Dzinkowski (2000) to be embedded within the information that surrounds the integration of human capital (employee know-how, skills and capabilities); organisational capital (management processes, organisational structures), and customer capital (customer loyalty, supplier relations, goodwill). Rivette and Kline (2000) suggest that trade secrets developed by organisations,

such as those pieces of intellectual work involved in establishing a business plan, become very difficult to keep secret, while patents that protect core technologies and business methods are the most tangible form of intellectual capital, enjoying the strongest legal protection.

A focus on proprietary issues can, however, be somewhat limiting when the source of competitive advantage lies more with innovative business methods than in its products or services. Whatever the method chosen to protect intellectual capital, there appears to be unanimous agreement of its importance for the long term survival of organisations within the current electronic environment (Phillips & Meeker, 2000; Rivette & Kline, 2000; Shapiro & Varian, 1999; Woods, 2000). In line with Zuboff's (1985) findings on advanced information technologies, it would appear that the Internet has variable effects on structure, including the ability to *automate* and *informat*e. When these two capabilities are combined within the Internet "every application not only applies instruction to equipment, but can convert the current state of product or process into information" (Zuboff, 1985, p. 105) to a potentially global audience with heightened levels of transparency.

Internet technology has provided organisations with the capability to offer improved and increasingly effective specialised services through the availability and development of increasingly sophisticated data systems. Information can be meaningfully separated and then recaptured in digital form – a characteristic of information technology that Sampler (1998) refers to as *information separability*. The codification of knowledge through such systems and the low transmission costs may eliminate the need for direct contact between buyers and suppliers, thus enhancing connectivity and the rapid diffusion of knowledge (Clarke & Clegg, 2000).

Nevertheless, McDermott (1999) cautions against viewing information merely as a commoditised element, suggesting that the leverage of information, especially non-routine data, can be complex and is likely to be highly dependent upon the ability to build relationships. McDermott (1999) suggests that this situation arises

not because individuals are reluctant to use information technology, but rather since they may need to share knowledge that is neither obvious, nor easy to document, and would, therefore, benefit from a human relationship to process understand and share it. “Ironically, while information technology has inspired the knowledge revolution, it takes building human communities to realise it”. (McDermott, 1999, p. 22). Furthermore, Sawhney and Parikh (2001) argue that as new technology markets in the current economy become increasingly diverse they will bring about further changes in relational structures. They predict a movement of *power* from the *inside* to the *out* as there is mutual recognition of the power held by those on the peripheries. Such features are bringing about an increased awareness of the value potential to be captured from the increased modularity and flexibility in organisational processes and structures facilitated by the Internet.

Modularity

The need for flexibility in organisational approaches can be traced back to the contingency approach, where proponents such as Lawrence and Lorsch (1967) identified the value in understanding the interdependence between organisations and their environment. Galbraith (1973, 1977) was one of many researchers who extended this perspective. He argues that three variables: interdependence, complexity, and uncertainty, all tap a single, deeper underlying dimension that creates increased information processing demands on organisational structure in order to coordinate activities accurately and efficiently. Higher levels of diversity, uncertainty, and interdependence in the work being performed, he argues are positively related to the requirement to process larger amounts of information. Galbraith (1977) claims that it is the demands for communication that shape the organisational structure, underpinned by technological complexity leading to structural complexity, uncertainty encouraging organic forms, and interdependence promoting demands for coordination.

Following on, Eisenhardt and Brown (1999) propose that organisations are wise to consider new and flexible evolutionary processes, especially within networked structures. Moss-Kanter (2001) suggests that successful organisations in the information age are more likely to demonstrate a tension between being highly

dynamic and adaptive. In order to achieve this situation, Eisenhardt and Brown (1999) recommend organisations engage in processes such as *patching* to build a more defensible position. Patching is a process of mapping and remapping business units in order to create an adaptable mix of highly focused, strongly coordinated networked organisations that can respond to changing market opportunities. While the focus of patching is flexibility, the process follows a pattern of usually small-scale, frequent changes. The authors suggest that patching be done quickly with the emphasis on getting the patch near right and adjusting it later.

On a similar note, Moss-Kanter (2001) stresses the importance of *acting now* by *sensing and responding* to buyer needs rather than on the traditional *make and sell*. However, she places a stronger emphasis on the importance of innovation in times of uncertainty, suggesting that innovation is at the heart of e-culture, with it being wiser to launch small experiments and learn from the results than waiting for perfection. These almost constant changes require management to engage in routine changes in the web of collaborative links that include information and shared asset exchanges that Eisenhardt and Galunic (2000) term *co-evolving synergies*, resulting in a shifting web of relationships that leverage new opportunities while discarding deteriorating ones. Thus, the modern corporation is viewed as a dynamic community or network that focuses on modularity and dynamic capabilities to achieve a balance between competitiveness and cooperation, and order and disorder (Galunic & Eisenhardt, 2001). It would appear that these views may be reflecting a level of uncertainty that is not just a function of technology but could also be a response to other issues such as boundary transaction uncertainty, identified by Susman and Chase (1986), as a response to changing customer demands. Upon closer inspection it needs to be questioned whether this pattern of dynamic change is a response to structural and or technological influence and what the interrelationship between the two might be.

Gray and Yan (1997) have likened the evolution of dyadic ties to a punctuated equilibrium model where discrete changes in relationship formation patterns have

coincided with changes in the environment. Madhavan et al. (1998) support this view in their examination of the evolution of patterns of structural embeddedness within industry networks. They suggest that the effects of *environmental jolts* such as changes in competition and key industry happenings on structure bring about evolution trends. These authors reported that structure reinforcing and structure loosening behaviour could be predicted in advance, with structure reinforcing behaviour being used by more larger or more dominant organisations to reinforce network structure. In contrast to the punctuated equilibrium theory, authors such Eisenhardt and Galunic (2000) suggest that environmental jolts are now the norm in this highly turbulent environment, and we need to move beyond this to view inter-organisational linkages as having new opportunities for evolution that are to be found within co-evolving relationships.

The concepts of patching and acting now can be linked to Simon's (1981) model of *decomposable systems* in the natural environment. Simon (1981) suggest that when an organisation contemplates change its first task is to define its inner environment, in terms of its goals, and to understand its limits with regard to its capabilities for adaptive and rationale behaviour in "gathering information, drawing inferences and making complex computations" (p. 61). Having defined its inner environment Simon (1981) then argues that fulfilment in the inner environment and the extent of adaptation will be constrained by uncertainty and happenings in the outer environment. He suggests feedback and feed forward systems, as well as prediction, to deal with uncertainty, especially in the external environment. Simon refers to the issue of achieving certainty in the face of environmental jolts, in a similar way to Eisenhardt and Brown (1999). Moreover, he argues that in order to survive the outer environment, a balance is required between maximising opportunities, termed substantive reality, together with being aware of the constraints of one's own ability to discover appropriate adaptive behaviour, termed procedural rationality.

In attempting to gain an increased understanding between the inner and outer environment, Simon (1981) identifies the information processing system as two

symbolised units - *humans* and *machines*. Shaprio and Varian, (1999) suggest that the Internet as a machine symbol has the capacity to absorb, store and automate increasingly significant amounts of information, while simultaneously significantly reducing or eliminating the need for complex information processing structures. In addition, the Internet has the capacity to create or generate new information opportunities (Scott, 1990). Sanchez (2003) suggests that B2B ebusiness platforms are in effect modular process architectures for managing increasingly standardised information content and buyer/supplier coordination globally.

The concept of *modular architectures* builds on Simon's decomposable systems. These architectures are suggested to be platforms that encourage substitutability (Sanchez, 2003). Two key aspects within this concept are *modular product architectures* and *modular processes* (Aroroa, Fosfuri, & Gambardella, 2001). Modular product architectures provide a structure where a product design is broken down into independent component parts and then the *standardised interfaces* between the inputs and outputs are identified (Shirley, 1992).

Similarly, modular processes decompose an organisation's key routines and the interfaces between them. Modular product designs can bring about a greater number of product variations, while simultaneously reducing switching time between product runs and also reducing the cost of switching (Sanchez, 1998). Warren, Moore, and Cardona (2002) extend the literature, identifying the modularity antecedents in the market context, (customer/competitor change, volume/margin pressure, and Internet channels). These authors also identify mediating variables in product architecture (entrepreneurial intent, innovative climate, modular structure, and modular processes) in order to achieve strategic flexibility and ultimately firm performance.

The evolvement of networks may not only be influenced by exogenous factors, but also by the impact of endogenous factors. Gulati, Nohria, and Garcia (2000) suggest that ties formed or broken by actors may not only influence their own future behaviour in embedded relationships, but they may also affect the

behaviour of others with the network. Other factors, internal to the network that may influence its evolutionary process include the knowledge or learning environment created, the degree of cooperative activity fostered, and the level of trust developed. These factors are now examined.

Knowledge

It is commonly agreed that knowledge is one of the most strategically important organisational resource, situated at the core of competitive advantage analysis (Grant, 1996). More specifically, the issue surrounds gaining sustainability through knowledge inimitability.

Accordingly, of all approaches to knowledge inimitability between a knowledge holder and a knowledge seeker, strategic alliances constitute perhaps the most adequate, but nevertheless challenging vehicle for internalising the other's competency. (Spender & Grant, 1996, p. 561)

Needless to say there has been an increase in the level of interest on how organisations learn from their partners and incorporate such learning into organisation specific capabilities that ultimately lead to the development of new competencies, routines, and structures (Kogut & Zander, 1996).

Nonaka (1994) proposes a theory of knowledge creation based upon the interaction of two dimensions of knowledge. First, is the often-quoted continuum between explicit and tacit knowledge. Explicit knowledge is identified as readily codified data or information that can be recorded in words and numbers, and is easily expressed, while tacit knowledge is defined as the *knowing* that typically exists in the minds of talented individuals and is more difficult to identify and codify (Powell, 1990). This knowledge type often underlies the development of organisational processes and routines that competitors cannot easily imitate or understand (Kogut & Zander 1996; Polanyi, 1967; Nonaka, 1994). Nonaka, Reinmoeller, and Senoo (1998) argue that it is the convergence between these two kinds of knowledge that is at the heart of knowledge creation. The second dimension of Nonaka's (1994) knowledge creation theory is the knowledge spiral that creates a knowledge exchange between individuals, groups, organisations, and inter-organisational members. Here it is suggested that as knowledge moves up the spiral from the individual it becomes increasingly enriched along the way.

Grant (1996) identifies three factors important to capturing value in the knowledge transfer process. First is *efficiency in integration* which refers to the degree of common knowledge, the frequency and variability of task performance and the structure of the organisation. Second is *scope of integration* which refers to the extent to which specialised knowledge complements rather than substitutes production and the degree of difficulty competitors have replicating knowledge in a capability when the knowledge is of significant scope. The last, *flexibility of integration*, refers to the continual renewal of competitive advantage by extending existing capabilities through additional knowledge and utilising existing knowledge to configure new capabilities.

In their study on the Toyota Network, Dyer and Singh (1998) identified four organisational resources and capabilities that include knowledge sharing processes and routines in the understanding of competitive advantage at the network level. These include *relation-specific assets* (the ability of partners to generate rents dependent upon the length of safeguards and the volume of exchange between partners), and *knowledge-sharing routines* (between partners defined by the depth of partner-specific *absorptive capacity* and the extent to which transparency and reciprocity are encouraged). Note that absorptive capacity is a term first developed by Cohen and Levinthal (1990) to conceptualise the “ability of a firm to recognise the value of new, external information, assimilate it, and apply it to commercial ends” (p. 128). The third knowledge sharing process *complementary resource endowments* (suggests the greater the recognition and combination of resource synergies among partners the greater the combined advantages, and also the recognition of prior experience and access to other complementary resources to generate advantages); and lastly, having an *effective governance mechanism* (the strategic advantages to all partners when informal self-enforcing processes are employed rather than third party enforced mechanisms).

Dyer and Nobeoka (2000) developed further insights within the Toyota network, identifying methods used to solve three fundamental dilemmas in knowledge sharing. First, is Toyota’s ability to motivate network members to openly share knowledge and participate. Next is their ability to prevent members from free

riding by either exiting or failing to share further knowledge once acquired. Last, is their ability to share both tacit and explicit knowledge, efficiently and effectively among a large group of individual members.

Just as there are processes and routines that actively encourage knowledge transfer, so too are there constructs that can work to provide barriers to knowledge assimilation. Szulanski (1996) discovered several constructs that may clearly act as motivation related barriers to knowledge. These include the effects of absorptive capacity, causal ambiguity, and the perceived degree of difficulty in the relationship between the source and the recipient. Two important points are highlighted here with regard to exploiting knowledge in fast changing environments. First, at an individual level, learning was found to be more difficult in novel situations, and likely to increase only incrementally. Second, at the organisational level, when an organisation ceases to invest in its absorptive capacity it may never move on to fully absorb and exploit the new information regardless of its value. Note that the concept of absorptive capacity can act to both impede and enhance knowledge transfer.

Both Pavlovich (2000) and Lane and Lubatkin (1998) extend the absorptive capacity construct to that of relational absorptive capacity arguing for the interdependence of learning between the nodal points within the network structure. Lane and Lubatkin (1998) suggest that in a network setting organisations do not necessarily always have equal capacity to learn from all other organisations. Instead, they suggest that dyadic learning is influenced by the extent to which each organisation has relevant and shared knowledge bases, structures, practices, values, and commercial objectives. Makri (1999) provides a three-step framework to evaluate potentially suitable learning partners within this construct. The framework suggests an organisation should be aware of its prospective partner's a) know-what (basic knowledge), b) know-how (decision making and compensation), and c) know-why (project preferences). Makri argues that individuals within the organisations are more likely to learn from those to whom they can relate.

A further potential barrier to the transfer of knowledge can result from *causal ambiguity*. Since tacit knowledge is organisation specific and often difficult to encode or decipher, it presents a quality that is not easily transmittable and is potentially richer than universal knowledge (Lei, Hitt, & Bettis, 1996). Barney (1991) argues that it is these very values within tacit knowledge that through causal ambiguity create high barriers to entry for other organisations. Lei et al. (1996) suggest that the causal ambiguity factor, or more importantly its absence, is also important within an organisation. These authors give an example where the research and development process can be important in developing tacit knowledge; however, the actual implementation of new technologies is often dependent upon a much larger mass of previously acquired knowledge embedded within the organisation. The presence of causal ambiguity can be identified by examining the characteristics of knowledge transfer, from the source, to the context, and then to the knowledge recipient (Reed & DeFillippi, 1990). In an empirical study of 147 multinational organisations Simonin (1999) found causal ambiguity to be a full mediator of the following antecedents on knowledge transfer: tacitness, prior experience, complexity, cultural distance, and organisational distance. A further example of causal ambiguity is found in WilliamsF1's ability to retain their winning secret with "the benefit of trust and commitment . . . ongoing corridor meetings and focused, yet impermanent teams are able to create a firm basis for working in a state of flow" (Gilson, Pratt, Roberts, & Weymes, 2000, p. 37).

Now, in more of a definitional summary to this section, Fransman (1998) makes an important distinction between the concepts of knowledge and information, a matter that is often overlooked. He argues that information is essentially a commodity that is capable of yielding knowledge and contained within a closed set. While knowledge is processed information open to intuition and interpretation and can be viewed as an *open set*.

Cooperation

A second internal value feature is cooperation. Network relationships at both the dyadic and portfolio levels may be neither strictly competitive nor cooperative,

but rather a mix of the two, with partner motives typically moving between private and common interests (Gulati, Khanna, & Nohria, 1994). Partners may work together towards a common or agreed upon goal. However, the information, knowledge and access provided to each partner may potentially benefit the private good of one partner more than of the other (Gulati, Nohria, & Zaheer, 2000). When one partner leverages these opportunities in order to gain a greater share of economic returns over their partner, this is termed a learning race. Hamel (1998) argues for the presence of learning races between a number of Japanese and United States alliance partners. He found that many partners from the United States were at a competitive disadvantage since the Japanese partners had entered into a learning race where they exploited their partner's knowledge and experience, while offering very little in return. At the portfolio level, Khanna, Gulati, and Nohria (1998) argue for the presence of learning races from partners involved in a number of ties who may exploit their relationship with organisations only involved in the one tie with them, by learning quickly and then abandoning that relationship.

Kale, Singh and Perlmutter (2000) address the dilemma of learning from partners within a dyadic relationship, while at the same time protecting their core knowledge assets. Whereas researchers have typically viewed the achievement of these objectives as mutually exclusive (Hamel, 1991; Kogut, 1988), Kale et al. (2000) examine the role of relational capital between partners as a potential way to improve cooperative behaviour while reducing competitive conflict. They suggest that relational capital based upon trust that is mutual between partnering organisations creates a foundation for know-how and learning transfer. They argue that happening simultaneously with this process is the curbing of opportunistic behaviour between partnering organisations, thus serving to prevent the leakage of important information between them.

Though authors such as Hamel (1998) have suggested that the value derived from the coordination of organisations within a network may potentially pit one organisation against another, others such as Kogut (2000) argue instead that network capabilities can augment firm level capabilities. Dyer and Singh (1998)

and Dyer and Nobeoka (2000) demonstrate situation this in a series of studies on the Toyota Network. Kogut (2000) suggests “It is through an understanding of networks as knowledge encoding coordination within and between specialised firms in specific cooperative and competitive structures that the missing sources of value can be found” (p. 423). On a number of occasions the network has been argued to be more effective than individual organisations in the development, transfer, and recombination of knowledge due to its superior ability to access a greater diversity of knowledge (Dyer & Singh, 1998). However, if networks are to be effective in knowledge management, it is important that they create coordinating principles that permit coordination among specialised firms (Dyer & Nobeoka, 2000).

Trust

A third internal network value feature is trust. It is suggested that trust is an important requirement in the establishment of high performing networks (Lorenz, 1988). Gulati (1998, p. 303) refers to the trust between organisations as “the confidence that a partner will not exploit the vulnerabilities of another”. The issue of trust may be examined from both a dyadic, interpersonal perspective and also from the broader socio-economic perspective – referred to as consensual ideology (Lorenz, 1988; Powell, 1990). Essentially the point is that the presence of trust within a network generates value, economising on information, search and transaction costs (Carney, 1998). Trust has also been associated with the promotion of increased adaptiveness and flexibility under changing circumstances, where joint maximisation can be enjoyed by those interacting organisations.

Gulati (1998) argues from a social network perspective that trust may be promoted through two main means. First, by serving as an effective referral mechanism through previous ties, where partner skills and values become known and informal personal connections may serve to develop the structure used to organise transactions. Second, social networks can provide an important basis for encouraging enforceable or deterrence-based trust. Under this view each partner becomes aware that the other has much to lose by operating in an opportunistic fashion, thus serving to reduce undesirable behaviour. Linked to deterrence-based

trust is knowledge-based trust that fosters mutual awareness and equity norms. These serve to create self-enforcing safeguards that enable partnering organisations to more readily predict the behaviour of others (Powell, 1990).

Das and Teng (1998) introduce the idea that trust and control operate as parallel concepts in inter-organisational ties. These authors argue that trust and control serve as two distinct sources of confidence in partner cooperation. However, they are not linked by “a simple complementary relationship” (Das & Teng, 1998, p. 510). In order to tease apart the issues related to trust building and the establishment of control mechanisms, they identify four key trust building constructs within dyadic ties. First is risk taking where trust and risk are considered mirror images of each other – with trust leading to risk taking over time and vice versa. Second is, equity preservation, where according to the equity theory of motivation equity and fairness built over time lead to increased levels of trust. Third is, communication, where proactive levels of information exchange increase the levels of trust. Finally, inter-organisational adaptation is where the development of partner adaptation mechanisms serve to meet the cooperative needs of the relationship and in doing so enhance trust. Furthermore, Das and Teng (1998) propose three control mechanisms: *goal setting* for each partnering organisation; *structural specifications* that clearly set out the rules and regulations of the arrangement, and *organisational culture blending* that encourage shared values and norms. They suggest these various alternatives and the interrelationships between them help to increase our understanding of how confidence in partner cooperation is developed.

4.5 Network Performance

Until more recently the issue of performance within embedded and other ties received less attention within the alliance and networks literature than areas such as formation and governance. This situation reflects a number of obstacles, including the identification of appropriate data sources, and the logistics involved in collecting this information. At the dyadic level, earlier research typically focused on measuring the performance of alliances rather than other tie types. These studies usually examined the alliance termination rates and the nature and conditions surrounding the event, such as, industry conditions, equity distribution

between partnering organisations, and prior alliance experience (Gulati, 1998; Harrigan, 1985; Park & Ungson, 1997). While these studies provide useful information surrounding the termination of an alliance, often their contribution in terms of understanding alliance performance was somewhat limited due to many studies failing to distinguish between planned and unplanned terminations and the fact that many successful alliances are often transitory in nature (Bleek & Ernst, 1991; Gulati, 1998).

The difficulty in establishing an accurate measurement criterion for performance was a further issue that plagued earlier research, due to the multifaceted nature of objectives in both embedded and other ties (Gulati, 1998). A number of termination studies implicitly considered performance to be dichotomous variables of success or failure, when in fact there can be gradations of success. Some other studies failed to take into account the asymmetry in performance between partnering organisations, when one organisation achieved its objectives, while the other did not (Gulati, 1998; Hamel, 1991).

Despite these measurement complications, researchers have discovered some key features associated with the multifaceted nature of success in both embedded and other ties (Gulati, 1998). There has been an increasing trend towards analysing the effects of exogenous variables on individual organisation performance in dyadic ties. Some studies at the industry level have measured the effect of stock market trends as a result of alliance announcements, across different alliance types. In a study on the impact of joint venture formation strategies within the information technology sector Koh and Venkatraman (1991) report that the market value of parent organisations generally increased on joint venture announcement. There was some variation, however, in market valuation across different joint venture strategy types.

A series of case studies by Gomes-Casseres (1994) investigated the impact of competing networks across a number of industries. One case examined tie formation and cooperation within the international airline industry. Each airline was involved in numerous dyadic and embedded ties that included production input, distribution, and maintenance organisations. The performance of these

individual organisations was found to be heavily reliant upon the performance of the networks that in turn depended in part for their success upon the larger airline networks within which they were embedded. Another study that investigated the success of competing networks in a specified geographic region, found

By building on the social networks and industrial infrastructure which were created and then abandoned by the established semiconductor firms, these small and medium sized enterprises are pioneering a new Silicon Valley - one which fosters collaboration and reciprocal innovation among networks of specialised producers. (Saxenian, 1990, p. 89)

Further studies have examined the impact of partnering organisations' resources and capabilities on individual organisation performance. Dyer (1998) investigated how specific asset contributions made by individual members impacted upon network performance, in an attempt to explain the difference in performance between Japanese and United States automakers. He found a positive relationship between supplier-automaker specialisation (asset specificity) and performance. In particular, the findings suggest a positive relationship between inter-organisational human asset co-specialisation and both quality and new model cycle time. Site specialisation was also linked to lower inventory costs. As a result, Dyer argues that networks within the auto-industry characterised by close proximity and high levels of human co-specialisation are likely to outperform loosely integrated networks with lower levels of inter-organisational specialisation.

A series of studies has focused on how the characteristics of partnering organisations are likely to affect the performance of other organisations within the network. In a study on inter-corporate technology ties Stuart (2000) found that the advantages an organisation derives from a portfolio of ties depends upon the resource profiles of the partnering organisations. Large organisations and those in possession of leading-edge technological resources were found to have the highest potential value for associates. In line with the transfer of status arguments, Stuart found new and small organisations more often benefited from innovative and large strategic partners than did either mature or large organisations. Dussauge, Garrett, and Mitchell (2000) reported greater levels of learning and capability

development between partners whose original capability contribution was different than when capability contribution was similar. In addition, Ernst (1999) argues that financially strong partners have the highest success rate in alliances, twice that of alliances in which even one partner is weak. Afuah (2000) explains performance at the organisation level by focusing on the capabilities available to the organisation from its network of suppliers and customers, arguing that an organisation's performance is reduced when the technological capabilities of other network members are made obsolete. Gulati (1998) suggests that identifying the specific endogenous characteristics of the network can further refine networks, an idea that is discussed next.

Turning to examine the impact of endogenous variables on firm performance, several studies have investigated the influence of *process* on the outcome of embedded and other ties (Anand & Khanna, 2000; Gulati, 1998). Depending upon the rationale for a particular dyadic tie, an investigation of the processes undertaken by partnering organisations may be more useful in understanding success, than are other measures. This may be especially so in learning alliances (Gulati, 1998). Hamel (1991) suggests that while partners may not be equally adept at achieving their individual objectives, either due to mixed levels of absorptive capacity or that some partners may have competitive as well as collaborative aims, this situation should not detract from the fact that the objectives of the learning alliance have been met. In another study, Anand and Khanna (2000) investigate for the presence of experience benefits to organisations as they enter more alliances. By separating out the alliances into contract types they identified significant differences in the amount of learning, as measured by abnormal stock returns across these contract types. Large learning effects were found in managing joint ventures, while no effects were found for licensing contracts. Within the joint venture category, the highest recording for learning effects was in research joint ventures and the weakest in marketing joint ventures. The authors suggest that this finding indicates that learning effects are more important in situations of greater contractual ambiguity.

The investigation of process can also prove useful in understanding productivity gains within networks. Hutt, Stafford, Walker and Reingen (2000) suggest the ability to communicate and proactively exchange information can nurture close working relationships which serve to reduce the likelihood of failure in dyadic ties. Dyer and Nobeoka (2000) found that the systematic knowledge-sharing processes put in place by Toyota in their network of suppliers led to significant gains in productivity. By creating a strong network identity with rules for participation and entry into the network, Toyota overcame three fundamental dilemmas with regard to knowledge sharing. These include that members are motivated to participate and openly share valuable information; free-loading is prevented; and costs associated with finding and accessing new information are reduced, thus leading to close inter-organisational interaction where production knowledge was viewed as the property of the network which in turn led to significant performance benefits.

In a further series of studies, Zaheer and Zaheer (1995, 1997, 2001) examined the effects of turbulent and hyper competitive environments on organisational performance. In their 2001 study they used global electronic networks within the banking industry to identify the concepts of *alertness* and *responsiveness*. They suggest these factors within individual organisations, especially within the centralised intermediating organisation, are important in determining network success. Alert and responsive organisations were found to utilise information networks in ways that expanded the range of information available to them, including a heightened awareness of any changes in the market signals.

While some research focused on *process*, other studies focused on the effect of network *structure* on performance. Several studies have found that the structure of their dyadic and embedded ties can have a significant influence on their performance (Gulati & Lawrence, 1997). Parkhe (1993b) reported high performance to be related to specific elements of alliance structure. When mechanisms are introduced to the alliance structure that permit access to real time information, improved behavioural transparency, and the opportunity for frequent interactions, this serves to minimise misperceptions, strengthen cooperation, and

ultimately improve performance at the alliance level. Another study on the effect of networks on alliance performance found that more embedded relationships across various types of supplier relationships within the automotive industry had higher performance outcomes than did alternative sourcing arrangements, especially in situations of high uncertainty (Gulati & Lawrence, 1997).

In a series of studies on biotech start-ups, Baum, Calabrese and Silverman (2000) report the initial composition of the alliance networks influenced early performance. Start-ups with up-stream and down-stream partners that ensured access to information, capabilities and resources to members were more likely to lead to stable exchange relationships and strong initial performance. Success was also found, however, in networks that included the judicious selection of potential rivals as partners. In a further study, Kogut (2000) focused on two ways in which organisational performance could be influenced by the network structure within which the ties were embedded. The first, like Baum et al. (2000), reported that the quality and variety of information made available by the network could advantage its members. The second suggested the provision of generative rules that provide a monitoring and sanction mechanism enhanced the coordination of activities among specialised producers and ultimately performance. Furthermore, Kogut (2000) found that employing such a monitoring system in the supplier system for the Toyota Production System guaranteed independent viability.

4.6 Conclusion

This chapter has reviewed the value creating points within the formation, governance, evolution, and performance of the networked organisational form. Progress is being made in examining and describing the issues involved in the changing dynamic and technological landscape with key authors such as Eisenhardt and Brown's (1999) patching concept, and Sawhney and Parikh's (2001) investigation into where value might lie in the networked world. However, there is much work yet to be done in providing clear empirical links between existing literature and new understandings of the separate value potential and impact of the current dynamic environment, and the Internet, on the network form.

Key issues worthy of further investigation are:

- Why and how are electronic networks such as the B2B (IE) network formed?
- What are the key structures and processes in B2B (IE) networks?
- What is the potential impact of the Internet and the business intermediaries on the key structures and processes in B2B electronic networks?
- How might B2B electronic networks evolve?
- How is value measured in B2B electronic networks?

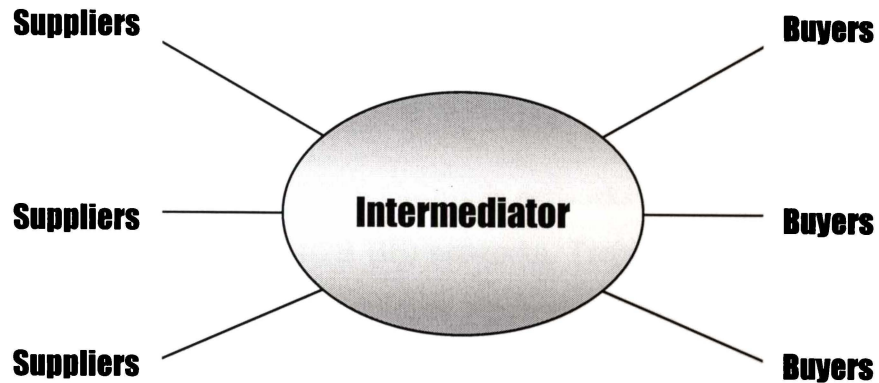
5. B2B Intermediated Electronic Networks

5.1 Introduction

After reviewing the value concept in the general strategy and networks literatures in chapters three and four, the discussion now turns to an investigation of the context of this research – the B2B (IE) network. The mainly descriptive accounts of the potential value features within this particular electronic networked transactional form are examined as follows. First, a definitional overview of the B2B (IE) network is provided. Second, the rationale for entering into this type of network is given. Third, the processes and structures used in this network are explored, including an investigation of the numerous *machine* or Internet features and the contribution and interaction of *man* or more specifically the role of the intermediary. Finally, the issues surrounding performance and ultimately the value accrued from both the perspectives of individual buyers and suppliers and the business intermediary are discussed.

5.2 Definition/Overview

It is generally acknowledged that B2B electronic networks exist in a wide variety of industries, for an equally wide variety of purposes. These purposes can range from the electronic exchange of data between research scientists in the biotechnology industry, to buyers and suppliers transacting in either private or public electronic intermediated networks. The current focus is on private B2B (IE) transaction networks that have a central intermediary and require membership and subsequent rule abidance from buyers and suppliers in return for the exchange of goods and services (see Figure 2). Drawing on Sculley and Woods (1999) and Woods (2000), the B2B (IE) network is defined as a mechanism that brings buyers and sellers together, into either a one-to-one, or a one-to-many, or a many-to-many virtual relationship, in one central, intermediated electronic space, to facilitate the regular exchange of information and ultimately transaction fulfilment, in accordance with the rules of the network.

Figure 2: A Simple B2B Intermediated Electronic Network

The origins of the B2B network can be traced back over the past 25 years to when electronic data interchange was first introduced (Weller, 2000). Value-added networks (VANs) systems permitted organisations and their trading partners to conduct standardised transactions on a point-to-point basis over a closed network (Sculley & Woods, 1999). The banking industry and large organisations such as Wal-Mart have used electronic data interchange (EDI) software and private electronic communications trading networks for over 15 years (Hansell, 2000; Weller, 2000). However, as has been well noted, such systems have never achieved critical mass due to the significant investment required, their proprietary nature, and their lack of flexibility (Weller, 2000; Wetenhall, Sutherland, & Boven, 2000; Woods, 2000). It has now been suggested that due to the increasing prevalence and relatively low cost of the Internet and its related technologies, organisations of all sizes have a means of quick and inexpensive electronic trading (Blodget & McCabe, 2000; Wetenhall et al., 2000).

Membership in a B2B (IE) network can include the following key parties a) the intermediary (administrator); b) buyers and suppliers; c) strategic partners, including investors, and trading system software developers (Software systems may developed internally); d) content providers, associated bodies, and e) third party traders or brokers. Secondary access may also be provided to a network of

partnerships developed by the platform provider, including consulting and integration organisations and information technology providers who provide a range of expert support services. The intermediary typically provides a centralised governance role between the other member groups in facilitating the transaction process.

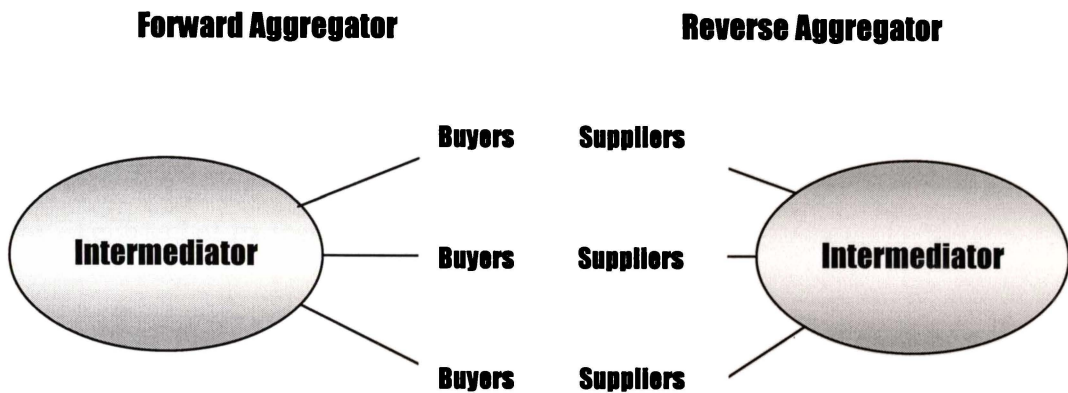
Just as there are a wide variety of B2B electronic networks as described earlier, so too, are there a wide variety of B2B (IE) networks. Trepp (2000) suggests there are seven models. The first is the Catalogue Aggregation Model formed through the collection and collation of product and/or service information in terms of currency, accuracy, depth of description and availability from paper-based catalogues provided by a variety of suppliers. A large number of buyers may then peruse the catalogue that provides, in effect, a more comprehensive and complex *one-stop* shopping list (Blodget & McCabe, 2000) than any individual or offline supplier could produce (Lee, Whittle, & Austrian, 2000). This model can also be used in a private one-to-one setting. Online catalogue trading is most suited to semi-static markets where products and services are systematically sourced (Lee et al., 2000; Phillips & Meeker, 2000). Usually the goods and services listed in such catalogues have a large and frequent turnover, are non-commodity type goods that have low value and are stably priced, often with reasonably high transaction costs (Trepp, 2000).

The second model is the Auction Model that offers either the forward auction or the reverse auction. The forward auction engages an online auctioneer that can either be an independent auctioneer or a supplier to the auction process. The online auctioneer's function is to mediate the sales process between the supplier group and a fragmented group of buyers. In this type of network the seller drives the auction by listing the items to be sold. Multiple buyers then enter into competitive bidding, resulting in an upward price movement for the designated item or service (Woods, 2000). If the auction is conducted over a shorter timeframe of several minutes, dynamic real-time pricing and order matching usually occur. If the auction happens over several days then bids are submitted; however, the final transaction execution may not occur in real-time (Trepp, 2000).

The second auction type, which is unique to the B2B procurement arena is the buyer driven or reverse auction. Here an online auctioneer (an independent auctioneer or a buyer) provides a mediating function between a buying group and a fragmented group of suppliers. The buyer enters a quote for services or products they require and multiple suppliers compete for the buyer's business in an auction format. Prices generally fall with the competitive bidding process as suppliers seek to undercut each other (Jordan, 2000). This auction type clearly favours buyers, especially when multiple suppliers offer similar products that meet with buyers' needs (Woods, 2000). The online auction offers a competitive bidding facility both across and within industry sectors and is often used when the value of the item being sold is unique but may be clearly described and/or viewed online. As well as this, either the value of the item usually tends to constantly change, or buyers have a specific request such as pricing construction projects (Lee et al., 2000). Suppliers may use online auctions to manage inventory levels, test pricing on new products, to promote products, or remove capital equipment, surplus stock or discontinued lines (Sculley & Wood, 1999; Weller, 2000).

The third model is the Online Exchange, also referred to as a vortex, butterfly market, or net-market (Dills & Strachan, 1999) that can provide either a many-to-many exchange and/or a one-to-many exchange system. The criteria within online exchanges can vary from those that are open to the general public, to those requiring stringent rules for membership where members operate in a private setting (Senia, 2001). In the business arena the private exchange format, whereby often geographically fragmented buyers and suppliers are linked together simultaneously to transact via a dynamic *real time* bid-offer pricing mechanism with membership rules has become increasingly popular (Trepp, 2000). The exchange model can operate either within a centralised market situation in a specific industry or across an industry within product categories. This model can be used to exchange products ranging from spot market commodities with high price volatility such as natural gas and electricity, to more stably priced industries. A key feature of this mechanism requires that there are consistency and clarity with regard to how the products or services can be described over the Internet (Sculley & Woods, 1999).

Figure 3: Forward/Reverse B2B Electronic Intermediated Network Auction Model



Other models include the Multiple Trading Platform that refers to a situation where a B2B (IE) network may have incorporated within it a number of models such as the auction exchange mechanism. Another example that can be incorporated is the Negotiation Model that facilitates one-to-one negotiation of price, or other bartering parameters between buyers and suppliers, such as delivery. A Request for Quote Model replicates the traditional model, providing buyers with product offer details. Last is the Buyer Aggregation Model where the purpose is to facilitate the aggregation of a group of small and/or fragmented buyers with the intention of seeking combined buying privileges.

5.3 Formation: B2B (IE) Networks

There appears to be general agreement that the likely rationale for entering into e-business, including B2B (IE) networks, is the reduced transaction costs, or market clearing enjoyed by buyers and sellers, as they connect via the intermediary with increased speed and efficiency (Anand, Khanna, & Rivkin, 2000; Amit & Zott, 2001). Lucking-Reiley and Spulber (2001) suggest improved information flow significantly reduces customer search costs in locating, as well as providing for reduced information asymmetries. Clemons and Row (1992) report improved information flow enables faster and more informed decision-making. The e-businesses investigated by Amit and Zott (2001) reported reduced transaction costs through the streamlining of inventory management, reduced distribution

costs, and simplified transactions, thereby benefiting both buyers and suppliers by aggregating and streamlining the supply chain process. Moreover, Garciano and Kaplan (2000) report transaction costs for online trade via the auction mechanism to be half that incurred in the offline auction. In addition, Amit and Zott (2001) and Anand et al. (2000) suggest that communication costs, marketing and sales costs and processing costs can be reduced within e-business, thus creating the potential for increased value creating potential through increased scalability, with the likelihood of increased transaction flow.

As well as providing the potential for increased efficiencies through reduced transaction costs, the Internet is also suggested to make possible opportunities to leverage increased value through new and novel ways of creating resources and capabilities in the form of individual goods and services, new business types, and new combinations of bundling of goods and services. Amit and Zott (2001) report *novelty* to be a key value driver within e-business. The creation of new and novel ways can be traced back to the works of Schumpeter (1934) who pioneered the process of technical change and innovation, while the bundling of goods and services can be in part aligned to the bundling concept highlighted by Nalebuff and Brandenburger (1996) in the strategy literature. Complementarities are suggested to be present whenever a bundle of goods and services provide together more value than the total value of selling each of the goods and services separately. The resource-based view also focuses on complementarities within strategic assets as sources of value creation (Amit, & Shoemaker 1993). As well as this, Gulati (1999) focuses on the importance of complementarities within the networks literature.

At the industry level, Raisch (2001) suggests that a likely motive for participation in B2B (IE) networks, from a buyer/supplier perspective is when there is a *large fragmented* market on either the buyer or supplier side, or both. According to Phillips and Meeker (2000) these benefits are likely to be attributed to market inefficiencies created through buyers and suppliers being either less or uninformed about each other, often through being situated in geographically dispersed locations. Lee et al. (2000) support this view arguing that buyers typically benefit from accessing and selecting between multiple suppliers while

suppliers aim to maximise their product and service exposure to as many new and existing buyers as possible. However, Lee et al. (2000) caution intermediaries entering asymmetrically fragmented markets. This market type can occur when either the buyer or supplier side is dominated by a small number of participants, while the other side is highly fragmented (Phillips & Meeker, 2000). In these instances Lee et al. (2000) advise intermediaries to ensure their value add is significant enough to reduce the likelihood that the dominant buyer(s) or supplier(s) in the non-fragmented side does not create their own online trading system.

In contrast to Raisch's (2001) more generalised view of the benefits accrued to buyers and suppliers across industries, Tully (2000) suggests that the fragmentation dynamic may be more applicable to, and benefit participants, in some industries rather than others. Phillips and Meeker (2000) report that those industries with a high buyer concentration, such as the automotive or manufacturing industries, are more likely to benefit buyers, while those industries with a high supplier concentration, for example the plastics and steel industries, are more likely to benefit suppliers. Finally, those with equally fragmented groups of buyers and suppliers, such as the health care and life science industries are, suggested to more likely provide equal benefits to buyers and suppliers.

A second potential reason suggested for the introduction of B2B (IE) networks is to reduce information inefficiencies or asymmetries across the supply chain (Phillips & Meeker, 2000; Lee et al., 2000; Raisch, 2001). Over the years supply chains within some industries such as manufacturing have operated with varying degrees of efficiency (Phillips & Meeker, 2000). It is suggested that such industries may experience difficulties in planning for the right mixes and volumes of products due to excess or insufficient inventory levels. As well as this, many suppliers have operated with very little information regarding when and how their customers use their products. In these instances, suppliers often build inventories to cover all scenarios, thus creating further resources quickly when demands change in volatile markets (Lee et al. 2000). In addition, Sculley and Woods (1999) suggest some industries that employ brokers may also bring about their own potential for information asymmetries. This may be especially the case when

brokers fail to share information that may jeopardise their earning potential (Sculley & Woods, 1999). Organisations can also experience inefficiencies created by leaked information, especially on large orders that can potentially cause the price to move against either the buyer or the supplier (Lee et al., 2000). Moreover, market inefficiencies can create high search costs when compared to the final price of the item. Raisch (2001) argues that prior to the Internet, many organisations were required to regularly complete a series of complex and collaborative tasks in the manual transfer of information, often resulting in considerable inefficiencies.

Since the Internet makes possible a wide range of B2B (IE) network models that all have the capacity to offer an equally wide product and service choice, it is important to understand which features are going to attract different buyer and supplier types (Sculley & Woods, 1999). Intermediators typically start by deciding between serving an industry sector or a specific end market across an industry (Lee et al., 2000). B2B (IE) networks that target a particular industry are termed *verticals*. Vertical (IE) networks typically focus on providing expert knowledge within a particular sector, as well as facilitating the exchange of direct input products, or raw materials, such as those used in the manufacturing process. Intermediators may also facilitate the exchange of specific products or service processes across several industry sectors. These B2B (IE) networks are termed *horizontal* and typically share common traits, such as maintenance, repairs and operations (MRO), spare parts or travel (Lee et al., 2000; Sculley & Woods, 1999). Horizontal B2B (IE) networks often support the exchange of operating input products that do not become part of the finished product (Kaplan & Sawhney, 2000). The distinction, however, between horizontals and verticals is beginning to blur as intermediators develop innovative strategies that involve the bundling of goods and services both within and across industry sectors.

There is a growing trend within some industries, such as the construction industry, to offer a one-stop-shop for a variety of construction and building products and services, across a number of verticals, such as steel, wood, and construction. Alternatively, intermediators may choose to remain in the one industry sector and extend their trading mechanisms, offering extra functionalities such as catalogue

and exchange options. Since intermediators are typically required to compete against other B2B (IE) network providers, it is important to identify what factors buyers and suppliers take into consideration both when deciding to trade via the B2B (IE) network and also when making a choice between which networks to enter.

Kaplan and Sawhney (2000) and Senia (2001) suggest that potential buyers and suppliers considering entering a B2B (IE) network may not only take into consideration the specialised nature of the network, but also its bias. Bias refers to the favouring of either the supplier or the buyer. Those B2B (IE) networks favouring suppliers are termed forward aggregators, where they amass supply and aggregate buyers downstream as with the traditional supply chain. Biased B2B (IE) networks that favour buyers are termed reverse aggregators (see Figure 3). Their function is to amass a number of buyers and then bargain with suppliers on their behalf. Alternatively, B2B (IE) networks may be neutral, being operated by an independent third party who normally has knowledge in, or access to others with a strong knowledge in, a particular industry or business process (Weller, 2000). Neutral B2B (IE) networks are suggested by Kaplan and Sawhney (2000) to be equally attractive to buyers and sellers. Trepp (2000) suggests that this does not, however, come without its challenges in the recruitment of buyers and suppliers.

Phillips and Meeker (2000) along with numerous others suggest that to increase the likelihood of success B2B (IE) networks need to attract both suppliers and buyers as quickly as possible and in sufficient numbers to be economically viable. If there are few or no listed suppliers, especially in the formative stages, buyers are less likely to want to join; conversely suppliers are less likely to be interested in joining when there are few or no participating buyers. Some B2B (IE) networks have attempted to solve this dilemma by offering equity investment opportunities to either large existing catalogue holders or leading organisations in the particular industry or sector. However, while this action may help to accrue a sufficient number of buyers and suppliers for transaction purposes, it may present difficulties in recruiting further industry members, as some large investors may view this as an opportunity to exercise control (Weller, 2000). Furthermore,

difficulties may be experienced in attracting large buyers who have already negotiated substantial discounts, or attracting suppliers who already have a large, established buyer base.

It has been suggested that it is important to understand the ownership structure of B2B (IE) networks, as the decisions made by individual intermediators inevitably influence potential buyers and sellers (Crimson Consulting Group, 2000). Business-to-business (IE) networks can be owned and operated by independent, neutral third parties that facilitate a many-to-many relationship between buyers and suppliers with no vested interest on the part of either party. Alternatively B2B (IE) networks can be biased, whereby they are owned and operated by a large or powerful private buyer or supplier that may be comprised of either a single organisation or consortia. Biased B2B (IE) networks with a supply focus may act as forward aggregators, by linking supply and operations downstream in a supply chain, or by bringing buyers together to participate in a forward auction mechanism (Crimson Consulting Group, 2000). This form of forward bias is similar to the traditional supply chain model and auction mechanism. (Kaplan & Sawhney, 2000) In contrast to traditional forward bias thinking, networks can also be biased in favour of the buyer. B2B (IE) networks that favour the buyer act on behalf of either one or a number of buyers by aggregating a group of suppliers through either the reverse aggregation or matching mechanisms (Kaplan & Sawhney, 2000).

At this point there appears to have been scant empirical examination into the decision-making processes engaged in by the intermedator when entering into a particular B2B (IE) network, let alone how they may decide to evolve, especially into other industries. In addition, there does not appear to have been any investigation into the decision-making processes that a participant may use to enter trade via either a single or multiple B2B (IE) network. However, there does not appear to have been any investigation into the nature or extent to which intermediators and/or participants enter into new relationships with each other as a result of B2B (IE) networked trade.

5.4 Governance: B2B (IE) Networks

Having described the general framework and issues associated with the formation of the B2B (IE) network, the discussion now turns to an investigation of the governance structure and processes of this network form. An empirical base is provided for the examination of the role of the Internet (machine) and the part played by the intermediary (man), as two potential intermediating bodies in this network form.

Technological Web

It is commonly suggested that a key value attribute of the Internet lies in its ability to connect or link transacting buying and supplying organisations together with increased ease and efficiency (Phillips & Meeker, 2000; Raisch, 2001; Woods, 2000). Two Internet functionalities that facilitate this process include increased reach, and especially within the B2B (IE) network context, the ability to aggregate and match. Evans and Wurster (1999) coined the term reach to describe the increase in the number of individuals and organisations who may potentially share product/service or other online information. The Internet enables these linkages to occur in many cases spontaneously over a 24 hour day, 7 day week, between individuals and organisations in geographically dispersed locations and different time zones. In the B2B (IE) network context, buyers and suppliers can leverage this facility with the assistance of the mediating function of the hub provider to reach each other (Woods, 2000). Zaheer and Zaheer (2001) found marketplaces in the online banking industry that had outlets that were similar in location by country, time zones or clusters were more likely to compete for business from the same customer base. Thus, location was found to influence who an organisation's competitors were, but not where customers came from.

As well as providing the potential for new and extended reach between transacting parties, the Internet mechanism also provides a tool that hub providers may use to aggregate or pull together a potentially large number of buyers and suppliers into one virtual space. Kaplan and Sawhney (2000) suggest that the aggregation mechanism is one of the primary linking mechanisms used in B2B (IE) networks to build and then bring groups of like-minded buyers and suppliers together. These scholars suggest that since buyer and supplier positions are relatively fixed,

adding another buyer to the B2B (IE) network is likely to benefit suppliers, while adding another supplier is likely to only benefit only buyers. The literature commonly makes reference to the importance of maximising value at this point by aggregating as many potential buyers and suppliers as possible (Woods, 2000; Phillips & Meeker, 2000).

The Internet also makes available a matching mechanism that can be used to bring buyers and suppliers together to negotiate prices on a dynamic and real time basis. This mechanism is used in exchanges and auctions as a mechanism that is separate and additional to the aggregation facility, matching those buyers who have specific requests with corresponding suppliers. Matching is characteristically used in commodity or near commodity type markets where goods may be traded sight unseen, but where the value or availability changes regularly (Kaplan & Sawhney, 2000). Buyers may forward bids and requests for specific quantities of required items, often in large volumes when compared to transaction costs (Raisch, 2001). Kaplan and Sawhney (2000) suggest the matching mechanism is more suited to those buyers and suppliers experienced in negotiating prices. These authors further suggest that within the matching mechanism the roles of buyers and sellers are fluid, in that buyers can be suppliers and vice versa. Therefore, adding any new member to the B2B (IE) network increases the market's liquidity and so potentially benefits both buyers and suppliers.

Lee et al. (2000) suggest that the Internet mechanism enables intermediaries to use not only the aggregation and matching mechanisms to link and facilitate many-to-many transaction relationships between buyers and suppliers at a group level (Lee et al. 2000), but also allows them to continue to facilitate point-to-point transactions between those same buyers and suppliers at an individual level (Woods, 2000). Lee et al. (2000) argue that in traditional trade in the non-electronic environment when there were, for example five buyers and five sellers, each buyer was required to manage five supplier relationships and vice versa. However, the functionalities provided by the B2B (IE) network enable each buyer and supplier to access multi-level opportunities, while having only one primary relationship with the intermediary, thus potentially benefiting from the reduced costs and time saved in the management and transaction process (Lee et al., 2000).

In addition, Trepp (2000) highlights the benefits of nonlinear linkages made possible by the B2B (IE) network that facilitate the flow of information between trading partners. Instead of waiting days or weeks for buyer trend information to flow back to the manufacturer from final suppliers, the Internet permits instantaneous transfer of such information.

Furthermore, Phillips and Meeker (2000) suggest that the Internet has the potential to improve information asymmetries and subsequent inefficiencies sometimes experienced between offline trading partners. Information symmetry appears to have manifested itself as information transparency, on the Internet (Phillips and Meeker, 2000). Lamming, Caldwell, Harrison and Phillips (2001) define transparency within this context as “a two way or reciprocal sharing” p. 23). Numerous authors including Woods (2000) and Lee et al. (2000) have gone so far as to suggest that the Internet permits unprecedented levels of transparency as information is dispersed into the marketplace. In order to understand the impact of information transparency Phillips and Meeker (2000) and Raisch (2001) developed a four-dimensional transparency framework that includes price transparency, availability transparency, supplier transparency and product transparency. Lee et al. (2000) suggest the Internet enables improved levels of price transparency for buyers as well as competing suppliers who may view and compare the prices of all items within B2B (IE) networks that are listed for general view. The two broad categories of price transparency within B2B (IE) networks are transparent or static pricing and nontransparent or dynamic pricing. Static pricing is used in online catalogues for stable priced items, where the item price is established and then normally listed for general view along with other item features. In contrast, exchanges and auctions use non-transparent dynamic pricing, where the focus is on item features such as availability and/or quality and price is used as a competitive bidding tool. The non-transparent pricing serves to maximise the final price earned for an item through the negotiating mechanism (Sculley & Woods, 1999).

The second transparency dimension enables buyers to establish the availability of the products or services required prior to continuing with the transaction. Suppliers may also use the availability function to examine and assess buyer

trends, with a view to providing specialised products or services targeted at buyers who have demonstrated particular needs (Phillips & Meeker, 2000). In addition, Raisch (2001) suggests that suppliers may seek information on buyer behaviour trends to improve predictions in planning and production processes. The third dimension supplier transparency enables buyers to identify individual suppliers who offer particular items within a B2B (IE) network. This transparency dimension is more likely to be available in those B2B (IE) networks offering stable priced goods rather than in the exchange and auction mechanisms where supplier anonymity may be preferred in some situations, while the focus is on other item features. In some instances supplier identity is revealed in the dynamic pricing mechanism; however, whether identity is provided or not may depend upon the nature of the items being offered and the rules of the network. Finally, the product transparency dimension enables buyers to learn about the particular features of the items offered for sale, prior to placing an order, thus encouraging informed decision-making (Phillips & Meeker, 2000).

In contrast to Phillips and Meeker (2000) and Raisch (2001), who focused on information transparency as a commoditised element within a system presupposing the bidirectional free flow of information between buyers and suppliers, Lamming, Caldwell, Harrison and Phillips (2001) suggest that transparency is a concept embedded within the relationship between transacting organisations, alongside other dynamics such as patents and agreed procedures. Lamming et al. (2001) refine their investigation into the transparency concept by examining cost transparency within supplier relationships. They found that in order for cost transparency to be of significant value a two way exchange of valued information between buyers and suppliers was required that included the selective and justified sharing of information. However, this exchange did not necessarily need to be symmetrical. A key factor found to be fundamental in distinguishing transparency was “. . . the joint sharing or pooling of risk” (p. 34). Furthermore, these authors suggest that the transparency concept is a dynamic element within each specific relationship. It is not required to be in constant action, nor applicable to the entire relationship between the organisations. In order to understand the dynamic nature of the transparency concept within relationships, Lamming et al. (2001) use the geological analogy of light to describe the

information or knowledge flow. These authors suggest, “. . . in practice rather than being opaque, translucent or transparent in a pure form, supply relationships are likely to contain elements of all three. They also propose that the path from opaque relationships (no knowledge on either side) to transparent relationships (full knowledge) within supplier relationships is not necessarily designated or mandated, but rather is less iterative with varying degrees of complexity. In keeping with the geological metaphor, Lamming et al. (2001) provide an example where a non-transparent relationship could develop fissures of total transparency resulting from a long-term relationship between boundary-spanning individuals in the two organisations.

In addition to providing the potential for an increase in the number and nature of linkages between organisations and individuals, the Internet also makes possible the potential to improve the quality of information flow along these linkages, which Evans and Wurster (1999) have termed dynamic *richness*. This term is taken to include: the bandwidth, or sheer volume of information transmitted between the sender and receiver at one time (Fulk & DeSanctis, 1995); the degree to which the information can be customised; the currency of the information; the possible interactivity of the information; as well as how much the circulated information can be trusted (Evans & Wurster, 1999; Woods, 2000). Evans and Wurster (2000) suggest that prior to the Internet, the exchange of *rich* information required complex and an often expensive communication channel such as electronic data interchange (EDI) mechanisms, and was usually shared in close proximity with a limited number of individuals. In contrast, less rich information was typically shared with a greater number of individuals, often with compromises being made in terms of the quality of the information.

Intermediator

After examining the value potential of the Internet, it is now important to investigate the intermediary role played by man between the buyers and suppliers in the B2B (IE) network. Casson (1997) goes so far as to argue that the intermediation function has become especially important in the new information age, despite much of the literature in the mid to late 1990's on online trade suggesting “the advent of the Internet signalled the death of the middleman”

(Anand, Khanna & Rivkin, 2000, p. 11) as the Internet enabled buyers and suppliers to enter into direct trade with each other more easily. It was predicted that these actions would lead to disintermediation of the supply chain, with brokers and distributors no longer required. Instead, there are new opportunities for re-intermediation through a variety of new technology channels being leveraged by new entrepreneurs (Peng & Wang, 2002).

Intermediaries are suggested to perform an important function as economic agents in the transaction process that either purchases from suppliers for resale to buyers, or as is the case in this instance assists buyers and sellers to meet and transact (Peng & Wang, 2002).

Intermediaries seek out suppliers, find and encourage buyers, select buy and sell prices, define terms of transactions, manage payments and record keeping for transactions, and hold inventories to provide liquidity or availability of goods and services.” (Spulber, 1996, p. 135)

As well as managing transactions, intermediaries often “transform products to add value, transporting, storage, repackaging, assembling preparing for final use, and adding information and guarantees” (Spulber, 1996, p. 136).

Spulber (1996, 1998) suggests that the analysis of the intermediary has its roots in the Transaction Cost Economics literature, where the focus has been on finding the most cost efficient organisational form in which to conduct the transaction after production costs have been expended. According to Williamson (1985) firms can incur search, negotiation and enforcement costs in the exchange of information. Intermediaries typically leverage such opportunities when there are information asymmetries or imperfections in this exchange process across the transaction process. Information asymmetries have in fact been argued to be a primary reason why (financial) intermediaries exist (Leland & Pyle, 1997; Peng & Wang, 2002). When the actions of buyers and suppliers are costly to observe the intermediary might play a monitoring role; or when there is an element of randomness or a need for immediacy in sale the matching role may be undertaken. When the product quality is variable, intermediators may play a guarantor role. A key role of the intermediary is suggested to be that of clearing the market, that is,

to ensure the prices match what buyers are prepared to pay and suppliers are willing to accept. In sum, Spulber (1996, 2003) identifies four important economic actions for intermediaries. These include: coordinating buyers and suppliers; providing liquidity and immediacy to products and services; setting prices and clearing markets; and guaranteeing quality and monitoring performance.

Focusing on non-electronic trade, Peng (1998) argues that information asymmetries can be especially pervasive in international trade that is characterised by geographic and cultural separation between buyers and suppliers. This can result in the incurring of high international transaction costs when compared with domestic costs. International trade intermediaries can therefore provide a bridge to connect domestic producers and foreign buyers or vice versa (Peng & Ilinitich, 1998). Specifically, these intermediaries can conduct market research, negotiate deals and enforce contracts, and in doing so, minimise the information asymmetries, that result in reduced transaction costs between the exporting and importing parties. Peng, Hill, & Wang (2000) examined the value role of the intermediary using the dimensions of culturally distant markets and product complexity from a TCE perspective. They found better performance results for intermediaries who focused on exports to distant country markets with less complex, more commodity based products. In contrast, Amit, Brander and Zott (1998) identified the presence of a disproportionately high number of venture capitalist intermediaries in more complex service industries such as biotechnology, software and communications.

Brokerage in the electronic environment has been suggested by several authors (Anderson & Anderson, 2002; Bilcher, 2001; Malone, Yates, & Benjamin, 1987; Spulber, 2003) to be a core component of Internet commerce, necessary for the maximisation of the new technological functionalities. Spulber (2003) and Malone et al. (1987) argue that the role of the online business intermediary remains largely unchanged from the offline business intermediary, with the exception of performing the required tasks with increased speed and efficiency, since information can be exchanged in greater volume and less time. Bilcher (2001) calls for closer investigation into the role of a business intermediary in the

electronic landscape. He believes that intermediators in the electronic environment provide similar benefits to those intermediators operating in the offline environment in terms of reduced costs, time saved in search and selection, improved pricing, greater confidence and security and/or anonymity. However, he questions whether there may be a difference in how ebrowsers might maximise value in the exchange of information in dynamic rather than static environmental settings.

Anderson and Anderson (2002) provide a conceptual framework suggesting three ways intermediaries currently contribute value in the electronic arena. First is matching information about sellers, buyers and products that they predict will change to where the service is most likely expected to be free. Second is with intermediating values - requisitioning product transformation, new opportunities, economies of scope (economies of scale and time and place utility) with value taking a new form. The final set – problem-solving activities (guarantee versus quality uncertainty, preserving anonymity and tailoring goods and services) suggests new growth opportunities. In another framework, Lee et al. (2000) argue for three potential areas where an electronic intermediary may provide assistance with, information intermediation, transaction intermediation, and fulfilment intermediation.

Though not within the electronic intermediation literature, Hargadon's (1998) work on firms as knowledge brokers may provide an interesting potential link to the centralised role of the electronic intermediary. Hargadon identified the value capture within the knowledge brokering role under four criteria. These include a) access from this knowledge broker to access a wide variety of organisations across a range of industries; b) learning of an industry's problems and solutions; c) linking to develop teams to combine ideas and confront problems, and d) implementation whereby innovative concepts from outside industries are turned into real products and processes in a learning-by-doing manner.

Despite these views, several authors (Phillips & Meeker, 2000; Porter, 2001; Woods, 2000) have cautioned the value of the electronic intermediary suggesting that the once potentially powerful position of the centralised figure may no longer

hold in the electronic arena, with the power now being more likely to move to buyers and suppliers. This view is based on the functionality of the Internet in enabling buyers to access a wider range of information on product availability, price and supplier details. Woods (2000) suggests that the increased availability of information has encouraged buyers to demand items with superior quality, service and competitive prices. In response, Stirland (2001) suggests that suppliers in a number of B2B (IE) networks are unhappy with the extent to which they are being forced to reduce their prices when trading online and that they "aren't going to take any more price-cutting" (p. 2). As a result, several intermediaries that once charged entry fees are now being forced to waive these fees in an attempt to attract more traders (Weller, 2000).

5.5 Performance

As the B2B (IE) network landscape consolidates, the issue of how value or performance is measured and the processes that can be employed to enhance performance become especially important. The wide variety of measures and methods used to describe success in this network form appears to fall predominantly into two areas – the economic viability of participation, and the characteristics and capabilities of the intermediary that includes the ability to recognise new and novel opportunities both within and across industry boundaries.

In terms of economic success, this value is typically measured by the ability of the network to generate a sufficient volume of transacting buyers and suppliers. A fee is then charged of between 1% and 2.5% of the value of the completed transaction to suppliers, and on occasion to buyers. As well as imposing this fee, the intermediary may accrue revenue by charging either initial and/or annual membership fees. However, due to the relatively low margins earned through these sources there is ongoing competition between intermediaries to attract as many buyers and suppliers to their individual sites as possible. In order to do this, some intermediaries have begun to reduce their transaction fee margin and waive membership fees. Consequently, alternative and often novel revenue sources are

continually being devised. These sources may include advertising, co-marketing, and the sale of analytic material and data (Sculley & Woods, 2000).

From the buyer/supplier perspective, the measurement of economic value has typically focused on the savings earned due to increased efficiencies and the subsequent reduction in transaction costs, rather than on any gain brought about through the new and novel methods of conducting and combining business. Sculley and Woods (1999) suggest buyer and supplier participants in B2B (IE) networks can expect to save between 10-50% on their supply chain costs. These savings can be considerable, especially when supply chain costs usually represent 10-15% of total sales in many industries (DeCovny, 1998). Focusing more specifically upon the buyer, the purchase types of direct purchases (materials used in the final product) versus indirect purchases (materials consumed in the process of the final product) have also been analysed. It is suggested that buyers make savings in both areas. However, there are more savings to be made (18%) in the purchase of indirect goods, compared with the purchase of direct goods (10%). It is believed that the indirect purchase benefits are primarily derived from a reduction in maverick spending on purchases that do not confirm to prior negotiated supply agreements (Wetenhall, Sutherland, & Boven, 2000).

Yet, Agrawal and Pak (2001) caution buyers and suppliers suggesting that it is unrealistic to expect savings in every element along the supply chain as a result of participating in a B2B (IE) network, and in fact some areas may experience little or no savings, as with the physical flow of products. Organisations may still be required to carry excess inventory despite experiencing improved information flow and the elimination of between 3 and 5 days ordinarily spent planning, negotiating and documenting transactions. In addition, Agrawal and Pak (2001) suggest that to ensure efficiencies it is important that there is synchrony between the same supply chain segments in different industries and different supply chains within the same industries when overlaps are required. Finally, the reluctance of some organisations to share information they believe is giving them competitive advantage is a further factor to consider when attempting to maximise efficiencies for buyers and suppliers.

Numerous authors have suggested that access to a large potential pool of buyers and suppliers is critical to the formation and ultimate success of a B2B (IE) network (Phillips & Meeker, 2000; Raisch, 2001; Woods, 2000). Though it is readily acknowledged that a large number of potential buyers and suppliers are required in order to maximise competitive pricing, and to ensure liquidity, there does not appear to have been any investigation to date regarding the optimum size for a B2B (IE) network. Attempts, however, to measure size both within the organisation-technology literature (Hickson, Pugh, & Pheysey, 1969) and networks literature (Alter & Hage, 1992) have found size to be a variable not easily conceptualised.

Instead of focusing upon market size at the industry level, Phillips and Meeker (2000) examined the market composition over several industries with regard to the degree of fragmentation of buyers and suppliers and the potential value to be derived for all participants. As can be seen from Table 1 below, buyers and suppliers are suggested to benefit most from participation in this network form when they belong to an industry that has a high degree of fragmentation for their particular strategic group, but not for the other, while intermediaries benefit most when industries have high buyer and supplier fragmentation. This study links to Amit and Zott (2001) and Brandenburger and Stuart (1996) who view the total value created as the sum of values appropriated by each party in the transaction.

Taking a more all encompassing view Sawhney and Parikh (2001) suggest that overall the value within generic networks in the electronic world lies more in each end with the buyers and suppliers rather than in the middle. Thus they argue that the middle of the network is best left mechanised while more care and personalised relationships are important at both the buying and supplying ends. This idea is further supported by Raisch (2001) who suggests that it is important to “humanise the front line and the last mile . . . [and] automate the rest” (p. 14). Sawhney and Parikh (2001) also suggest that value lies in modularity and the orchestration of such networks, views that link with the works of Eisenhardt and colleagues.

Table 1: Value Summary By Industry: B2B (IE) Networks

Percentage Value Breakdown For Of B2B (IE) Network

Industry type	Buyer	Supplier	Intermediator	Technical Provider
High buyer concentration	70	10	10	10
High supplier concentration	20	60	15	5
Fragmented buyers and suppliers	25	25	35	15

(Adapted from: Phillips &, 2000, p. 23)

Having examined the value of the B2B (IE) network from an economic perspective it is now important to investigate the potential role played by the intermediary. It has often been argued that the greater the number of competing buyers and sellers brought together in one critical mass within this network form, the more liquid and potentially valuable that B2B (IE) network becomes (Lee et al., 2000; Phillips & Meeker, 2000; Woods, 2000). This has long been an issue within the telecommunications field, where an understanding the customer requirements was found to be critical. From a participant perspective, this argument can be based on the principle of network externalities (Katz & Shapiro, 1985) where there is mutual benefit with increasing numbers of buyers and suppliers. However, the question of just what attracts buyers and suppliers to particular B2B (IE) networks remains. Though numerous authors have argued that one of the key advantages of utilising the Internet is the increased speed with which it enables transactions to be fulfilled (Ernst, Halevy, Monier & Sarrazin, 2001; Fulk & DeSanctis, 1995; Lee et al., 2000; Phillips & Meeker, 2000) due to the highly imitable nature of this facility Bates, Rizvi, Tewari, and Vardhan (2001) suggest that the central issue may rather surround harnessing the power of speed through the development of capabilities, to move with speed to become first movers; to respond with speed; to retain or establish lock-in of their buyers; and to erect official standards for their particular industry or sector.

It has repeatedly been argued that intermediators who act with speed to become first movers in a particular vertical or horizontal sector are more likely to become successful in attracting a larger number of buyers and suppliers than other intermediaries are (DeBaere, 2000; Phillips & Meeker, 2000). Amit and Zott's (2001) study of value creation in ebusiness supports Lieberman and Montgomery's (1998) earlier study on first mover advantage, finding that those first movers in ebusiness who employ novel business methods are more likely to take the lead in capturing mind-share, developing brand awareness and reputation, pre-empting scarce resources such as superior market positions, as well as being able to amass learning and proprietary knowledge. Moreover, it has been suggested that first mover intermediators, like traditional organisations, are more likely to use their status to shape industry standards and erect entry barriers against competitors (Ramsdell, 2000; Woods, 2000). The importance of adopting key design proprietary standards is supported by the earlier work of Teece (1987). The standards in B2B (IE) networks may include consensus around the accrual, sharing and distribution of products and knowledge (Woods, 2000). The establishment of standards may serve to allay the fears and insecurities held by some potential B2B (IE) network participants (Woods, 2000) with Jupiter research reporting in 2001 that 50% of United States organisations expect to do only 20% or less online corporate purchasing over the next few years due in essence to a lack of confidence in the new electronic mechanisms and trading relationships. Pearlstein (2001) further stresses the importance of developing standards, especially around conflict resolution in an attempt to allay any initial wariness from buyers and suppliers that may be further heightened by the design of the B2B (IE) network where participants are required to compete as well as to collaborate - an issue that is in line with Nalebuff and Brandenburger's (1996) concept of cooptation.

However, Dills and Strachan (1999) caution that fast execution within ebusiness carries with it the inherent risk of quickly depleting both financial and human resources before the business becomes self-sustaining. Lieberman and Montgomery (1998) support this claim, reporting that on some occasions pioneers either missed the best opportunities due to market uncertainties, or through acquiring resources that proved to have limited value as the market

evolved. Bates et al. (2001) take a more moderate view suggesting that, while first mover status within B2B (IE) network is still a worthwhile goal, the marketplace is complex and careful planning is required. The sustainability of first mover advantage that Barney (1991) defines as entry of other organisations rather than the passage of time have been suggested by Rumelt (1984) as being likely to be dependent upon the presence of isolating mechanisms such as patents, proprietary learning, economies of scale and scope. Both Lieberman and Montgomery (1998) and Makadok (1998) suggest the sustainability of first mover advantage is more likely to depend upon the initial resources captured such as access to a substantial buyer base, as well as the acquisition and continued development of superior resources and capabilities when compared to later entrants. While neither study specifically addresses the electronic commerce sector, Makadok (1998) in particular does provide relevant insights.

Zaheer and Zaheer (2001) provide a link between the electronic environment and intermediary behaviour finding that the ability of intermediaries to move with speed and to be constantly alert to customer requirements are two key capabilities that contribute towards success in a dynamic environment. In their study of electronic networks in the online banking industry they reported the banks that moved with speed and alertness in providing informational advantages competed for the same customer base. These findings extend their earlier work (1997) that examined these same capabilities within the general electronic environment. They suggest that organisations are more likely to prosper when they are alert to the information arising from the pattern and breadth of information available within their networks, and when they demonstrate speed of response to changing market signals. While speed of response is undoubtedly an important capability, Senia (2001) cautions that attention is still required to other product and service features, such as quality, that clearly continue to be valued by buyers.

Though the ability to respond with speed and achieve first mover status is suggested by Bates et al. (2001) to be insufficient alone to entice buyers to remain with the same B2B (IE) network. These authors propose that such factors “make sense only if you can lock in customers and keep out competitors” (p. 2). *Lock-in* that manifests itself as switching costs and is anchored in part in Porter’s (1985)

five forces model is suggested by Amit and Zott (2001) to be a key value creating dimension within ebusiness. These authors argue that value is increased by the extent to which buyers are prepared to engage in repeat transactions, thus increasing the likelihood of greater trading volume. Due to the increased transparency of product and service type, as well as the transaction process made possible by the Internet and the relatively low profit margins per transaction, the issue of locking-in customers is important. It has been suggested that the development of a) strong brands (Raisch, 2001), b) loyalty programmes, or c) partnering with reputable associated trade bodies (Phillips & Meeker, 2000) may assist this process. However, Bates et al. (2001) argue that lock-in factors are unlikely to lead to significant retention levels due to the fickle nature of customer decision-making. Instead, Bates et al. (2001) suggest that customers are more likely to resist switching "when it involves large scale set-up costs or a complex implementation process" (p. 2). Instead, these authors suggest intermediators may do better to work towards continually improving their coordination and innovative information flow features.

Raisch (2001) suggests that a full range of personalised and customised services may also enhance lock-in. Customisation opportunities enable customers to extract tailored information, services and products in numerous ways. Amit and Zott (2001) reported ebusinesses with facilities that enabled customers to filter news and stock trading information to their unique requirements. Some ebusinesses also operated one-click self-help ordering systems. In addition, electronic businesses, including B2B (IE) networks, may offer personalised services. These services can include personalised store fronts, interfaces, direct advertising, targeted emails, real-time interfaces with chat rooms, threaded discussions and after sales assistance, bulletin boards and newsletters (Amit & Zott, 2001; Raisch, 2001; Woods, 2000).

The development of personalisation processes requires ebusinesses to extract, compare and contrast individual customer behaviours (Arthur, 1990). Shapiro and Varian (1999) suggest two key sources for this data. One is from customer registration, billing and demographics. The other is from customer observation, often through search queries. This information may be used by ebusinesses to

make personalised customer offerings in either product description or price offerings (Shapiro & Varian, 1999). The personalised or flexible pricing system may enhance point-to-point transactions, with price modifications being made to customers with large, regular purchase orders or those requesting highly differentiated items while differentiation by price is less likely with generic items in public price postings. As well as making available transaction conveniences, the personalisation dynamic is also argued by Raisch (2001) to provide customers with the human factor including the need for person-to-person contact that is not readily present when transacting via the Internet. Moreover, Amit and Zott (2001) argue that the overall value-add from customised and personalised services is repeat business.

Moreover, it is important that attention is given to those intermediaries who are able to look beyond their immediate situation in providing increased efficiencies and reduced transaction costs to buyers and suppliers, to those intermediaries who are able to leverage new and novel opportunities that may arise both within and outside the network. Amit and Zott (2001) identify novelty as a key value driver in ebusiness. Novel inventions have included the appearance of the reverse auction model, and the continuous introduction of new products and services. In addition a number of intermediaries are venturing across industries as boundaries increasingly blur. Some 20 years ago, researchers such as Astley (1985) and Abernathy (1978) argued that it was necessary to forsake conventional industry categories in the wake of large new technologies so that developments could be tracked and explained across a wider and diverse environment. At this point there does not appear to be any research that investigates why and how some intermediators take new and/or inspirational directions.

5.6 Summary

This chapter has identified the B2B (IE) network as a business model in the electronic environment that is worthy of further investigation. The introduction of the Internet has brought with it promises of new value creating opportunities that are not yet fully understood. At this point it is unclear to what extent the Internet influences performance, especially between organisations within a network

setting, and conversely to what extent the relationships embedded within those networks influence the technological design of the individual systems contained on the Internet network. The following questions have specifically been identified as ones worthy of further investigation.

- What factors either external or internal to the existing value chain are going to influence buyer and supplier participation?
- Since the intermediating roles of the Internet and intermediary often appear to merge, what might their separate value adding roles be?
- How do differing levels of price volatility/environmental complexity impact upon these intermediary roles?
- How do intermediaries use their centralised position to create knowledge to simultaneously leverage current and future opportunities?
- How do the economic measures of value in the B2B (IE) network relate to the human value features of the intermediary?

The next chapter brings together the literature reviewed in this and the previous two chapters to identify those key areas that are the subject of investigation.

6. Synthesis: Key Theoretical Issues

6.1 Introduction

The key issues identified from a review of the strategy, strategic networks, and emergent B2B (IE) networks literatures are now drawn together to formulate four primary lines of enquiry that underpin the over-arching research question in this study, “What are the key points of value in B2B (IE) networks?” The extent to which the literature has examined these four lines of enquiry is incorporated in the following sections. First, the nature of the information flow and the location of the information gaps required by buyers and suppliers across the transaction process, prior to their entering a B2B (IE) electronic network are examined. Second, the brokering roles of the Internet and the business intermediary in providing a governance structure and processes that link buyers and suppliers across these information gaps are investigated. Third, the simultaneous identification of current and future information gaps, the relationship between them, and the value potential for the business intermediary in brokering these gaps is observed. Finally, the degree that value overall may be created and captured in this e-enabled networked transaction form is explored.

The B2B (IE) networks literature frequently mentions the potential for increased value for buyers and suppliers in terms of increased efficiencies and reduced costs (Balakrishnan, Kumara, & Sudarensan, 1999). These benefits are suggested to come in part from the functionalities offered by the Internet in terms of providing increased reach and access to a rich flow of information between parties (Evans & Wurster, 1999; Shapiro & Varian, 1999) with increased speed (Agrawal, Arjona, & Lemens, 2001) resulting in heightened accuracy in management decision making (Gurbaxani & Whang, 1991). Furthermore, the Internet is argued to facilitate transparency in data exchange. Lamming, Caldwell, Harrison, and Phillips (2001) suggest transparency from the Internet is “perhaps ultimately the most significant pressure on margins” (p. 4). Organisations transacting in industries with high levels of supply chain inefficiency and/or fragmentation (Phillips & Meeker, 2000; Raisch, 2000) are

believed to especially benefit from these Internet functionalities within the B2B (IE) network form. However, despite the introduction of these new functionalities and assertions regarding the Internet, there is presently scant empirical research into the area. What is of particular interest is the extent to which the Internet and/or man, in this instance, the business intermediary, might enhance and/or create new opportunities for information flow and decision making for buyers and suppliers in the B2B (IE) network.

6.2 Identification: Information Gaps

Transaction cost economics provides a useful theoretical perspective to begin this investigation as it links together some established core units of value in terms of the concepts of increased efficiencies and reduced transaction costs with the value of information exchange. According to TCE, when information is evenly or perfectly distributed through a process of rational decision making, individuals are more likely to prefer to use the market mechanism. Price is used to communicate in symbolised form the necessary information for exchange. The various price mechanisms can include those used to determine fixed, negotiated, and bid-offer prices. When information is unevenly distributed between members, especially in times of uncertainty, information asymmetries can arise that may ultimately lead to increased price discovery costs, such as search, negotiation, and asset specificity, hence providing a rationale for internalising activities within the firm (Coase, 1937).

Taking a somewhat different view to the argument that asymmetric information invites problems, from a behavioural perspective Williamson (1991) suggests that if individuals were honest then all information could be presented in perfect symmetry. The need for information asymmetry he attributes to the potential in individuals for opportunistic behaviour. Instead of focusing on the potential benefits of personal trust, Williamson (1998) views *trust* as a subset of *risk*, whereby rules around information disclosure and settlement act as substitutes for real trust especially in commercial and calculative relationships. In addition, Williamson argues that when individuals intend to act rationally they are likely to experience information asymmetries due to their own bounded rationality.

Incomplete information can lead to a reduction in the individual's physiological and psychological capacity to acquire, store, process and recall relevant information (Fransman, 1998), and ultimately in "formulating and solving complex problems" (Simon, 1957, p. 198). Simon (1983) suggests that individuals may also become bounded by organisational capacity in terms of culture and goal setting. However, he does suggest that there are overlaps between individual and organisational rationality, with the key difference being that only organisational rationality attends to the issue of goal setting.

Though TCE remains a sound theoretical perspective, critiques of this view argue that it remains neoclassical in its interpretation of economic behaviour. Individuals are viewed as rational decision makers, assumed capable of maximising their utility without moral judgement. The concept of trust is assumed to be a negative feature within the individual, and captured as a subset of risk in the concept of opportunism. At no time is trust seen as a positive feature, but rather something to be contained with the assistance of organisational rules and guidelines. In contrast to this view of trust, Das and Teng (1998) argue from a socioeconomic perspective that trust and risk are mirror images of each other, with increased trust leading to more risk taking over time, and vice versa. In addition, the TCE perspective suggests that individuals are intent on working in the most productive and rational manner to optimise efficiencies and reduce transaction costs in a logical empirical manner, only being constrained by rational behaviour. Etzioni (1988) reintroduces the full extent of the bounded rationality concept intended by Simon (1979) by focusing on what Etzioni terms beyond rational behaviour that includes normative/affective values such as choice. This concept of beyond rational behaviour could also include the overlapping concepts of intuition, insight and creativity highlighted by Simon (1997) as nonrational behaviour. When these issues are combined with the fact that there has been relatively little empirical research on the network as an organisational form, the social networks literature becomes a useful complementary empirical base to examine the value potential within B2B (IE) networks.

The social networks perspective focuses on leveraging the value within the interrelated pattern of nodal points consisting of either individuals or organisations, their position within the network, and the paths that connect them in achieving their goals (Uzzi, 1996). Strong relational ties, where organisational members mix in similar circles, are argued to be associated with the exchange of trusted, high quality, fine grained information. However, the repetitive nature of such ties has also been associated with the sometimes tedious transfer of information that is so similar in nature or content that it is likely to lead to redundancy in information exchange (Burt, 1982). In contrast, those organisations linked together by weak ties, whereby they normally circulate in different information flows, have been associated with information exchange that is less likely to become redundant, but rather provides opportunities for a more rapid increase in organisational knowledge (Granovetter, 1985). Burt's (1982) expansion of the weak tie concept with the structural hole theory argues for the value in linking together weak non-redundant organisational ties over structural bridges by a central mediating figure (Burt, 2000). In suggesting this, Burt (1992) argues that it is the chasm beneath the bridge that supports the information flow rather than the tie that is responsible for generating the initial value conditions. In this instance the chasm of focus is the information gap that separates buyers and suppliers in the B2B (IE) network.

Burt (1982) suggests two value creation opportunities arise from the structural hole concept. First, is the value opportunity in terms of increased informational benefits enjoyed by organisations on either side of the hole, with such organisations typically having access to a broader range of often new, more novel or timely information, especially when they are positioned in networks with a large number of structural holes. Second, is the value opportunity for those organisations undertaking the brokering or control function in forming the bridge over the structural hole. Though there has been much work done on the benefits and outcomes of bridging these gaps from both the perspective of the organisations on either side of the hole, and that of the broker, just why these holes exist, the benefits of these holes remaining open and even extending on some occasions in either size or number require investigation. Furthermore,

unlike TCE that is associated with providing clear benefits for individuals and organisations, in terms of how costs can be reduced, Burt's focus on the value of social capital is less clear, in terms of how it may directly lead toward increased efficiencies in organisations (Guillen, Collins, England, & Meyer, 2003).

Still within the social network perspective, Eber's (1997) identification of three content flow dimensions provides a base to begin to examine the potential value in the nature of the information flow between buyers and suppliers prior to their joining a B2B (IE) network. The first dimension, resource flows, centres on the nature of the resources exchanged. This dimension may include Morrison's (1993) five informational content types: technical, referent, performance feedback, normative feedback, and social feedback. The second dimension value of information flow can incorporate Sampler's (1998) two strategic characteristics of information, where he argues that the usefulness of the information content flow can vary depending upon the situation. Sampler's first characteristic is information separability, referring to the extent to which information can be meaningfully separated between the transaction and captured in digital form. His second characteristic is information specificity, defined as the extent to which information can be used/and or acquired. This second characteristic is further divided into two sub-characteristics, knowledge specificity (the extent information is limited in use to certain individuals) and time specificity (the time span of use of the information), while the third of Eber's dimensions, mutual expectation, is suggested by Gualti (1998) to be important in influencing organisational behaviour and cooperative dynamics.

From this literature the following questions arise:

- What is the content and strategic nature of the information flow required by buyers and suppliers across the transaction process prior to their joining a B2B (IE) network?
- Where are the information gaps or structural holes located?
- Is there any difference in the nature of the information flow, or the number, or nature of the gaps across the three buyer/supplier groups prior to their joining the three respective B2B (IE) networks?

- Why might buyers and suppliers choose to remain in a transaction situation where structural holes are retained or even expanded upon in terms of their number or nature?

6.3 Brokering Role: Internet/Business Intermediary

After providing a base to examine the nature of the information flow between buyers and suppliers and the gaps that separate them prior to joining a B2B (IE) network the extent to which the literature has examined the boundary spanning role of the Internet and the business intermediary are now investigated. Simon's (1981) concept of decomposable systems, where he argues for increased understanding between the inner and outer environment by breaking *humans* and *machines* down into symbolised forms (also known as *information processing systems*) provides a starting point. From here a base can be built to examine the separate and combined intermediating roles of the Internet and the business intermediary organisation in developing a structure and series of processes to govern a B2B (IE) network.

The Internet as a physical symbol system has the capacity to absorb, store, and automate increasingly significant amounts of rich information, with increased reach and transparency (Shapiro & Varian, 1999), while simultaneously greatly reducing or eliminating the need for correspondingly large or complex information processing structures (Galbraith, 1969). Furthermore, the Internet has the capacity to create new information opportunities (Scott, 1990). Simon (1982) suggests computers are used in two key ways: first to keep financial, production and sales records accurate, and so computers provide a new way of performing an old function, and second in the heuristic procedures that the computer can provide in terms of improving operational design. The computer can be programmed to search, discover, decide upon, and evaluate suitable procedures or designs, thus performing a new function. Simon (1996) likens the computer to the human brain as a connectionist system capable of handling increasingly complex cognitive tasks in a networked manner. However, he does caution that the success of any information design system, man or machine, requires a matching of the technology to the limits of the resources involved in terms of: input to overall

output; its memory (nature of inputs, time required to access, duration and quality of information retained, storing index), and its processing systems (including numeric and other symbols). Rather than arguing that the output from the computer is confined to the programmers skills, Simon (1996) suggests that overall this is more likely to be bounded by the goals of the organisation. He shares further concerns regarding the potential limitations of the computer, where it is sometimes viewed as being too mechanistic and, therefore, too rational in its output, especially in terms of its ability to be insightful, intuitive, and creative.

At this point there is no literature that has analysed the separate intermediating role of the Internet. Rather, it has been subsumed in reviews on the role of the intermediating organisation. Nor has this literature viewed the intermediating organisation as a physical symbol system. The role of the business intermediary organisation has been investigated over numerous studies perhaps best summarised by Spulber (1998, 2003), as one of market clearing when there are economic frictions between buyers and suppliers from information asymmetries and transaction costs. Spulber identifies four economic actions intermediaries may take to reduce these costs. These include searching or reaching between and coordinating buyers and sellers; price setting and market clearing; enhancing liquidity and immediacy; and providing quality and performance guarantees.

Both Spulber (2003), and Malone, Yates, and Benjamin (1987) in their study on markets and hierarchies, suggest that since information technologies permit a greater flow of information in the same or less time than before, the electronic broker can potentially increase the number and quality of the solutions, thereby reducing the likelihood of errors and inventory costs, and ultimately overall transaction costs. Though these studies examine the value of brokerage in the electronic environment, they do not separate out the individual value contributions of information technology from the brokering role of the organisation. Nor do they systematically examine these roles across the entire transaction process in environments with differing levels of volatility where the price mechanism is used as an independent construct. Inconclusive evidence was provided by Peng et al. (2000), who from a TCE perspective found that business intermediary's were

more likely to provide value in brokering distant markets with low complexity products. Though not from a TCE perspective, contrasting somewhat from Peng et al. (2002), Amit et al. (1998) found a high number of venture capitalist intermediaries in more complex service industries such as biotechnology, software and communications.

The cost savings associated with the brokering role of an organisation embedded with the network setting also require investigation. Gurbaxani and Whang (1991) in their study on the value of information technology in markets and hierarchies identified transaction cost savings as market costs (operational: search, transport, inventory holding, communication, and contractual: cost of writing and enforcing contracts), and organisation costs (monitoring, bonding, and decision information costs).

Within the networks literature, boundary spanning or brokering organisations are argued to have informational benefits, making it more likely for them to identify when it is most valuable to bring certain disconnected parties together, especially in situations where the information flow has the potential to become distorted or ambiguous (Burt, 2001). This brokering or intermediary role can be linked to the concept of centrality within the social networks literature, whereby organisations occupying this position are argued to have the potential to gain greater access to valued resources and information. Such organisations are argued to play a key centralised role in coordinating and disseminating this data (Gulati, 1998; Sydow & Windler, 1998; Tsai, 2000).

Freeman's (1979) second criterion measure of centrality, betweenness, can be described as positioning on the shortest path connecting pairs of actors. In order to increase the likelihood of success in intermediating the information flow, centralised organisations typically works to instil trust in the form of confidence between organisational links. Trust may be promoted through referral mechanisms from previous ties, enforcing deterrence based trust (Gulati, 1998) or preserving fairness, and ensure proactive levels of information exchange (Das & Teng, 1998). Burt (2001) suggests that the desired state for the centralised brokering

figure is one of working toward, rather than achieving a state of equilibrium in, information exchange. Taking somewhat of a contrasting view on the value of the centralised figure holder, especially in the electronic arena, Sawhney and Parkih (2001) suggest that value is more likely to lie at each end of the network, with the centre being a *mechanised middle*, and so signifying a *hollowing out of the middle ground*.

From this literature, the following questions are identified as needing to be addressed:

- What are the separate and combined brokering roles of the Internet and the business intermediary, both in locating existing information gaps, and also in establishing new ones between traders?
- How do the rational and beyond rational behaviours of traders impact upon these brokering functionalities, especially in keeping the information gaps open between them?
- How might these brokering roles differ across the three trading environments?
- What is the overall value to traders from these combined brokering roles?

6:4 Leveraging New Brokering Opportunities

Having established a foundation to examine the brokering roles of the Internet and business intermediary, this section provides a base to investigate the processes a business intermediary might use to identify and leverage new information gaps both within existing as well as future B2B (IE) networks. Traditionally, organisations have focused on designing work units that limit uncertainty both now and in the future. Transaction cost economics has viewed uncertainty as an inefficiency that incurs increased transaction costs (Williamson, 1985). Since organisations are increasingly leveraging situations that maximise uncertainty, especially in dynamic environments, Venkatramin and Subramaniam (2002) argue that competitive advantage may no longer be a fit between information processing capabilities and uncertainty, as traditionally understood. Instead, they argue that competitive advantage may be more a function of an organisation's ability to "continually navigate its way into the realms of the unknown and to concurrently

develop requisite new expertise” (p. 470) that requires new organising principles. However, the central focus of the outcome of these organising principles on efficiency; and Chandler’s (1962) basic treatise that organising principles need to be aligned to the strategic direction of an organisation are still pertinent. Consequently, it becomes important to identify the nature and role of these efficiencies and new organising principles. It is, therefore, timely to investigate whether Simon’s (1983) view of designing information systems that maintain a balance between production and consumption can be extended to that of increasing the consumption capacity of the end users.

In contemplating its future direction, Simon (1981) argues that a key task for any organisation is to first define its inner environment, in terms of its goals, and to understand its limits with regard to its ability to enter into adaptive and rational behaviour in “gathering information, drawing inferences and making complex computations” (p. 61). If we take the business intermediary in the B2B (IE) network as an example of the centralised figure within the inner environment of the networked organisation, its goal as already mentioned, is to optimise the flow of information between buyers and sellers in terms of searching, price setting, market clearing and settlement (Spulber, 2003). These functions are reported to lead to increased buyer and supplier value in terms of reduced transaction costs, including search, moral hazard, adverse selection, and contractual opportunism. Spulber (2003) suggests intermediaries also accrue value, with risk pooling and information gathering of buyer/supplier data thereby creating increasing returns to scale in transactions, and enhancing reputation.

Having defined the nature and goals of the inner environment Simon (1981) cautions that ongoing fulfilment, and the extent of adaptation, will be constrained by uncertainty and happenings in the outer environment. These features are consistent with those noted by proponents of the contingency approach (Lawrence & Lorsch, 1967), and especially with Galbraith (1973, 1977) who argues that the variables of complexity, uncertainty, and interdependence all tap a deeper underlying dimension that serves to place increasing demands on organisational structures to coordinate information processing activities to increase accuracy and

efficiency. Simon (1981) argues that prediction, as well as feedback and feed forward systems, are suggested as ways of dealing with uncertainty, especially in the external environment. The task of achieving certainty in an uncertain environment has been likened to environmental jolts by Eisenhardt and Galunic (2000) and as punctuated equilibrium by Madhavan, Koka, and Prescott (1998). Eisenhardt and Galunic (2000) question whether the current dynamic environment consists of a constant flow of environmental jolts. Furthermore, Simon (1981) argues that when making adjustments to survive the outer environment, a balance is required between maximising opportunities, termed substantive reality, while keeping in mind the constraints of one's own ability to discover appropriate adaptive behaviour that is termed procedural rationality.

Adapting to the external environment within a natural setting has been suggested by Von Hippel (1994) to be one of compartmentalising problem-solving tasks, with the aim of increasing efficiency. This process builds from Simon's (1962) concept of decomposable systems, where he argues for increased understanding between the inner and outer environment by breaking humans and machines down into symbol forms also known as information processing systems. Modular architectures, a subset of Simon's decomposable systems are conceived of as platforms that facilitate substitutability (Sanchez, 2003), with two central themes - modular product architectures and modular processes (Aroroa, Fosfuri, & Gambardella, 2001). Modular product architectures provide a structure where a product design is broken down into independent component parts, and then the standardised interfaces between the inputs and outputs are identified (Shirley, 1992). Likewise, modular processes decompose an organisation's key routines and the interfaces between them. Modular product designs can bring about a greater number of product variations, while simultaneously reducing switching time between product runs and also reducing the cost of switching (Sanchez, 1998). Warren, Moore, and Cardona (2002) extend the literature identifying the modularity antecedents in the market context of customer/competitor change, volume/margin pressure and Internet channels. They also identify mediating variables in product architecture (entrepreneurial intent, innovative climate,

modular structure, and modular processes) in order to achieve strategic flexibility and ultimately firm performance.

In terms of the direction and strategic flexibility of these new modular organisational structures, Eisenhart and Brown (1999) suggest, patching business now, and getting it nearly right, with adjustments to follow. Similarly, Moss-Kanter (2001) advocates acting now, in an innovative manner by sensing and responding. Both of these views appear somewhat similar to Simon's (1981) concept of uncertainty absorption, where he suggests that the sources and nature of the uncertainty be estimated. However, he places a caveat on the sources of uncertainty, arguing that in certain situations, standardisation may be better than flexibility and prediction. Sanchez (2003) suggests that the B2B arena promotes modular process architectures for the global exchange of information, and in doing so highlights the value of standardised interfaces between businesses. There are two potentially useful links between the concept of standardised interfaces and how the business intermediary within a B2B (IE) network might leverage current and future opportunities. First is Simon's (1981) understanding of man and machines as physical symbol systems, with each recognised as possessing complex processing and memory mechanisms, and second are the TCE concepts of information asymmetries, uncertainty, and asset specificity and how they might relate to the concepts of rationality, bounded rationality and beyond rationality. These features when combined provide a base to examine how the business intermediary might simultaneously leverage current and future opportunities.

From this review the following questions emerge:

- What is the relationship between the business intermediary and the Internet as two brokering mechanisms in the B2B (IE) network, especially as business intermediaries contemplate their future direction?
- Is there any difference in the value creating opportunities for business intermediaries across the three respective B2B (IE) networks?
- What value do business intermediaries place on certainty versus uncertainty in navigating their way into the future?

- What is the relationship between the concepts of asset specificity and uncertainty as business intermediaries move forward?
- How does the modularity concept relate to Burt's (1982) structural hole theory described earlier?

6.5 Overall Points of Value

This section provides a platform to investigate where the overall points of value are in the B2B (IE) network organisational form. As the Internet, together with the current dynamic environment, encourages the production and exchange of voluminous amounts of information for decision making, some things have remained unchanged. One of these is Chandler's (1962) central principle that organisational goals should be aligned with the strategic direction of the organisation. From a TCE perspective, this has led to securing a governance structure that has typically been a choice between the market and the firm, in optimising the transaction process. Furthermore, traditional measures of success or performance have usually been associated with hard financial measures reported from single organisations, based on historical events. Now, there is a call to expand our conception of value to take into consideration the potential effects of networked relationships, information flow, the impacts of technology, and perhaps more importantly how these features can be combined. This is especially so as organisation's simultaneously develop expertise to leverage current and future opportunities. The discussion that follows integrates these issues with existing measure of value so as to establish a base to identify the potential unit(s) of analysis, and the governance processes and structures operating within the B2B (EI) network.

As organisations increasingly enter into networked trade it becomes important to identify whether the existing units of analysis will suffice, or whether reconstituted or entirely new ones should be devised. The TCE perspective has typically used the transaction as its unit of analysis, focusing on concepts such as uncertainty and asset specificity to select the optimum governance structure between the market and the hierarchical firm. In contrast, Simon (1957) focused on the decision premise as the unit of analysis with role and idiosyncratic

information being used for human problem solving (Newell & Simon, 1972). Porter (1980) in his work on leveraging market imperfections developed analysis models at the industry and business unit levels, with the five forces and value chain models respectively. Then proponents of the resource based view perspective, including Barney (1991), adopted the organisation as the central unit of analysis in their efforts to identify how sustainable competitive advantage may be achieved. However, the focus has now moved from the organisation to the network level, production industries are giving way to service industries, new business intermediaries are appearing, and there is an increased awareness of the importance of information exchange and relationships in identifying value both in current and future opportunities.

There appears to be relatively little investigation into any new *units of analysis* beyond Nalebuff and Brandenburger's (1996) value net model that focuses on grouping business relationships, and some other closely related models such as Cartwright and Oliver's (2000) value clusters model. When exploring the likely units of analysis within the B2B (IE) network, two potentially useful links are made. The first link is to Etzioni's *I* and *We* concept as ways of understanding value from the individual and networked organisation perspective. The second is to Simon's (1976) conceptualisation of man and machine (the Internet) as physical information processing systems that may facilitate understanding of the role of the Internet in this network form.

In addition to examining whether new units of analysis are required, it is important to investigate the costs and subsequent value of the *governance processes* involved in the B2B (IE) network form. The descriptive literature on electronic commerce, especially within B2B (IE) networks, primarily focuses upon the increased efficiencies and reduced transaction costs to be sought from the information links that provide potentially rich data, all with increased speed, reach, and transparency. However, from a TCE perspective the exchange of information, including that electronically submitted, still involves costs such as asset specific investments, search, and collation costs due to information asymmetries and rational decision making in times of uncertainty. Etzioni (1988)

stresses that information costs and transaction costs should not be viewed as synonyms, as transaction costs include not only information costs, but also implementation costs. The concept of implementation costs that encompasses a range of decision making provides a useful link to the human behaviour perspective offered by Simon (1976) in his concepts of bounded rationality taken up by the economists, and beyond rationality highlighted by Etzioni (1998). From here, links can be made to the network literature, in examining the value of strong versus weak relational ties in the development of trusting relationships and the quality and nature of the information exchange.

A third factor worthy of investigation is the value to be captured within the *governance structure* of the B2B (IE) network. Venkatramin and Subramaniam (2002) suggest that if the network is adopted as the new unit of analysis, then the knowledge and expertise generated within the network is likely to radiate from the centre to the outside, which links to the centralised brokering roles of the Internet and the business intermediary. These roles may be aligned to the centrality and betweenness concepts in the networks literature (Freeman, 1979); and also to Quinn, Anderson, and Finkelstein's (1996) starburst model that highlights the value of the centralised figure within a network setting. Quinn et al. (1996) suggest the central figure or organisation is well positioned to develop a deep and/or common knowledge base into a "central core of intellectual competency" (p. 19) that radiates knowledge to the outer nodes. However, these authors do caution that the central knowledge core should not be confused with organisations such as banks that merely collect and disseminate funds. Last, a potential link is made between the information flow across the bridges provided by the centralised brokering roles of the Internet and business intermediary, Quinn et al.'s (1996) focus on knowledge flow, and Fransman's (1998) interpretation of the differences between the concepts of *information* and *knowledge*. Fransman suggests that information is a closed-set commodity capable of yielding knowledge; and knowledge is identified, with information-produced (or sustained) belief being open to interpretation and intuition.

From this review the following questions have been identified for further investigation:

- What is the unit(s) of analysis in the B2B (IE) network form?
- What are the key value processes in this network form?
- What part do the business intermediary and Internet play as centralised figures in providing a governance structure to facilitate the flow of information in the B2B (IE) network?
- What is the relationship between the units of analysis, process, and governance structure that maximises value opportunities in the exchange of information in the B2B (IE) network?

6.6 Conclusion

This chapter has drawn together and highlighted the key areas to emerge in the combined strategy, networks, and the emergent B2B (IE) networks literatures. Together, these areas form the basis to investigate the key research question in this study – “What are the key value drivers in B2B (IE) networks?” Four lines of enquiry were identified. These include identifying the nature and location of the information gaps between buyers and suppliers prior to joining a B2B (IE) network; the brokering role of the Internet and business intermediary; how the intermediary might simultaneously leverage current and future opportunities, and where the overall points of value might be in a B2B (IE) network. These areas are investigated in chapters 8, 9, and 10, the three results chapters. First, however, the thesis now turns to the questions of methodology and method.

7. Methodology and Method

7.1 Introduction

Investigation is characteristically underpinned by a researcher's theory of reality and how that reality is encapsulated within her or his quest for knowledge. This study views *reality* as the duality of human agency and social structure, as it relates across time and space. Structuration theory has, therefore, been selected to examine this ontological perspective, as it provides a framework to understand the systems, processes, and contexts involved in the interrelationship between individuals and the social structures in which they are embedded. Hence, the first section of this chapter examines structuration theory and its historical underpinnings. The second section examines the case study method. The multi-case study approach has been selected as a method of data collection to investigate for theoretical replication between the relationship of individuals and social structure within and across three B2B (IE) networks. In the third section, the grounded theory method of analysis is reviewed. The use of standardised data collection and analysis methods assists in ensuring systematic and rigorous examination, as well as providing an opportunity to gain new and novel insights into the value creation potential of these particular electronic networks. Then the fourth section describes the midrange theoretical position that this study embeds itself within. In the fifth section data presentation issues are discussed. Finally, the practical application of this methodology is provided.

7.2 Structuration: An Ontological and Epistemological Account

Understanding individuals, their actions, and how this interaction process is conceptualised and relates to organisations can be traced back to the functionalist/positivist and phenomenological schools of thought in the 18th and 19th centuries (Brown, 1969). The European rationalists argued that it was possible “through reason to obtain an absolute description of the world uncontaminated by the experience of any observer” (Scruton, 1982, p. 14). In contrast, the English empiricists believed that individuals were unable to generate ideas other than those that were derived via an individual's senses. Consequently, any statement

that was presented to an empiricist, apart from those of pure logic, being confirmed as either true or false, only by testing. Both the empiricists and the rationalists viewed their approach as the absolute truth and were dismissive of the other (Brown, 1969; Laughlin, 1995). A collation and critique of the rationalists and empiricists led Kant (1724-1803) to query the degree to which reality was real and tangible when mediated through personal experience. The degree to which the subjective interpretation of individuals was open to change and critique came under review (Laughlin, 1995). Comte (1798-1857) followed Kant, somewhat unquestioningly combining the rationalist and empiricist traditions into a positivist and objective view of reality. Comte's positivist stance that assumed rational processes and clearly defined rules on how to view the empirical world was very much welcomed at the time (Laughlin, 1995), serving to allay concerns that had begun to emerge within European academic circles, especially with questions such as those raised by Kant (Meehan & Wood, 1975).

The beginnings of an interpretive or phenomenological approach to the social world, where human values were believed to impact upon the construction of reality, can be linked back to one of Kant's students – Fichte (1762-1814) (Laughlin, 1995). Fichte, in response to some of the unanswered questions raised earlier by Kant, emphasised the highly subjective nature of reality. Fichte argued that reality in essence was a projection from the mind of the individual that made the material world uncertain. However, despite a raised awareness of the potential value of the phenomenological view, this area remained largely suppressed until the 20th century. As a result, the general agreement that order was external to, and constraining of, individuals remained. As a consequence, the views of theorists such as Hobbes (1651, 1962), who argued that social order existed independently of an individual's actions, and that individual's could either act as the order dictated or were considered deviant, largely unchallenged (Meehan & Wood, 1975).

Parsons (1937) continued to examine social order, based upon interpretations of 19th and 20th century European organisational theorists - Durkheim, Weber, Marx, and Pareto (Meehan & Wood, 1975). The systematic framework that Parsons

developed identified structures of external order and their functional interrelationship centred on the assumption that external order can be taken for granted. In this way Parsons acknowledged the relevance of certain norms in social situations and then examined the individual's role in matching those norms with particular scenes (Meehan & Wood, 1975). Furthermore, Parsons combined a complex version of functionalism and a naturalistic position on sociology, emphasising that although human action has "very distinctive attributes, social science by and large shares the same logical framework as natural science" (Giddens, 1984, p. 17). Parsons' work culminated with the publication of *The Structure of Social Action* (1949). This became one of the most prominent works in social theory.

However, the views of Parsons did not escape critique. It has been suggested that he almost completely ignored the original political and philosophical views of writers such as Marx and Weber, in terms of class division, conflict, and power (Meehan & Wood, 1975). Others questioned whether his central aim was to preserve the dominant functionalist position of American sociology (Giddens, 1984). Burrell (1996) succinctly summarises an overall critique of Parsons' work, that "in seeking to form an administrative science, unity, homogeneity and coherence were emphasised at the expense of fracture, fissure and difference." (p. 642)

In the mid to later part of the 20th century, numerous competing theoretical perspectives, such as symbolic interactionism, positivism, and realism came into prominence. Other schools of thought, such as phenomenology, that had developed separately from the main body of social science were for the first time, being taken seriously, "dissolving whatever consensus had existed before about how social theory should be approached" (Giddens, 1986, xv). As a result, the preeminence formerly enjoyed by the orthodox view could no longer be recaptured. The language and interpretations of meaning in those schools of social theory that had not been taken seriously came to the fore. Moreover, the behaviour of individuals began to be viewed as active and reflexive rather than being controlled by forces that could not be understood. It is with such developments

regarding the “shortcomings of the orthodox consensus and the significance of the convergence in thoughts” that structuration theory was developed (Giddens, 1984, p. 11).

Through a series of publications (1976, 1977, 1979, 1982) that led to the systematic exposition of the theory of structuration in *The Constitution of Society*, Giddens (1984) expresses an interest with the simultaneous and mutual causation between context and the action of individuals or actors. In this instance context is viewed

not just [as] a stimulus environment, but a nested arrangement of structures and processes where the subjective interpretation of actors perceiving, comprehending, learning and remembering help shape the process. (Pettigrew, 1990, p. 45)

Giddens (1984) argues that the study of context or the positioning of the individual is inherent in the investigation of social reproduction, with the individual being “positioned in the immediate circumstances of co-presence, in relation to others” (p. 25). Every individual is positioned in “a multiple way with social relations conferred by specific social identities” (p. 26) resulting in a range of social roles that have associated with them, obligations, normative rights, and sanctions. This is the main sphere of application of the concept of social role. The context of an individual can involve boundaries across time and space, with either physical markets or symbolic markers and interaction strips. Giddens stresses that the co-presence of individuals, directly mediated by the body’s sensory properties is different from social interactions established in the absence of time or space. The awareness and reflexive use of a diverse range of body gestures, facial expressions, and linguistic terminology can influence and/or control the interaction flow. Giddens (1984) suggests that it is not only individuals who are positioned relative to one another, but the contexts of social interaction are also positioned in this manner.

Giddens (1986, p. 8) refers to individuals as *agents* who move with rational intent, routinely monitoring “aspects, social and physical of the contexts in which they move”. He argues, therefore, that individuals have the capacity to understand what

they do, while they do it, during the course of their day-to-day social activity. However, he does caution that reflexivity operates only partly at a discursive level, and is more likely to be contained at the level of practical consciousness, where there is tacit understanding. The notion of practical or pre-consciousness that is positioned between the conscious (discursive state) and the unconscious state is fundamental to structuration theory.

Giddens (1984) uses the term agency to refer to the capability of agents to conduct certain activities, rather than the intentions or motivations they may have for doing them. In this sense an actor is the perpetrator of those activities, and “at any phase in a given sequence of conduct, [could] have acted differently” p. 14). The agent is able to deploy a variety of causal powers, with the actions of individuals depending on their capability to impact upon a preexisting state of affairs. Giddens (1986, p. 15) advocates that, “action logically involves power in the sense of transformative capacity”, so an agent ceases to have power if she or he loses the capability to make a difference, that is, to exercise power in some form.

Power is viewed as the property of either the individual or, as in the case of Parsons, the property of society, to achieve desired outcomes. Rather than focusing on one of these sources at the expense of the other, Giddens proposes the duality of structure in power relations. He suggests that resources are structured properties of social systems, called upon by knowledgeable agents in the course of their day-to-day conduct. Using this conception, power is not a resource. In this context, resources are viewed as the medium through which power is exercised, with power being deemed to characterise all, rather than specific types of conduct in social reproduction.

Furthermore, Giddens (1984) distinguishes between reflexive monitoring and rationalisation of action from the motivation of the agent. Motivation refers to the potential for action rather than the mode in which the action is conducted. Much of an agent’s day-to-day activities are not directly motivated, but rather there is an overall plan that can include a range of conduct. Competent actors are less likely to be able to report discursively about their motives for acting, since unconscious

motivation is a significant feature of human conduct. Giddens suggests that phenomenology and ethnomethodology have provided detailed treatment of the nature of practical consciousness, with this state remaining blind to agents within the other objectivist schools of thought. Giddens does not intend rigidity in distinction between the states of consciousness; rather he suggests they will change, especially as actors undergo learning and socialisation experiences.

The core of structuration theory then surrounds the concepts *structure*, *system*, and *duality of structure*. Though the notion of structure or social structure is prominent in a variety of functionalist writings, Giddens (1984) argues that structure had not been conceptualised in a manner that adequately met the demands of social theory. In the social science arena structure has most commonly been associated with the patterning of social relations or phenomena, often in a similar manner to the “skeleton or morphology of an organism or the girders of a building” (Giddens, 1984, p. 21). Here, the notion of function has typically been focused on at the expense of structure, with the latter more often used as a received notion. Instead, systems and structure can be viewed as a dualism of subject and object, with structure appearing to be external to human action. By focusing on the difference between the concepts of structure and system and then combining the functionalist view on structure with the structuralist view that suggests structure is “an intersection of presence and absence [with] underlying codes [being] inferred from surface manifestations” (p. 16) Giddens (1984) provides a base to explain the structuring of social relations.

Giddens (1984) suggests that an analysis of social relations requires both a

syntagmatic dimension, the patterning of social relations in time-space involving the reproduction of situated practices, and a paradigmatic dimension, involving a virtual order of modes of structuring, recursively implicated in such reproduction. (p. 84)

So, structuration theory retains the idea that structure is associated with the enduring aspects of social systems, but argues that the more important aspect of structure is the rules and resources recursively contained within it. Rules in this context are taken to mean multifaceted, complex procedures that intersect with practices in contextuality and cannot be conceptualised apart from resources.

Resources include allocative resources such as the material features of the environment, for example, raw materials, production processes and finished goods; and authoritative resources that include the organization of temporal-spatial paths, the production and reproduction of organisational and individual relations and life chances in terms of self-development. Since the structuring properties in social analysis permit the binding of social systems across both time and space, they enable discernibly similar social practices to exist virtually across various social interactions that can lead towards a systematic form, which means that social systems, or reproduced social practices exhibit *structural properties* rather than *structures*, with the structural properties serving to orient the conduct of knowledgeable individuals. Giddens (1984) advises that this understanding of structure does not prevent the conception of structural properties as hierarchies within organisations “in terms of time-space extension of the practices they recursively organize” (p. 80). Those interactions that enjoy the most deeply embedded structural properties, with the greatest time-space extension, are referred to as ‘institutions’.

The theorem of the *duality of structure* suggests that individuals or agents and structures are not two independent sets of phenomena, or a dualism, but rather they represent a duality (Giddens, 1984). According to this theorem the structural properties of social systems can be both a medium and an outcome of the routines they recursively organise. Structure is not seen to be external to individuals, but rather is embedded within social practices. Under this view structure is not to be equated with constraint, but instead is to be viewed as both constraining and enabling. So, the duality of structure theorem argues that social structures are constrained by the choices that individuals make regarding their activities, and at the same time, social structures are created by the activities they constrain (Hatch, 1997). The duality of structure is suggested to underpin the continuities in social reproduction across time and space (Giddens, 1986).

However, Giddens (1984) cautions that individual choice is likely to be bound by human knowledgeable ability. Though individuals may be familiar with the conditions and consequences of their actions in their daily lives, this flow of action may produce consequences that are not intended by individuals that in turn may result

in unacknowledged conditions of action through feedback. Two levels of *systems-ness* have been developed to understand and monitor the generalised conditions of system reproduction that may result in reproduced practices in interactive settings. One is the homeostatic process of reproduction, prominent in functionalism. Interdependence is viewed as a homeostatic process “akin to mechanisms of self-regulation operating within an organism” (Giddens, 1986, p. 26), with numerous causal loops operating to feedback a variety of unintended consequences of action that reconstitute the initiating circumstances). Also operating at this level is the process of selective information filtering, where strategically placed actors may position themselves to either change or maintain the status quo. Giddens (1984) suggests this first level of interdependence may be complemented with a second level that acknowledges the reciprocity of practices between actors or collectivities, involving both social and systems integration. Social integration relates to the face-to-face interaction between actors in contexts of co-presence. Systems integration refers to the level of reciprocity between actors or collectives who are physically absent in either time or space. Giddens stresses that the relations implied or actualised at and between the two levels of system-ness is widely variable with regard to their degree of permeability and looseness.

The modalities of structure (see Table 2) serve to clarify the main dimensions of the duality of structure in interaction that relate

the knowledgeable capacities of agents to structural features. Actors draw upon the modalities of structuration in the reproduction of systems of interaction, by the same token reconstituting their structural properties. (Giddens, 1986, p. 30)

Individuals are not only able to monitor their own day-to-day activities and those of others; they can also monitor that monitoring in discursive consciousness. Interpretive schema within an individual’s stock of knowledge are drawn upon in the conduct and reproduction of an interaction, and applied reflexively in sustaining communication. Giddens (1986) argues that communication of meaning may take two forms. Individuals routinely incorporate temporal, spatial, and other features within the contextuality of action, in the form of communicative intent that is, what the individual means to do or say. Communication may also be viewed as a more general and inclusive element in

the process of meaning. Rather than suggesting that overall communication is more meaningful than communicative intent, or vice versa, structuration theory continues with the duality theme, advocating for the duality of the two themes rather than for a mutually exclusive dualism.

Table 2. Dimensions of the Duality of Structure

<i>Structure</i>	<i>Modality</i>	<i>Interaction</i>
Signification	Interpretive Scheme	Communication
Domination	Facility	Power
Legitimation	Norm	Sanction

(Source: Giddens, 1986, p. 30)

Contribution to Research

Structuration theory has, however, attracted some critique, especially around the two key concepts of duality and objectivism. Some have suggested this theory to be unnecessarily complex, in terms of its dimensionalities and its mid-range positioning between the subjective and objective paradigms (Brooks, 1997). Layder (1987) argues that the claims for structuration theory are excessive and the case against sociological objectivism is overstated. He suggests that the duality of structure fails to properly account “for the collectivist or objectivist movements of social reality mainly because structuration theory is predicated on a complete rejection of objectivist ontology and epistemology” (p. 27). In addition, Layder believes the concepts of structure and system within structuration theory are weakened by their lack of focus on objectivism, with the concepts of social constraint, power, and control being dealt with at the subjective end of the continuum. However, despite such critiques structuration theory has emerged as a legitimate and valid tool that provides a means of bridging the structure-agency gap in understanding organisations. Brooks (1997) commends structuration theory in revolutionising our knowledge of social order. Hatch (1997) suggests that this theory enables attention to be given toward understanding how day-to-day

organisational practices facilitate the construction of the very rules of organising that those same organisational members follow, rather than focusing upon social structure as a system for identifying and controlling interactions within social relationships.

Structuration theory has been selected as an ontological base for this thesis primarily because of its recognition of the duality of structure. Here the Internet is viewed as a structure that works interdependently with individuals. The Internet with its low associated costs and open standard is so readily available that most individuals can readily connect to this mechanism with ease to exchange information (Afuah & Tucci, 2000). In addition, the Internet has made possible the exchange of information with greater speed, reach, richness, and transparency than ever before. The Internet, therefore, has been an important development in the business arena, providing a structural mechanism that operates between parties, especially at the B2B level (Turban, Lee, King, & Chung, 2000). However, it is argued in this thesis that the value embedded within this electronic intermediating structure, especially in terms of the new and extended features it provides, will be influenced by the extent to which individuals and organisations are socially bound. The nature of this bounding may be influenced by features such as the physiological and psychological limitations and the creative potential of individuals at the organisational level, and also by factors such as existing levels of trust, content requirements in information exchange, and position, if in a network situation. Since the Internet can readily be programmed to meet most user requirements, its operation is suggested to be influenced by the routines recursively organised by individuals. In arguing this, the structure of the Internet is not seen to be external to individuals, but rather as a tool that is embedded within social practices. Structuration theory, therefore, provides an effective lens to examine the interaction between individuals and the Internet in investigating the value drivers in B2B (IE) networks.

7.3 The Middle Ground

This study is well positioned within the midrange thinking perspective developed by Laughlin (1995). This perspective suggests the level of theoretical

development prior to the commencement of the fieldwork determines the methodological position taken. When there has been scant *a priori* theorising based on previous literature, the midrange perspective is suggested to provide an opportunity to maximise new understandings from the rich and detailed accounts of participants, while remaining within the general bounds and overall direction of the study. Laughlin (1995) also focuses on the nature and general characteristics of the methodology used and how these are likely to impact upon the role of the researcher. Those taking the middle ground on the continuum “are more strategic in their attitude to change - open to maintaining certain aspects of current functioning but also open to challenging the status quo” (Laughlin, 1995, p. 68). A framework is recommended that recognises the contribution of existing literature, while simultaneously remaining open to change, as a result of further investigation. Laughlin (1995) likens the midrange skeletal framework to that of a human skeleton in that

A skeleton remains unchanging yet incomplete to encapsulate the nature of human beings, so a “skeletal” theory may also be similarly unchanging (being the extreme of human generality) and always require the diverse empirical ‘flesh’ to arrive at meaningful ‘whole beings’. (p. 82)

7.4 Method

Midrange approaches to research such as structuration theory are ideally suited to the case study method. When taking the structuration lens, the case study approach facilitates the capture and in-depth examination of the rich detail contained between agents and their structure. The framework for the selection, collection, and analysis of data using the multicase study method is now examined.

The case study as a method, or research strategy, is identified as having intellectual value in organisational research due to its ability to cover wide variations in organisation process and structure (Yin, 1988). Case studies can be used to either test theory (Yin, 1989), or to develop theory (Eisenhardt, 1989). The case study method can be very useful in deriving new insights (Numagami, 1998) within a contemporary set of events when “the boundaries between phenomenon and context are not [yet] clearly evident” (Yin, 1994, p. 15). Furthermore, case

study data can be measured qualitatively or quantitatively from information extracted from a variety of sources that include interviews, documentation, archival records, and participant (Chetty, 1996).

Yin (1994) suggests that case study design involves five different components. First is the development of a study question. Yin (1994) argues that *how* and *why* questions that require no control over behavioural events, especially contemporary ones, are most suited to this research format. The next component involves the development of a series of propositions if possible. Both Yin (1994) and Stake (1995) argue that the development of prior theoretical propositions from what is already known provides a conceptual bridge to guide data collection and analysis. Third, is the identification of units of analysis that link back to the formulation of the initial research question. The fourth and fifth steps involve identifying the logic that links the data to the propositions and then developing the criteria to interpret these findings.

Yin (1989) refutes a common criticism of case study research – the failure of this method to provide a sufficient basis for scientific generalisation. He argues “case studies, like experiments are generalisable to theoretical propositions and not to populations or universes” (p. 21). Yin claims that case researchers seek both what is common and what is peculiar to a case, ultimately resulting in the presentation of something unique. Stake (1994) supports Yin, suggesting that uniqueness can be extended to a) the nature of the case; b) the historical background; c) the physical setting; d) other contexts, including economic, political, legal, and aesthetic; e) other cases through which this case is recognized, and f) those informants through whom the case can be known. Stake (1995) argues the

real business of case study is particularisation, not generalisation. We take a particular case and come to know it well, not primarily as to how it is different from others, but what it is, what it does. There is emphasis on uniqueness, and that implies knowledge of others that the case is different from, but the first emphasis is on understanding the case itself. (p. 236)

Three alternative case study types are put forward by Stake (1994). First is the intrinsic case study where pre-selected cases are chosen for their uniqueness. Here

the researcher is required to make interpretations based on novel issues within the particular context of the case. Next is the instrumental case, where the emphasis is on gaining a general understanding of the research question. Cases are typically chosen that best represent, or are instrumental to providing, an in-depth understanding of a particular issue(s) in question, rather than the uniqueness of one particular case. Last is the collective case study that involves multi-case studies selected for their literal replication, in predicting similar results, or theoretical replication, where contrasting results are produced for predictable reasons (Yin, 1994).

The multi-case study approach that has become increasingly popular over the past two decades (Yin, 1989; Strauss & Corbin 1990) is used in this study. Eisenhardt (1989, 1991) and Yin (1994) provide thorough accounts of the theory building properties of this approach. Eisenhardt (1991) asserts “multiple-cases are a powerful means to create theory because they permit replication and extension among individual cases” (p. 620). Yin (1994) suggests that multi-cases studies may permit both literal replication – predicting similar results, and theoretical replication – producing contrasting results for predictable reasons. Extension refers to use of multi-cases to develop more sophisticated theory. Eisenhardt (1991) argues that a further potential advantage in multi-case studies is the use of methodological rigour in the development of research questions, interview schedules, questionnaires, and theoretical sampling.

Eisenhardt (1991) suggests that the use of three to four cases in a study is appropriate, but the final number should consider the state of existing knowledge in the area, with more cases being required for new areas. Yin (1994) offers a slight moderation to this view, suggesting that the number of case studies chosen may also depend on their availability. Regardless of the number of cases chosen, each case needs to be viewed as a separate entity that enables the establishment of unique patterns across the cases (Chetty, 1996) while individual idiosyncrasies are retained. Though Dyer and Wilkins (1991) critiqued the multi-case approach, arguing that this method gives an inadequate account of the rich contextual

background of the individual cases, Eisenhardt (1991) counters this view by suggesting that it is inaccurate to view constructs and contexts as a dichotomy.

Having decided upon the case study approach, the next step is questionnaire design. Stake (1995) advocates that case study interview questions can be shaped through the identification of key concepts worthy of further investigation within the literature. In this way the interview questionnaire becomes the conceptual bridge between what has already been identified and what is yet to be identified. When designing a questionnaire for the multi-case study approach it is important that the questionnaire accommodates not only the investigation of constructs and the idiosyncrasies within individual case, but also the identification of patterns across the entire number of cases under consideration.

In addition, Stake (1995) cautions the questionnaire designer, suggesting one of the most challenging tasks is to achieve a balance between designing questions that provide sufficient direction for the research while not overly prescribing the answers. This study uses the semi-structured opened-ended interview schedule, a style suggested by Broadbent and Laughlin (1997) that is located within the middle range theorising perspective. This interview schedule style attempts to guide participants toward the topic of interest, with some uniformity and consistency in the questions being asked across participants and cases, but without being overly influenced by the views of the researcher. In addition, the semi-structured open-end approach to questions also gives an exploratory lens advocated by grounded theory proponents (Strauss & Corbin, 1990) that serves to enhance the likelihood of extracting rich data. Furthermore, this method is suggested to reduce researcher bias.

Denzin and Lincoln (1994) describe the interview as a conversational art form that involves questions and listening, though they do caution that the interview is not a “neutral tool, for the interviewer creates the reality of the interview situation . . . thus the interview produces situated understandings grounded in specific interactional episodes” (p. 353). The creation of the interview situation, therefore, begins prior to the interview with a self-awareness check by the

interviewer/researcher regarding how he/she is likely to influence the process. Johnson (1975) suggests that the interviewer does not want to seem to be a spy, nor does he/she want to appear to be too much of a learner. In addition, Fontana and Frey (1994) advocate the importance of an awareness of how the personal characteristics of the interviewer, including ethnicity, class, and gender are likely to impact upon the interview process. During face-to-face interviews, as with this study, it is important that the researcher is aware of how his or her body language, especially facial expressions, may potentially cue or impact upon participants.

Undoubtedly

The decision of how to present oneself is very important, because after one's presentational self is "cast" it leaves a profound impression on the respondents and has great influence on the success (or failure) of the study. (Fontana & Frey, 1994, p. 367)

Van Peurseem (1996) recommends that one of the first contacts in each organisation is the highest-ranking person from whom valuable knowledge, experience and further contacts can be sought. In addition, Fontana and Frey (1994, p. 14) suggest that locating early on an "insider, a member of the group studied, [who is] willing to be an informant and to act as a guide to and translator of cultural mores" and language may save time and enhance accurate data interpretation. Both single and group interviews may be conducted depending upon the location of the participants and their availability. The regular use of group interviews is advocated to complement the information sought from individual participants. Furthermore, it is important that the researcher remains open and flexible to participants joining the study part-way through the study, especially as new and relevant information comes to hand.

Since the goal of the unstructured part of the semi-structured interview process is to understand the issues that come to hand, it is especially important that the researcher creates rapport with participants as early as possible. Consequently, the establishment of trusting relationships with participants becomes vital in facilitating 'the free flow of information'. However, Fontana and Frey (1994) caution interviewers in seeking a balance between gaining sufficient rapport to increase the likelihood of access to more information, and at the same time not

becoming too close to cloud their objectivity. Furthermore, the development of a trusting relationship with participants becomes especially critical if the interviewer wishes to use a tape recorder, either instead of, or in addition to, taking notes. Taped interviews can be especially useful to maximise data capture and to reduce the likelihood of misinterpretation. If data are to be recorded either in written note form, and especially if tapes are to be used, it is essential that the interviewer seeks prior permission with each participant. Furthermore, when tapes are used, it is important to disclose to the participant that upon transcription of the taped information, the tape will be destroyed immediately.

Janesick (1994) advocates that once the interview questionnaire and format have been decided upon that pilot studies are used to enhance overall validity. Janesick (1994) recommends pilot studies in qualitative research for four key reasons. First the pilot study may provide a focus in particular areas that were previously unclear in the literature. Second, the pilot study permits the testing of questions. Third, the pilot study allows the researcher an opportunity to establish dialogue and a sense of rapport with participants. Potential opportunities for group as well as individual interviews may be established. Last, an opportunity is provided for a review of the literature, where the researcher may now uncover a particular aspect or insight triggered by the pre-interview process.

7.5 Data Analysis

Stake (1995) suggests

There is no particular moment when data analysis begins. Analysis is a matter of giving meaning to first impressions as well as to final compilations. Analysis essentially means taking something apart. (p. 71)

Consequently, the systematic collection, documentation, and storage of data that Miles and Huberman (1994) suggest are part of data management are inextricably linked to the data analysis process. Eisenhardt (1989, p. 39) argues that data analysis is at “the heart of building theory from case studies”. In addition, data analysis is commonly argued to be one of the most challenging aspects of

research, where the role of information gatherer is central to the interpretation of data (Stake, 1995).

The grounded theory approach developed by Glaser and Strauss (1967) is commonly used to analyse data within the case study method. Eisenhardt (1989) supports this approach, especially when using case studies to build theory. Using the grounded theory method for analysis only, in research, follows Patton's (1990) view when he calls for the selection, design, and implementation of evaluation methods that provide flexibility based upon practical need.

Rather than believing that one must choose to align with one paradigm or another, I advocate a paradigm of choices. A paradigm of choices rejects methodological orthodoxy in favour of methodological appropriateness as the primary criterion for judging methodological quality. The issue then becomes whether one has made sensible methods decisions given the purpose of the inquiry, the questions being investigated, and the resources available. (Patton, 1990, p. 8)

Glaser and Strauss (1967) argue for the joint collection, coding, and analysis of data in the grounded theory technique. Miles and Huberman (1994) suggest this process begins with a focus on data reduction by selecting relevant case studies and interview questions and then continuing into the field. Since semi-structured interviews often generate a large amount of data that either is not analysed immediately or is not clearly decipherable, it is important that appropriate data collection methods are employed. Audiotapes can be used to ensure that all data is recorded. In addition, field notes can be used to record both observation and analysis of situations as it occurs especially when "it is often difficult to know what will and will not be important in the future (Eisenhardt, 1989, p. 538). Burgelman (1983) advocates the use of field notes when examining across cases, to record informal observations, anecdotes, and hunches. Such information may provide useful prompts to investigate new or novel areas. Eisenhardt (1989) suggests that rather than viewing this approach as flexible and unsystematic it should be viewed as controlled opportunism, "in which researchers take advantage of the uniqueness of a specific case and the emergence of new themes to improve resultant theory" (Eisenhardt, 1989, p. 540).

Denzin and Lincoln (1994) suggest that within-case analysis calls for the researcher to become intimately familiar with each case as a stand-alone entity. As a result, the researcher can become familiar with the unique patterns of each case as it unfolds before moving to establish generalised patterns across cases. In addition, researchers who have a rich familiarity with each case can efficiently move through cross-case comparison analysis. Miles and Huberman (1994) suggest that within-case analysis permits an understanding of two primary levels of understanding. The first is descriptive, concerning seeking answers to the *What is going on* and, *How are things proceeding*, questions. The second surrounds answers to the *Why things are*, or the *Why they happen the way they do*, questions. In answering these questions, it is recommended that the explanations include justifying actions, supporting claims, making causal statements, and providing requested information.

A key advantage in using the grounded theory data analysis technique is that it provides a series of systematic processes to classify and code the various categories and concepts. The first process *constant comparison* involves generating categories and properties that Glaser and Strauss (1967) describe broadly as conditions, consequences, types, processes, or causes. This information may be indexed (Codes and structures for material are developed.); abstracted (Field documentation is paraphrased.); and paginated (Pages and references for specific items and materials are noted.) (Levine, 1985). Constant comparison is an iterative process that reviews the data again and again. Key or preference concepts are identified by the researcher who subjectively analyses the data by reading, coding (classifying), reviewing, rereading and reclassifying. Hence, the transcribed tapes are intensively and repeatedly reviewed phrase by phrase to identify concepts of preferences for report. The coding emerges from the data (Levin, 1985) through

the generation of 'preference concepts' from the art of 'constant comparison that may highlight ideas and enhance understanding about the properties and interrelationships of these concepts. Patterns expressed between participants also should be noted. (p. 8)

Strauss and Corbin (1990) argue that analysing the data in this way facilitates the generation of theory.

The quality of the coding process is suggested by Strauss and Corbin (1990) to be influenced by the degree to which the researcher can demonstrate *theoretical* and *social* sensitivity. Social sensitivity refers the ability to have insight and also to conduct oneself in a professionally appropriate manner in a variety of unpredictable circumstances when in the field. Theoretical sensitivity is concerned with demonstrating an ability and insight that provides “meaning to data, the capacity to understand, and capability to separate the pertinent from that which isn’t” (p. 42). Strauss and Corbin (1990) propose that theoretical sensitivity is derived from two key sources. These include being well-versed in the literature, and also from prior professional and personal experiences. The need to be theoretically sensitive continues throughout the data collection process. Theoretically sensitive researchers more readily discriminate among and give meaning to particular components of data within the potentially broad masses of information that are generated. Strauss and Corbin (1990) suggest that this ability assists in the formulation of theory that more accurately reflects the phenomenon under study. In line with the data reduction technique advocated by Glaser and Strauss (1967), Strauss and Corbin (1990) call for the development of a skeletal model framework that shows a series of emergent concepts and relationships that require further investigation. This model then serves as a tentative guideline for theorising. These authors caution the researcher to be selective in deciding upon the concepts and relationships to be focused upon

you do not want to enter the field with an entire list of concepts and relationships; some may turn up over and over again in the literature and thus appear to be significant. Those who may want to bring to the field where you will look for evidence of whether or not the concepts and relationships apply to the situation that you are studying, and if so what form they take here. (Strauss & Corbin, 1990, p. 50)

The second and third coding procedures used in grounded theory are *questioning* and *theoretical sampling*. The use of questioning techniques guides the researcher towards a thorough understanding of the data under review, as well as towards the

identification of any gaps. Strauss and Corbin (1990) suggest that such information can be extracted through the asking of *what*, *why*, and *how* questions. Thus, the questioning technique underpins the development of concepts and relationships within the theoretical framework and also permits reflection and expansion of data once in the field. This study also followed the theoretical sampling process. Once it becomes clear that particular theoretical areas or samples are beginning to emerge it may become pertinent to include additional participants or other data sources in order to satisfy this gap in the investigation. Grounded theory supports the addition of such sources when their identity becomes known.

The fourth and last component in grounded theory analysis is the coding process. A distinctive feature of the coding process surrounds the underlying rationale of the grounded theory technique that is to build rather than to merely test theory. The grounding facilitates the generation of a richly woven blanket of strands from a dense data source, culminating in “explanatory theory that closely approximates the reality it represents” (Strauss & Corbin, 1990, p. 57). The coding process in grounded theory requires the researcher to build upon the concepts and themes under review, thus reducing the temptation to introduce personal biases and assumptions. Glaser and Strauss (1967) developed three main coding methods: *open coding*, *axial coding*, and *selective coding*, each representing a progressive stage towards theory development.

Open coding involves the identification of concepts and the development of properties and dimensions within each of these concepts. Concepts, or as Strauss and Corbin (1990, p. 76) term them “the basic building blocks of theory”, are identified from discrete incidents and events occurring within the phenomena under review. Two analytic processes, making constant comparisons, and asking questions enable the researcher to label and conceptualise the phenomena under review. The concepts are compared with each other to enable some form of meaningful grouping or categorisation. The categorisation process entails the identification of properties that are the attributes or characteristics of a category

and their dimensions that represent the placement of a property along a continuum.

The second method axial coding is a systematic procedure whereby data is recomposed in new ways after connections have been made between categories. In order to arrive at a model that contains density and precision, Strauss and Corbin (1990) suggest subcategories are linked in a particular manner that includes: causal conditions; phenomenon; context; intervening conditions; action/interaction strategies, and consequences.

Selective coding, the final analytical procedure in grounded theory, involves the selection of “the core category, systematically relating it to other categories, validating those relationships, and filling in categories that need further refinement and development” (Strauss & Corbin, 1990, p. 116). Selective coding has the effect of reducing the number of concepts to a manageable level, while at the same time providing some semblance of meaningful order. This process serves as a useful validation method that requires a review of the concepts from a fresh perspective (Strauss & Corbin, 1990). Eisenhardt (1989) suggests that the point of saturation or closure to this iterative task is realised when incremental improvement is minimal. It is widely recognised that the process of making it ‘all come together is usually one of the most difficult tasks of the entire research after a considerable time of data gathering and analysis (Hammersley & Atkinson, 1983).

Cross-Case Analysis

If the multi-case study approach is adopted, data analysis is required both within each case study and also across the entire range of cases under review. The use of cross-case analysis forces “researchers to go beyond initial impressions and take a more in depth structured approach with the data” (Chetty, 1996, p. 74). Eisenhardt (1989) suggests that such tactics improve the likelihood of developing accurate and reliable theory that resembles a close fit with the data. In addition cross-case analysis techniques increase the chances of locating novel findings that may exist amongst the data. The data extracted from each case are analysed both

individually and across cases and then compared to the theory. In this way, there is constant comparison between the data collected and the established and emergent theoretical issues. The data are analysed both for unique features of a particular case, and for similarities across cases that have varying degrees of fit with the current theory. As indicated by Strauss and Corbin (1990, p. 111) “the discovery and specification of differences among and within categories as well as similarities is crucially important and at the heart of grounded theory.”

Yin (1994) stresses the importance of having a “specific purpose within the overall scope of inquiry” (p. 45) when selecting cases in a multi-case design. He suggests care needs to be taken that cases within the multi-case design are viewed as individual experiments and not incorrectly considered to be similar to numerous participants in a survey that follows a sampling logic. Instead Yin (1994, p. 46) suggests that each case is carefully chosen to either “predict similar results (a literal replication); or produce contrasting results but for predictable reasons (a theoretical replication).” A further consideration in multi-case design is the number of cases to be used. Since sampling logic is not applicable in this instance, it is important to consider factors other than sample size. Rather, the number is a matter of judgement, discretion, and the certainty the researcher has regarding the replicability of multi-case results. As a result, the researcher’s “sense of the complexity of the realm of external validity” becomes important (Yin, 1994, p. 50). In practice, a point of saturation is reached in terms of the number of case studies used, by combining pragmatic issues such as researcher resources including time and funding, together with the knowledge that adding a further case would provide minimal further theoretical advancement. However, Yin (1994) does advise that case study design is not something that is completed in its absolute form at the outset, and can be altered, but only under stringent circumstances.

7.6 Presenting The Data

The ultimate purpose of data analysis within organisational research is to either develop new theory or to test existing theory (Eisenhardt, 1989). The presentation of frameworks for new organisational theory development has traditionally been

derived from combined understandings in earlier literature, experience and logic, and actual data. However, the connection to actual data has often proved tenuous. As Glaser and Strauss (1967) argue, it is the close connection with empirical reality that facilitates the development of a relevant, testable, and valid theory. One increasingly popular method of multi-data collection and analysis is that of *triangulation* developed by Jick (1979a) and Denzin (1989).

Denzin (1978, p. 291) defines triangulation as “the combination of methodologies in the study of the same phenomenon”, whereby organisational researchers can increase “the accuracy of their judgements by collecting different kinds of data bearing on the same phenomenon” (Jick, 1979b, p. 136). In social sciences the use of triangulation can be traced back to Campbell and Fiske (1959, as cited in Jick, 1979b) who argues that more than one method should be used in the validation process to ensure that the variance reflected is one of trait and not method. So, the convergence or agreement between two or more methods increases “belief that the results are valid and not a methodological artefact” (Bouchard, 1976, p. 268).

This kind of triangulation, referred to by Denzin (1989) as cross-method, is the most commonly used form of triangulation. When conducting qualitative research in the organisational setting this may include the examination and comparison of a dimension between interview, observation, archival data, and academic literature. Stake (1994) advocates the use of questioning and reflection to assist in clarifying meaning, and also to verify repeatability of observation and interpretation. Two additional forms of triangulation are highlighted by Miles and Huberman (1994). These are triangulation by *data source* that can include persons, times, and places, and, by *researcher*, when more than one individual is used to collect data. Regardless of the methods used, the aim is to systematically achieve a richer and more meaningful set of results (Flick, 1992) as “weaknesses in each single method will be compensated by the counter-balancing strengths of another” (Jick, 1979b, p. 138).

Verification of Data

Denzin and Lincoln (1994) argue the

processes of analysis, evaluation, and interpretation are neither terminal nor mechanical. They are always ongoing, emergent, unpredictable, and unfinished. They are done through the process of writing, itself an interpretive, personal, and political act. (p. 479)

So the art of analysis and interpretation in qualitative research creates understandings fashioned by “genre, narrative, stylistic, personal, cultural and paradigmatic conventions” (Denzin, 1994, p. 507). As a consequence, there has been much discussion over what constitutes sound interpretation in qualitative research (Hammersely, 1992). The positions held range on a continuum from the positivist approach, believing that one standard set of criteria needs to be applied to all scientific research, to the other end of the continuum that takes a post-structuralist view, requiring an entirely new set of qualitative criteria to be established.

One position, the post-positivist - takes a midrange view that fits somewhat within the midrange position taken in the current study. This view is similar to the positivist paradigm, whereby a set of standardised criteria specific to qualitative research are used. Hammersely (1992) developed four standardised features that guide the verifiability of research using this view. These include the researcher’s ability to develop formal and generic theory based on both cross-case study and literature reviews. Second is the need to be well grounded empirically in order to produce scientifically credible data. Third, the findings must be able to be generalisable to other settings. Last, the researcher is required to be flexible in terms of taking account of the impact of the researcher and the research strategy on the data found.

Limitations and Key Assumptions

Janesick (1994, p. 213) reminds us “the use of qualitative techniques does not necessarily mean that the research being conducted is qualitative. What makes the research qualitative is a matter of substantive focus and intent.” However, despite the often very clear intent of qualitative researchers, this form of research and

especially the case study technique has often been criticised. Common criticisms include its potentially narrow focus and idiosyncratic nature in revealing data, thus providing for little scientific generalisation (Yin, 1994). In addition, concerns have been expressed at the considerable volume of data that may be gathered from which to develop theory. It could be argued that such comments have overlooked the rigid processes recommended in qualitative data analysis techniques such as those set out in the grounded theory approach. In addition, a comprehensive database of information, once carefully analysed may be very useful in identifying unique patterns and complexities of human behaviour that can then be generalised across cases (Chetty, 1996).

The art of constructing human knowledge during the entirety of the research process is “inevitably entwined with the perceptual frames, histories, and values of the inquirer” (Greene, 1994). Rather than offering apologies for the inherent subjectivity underpinning qualitative research, Guba and Lincoln (1989) suggest that trained researchers should aim to maintain a detachment and neutrality to guard against potential bias, in the pursuit of truth. In addition, Greene (1994, p. 539) proposes it is “precisely the individual qualities of the human inquirer that are valued as indispensable to meaning construction.” Eisner (1992) views the qualitative evaluator as an expert who makes informed methodological decisions that are valued by all and will influence the inquiry. In contrast, Patton (1990) regards the evaluator as more of a negotiator, one who works towards having his or her presence minimised during the investigation process. Taking more of a middle ground approach, Guba and Lincoln (1989) argue “evaluators are subjective partners with stakeholders in the literal creation of evaluation data” (p. 110), where shared responsibility is taken for the interpretation and creation of meaning.

Stake (1995, p. 244) suggests “qualitative researchers are guests in the private space of the world. Their manners should be good and their code of ethics strict.” Qualitative research typically takes an intense interest in the lives and personal views and circumstances of those being studied, it is essential that utmost respect be provided to all participants. This respect can be fostered in numerous ways that range from creating a trusting relationship with participants, through to the

researcher provision of a full written explanation of the purpose and the nature of the use of the research, and the exchange of confidentiality agreements.

7.7 Theoretical Application

The skeletal framework provided in chapter 6 identifies four key areas for investigation. These areas are based on *a priori* research in the strategy, networks and emergent B2B (IE) networks literature. As advocated by Strauss and Corbin (1990), this framework is underpinned by theoretical sensitivity that includes a thorough analysis of the existing literature by me as researcher. In accordance with the data reductionist technique promoted by Glaser and Strauss (1967), a skeletal framework has been developed that identifies a series of emergent concepts and the relationship between them. The use of a loose skeletal outline supports Laughlin's (1995) midrange theory perspective by providing an overall boundary and general direction, while remaining open to the rich and detailed accounts of data findings. The four key areas identified in the framework are as follows. First is the nature and location of the information gaps that separate buyers and suppliers prior to the B2B (IE) network. Second is the brokering role of the Internet and business intermediary in linking buyers and suppliers across the information gaps. Third, is the simultaneous identification and leverage of current and future information gaps by the B2B (IE) business intermediary, and fourth is the extent of overall value capture in this e-enabled networked transaction form.

Entering the Field

The multi-case study approach is used here to build theory in an area where there has been relatively scant research to date. The new organisational form of the B2B (IE) network is examined across three case studies. The use of three case studies is in line with the number suggested by Eisenhardt (1989) to maximise the collection of rich data, while also increasing the likelihood of theoretical replication. Each of the case studies has an intermediary who electronically facilitates the exchange of services and products between buyers and suppliers that use three different price mechanisms: fixed, negotiated, and bid/offer. The intermediators are all physically situated in New Zealand. First is M-co, an electronic network that facilitates the

exchange of electricity. M-co operates its network via bids and offers. Second, is Global Ecomex, a network that operates as an electronic exchange in the timber industry. This network uses negotiation as a price mechanism. And third is EDIS, an electronic data interchange network that links buyers and suppliers based on fixed prices. All three networks are private in the sense that membership is required for participation.

In accordance with Van Peursem (1996) who advocates that first contact should be made with the highest-ranking person in an organisation, the managing director of each B2B (IE) network was first telephoned; the purpose of the research was explained, and their willingness to participate was confirmed. (purpose statement, signed consent forms) This request involved seeking permission to access key management, marketing, and information technology staff within the central intermediating body of the network. On occasions where intermediary staff believed that the research data would be enriched by the knowledge of strategic partners, these parties were contacted and asked about their willingness to participate. Permission was sought to contact between six and eight buyer-seller participants within each network. The buyer-seller participants were randomly chosen by me from lists provided by the managing director in each respective network. A research information sheet and consent form was given to each participant.

Three semi-structured interview questionnaires were developed, with 25 items in each. Questionnaires were designed for the B2B (IE) network business intermediary staff, buyer-supplier participants and strategic partners (see Appendices A, and B). In accordance with Strauss and Corbin (1990), the items in each questionnaire were developed with the dual purpose of extracting data that would provide a guide toward a better understanding of the existing literature, as well as identify sufficient detail in order to begin to fill in the gaps in the literature. The business intermediary questionnaire called for data in the following areas: a) the date and rationale for commencing business; b) product, buyer-seller and strategic partner characteristics; c) the depth of functionality of the exchange processes and structures; d) current and planned expansions, and e) overall

perceptions of value including performance. The questionnaire for buyer-seller participants addressed these same dimensions; however, it did so from a buyer-seller perspective. Likewise, the questionnaire administered to strategic partners also investigated these dimensions, but from a partner perspective. As advocated by Janesick (1994), pilot questionnaires were tested out before commencing the interview process proper. Two questionnaires were piloted with two business intermediary staff, and two buyer-seller participants, in one network. Following this, several minor amendments were made, largely to assist question clarity. In line with Eisenhardt (1989), permission was sought from all participants to record the data gathered via audio-taped semi-structured interviews. In addition, data on each B2B (IE) network was also gathered from company material that included written reports, website and general industry information, and also from general observation at each B2B (IE) network site.

Upon completing data collection, the grounded theory analysis technique was followed (Glaser & Strauss, 1967; Miles & Huberman, 1994). Mindful of the importance of maximising the likelihood of producing valid results, this process began with checking for data source, method, and researcher consistency, as advocated in the triangulation technique (Denzin, 1978; Jick, 1979b). Care was taken to ensure that a comprehensive range of participants were interviewed within each network and this range was as similar as possible across the three case studies. Strategic partners were interviewed on some occasions when it was found that additional information would enrich data collection. Care was taken to ensure consistency as far as possible both within and across the three case studies, with regard to the location and timing of the interviews in each case study. The same rapport-building style was used for each participant. I, as researcher, managed each relationship in a professional, yet relaxed manner. Permission was also sought from participants to audio-tape each interview, in order to maximise the quality of data capture. All interviews were conducted at the firm's office for each participant type. Interviews across the three case studies were all conducted and completed within a 6 month time span from July 2002 to January 2003.

As outlined earlier, consistency was also striven for as much as possible with regard to the forms of data collected in the case study method. The interview schedules across the three general participant types were kept as similar as possible. However, there was some variation across the three case studies in terms of the written material that was available. The electricity network, M-co made available much written data in the form of company reports, publicity data, general information, and website material. EDIS network provided in the main promotional material and website data. Ecomex made available company report and descriptive material. Data gathered from the interview process, written material, and general observation were then triangulated for consistency both within and across each network. It was kept in mind that promotional and company report data were likely to depict each respective network in a favourable light. Such data, therefore, needed to be compared to the content of the interview transcripts in order to increase the likelihood of validity. Finally, since I gathered the data as a sole researcher, consistency in my interpretation of the findings was sought by asking a company representative to view the final draft of the results chapter that pertained to each respective network.

The write up of the findings for each respective case study, in chapters 8, 9, and 10 began with the open-coding process referred to by Strauss and Corbin (1990). This process involved initially combing back and forth between the interview and company data within each network to identify both expected and emergent patterns from the conceptual areas already identified. The evolutionary path and stage that each network was at was clearly influenced by the detail, amount of recall, and current focus of the intermediary staff. M-co network could be described as the most mature of the three networks in terms of stage of growth. In this network many of the start-up issues appeared to be distant memories in the minds of staff. Furthermore, M-co had a comprehensive amount of written data available on its general progress and operations. Global Ecomex network could be described as being at a midway point of maturity. This network made available some written material. Intermediary staff identified the challenge of simultaneously putting energy into ongoing development of the technology trading platform, along with building supplier/buyer numbers. Finally, EDIS

could be described as being in more of an emergent state. Interview and written document data for each of the three case studies was divided into similar categories: with formation rationale; governance relational processes and structures; evolutionary steps, and where the network believed their key sources of value could be found. This format ensured some consistency in coding the data across the three networks, while also retaining their individual characteristics.

Upon completing open coding of the data, the axial and selective coding processes, also advocated by Strauss and Corbin (1990) were followed. The combined data from the three case study chapters was scanned in an iterative manner to identify both common and unique themes. These findings were then systematically analysed together with the four key areas identified as requiring further empirical investigation in chapter 6. Following this, a theoretical framework was developed (see chapter 11) that provided both support and extension to existing literature, and also a new contribution toward understanding the joint value adding roles of the Internet and business intermediary.

The four key questions that underpin the overarching research question “What are the key points of value in B2B (IE) networks?” are:

- What is the nature and location of the information gaps?
- What are the separate and combined roles of the Internet and intermediary in brokering the information flow across the gaps?
- How are current and future information gaps simultaneously recognised and leveraged?
- What are the overall sources of value creation in the B2B (IE) network?

Links are made within each of the above areas to extend the literature that resides primarily in the following areas. These include: electronic commerce (reach, richness, transparency, speed); networks (centrality, structural hole theory, relational ties, modularity, information, knowledge), and TCE (bounded rationality, asset specificity, information asymmetry).

7.8 Conclusions

This chapter sets out a methodological framework that provides direction for the collection and interpretation of data. It is readily acknowledged that the ontological and epistemological perspectives taken in qualitative research are heavily influenced by the personal views and biases of the researcher. However, it is argued here that sharing such information provides clarity and explanation regarding the direction of the study. In addition, it is proposed that viewing reality as a contextual field where it is suggested that there is simultaneous and mutual causation between context and the actions of organisations provides the most appropriate lens to investigate for the potential value drivers in B2B (IE) networks.

The next three chapters provide a descriptive account of the data collected within each of the three B2B (IE) networks. Chapter 8 describes the results for M-co, the electricity network. Chapter 9 reviews the data collected for Ecomex, the timber network and Chapter 10 gives an account of EDIS, the electronic data interchange network.

8. Case Study: The Marketplace Company

8.1 Introduction

The Marketplace Company (M-co) is a B2B (IE) network that operates within the highly volatile New Zealand electricity industry. This chapter introduces M-co and examines how value is created within this network form both from a buyer and supplier perspective and from the perspective of M-co as business intermediary. Value in this instance combines the duality of the Internet and business intermediary in creating the structure, processes, and content of information flow embedded within this network form that ultimately leads to increased efficiencies and reduced transaction costs. First, the chapter provides a brief overview of the data collection and analysis methods used. Second, the rationale for the formation of M-co is explored, including an overview of the New Zealand electricity industry and the key participants within it. Third, the governance structure of M-co is investigated. The processes, rules, regulations and embedded relationships within this structure, with a specific focus on the value provided by both the brokering roles of the Internet and M-co as business intermediary, are examined. Last, the value accrued to buyers and suppliers, and e M-co in the present and future is assessed.

8.2 Data Collection and Analysis

The four key areas identified in the skeletal framework in chapter 6 provided both a boundary and general direction for data collection. The two methods of data collection were used in this case study, semi-structured interviews, and written company material. The 25 item questionnaire developed for use across all three case studies was administered to the business intermediary staff and Trader Participants in M-co (see Appendices A and B) via the interview process. The questionnaires was administered through semi-structured interviews conducted with six business intermediary staff that included the CEO, Management Staff in communications, information technology, operations, and policy. After consultation with the CEO, this particular group of staff was selected due to their combined depth and breadth of knowledge of M-co and the electricity industry. In addition, 6 electricity Trader Participants were interviewed. Trader Participants

were randomly selected by the researcher from a list of generator and purchaser participants provided by M-co. All Trader Participants selected engaged in electricity trade using both bid-offer and bilateral trade through M-Co. Data were also sought from written company material made available by the communications manager that included Market Reports (2000, 2001), promotional material *We Make Market Places* (2001), and visiting the websites www.mco.com and www.comitfree.co.nz.

After completing data collection, the grounded theory technique (Glaser & Strauss, 1967) was used for analysis purposes. In order to increase the likelihood of producing valid results, both within and across the three case studies, this process began with a review of data source, method and researcher consistency used in M-co, as advocated in the triangulation technique by Jick (1978) and Denzin (1979b). Care was taken to include a comprehensive range of participants both within the administrative arm of M-co in terms of intermediary staff and Trader Participants interviewed. Consistency was sought in the timing and location of the interviews with M-co intermediary staff and electricity traders. All interviews were conducted in the office of each respective participant over a 2 month period from November to December 2002. On each occasion rapport was built with each participant by engaging in the interview process in a relaxed, professional manner. Permission was sought and gained on all occasions to audio-tape the interview, in order to maximise recall from the rich data base that was being generated through the interview process. Assurance was given by me as researcher to all participants that, apart from those of the CEO, any quotes used in the thesis would protect the anonymity of the participant concerned. Accordingly, the quotes used in this chapter are coded as follows; chief executive officer (CEO), M-co intermediary staff (Management Staff), and electricity generators and buyers (Trader Participants).

The analysis that follows in this chapter is a culmination of an iterative process that has involved identifying both existing and emerging patterns between interview and written company data, remaining aware that some promotional material may have been portraying M-co in a positive light. From here, the analysis process involved weaving together the collated data with some of the

more generalised theoretical categories and concepts identified in chapter 6. These steps follow the open coding process identified by Strauss and Corbin (1990). Care was taken at this point to ensure that a comprehensive and accurate account of M-co was provided. An M-co staff member was contacted and asked to review the contents of this chapter for accuracy since I gathered the data as a single researcher. The data in this chapter have been structured in such a way that they provide for both a meaningful comparison between the case studies in chapters 9 and 10, while also retaining the unique features pertaining to this particular network.

8.3 Formation Rationale

Prior to M-co's establishment there was often much angst within the New Zealand electricity industry. Fluctuations in the generation of electricity and its demand by consumers often led to entire black-outs. This situation was especially evident in the winter of 1992 when the water volume in the lakes responsible for the supply of hydro-generation hit an all time low due to a long dry cold winter, and consumer demand continued to rise. Consumers reacted to the situation by

opening their windows, instead of switching off their heaters, and consequently there were 'black-outs' around the country. This made government realise that there needed to be wholesale price setting in order to balance supply and demand; and, to give the right investment signals about where investment should take place, that is, in generation or transmission. (Management Staff)

At this time, the production, transmission and pricing of all electricity was conducted within a single firm the State-owned enterprise, Electricity Corporation of New Zealand (ECNZ). Fifty five companies known as power boards or municipal electricity departments, owned by elected local government authorities, were responsible for the distribution of this electricity. So, under this system

Essentially, there weren't any price signals. In essence, government rather than the market set the price for electricity. Combined with this were further inefficiencies in the production and transmission of electricity. (Management Staff)

A government appointed committee brought about by what came to be known as the 1992 hydro crisis, identified that "correct economic signals would only be

derived from a competitive market” (Management Staff). These findings reinforced the need for significant change, and subsequently a number of reforms began to emerge within the electricity industry. Companies could no longer generate and distribute electricity; however, generators could be retailers as well. This situation led to a buying spree whereby generators began to purchase, and now own all the retail companies¹.

The key concern was to separate and thereby increase the efficiency of the distribution of electricity, as this was viewed as the monopoly part of the business. The generation and retail sides of the business were considered the competitive elements of the business. Generators aim to maximise their plant production, and, therefore, avoid having stranded assets by offering retail hedges. These hedges are welcomed by the retailers and large industrial customers since they reduce the risk of supply fluctuation to their customers or production processes. The separation of these business components led to the birth of a wholesale electricity market and subsequently, market determined price signals with “transparency in the value of electricity generation.” (Trader Participant)

Competition in generation was encouraged under The Electricity Reforms Act (1998), with the privatisation of a large portion of generation to Contact Energy. The splitting of the remaining generation rights under ECNZ into three State-owned Enterprises closely followed this. The high voltage grid component also split from ECNZ to become the State-owned Enterprise, Transpower. Transpower operates as a service provider under a contestable contract to schedule and dispatch electricity over the national grid. It has a key responsibility to government and ultimately the citizens of New Zealand to *keep the lights on* by ensuring supply meets demand at all times, in the most cost effective manner.

Approximately eight large electricity trader organisations, with 50 or more staff, and over 25 smaller traders, resulted from this reform; all are located within New Zealand. The trader organisations had both generation and purchase requirements, and were all aware of the importance of maximising the price they either offered

¹ See Appendix C for a complete list of participants in the NZ Electricity Industry

or bid for electricity. Three trading options were available to these traders. The first is embedded generation. This is a “non-market [situation], where suppliers generate and then retain that portion of electricity for their own use. And any electricity generated over and above this is traded” (Management Staff). Consequently, the individual generator is in fact the only participant in this instance.

A second choice is to trade through bilateral contracts. Bilateral electricity trade is conducted under fixed contract between two organisations. Most participant traders were found to use this form of trade at times for the following two reasons. The first is to increase certainty over price in the future supply and demand of electricity. An example of the importance of bilateral contracting was borne out in the experiences of one trader. He recalled a previous winter when the expiry of his company’s fixed term contracts coincided with high customer demand and high purchase prices through M-co’s bid/offer mechanism

if the prices go high, like they did, like miles above where anyone expected, that means we’re buying the power at a considerable price, and selling it at a lot cheaper price to end users, and losing a lot of money. (Trader Participant)

Another trader reports that generators can also get into vulnerable situations

If you’re generating and it costs you say \$40.00 to generate that electricity, if the market’s at \$20.00, you’re generating at a loss. But if you can sell a contract at \$50.00, then you’ve guaranteed yourself that revenue stream. (Trader Participant)

A second reason for bilateral trade is that it provides the opportunity to enter into more complex contractual arrangements than those the market provides. Trade through the market is relatively standardised with a block of electricity being traded at a fixed time, with fixed contractual conditions. This type of trading does not accommodate the needs of traders who may wish to enter into a number of complex contractual variations, including long term supply. A further reason for bilateral trade, especially when focusing upon small traders, is cost efficiency. The bilateral trade method did evolve to one that uses the M-co information and

financial settlement system, explained later. This allows smaller bilateral traders especially, to benefit from the free information offered by COMIT, without their needing to pay the relatively large participation fees. Examples of organisation types that use bilateral trade include: large, high electricity usage, industrial organisations and single, large generators; small or unique traders who believe they have not got sufficient supply to enter onto the market; and traders who want to maximise certainty in meeting customer needs (www.comitfree.co.nz).

In sum, most large electricity traders engage in bilateral contracts on a regular basis. However, when compared to trade through the electronic market (M-co), the mix is 20-25% to 75-80%, respectively. In addition, the large traders who use bilateral contracts readily acknowledge that they rely on M-co's price discovery method to set their bilateral trade price. "To get an optimum price, you need volume, and if no trade is put through the wholesale market the price is skewed."

One trader went so far as to suggest

off-market trade is possibly a free riding activity where the people who trade off-market are trying to avoid market fees. So they are using the price discovery mechanism and then not paying the fees.

Without the use of an intermediary, the electricity traders were aware of their limitations both as individuals and organisations in terms of the nature, quantity and extent of information they could first of all obtain and then extract alone. It was commonly reported that "this industry is information overload, really it's physically impossible for one trader to get to grips with it all, all the time" (Trader Participant). Traders were aware of numerous *information asymmetries* between them and what information was available. In order to maximise the price either offered or accepted for electricity, data were ideally required on areas such as the lake levels for hydro generation, seasonal demand, government rules, and regulations. One trader reports some issues involved in gathering data, "it's a time thing, as well as a processing thing. There is just so much data to process that when you put it all together its very complex, with what you are prepared to bid or offer, and seasonal demands etc". Due to the highly volatile nature of electricity, with high variations in supply and demand, its highly perishable, intangible

nature, internal information on supply and demand requirements was found to be valuable. However, if each party was to maximise its own individual price either offered or accepted there was little incentive to share such information as this would disclose their individual situations. All traders reported that they knew of each other in the industry and that there was an overall culture of *trust*, as one trader reports

it's not so much that we don't trust each other. I think that everyone has a healthy respect for each other. It's more about putting trust into the process. We don't want to let others know our identity and equally we are not interested in theirs, it's about maximising and arriving at a fair price that we either pay or offer for our product.

A further limitation of these traders surrounded the time and resources required to secure new markets. While not so much of a problem for the larger traders in a relatively small industry in terms of participant numbers, all traders were unanimous that “the more the merrier” (Trader Participant).

The third method of trade available to electricity traders within New Zealand is that of intermediated trade via the B2B (IE) network. Referred to as M-co, this network, as explained, would provide opportunities for *dynamic pricing*.

8.4 Governance Structure Development

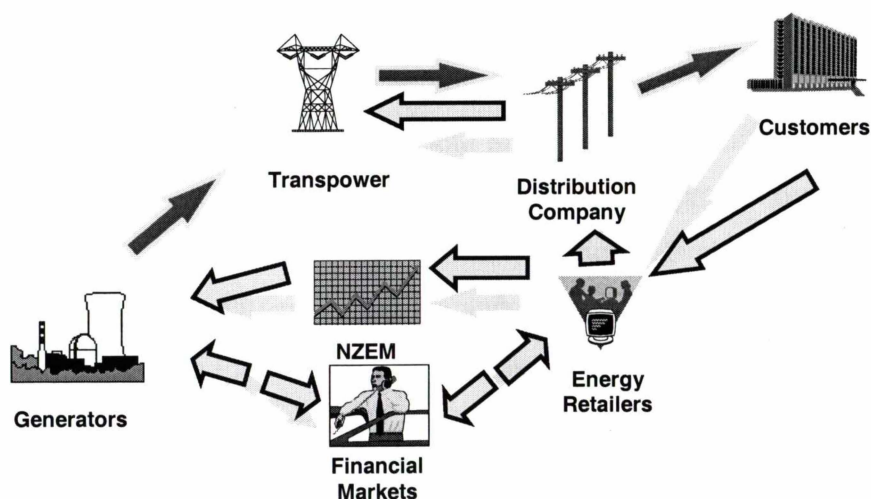
The development of the joint brokering roles of M-co and the Internet as two intermediary structures between Trader Participants has been an iterative one. During this time numerous processes, rules, regulations and relationships have developed. First, the structure of M-co is described. Second, the Internet facilitated trading system is investigated. Third, the rules and regulations are reviewed. Last, the relationship processes are uncovered.

M-co Network Structure

M-co began as a joint venture initiative between the New Zealand government and members of the electricity industry in New Zealand. This network now has flowing through it over 80% of New Zealand's electricity trade. Its primary purpose was to act as an intermediary in the form of a B2B (IE) network to

creatively design and implement the wholesale electricity market in New Zealand and facilitate the flow of information to maximise decision making and ultimately price discovery. Membership within the network includes approximately nine large electricity trader generators, electricity purchasers (retailers) and several large organisations that trade in wholesale electricity, as well as the high voltage grid and several low voltage grid distribution networks (see Figure 4). Generators offer electricity into the marketplace, and retailers bid for and purchase electricity from the market to supply their needs. M-co covers the New Zealand Electricity Market (NZEM) and financial markets points on this diagram.

Figure 4: New Zealand Electricity Market



Source: M-co, 2001

M-co began, as one trader recalls, “as a doggy system to start with, and that was just the nature of the beast. M-co was so immature, it had to evolve”. Early

teething issues included the COMIT trading system going down with some frequency. As a result, traders “could potentially lose revenue in the thousands of dollars each half hour, because trade couldn’t be made” (Trader Participant). Another issue that M-co confronted was the realisation that if a market mechanism “is not wanted or needed [by the majority of participants] it is likely to fail” (Management Staff). The Day Commitment Market and the Futures Market are examples of two services that did not succeed. As one trader commented

It might be what some individuals want but you don’t make a market out of a couple of individuals. And that is exactly the lesson that M-co have learned.

However, following a creativity process that involved numerous feedback and feed forward sessions with participants and numerous iterations of both online and offline processes and systems, there is now unanimous agreement among Trader Participants that M-co has evolved to the extent that

it [M-co] now offers a very good product. It must be a good and successful product because M-co is taking its systems and processes around the world to interface them with a whole lot of different markets and seems to be doing well. The most important thing is that it continues to evolve with the market and it keeps up with the changes that it is required to keep up with. (Management Staff)

In terms of the participant selection criteria, essentially anyone that has an interest in exchanging electricity “can apply to join M-co” (Management Staff). However, the size of the annual fees and credential requirements of prospective participants on this network serve as a selection process. Participants are required to pay a joining fee of \$75,000.00, an annual fee and then two user fees. Traders believe these fees, along with the relatively small *asset specific investment* in technology is well worth the certainty that the service provides, in terms of optimising the dynamic pricing mechanism. One is the payment of \$100.00 per month per grid point to cover meter reconciliation. The other is a volume-based fee of approximately .30c a megawatt hour to cover pricing, clearing and administration. Therefore, participants are most likely to be larger, high volume buyers/suppliers. Prospective purchaser participants “have to supply proof that they will be able to meet payment, so bank guarantee letters of credit are required” (Management

Staff). M-co staff acknowledge that one of the fundamental successes of the market is that payment is ensured at the end of the day

so the criterion to become a member is set quite high. But any trader can apply to join the market. If someone generates a small amount of electricity from their own windmill they are welcome to join as a generator. But it is not a smart thing for them to do as it will cost them more than they are likely to get out of it.

M-co participants range in size from large to moderate sized traders, with the smaller traders as mentioned earlier linking via a larger participant. Some of the large traders who already had several established trading links prior to joining M-co believe that it is very important that they belong to the market for two primary reasons. First, the market helps to maximise the price discovery process for them. Second, these large traders are prone to over and under generate at times and so require additional contacts to trade their surplus or deficit (www.mco.com). One trader said

When the market first began, we were one of the three large generators. Though we had a whole lot of contracts with individual retail companies we still had a lot of generation that we had to sell on the spot market, so we were very proactive in the establishment of the NZEM. We saw the market as something we could use to our advantage...at different times of the year we would be the price maker and at other times the price taker. We were, and still are, one of M-Co's largest clients.

Internet Trading Platform

At the heart of M-co, and in fact NZEM, is the electronic trading platform, referred to as the commodity information and trading system (COMIT). This electronic trading platform, which is owned and serviced by M-co, extracts data from a variety of sources, processes this, and then makes this available to industry participants and service providers on a 24 hour per day, 365 day per year basis. The COMIT system provides a gateway to the electricity market, encouraging data exchange and ultimately trade via the Internet. The functions offered by COMIT are shown in Table 3. Such is the reliability of COMIT that it has achieved reliability levels of 99.9% in 2001, equating to being down 8 hours over the 24/7 trading period per annum.

Traders report that if they were to use the Internet alone as an intermediary, they would only be able to successfully use some of these COMIT features, such as exchanging emails, and obtaining news and information. These limitations were underpinned by limited staff resources and those staff not being aware of all the likely sources of information. Due to the highly competitive nature of the industry, traders suggest it is very important to obtain time specific and accurate information on features such as lake levels and demand forecasts. However, either due to the complexity involved in getting this data or the inability to protect anonymity especially in forecasting and dispatch schedules, the Internet as sole broker again provides limited value. While speed, accuracy, and complex scheduling are made possible by the Internet, these features are greatly enhanced with the additional help of the intermediary in M-co.

Table 3: Features of the COMIT Information System

<i>COMIT Functions</i>
<ul style="list-style-type: none"> • Enter bids and offers to NZEM • Obtain pre-dispatch and dispatch schedules • Access forecast, dispatch, provisional and final prices • View reserve prices and hydrological data • Observe island supply and demand levels • Receive market summaries and clearing settlement reports • Send and receive email • Obtain real-time news and information • Create a personalised view of the market through MyCOMIT

(M-co Report, 2001, p. 14)

A particularly unique feature of COMIT is MyCOMIT. This feature allows participants to create their own customisable web page that gives a real-time market summary. Participants can configure their own personalised view right down to a market node level, increasing flexibility and functionality. MyCOMIT

updates automatically and gives an immediate summary of what is happening in the market at any time. Another popular function of COMIT is www.comitfree.co.nz. This service was established to provide free electricity data to users such as major electricity user associations who could not withstand, nor fully benefit from full membership and service fee payment. The information provided is not live; however, it does enable users to follow the trends and patterns of trade.

However, in order to arrive at the current level of comprehensiveness and accuracy, COMIT has undergone a number of formal and informal feedback sessions by market participants and subsequent iterations, followed by feed forward sessions by M-co staff. The initial version of COMIT was outsourced to a computer software company in 1996. They developed software based on client server technology which involved rolling out specific configurations and software to a dedicated network between approximately 40 user sites in New Zealand and M-co. Under this system, the database at M-co interacted with the FAT client software. However, after approximately 12 months it became

a real headache to maintain, particularly across the 40 sites. The market was new and dynamic and the software was changing every 3 or 4 days, literally. So that meant every three or four days a software upgrade was required. We had to make sure users logged out of those PCs overnight to do remote control, software upgrades. Then the users let us know that they didn't want the problems associated with continuous upgrades. It was just an absolute nightmare. Then we put in a proposal to make COMIT Internet based. All that was required was a personal computer and a browser . . . then in 1998 we went live on the Internet and it continued from there. (Management Staff)

Also, as a result of feedback and discussion, generator and retailer participants now have two electronic communication options, with the fixed network and the Internet. The fixed network provides a link between participants' personal computers and M-co's system under an Internet based application. M-co has a contract with Telstrar to provide 99.9% service levels to this dedicated intranet type system. Since the electricity market requires continuous trade on a 24/7 basis and there is

no guarantee the Internet is going to be up in 24 hours whereas the fixed line provider offers a high level of guarantee for that

service [and also, that] . . . the Internet can be slow and runs the risk of hackers. (Management Staff)

Traders tend to prefer using the fixed line intranet based system, and will only use the Internet as a back up as “this is a real tough market, where they simply must trade” (Management Staff). There was unanimous agreement between M-co staff and user participants that the current system is significantly more efficient than earlier versions were and is also user friendly.

The Market Pricing Model

What many traders would argue is the most valuable feature offered by the combined brokering roles of the Internet and M-co as intermediary is the *dynamic pricing system*, whereby the competitive action of buyers and sellers determines the price of wholesale electricity within NZEM. Metered demand volumes via buyer bids are matched against offers from generators. M-Co has developed a complex system that increases the likelihood of maximising price discovery via the Internet. This system, which has been developed over time in consultation with traders and other associated parties, works to maximise the information processing abilities of the trader staff in terms of what they can physically and cognitively process in a highly dynamic environment. Data are captured for all the 244 nodal entry and exit points for electricity on the national grid over 48 trading periods in any 24-hour day. Traders are provided with time and data specific information over three stages of the transaction process: at pre-purchase (forecast price), at point-of-sale (dispatch price), and at settlement (final price) (see Table 4). As already mentioned earlier, due to the highly complex nature of this industry and the need to protect the anonymity of internal traders, many of these features would not be able to be provided if traders were to use the Internet alone as their sole broker.

Pre-purchase or forecast prices are those prices used to signal prospective prices to generators and purchasers so that they can plan their bid and offer strategies. Generators and retailers can enter offers and bids “for every single half hour during the 48 trading periods for every single node on that grid” (Management Staff). Bids and offers can be made up to 5 days in advance and can be updated

every 5 minutes up to 2 hours before a specific trading period. A staff member at M-co reports

What you tend to find is that 2 hours out from any period, so in effect just prior to every half hour, there's a little flurry of activity. The generators are trying to guess what that optimal price is. If they're one cent over, they don't get to generate. If they're one cent under or bang on, they'll get to generate. So they're always playing off against each other, and that's kind of how it works. Once that transaction goes through, the generators then get told [by Trustpower] that they have to dispatch, so rather than actually saying you're scheduled for electricity, you have to dispatch, you physically have to generate that electricity.

Table 4: M-Co Pricing System

<i>Pricing System</i>	<i>Pre-Purchase (Forecast prices)</i>	<i>Point-of-Sale (Dispatch Prices)</i>	<i>Settlement (Final Prices)</i>
<i>Data Source External</i>	Knowledge on local variations at 244 nodes (transmission system outages, transmission losses, capacity constraints)		
<i>Data Source Internal</i>	Bid/offer data from all generators and purchasers	Based on bids/offers and metered demand volumes	Reconciled from bid/offers/ metered demand and losses in grid
<i>Time Specificity</i>	Updated every 5 minutes until 2 hours prior to trade	Updated every 30 minutes	Published by 12 noon on day following sale (individual traders not identified)
<i>Purpose</i>	Traders can plan bid/offer strategies	Data is provided on cost of sale	Final costs reconciled for settlement
<i>Extra Data Generated</i>	Electricity price index (7 day rolling average prices, over 4 regional areas) Data for demand-side investment and conservation management, e.g. hydro-lake management, electricity use.		

The forecasting method also permits bid/offer fluctuations during the course of a day. A generation trader reports

We would offer at different prices depending on what our position is within the market, and depending on where our price sits against others in the market. This determines whether you're dispatched or not, so what level your plant runs at.

Improvements in the collecting of non-market data have significantly increased the accuracy of forecast pricing. However, because forecast prices continue to use purchaser bids as opposed to metered demand volumes to measure demand, this price may not always reflect the magnitude of any final price spikes.

Point-of-sale or dispatch prices are also discovered at each of NZEM's 244 connection nodes for each of the 48 trading periods. These prices are calculated at, or just before, the time electricity is actually dispatched, and published up to 4 hours (8 trading periods) ahead of real time. Considered to be an improvement on forecast pricing, dispatch prices take into account the cost of generation, in other words the cost of producing the electrons. Dispatch prices also incorporate the cost of moving the electrons along the national grid, while accounting for account local variations and the cost of providing reserve. Variations can arise from, transmission losses as a portion of energy is lost as heat as the electricity travels through the national grid. Variation can also be brought about through transmission grid constraints. This situation arises since the electricity transmission line between two areas can only carry a finite amount of electricity at any one time. Once maximum capacity or constraint is reached the regions on either side of the constraint are considered separate and demand is met by local generation, whereby price can vary.

M-co suggests the provision of, nodal pricing, serves three important purposes. First, it provides generators and retailers with improved price signals so that they may "make the best possible generation and purchase decisions throughout the day and over time" (Trader Participant). Second, it sends strong investment signals that help market participants to identify whether to invest in generation or load management systems, and third, it facilitates "demand-side investment and effective conservation management such as managing hydro lake levels and electricity use" (M-co Company Report, 2001, p. 10).

The final price or settlement for electricity is established through M-Co's settlement system. This *information gap* identified by M-co staff involves reconciling, clearing and finally settling all electricity purchases and sales. Initially, prudential security checks are done on all purchaser market participants to ensure that they can meet their financial obligations. This system is deemed important, since retailers effectively consume electricity up to 50 days before they are required to pay for it. Each purchaser is required to supply an appropriate amount of security to cover this exposure. Hedge contracts can be used as an additional form of prudential security. This system ensures that the clearing manager is able to pay generators in the event that a purchaser defaults on a payment on settlement day.

The reconciliation process begins with the reconciliation manager at the national grid calculating how much electricity (quantity) has been bought and sold by each market participant, and then adjusting the volumes for losses at the entry/exit grid connection points. The data are then sent to the clearing manager at M-Co to establish the final price and to calculate the amounts due from or to electricity retailers and generators. The clearing manager operates a purpose built electronic settlement system called CHASM for clearing and settlement. The final price is calculated on the day after physical dispatch and available by 12 pm of that day. If input data are such that final prices cannot be published, provisional prices are calculated and replaced with final prices within 2 business days. Final prices are calculated from the processing of over 8 million pieces of data and used for monthly settlement. Generators are paid in full once all cleared funds have been received from purchasers. Then full trade details, identifying the bids and offers from individual traders are made public 30 days after each trade day and are available at a website.

As well as offering the *market pricing model*, M-co administers the *must run dispatch auction*. The auction permits generators to bid for the right to offer their electricity generation at zero prices to ensure it is dispatched. This system exists because the market pricing model does not yet allow for negatively priced offers. Negatively priced offers typically occur during periods of low electricity demand

such as in summer, when generators *must run* their plant because it is less expensive to generate electricity than to halt production. “For example, you get a lot of geothermal plants that simply can’t stop. The steam just keeps coming up” (Management Staff). Moreover, generators may be required to run continuously for contractual or legal obligations, or it may simply be too expensive to turn supply on and off.

Rules and Regulations

M-co as intermediary, along with its participants, operates within a complex set of rules and guiding principles that have been developed after numerous iterations and much consultation between M-co staff, participants, and other interested bodies, and numerous iterations. The rules provide a self-regulatory framework or structure that outlines how electricity should be traded and the responsibilities of market participants and service provider organisations. The rules committee operates as a governing structure to formulate industry processes for rule enforcement, changes, and disputes resolutions. This committee is responsible for operating and continuously improving the rules in line with the changing needs of participants, the wider industry and government. Rules are made for information disclosure, dispatch, clearing and settlement, fees structure and service provider contracts.

An independent Market Surveillance Committee is responsible for monitoring rule compliance. This is a unique disciplinary structure that sits outside of M-co, and differentiates NZEM from other electricity markets around the world. The market surveillance committee consists of an elected body of independent members who are charged with the responsibility of ensuring that market participants and service providers meet the “high standards of integrity, transparency, order and compliance with the NZEM rules” (M-co, 2001, p. 12). The committee has three primary responsibilities. These include: the routine monitoring and investigation of alleged rule breaches by market participants and service providers, including M-co; suggesting rule changes, and ensuring the NZEM rules follow the overall principles of the industry. Changes can be made to

these rules by the Market Surveillance Committee, network participants and service providers.

In addition, operating within M-co is a surveillance and compliance team that provides support to the Market Surveillance Committee and any NZEM appeal boards that are established. The team, made up of lawyers, investigators and a surveillance officer, investigates and monitors market participants' and service providers' performance. Those market participants who breach rules and subsequently incur a fine, have their name, the number of fines and total associated costs added to a publicly available list. The surveillance and compliance team also educates market participants and service providers on NZEM rules.

Ideas for new rules and/or amendment to existing rules from network participants are fed into M-co through a formalised structure referred to as The COMIT User Group. This group, made up of representatives from each participant trader organisation and coordinated by M-co, meets quarterly. Through this process, members are encouraged to share ideas that they believe would improve the systems and processes offered by M-co. One trader reports

Through this forum we have brought about changes for back up procedures and improvements. Normally things are instigated reasonably quickly. On some occasions major changes that involve a lot of companies, especially Transpower take a bit longer, but the problems are often more complex. Simple ideas are implemented relatively quickly and people are usually all happy with them.

Another trader makes the comment

It's a bit perverse really, because all the information that M-co generates comes from the participants. M-co, or the COMIT system is just a medium for gathering information, aggregating it and then re-distributing it.

However, individual traders, even when using the Internet as their sole intermediary, are not likely to be able to physically collect and collate this information, nor are fellow traders likely to disclose data that may unfairly lead to their promoting other traders ahead of themselves.

Upon receipt, participant ideas are then considered by one of a number of working groups comprised of individuals drawn from the industry. Upon review of these ideas, the particular working group will make a recommendation to the rules committee. Members of each working group are aware that their recommendations must serve the interests of the industry and the economy as a whole, rather than merely the interests of the organisations that they represent. The wide range of working groups include: those involved in clearing and settlement, rules structure, fees structure, and market information. Working groups can be formed when the need arises and disbanded when particular projects are complete. It is normal practice for a working group to develop ideas up to “some loose requirement . . . then pass them upstairs [to M-co] “and say, flesh this out and give us a quote” (Management Staff). The working group may have, for example a request to have COMIT publish a particular set of data instantaneously. The information technology unit at M-co will then assess how this can be done, together with the associated costs. These findings are then fed back to the working group requesting this information for consideration at their next meeting. Ways of working out how to optimise the data flow without unfairly penalising some traders, or provide excessive or inappropriate data are considered. Due to the highly complex nature of the electricity industry and the numerous factors that need to be taken into consideration, these are tasks that take much care.

Ideas put forward by working groups that involve changes in information disclosure that may affect the competitive behaviour of market participants require further approval from the Commerce Commission. For example, some traders put forward a request to reduce the bid and offer information disclosure time from 4 to 2 weeks after the transaction date. A member at M-co reported that

the Commerce Commission makes sure these ideas won't result in anticompetitive behaviour or allow companies to start forming collusive behaviour within the market.

It is commonly acknowledged both by M-co staff and participants that while the process from an ideas stage to its final implementation is often complex, once the approval criteria have been met, the ideas for change “do come out in a very good format” (Management Staff).

M-co staff stress the importance of *transparency* in all decision making processes with regards to rules and procedures in how they are formed and why they change. The outcomes from the rules committee and the working group processes are made transparent for all to view. Trader Participants have complete access to the rules surrounding the pricing, settlement, prudential security check processes and requirements. Furthermore, work-in-action, such as working papers, is made available on the intranet, so that participants can view the decision making processes. Moreover, fines incurred by traders for breaching a particular rule or regulation are also made public. A full list of traders, including names and fine amounts, appears in the annual report.

Management staff suggest that “information transparency is considered key to enhancing the accuracy and economic efficiency of the price signal” (M-co, 2001, p. 14) in the price discovery process. However, rather than offer complete transparency, as with the governance process, the price discovery process can be described as semitransparent. All users have access to the same COMIT system, but the information that each participant organisation can extract from COMIT is dependent upon how the system has been programmed. COMIT has the capacity to provide information ranging from perfect transparency of information exchange to complete blocking. It is suggested that COMIT provides perfect transparency surrounding: the dispatch prices and quantities at all 244 nodal points in New Zealand; wholesale electricity prices, demand and hydrology; data on the reserve offer stack, and a more complex stack adjusted for expected generation. So again the intermediary is providing a brokering service that is enhanced by the use of the Internet with its features, but is not likely to be successfully conducted by traders using the Internet alone.

As a rule of thumb all generalised data that does not identify an individual trader’s behaviour is made public. One trader commented that any

information that is generic can be published right down to a specific node and level. So you can get the spot price for any node in the country, it is very specific. You can get the demand for any grid exit point in the country it’s very specific. But you cannot get an individual’s demand at a grid exit point.

Another trader suggests that it is normal practice that participants do not know

who they are buying and selling to. It is blind offering and bidding. In fact technically speaking you buy and sell from M-co Clearing House. You can't identify who you are trading with. The supply of electricity comes along the grid and you cannot identify whose electron that belongs to. The flow of electricity becomes one.

But when there is likelihood that a trader(s) may be identified, the information can be aggregated to a particular level to reduce this possibility. Since there are only two generators in the South Island their bid information is aggregated with the North Island generators.

You can't say lets have a look at the aggregated offers of all the generators in the lower South Island because there are only two. So you aggregate up and have South and North Island together.
(Management Staff)

The release of trade information by M-co may not only be *manipulated* by aggregating it to a particular level, but also by controlling the time frame in which it is released. At the point-of-sale, all identifying information from individual generators and purchasers is made nontransparent.

As already mentioned it is not until 30 days after the date of sale that identifying information is released. The rationale behind the delayed release of this data is to reduce the likelihood of collusive or opportunistic behaviour between either generators or retailers. Participant traders find the release of data by M-co both during and after each 30-day trade period to be very useful for decision making purposes. The data schedules available to individual participants upon entering their bids or offers provide a forecast of not only price but quantity requirements.

A trader comments

they [M-co] won't tell you who it is, but they'll say where they think the market is going to clear . . . This allows us to decide whether we need to readjust our offers or tailor our generation. It also means retailers can use this information to readjust their bids.

This information that is available for each trading period for each nodal point provides traders with a series of supply and demand curves that can be used to gauge whether prices are likely to be volatile. A Trader Participant suggests "this

enables some price sensitivity analysis on the variations where we can then monitor what effects that will have on our business” (Trader Participant).

The release of identifying data 30 days after trade further assists the matching of supply and demand. Traders can then take into account not only seasonal demand, but also how specific traders are likely to react to such situations. One Trader Participant reported

You could look back and say . . . we had a cold snap coming through, so what did Meridian [a trader] offer for instance? What’s their bidding behaviour? So if another cold snap comes through, you might predict that is how Meridian is going to behave. So maybe we should offer higher or lower to make our price a little bit more competitive.

A further issue with regard to the processes, rules and regulations of M-co is the methods chosen to protect the intellectual assets or property developed within this network. While M-co as a service provider to NZEM is responsible for developing and maintaining the intellectual property that the market operates within, participants also have a certain sense of ownership. It is the market participants who contribute and begin to develop the initial ideas through the user and working groups. However, it is M-co which ultimately has the responsibility to aggregate participant ideas, absorb “all development costs and teething problems” (Management Staff) and then build and operate the resultant systems.

In order to provide a sense of *balance* in the *ownership of assets*, one M-co staff member reports

We own the intellectual property and all the systems and procedures that we have developed, but under our service provider contract if they were terminated for bad performance we have to license that over to another company so that the market can continue to operate. So we obviously have an incentive there, if we perform badly someone else is going to get our intellectual property.

The ownership concern held by some participants appears to primarily focus upon the extremely small possibility that M-co could cease operations in New Zealand, to focus upon international ventures. This fear overrides any concern that M-co

may use and develop the systems and processes further for use in other industries.

One Trader Participant reports

If they [M-co] want to pick up the model and sell it to someone else, so long as they re not plagiarising it, then that is ok. If they want to tidy it up and add a 'clip-on' or two, that is just fine . . . it's just making sure that the level of service continues and the sources don't disappear.

Another participant trader said

They [M-co] are heading off into Singapore and other countries, so they are taking the concept overseas. There generally has not been any disapproval or comment from other traders.

M-co does not hold any patents or copyrights over its systems and processes. It works under the assumption that much of what it does is "just so blatantly obvious" (Management Staff). Also, much information is made publicly available. The working papers developed from various working groups can be viewed on their website. Staff at M-co are aware of their first mover status within the NZEM and the value held within the number of systems iterations and strong relationships they have developed over the years. Moreover, there is the belief that much of the intellectual property lies in "its people and their knowledge and experience" (Management Staff).

Relationship Processes

As mentioned earlier the development of the processes, rules, and regulations within M-co has been an iterative one, influenced not only by M-co in its role as intermediary, but also by buyer and supplier participants and other interested parties. The discussion, therefore, now turns to focus on the value role of both the intermediary and the Internet in fostering the relationships embedded within M-co's structural framework.

The announcement of the New Zealand electricity reforms in the late 1990s and the formation of M-co brought with its opportunities for significant relationship changes. As one trader reports, "back then there were no competitors, there was one big happy family". At the same time there were a large number of retailers who also owned the lines companies. The Electricity Reforms Act (1998) that

required the separation of retail and lines companies led to a reduction in the number of retailers and an increase in the split of generators, resulting in the generators buying up many of the retailers “so both the retail and the generation sides became a lot more competitive” (Management Staff). The emergence of M-co brought with it complementary opportunities to leverage the Internet in potentially new ways and also to form new relationships with one another via a new intermediary.

Charged with the responsibility of brokering the information flow between electricity traders M-co staff were very aware of their privileged position and the importance of establishing and maintaining strong, trust relational links. This position is reflected somewhat in M-co’s motto “to build a secure environment for trade”. There appear to be four key facets that M-co as an intermediary figure focuses its relationship building process. First is the practice of engaging in a consultative approach that includes face-to-face contact. This form of contact which is used when engaging in both new and existing relationships is recognised as very important in building trust, and is a feature not adequately offered by the Internet as intermediary. Prospective international clients typically meet M-co staff in New Zealand prior to formalising any arrangements. Regular face-to-face meetings are conducted between M-co and participant traders. An M-co staff member suggests “our approach is one of partnership and consultation, in bringing markets to life”. A trader confirms the practice of this approach saying

I see that the people who are responsible for COMIT are very industry friendly; they consult the industry on a wide and regular basis. They respond to industry user enquires. They bring all the participants together regularly in a face-to-face setting, where obviously levels of confidentiality exist.

The second aspect of the relationship building process surrounds M-co’s highly proactive approach, in recognising and responding to participant needs, another feature unable to be undertaken to a large degree by the Internet. Some accusations made earlier, regarding a few generators *gaming the market*, resulted in M-co making a rule change, and a subsequent information output change. Full sales details were then released 30 days after trade. One trader reported

satisfaction at the level of participant involvement and the level of follow through by M-co.

M-co certainly listens to customers when they ask for changes. They make changes all the time. We have a say in the service providers that M-co use and how much we are prepared to pay.

Another trader reports

We are a large company and we went to them [M-co] and said we need a tiered approach – different levels of service provision. We couldn't afford to rely solely on the Internet in case it went down. We asked for and now have 'gold level' 24 hour support. It costs significantly more, but for the volume [of trade] we put through it's worth it. So while there was no other choice of market to join, we had a say in the level of service we needed.

A third feature of M-co's relationship building process surrounds the practice of joint accountability and ownership between M-co and its participants. Just as participant behaviour is monitored and enforced by the Market Surveillance Committee, so too are the actions of the service providers, including M-co. There is a set of steps within the rules that clearly identifies the procedure. Depending upon the nature and severity of the alleged breach, there may be a written warning, followed by a fine that escalates if the behaviour is repeated. For instance, if M-co sent out participant identifying information via e-mail to other participants in error, it stands to incur a fine up to \$100,000. Both participants and service providers can also enter into a formal appeal process. One participant trader said

so there are those sort of measures in place that ensure that M-co don't break their promises as a service provider . . . M-co have quite a lot of accountability, so it really is a transparent process.

So again, this is a process that is not satisfactorily undertaken by individual traders using the Internet as intermediary alone.

A sense of joint ownership is installed through the consultative process. A trader reports

To a large degree the participants owned the system they wanted to make sure it succeeded. Because everyone had invested so much time in assuring that the market got off to a good start everyone would work closely together at the start to ensure it succeeded. Because we all worked closely together at the start we

did forge high levels of trust. Rather than someone come along and say 'boy have I got a product for you', we built, or we played a large part in building the system in an ongoing capacity. You feel that you have got a lot of say in it.

A fourth factor closely entwined in the relationship building process is that of establishing and maintaining trust. If traders were to use the COMIT system with the assistance of the Internet, but without the business intermediary, then they would be without a number of value adding features. These features include: not being able to view data from multiple traders to make bid or acceptance decisions due to a lack of anonymity with commercially sensitive data, nor would there be any entity to collate the data, or to ensure ongoing security, or maintenance of the system. As one trader said, the benefits of leveraging the combined brokering roles of the Internet and intermediary with the neutral trading system (COMIT) and their administration is that

I have a lot of trust in the [intermediated electronic] network. I guess because it is an anonymous market. The administrators of COMIT do not benefit from the commercially sensitive data. To them it's just data. The data comes out in an aggregated form, so you can put information through and have trust that it will remain anonymous. With the systems and security that COMIT provides you can safely trade through that medium. I just don't see how a market like this would work without having a system.

The second area of trust surrounds the development and enforcement of the many rules, regulations and systems. One trader said

It [NZEM] is so tightly governed [by M-co] that there is quite a tight change control process around the critical parts of price discovery. It's all got to be audited by a separate company to ensure the changes meet certain criteria. So the added functionality on that level sits over the underlying price discovery models and calculations, which are also very tightly controlled. We need to be able to trust the price discovery mechanisms and the information we are sent.

Trust in the system was tested in the winter of 2001 when lake levels were low and consumer demand was high, resulting in elevated wholesale electricity prices. An example of the rules and regulations providing trust and *certainty* in the system were tested when the market surveillance committee was asked to investigate for a potentially *undesirable situation* at this time. The rule governing

an undesirable situation describes a situation when trade is threatened by a service or market occurrence. On this occasion two participants believed that the winter's high wholesale electricity prices were due in part to the lack of competition in NZEM and that some generators may have been engaging in manipulative practices. After a full investigation the market surveillance committee, as part of the intermediary watch dog body, concluded that the trade situation was in fact fair noting that "the rules should not be used to shield market participants from market forces" (Management Staff). Again, this is a task that would not have been able to be undertaken by individual traders with the assistance of the Internet as the sole broker.

As well as exploring the nature and degree of trust in M-co, those features surrounding the concept of power were also investigated. Three features were found, with regard to the perceived power that surrounds the relationships between M-co, its participants, and other service providers within NZEM. First is the *shared power* with Transpower as this organisation is the national grid operator. In its capacity, Transpower is not only required to supply and maintain the national grid power lines, but to also keep a constant flow of electricity along the grid balanced at all times. So Transpower

effectively has control over who does and does not generate and who does and does not retail. They also have the power over the capacity of electricity that flows along the grid. (Management Staff)

This brings about what some have deemed to be an internal conflict between Transpower maintaining the grid as efficiently as possible and at the same time ensuring that the quantity of electricity that flows along the grid is run as cost effectively as possible. For example, there may be a ruling that only 200 mega watts of power is permitted to flow along the line, but an increase to 220 mega watts could effectively bring about cheaper generation.

Second is the perceived power held by market participants, highlighted by Sawhney and Parkih (2001) as the dissemination of power from the centre of the network. This issue is reinforced in M-co with a 3 yearly renewable service contract that M-co is required to sign. M-co staff take seriously the threat that

other specialist companies could bid for and win either the administration and/or information technology components of the business. Both local and international generators or retailers who understand the industry could potentially bid for the administration component, while information technology companies could bid for and perform the information technology component. However, any successful competitor would encounter

a steep learning curve. It is not until you start doing things that you understand the detail. And the devil is in the detail. It looks easy, but it is not until you try and implement something that maybe doesn't work that you realise that maybe it is not as easy as it seems. (Management Staff)

Further support for M-co's continuance is found in the strong and genuine relationships that have developed between M-co and the market participants. A trader comments

M-co is a monopoly service provider in the form of an electronic network, but they don't act like a monopoly service provider. They are always very supportive. I guess their success depends upon the involvement of its customers.

Third is the perceived power of individual market participants in terms of size or ownership or location. These factors are suggested to inevitably filter into the price setting mechanism. As one trader points out

dominance in terms of size, usually means dominance in terms of quantity. And they may have location as well, then this has influence in dominating the market in real time and subsequent periods.

Another trader reports

There are a limited number of participants and that would send a message to me that it is not as true a market as it could be. Particularly when three of those players are government owned. There is a significant dominance by those three players. That makes our company about fifth in the heap. And, so what you get is a market that starts to resemble the potential of a market but with dominant and nondominant participants.

A further issue worthy of note is the value Trader Participants place on the number of relational links that they can access through M-co. Trader Participants generally acknowledged that the greater the number and balance between

generators and retailers the more efficient the price discovery process becomes. Currently there are nine main generator participants. Of these generators, eight are main purchaser participants as well. The large purchaser participants also act on behalf of a number of smaller purchaser participants, so in effect the larger trader acts as a secondary intermediary or broker. One trader recalls that the network started with four members. Both retailers and generators said they would like to see more participants. One trader recalls

When we were a retailer, we didn't think there was enough generators, there was limited choice. I still think it's the same, even as a generator, you are dealing with a very limited amount of parties.

However, there is awareness, as another trader suggests that, "basically other traders are just not available, rather than they're available and not operating through M-co". The focus instead is upon capturing a sizeable proportion of the New Zealand market share for electricity trade.

8.5 The Value of Exchange

Current Value Exchange

There is unanimous agreement that the key benefits derived by traders within M-co are increased efficiencies and the subsequent reduction in transaction costs in the exchange of electricity within New Zealand (M-co, 2000). Efficiencies are first identified in terms of the reduced amount of time required to locate and collate traders. M-co (2001) suggests "it [M-co] pools the traders to reduce the cost of search activity."

The next efficiency identified by Trader Participants is their ability to access and leverage the price discovery mechanism. They can then make supply/purchase decisions with increased speed and accuracy. This situation is reflected in a trader's comment, "it's really about finding a true market price. It's a money making decision for us to participate". Another trader suggests

We could choose not to participate in it [M-co], but if we didn't then we wouldn't have the competitive advantage that we currently have. We would lose customers, since other retailers who trade on the system would be able to offer customers a lower

priced product. It's a case of having to trade through M-co rather than wanting to, to a large degree.

It appears the efficiency offered by the pricing mechanism can be further refined into several other efficiencies. First are the efficiencies in terms of the time saved from physically locating, and psychologically filtering and collating the large volume of data in the electricity industry into manageable units, in terms of quantity, accuracy and specificity with the assistance of both the Internet and intermediary. It is widely acknowledged that the electricity industry produces vast quantities of information that individual organisations can find challenging to interpret. A trader said

The biggest thing for us is the information that is provided through the system. There are vast amounts of information that come through all the time. We get thousands and thousands of pieces of information on prices alone each day. One of the big things is COMIT filters the information, like offers and bids. These are updated every 5 minutes at each of the 244 nodal points, so we can see the prices at those nodes. We can use that information now, and also store it to analyse trends.

Other efficiencies embedded within the price discovery mechanism surround the effectiveness with which decisions are made at the point-of-sale, in terms of increased speed, confidence and accuracy, attributed in part by M-co's governance structure

the contractual terms and conditions are standardised to reduce bargaining costs, and more effective policing and enforcement are used to improve security of transacting. Each of these features reduces transaction costs and thereby increase the gains from trade to be shared by society as a whole. (M-co, 2001, p. 15)

Trader Participants report having trust and confidence in the price discovery process to filter information on trader identity. This trust surrounds not only the reliability of the Internet system, but also the role played by the intermediary. The COMIT system can strategically *block* trader identity by time and geographical location in order to reduce the likelihood of opportunistic behaviour and increase opportunities for everyone to maximise *fairness* in the bid or acceptance prices. One M-co staff member recalls an interesting situation where retailers were calling for the identity of all those making bids and offers

as there was this perception that the generators were colluding. Then when the information came out, all of a sudden the retailers saw - by giving out this information you are actually allowing the generators to see what everyone is bidding and offering so you are actually giving them more information. So it swung around, the retailers could see that all this information was giving the generators more power. They didn't realize it at the time they requested the change. Now they think that sometimes more information (transparency) is not always a good thing.

Trader Participants within M-co also reported two further efficiencies in terms of speed and clarity in future planning, especially as a result of participating in the price discovery mechanism. First, the prices discovery process encourages electricity organisations to independently and objectively value the component (generation, retail) parts of their business. This process can lead to improved investment decisions and opportunities to improve risk management for traders. These improvements can occur as marketplace trade for a physical commodity is often the “forerunner to the development of a futures market in that commodity. Such markets reduce the transaction cost of undertaking risk management activity.” (Management Staff)

Upon closer inspection it appears that the efficiencies outlined above are underpinned by the presence of two key features present within M-co. First is the functionality offered by the Internet or what M-co refer to as *market enabling information technology*. The Internet makes possible the timely collation, analysis and transference of voluminous amounts of data in a highly volatile industry. Buyers and suppliers of electricity rely on the receipt and exchange of such data for regular decision making. Second is the role of M-co as intermediary in the network. Staff at M-co attribute their success to a unique combination of generic *network building* strategies that provide an *end-to-end* approach for the exchange of electricity. M-co staff are quick to point out that while the Internet plays an integral part in this network, its value is governed by the needs of the Trader Participants and how well M-co can implement its overall strategies.

The intermediary within M-co took as its first step in the building of this modular network the developing of a concept and vision, where general issues and stakeholder requirements were understood. Initially, M-co

as the administrative arm of the NZEM, was charged with 'implementing a 'vision' that entailed building an electronic network to facilitate the exchange of electricity between industry members, due to real problem in the industry. (M-co, 2000, p. 14)

This challenging process began by acquiring "a unique combination of motivated staff that had a variety of specialised skills, including information technology, general management, law, economics, and marketing" (CEO). Access was also required to a variety of prospective participants including generators and purchasers. Furthermore, access was required to other service providers and relevant electricity industry specific rules and government regulations. The interpretation of the vision also required expertise and skill not only in interpreting what was required, but also what was possible in terms of delivery. This required M-co staff to liaise with key stakeholders, including government and other service providers. Then communicating the vision involved identifying, targeting and beginning to build a strong relationship with prospective participants and other industry members with the ultimate aim of attaining their widespread *buy-in* "and active participation and support" (M-co, 2001, p. 22).

The second step in building the network surrounded the *design and implementation* of governance, rules/procedures, price discovery/settlement and information technology systems, so both online and offline design skills were required. An M-co staff member suggests that as an administrative body M-co staff have the "specific capabilities and proven performance to ensure successful completion of the project as a whole", rather than concentrating on a small feature of the network. They suggest their expertise surrounds not only their ability to design Internet and offline processes, but also to implement them in the most cost effective way. Another staff member said, "these systems are not just information technology systems, but also governance structures, processes, rule books and legal structures and systems". Within each of these systems M-co has forged a reputation for providing open and transparent structures, and consistent decision

making over time in building end-to-end processes, something that could not be done by traders with the assistance of the Internet alone. Traders and staff agree that

The market definitely needs someone independent in the middle to sort out everyone's bids, offers, and whatever else goes through the system at the time. (Management Staff)

I'd see it hard [sic] for the market to function with all these different players unless there is someone in the middle taking all this information, or everyone's position, and what they're wanting to do and then actually putting the information together, and putting it into some sort of format. (Trader Participant)

However, staff readily acknowledge that an initial and on-going challenge has surrounded balancing the requirements of multiple shareholders in the designated time frames.

The original challenge was to produce a design system that could be implemented in just 16 months. This is an astoundingly short time frame. And then the other challenge is just keeping up with, and/or leading future change in the industry. For example the challenge we have at the moment is dealing with reforms to the market that were initiated by the Ministry of Enquiry into the electricity industry. We also have to deal with changes to the regulatory environment. (Management Staff)

It is commonly acknowledged that industries subject to considerable government regulation confront particular challenges.

It is often difficult for governments and their agencies to loosen their perceived control of publicly sensitive areas . . . nevertheless, experience from the electricity industry in New Zealand demonstrates clearly that appropriate self-regulatory behaviour can lead government to gradually withdraw from a high regulatory approach and transit to a much more hands-off approach . . . M-co has . . . experience in liaising, negotiating and working with government and their key agencies to successfully bring about devolution. (M-co, 2001, p. 15)

The third step for M-co has been that of *implementing the operation*. Once developed, M-co aimed to ensure that its systems and processes within the network worked with precision, especially given the highly volatile nature of the industry. In addition, M-co attempts to demonstrate "flexibility to address evolving needs. Networks in industry marketplaces, by their nature, must evolve.

But they must operate with precision at the same time”. One way in which they try to achieve this is through the consultative process with feedback and feed forward. This process is actively practiced both within M-co and also when engaging in network opportunities beyond M-co.

We work alongside participants in a partnering role. We try to actively empower them to manage their own affairs in ways that stimulate innovation and initiative, yet remain within appropriate standards and legislative requirements. The key to a successful workplace in our experience is a framework built on consultation and consensus. (M-co, 2001, p. 14)

An M-co staff member suggests that

One of the key differentiators in our work is that we do not assume the key decision-making role. Rather, we look to foster an *exchange of experiences* through a carefully worked-through consultative and consensus building process.

As well as practicing the above-mentioned strategies, M-co staff also attribute their success in part to the following three factors. First is M-co’s, first mover status, not only in the New Zealand electricity industry, but also globally. One staff member reports

We are actually ahead of our competitors in the States, mainly because New Zealand is a long way ahead in terms of electricity reform. This means we have been operating for longer. New Zealand was the first country in the world to have a nodal priced market, and to trade electricity over the Internet in 1998. (M-co CEO)

Another M-co staff member suggests

. . . we have taken the skills and lessons we’ve learnt there, in relation to the design and operation of the market both in relation to ‘human capital’ administration, and ‘process’ administration, as well as information technology. We’ve applied those lessons to other markets.

The second important feature for M-co, especially in terms of expansion into the international arena explained later, has been a change in shareholder in 1999 to a South African financial institution. An M-co staff member suggests that this move was “the most significant success factor for us.” Another staff member believes this change has

actually created an environment where growth and expansion are encouraged. Since the shareholder is a financial institution they [sic] understand risk and return very well, and have the capital. So they've empowered the organisation to grow. We've been able to provide the skills that we've built in the New Zealand electricity market.

A third success factor is claimed to be M-co's *creativity* in terms of its entrepreneurial approach that staff refer to as *Kiwi ingenuity*. Since New Zealand is a small country most of its senior managers have developed "a good cross section of different experiences" (CEO) across a variety of industry sectors that enables them to "actually think, and then apply what they have learnt to a lot of different situations. You can come up with quite different and innovative ways of doing things. Creativity is all about varied experience" (CEO). Solutions to complex issues can be found by applying parts of the solutions identified in other markets. "It's a bit of the number eight fence wire type mentality" (CEO).

On-going Value Exchange

Having got the inner workings of M-co *right*, demonstrated by Trader Participants *stickiness* with approximately 80% of New Zealand's electricity trade voluntarily going through the network, and the large *asset specific investment* required for this, one natural progression for M-co as intermediary is to expand its offerings to other industries and/or countries. M-co is suggested to be a unique marketplace company that began with the primary purpose of solving the inefficiencies in the New Zealand electricity industry. The *vision*, *experience* and *resources* that they have developed as a centralised figure staff argue can readily be transferred and leveraged across a wide range of sectors. These include skills suited to other network industries, or networks in the same industry, but in different global locations. As a staff member reports

Though each electricity industry in a country has a lot of unique characteristics, in terms of culture, structure, pricing, rules and regulations, the market structure can be very similar. For example, in the United Kingdom the market structure is very similar for traders, but the price discovery process is completely different. So we could leverage our market structure building skills.

In addition M-co can offer its expertise to complex commodity markets

that is, for any commodity for which the actions of any two trading parties have potential knock-on consequences for other industry participants and the public. This applies in some form to a surprisingly wide range of goods and services. (CEO)

The Annual Report (M-co, 2001, p. 16) suggests M-co is particularly well situated for those industries with one or more of the following features. These include

a strong presence of public good and/or common resource aspects; the need for centralized mechanisms that enable controlled access in some form; and the need for high performance, confidential information technology systems, capable of handling large amounts of complex data.

In less than 2 years M-co has leveraged both online and offline skills in developing rules, relational processes and structures, experiencing significant growth at both the domestic and international level over a range of industries. These include wholesale energy markets, retail competition markets, registries and sophisticated Internet-based trading platforms. M-co now operates subsidiaries in Australia, Singapore, South Africa, and Europe. In addition M-co has formed a company M-co Development - to focus specifically on international business development opportunities. When representatives from the Singaporean government visited M-co, one said "I really like what you're doing in New Zealand. How would you like to come and do the same thing in Singapore?" (CEO). This resulted in M-co entering into a joint venture with the Singaporean government to build their electricity market. The Taiwanese government has also called upon the expertise of M-co staff

to design an independent system operator for their electricity market. And also, we're getting ourselves involved in training participants in national markets, as they are going through reform, such as Korea. They're coming out here and learning how it actually operates in a deregulated market. (CEO)

M-co has also been active in nonelectricity markets. They have helped to establish the New South Wales gas market. In addition, M-co built a renewable energy certificate marketplace to assist energy companies in Australia to meet their obligations under government legislation.

Challenges

However, despite the successes outlined above M-co staff recognise that they cannot afford to become complacent. One staff member reports

We are doing well, but there is also a challenge not to get complacent. Just because we have got the contracts now doesn't mean we will have them in the future. They all have expiry dates. We have got to ensure we are providing a cost effective, quality service to our customers.

More specific challenges arise for M-co staff in terms of coordinating the potentially voluminous output of data from the numerous working parties in the designated time frames. The process starts where either M-co staff or a participant has ideas for change

From an information technology point of view . . . we can say, oh, it's going to take us a month to re-jig our systems, to publish things twice as fast as what currently happens. As far as we are concerned, technology has never ever been the problem. (Management Staff)

M-co staff has the capability to "deliver information, any information in real time, to anybody, anywhere". However, ideas are required to be

put through the working group process and the rules-making process, which may take from two to three months, to over one year. This is always a constraining factor. (Management Staff)

Further challenges for M-co with current Trader Participants that lurks somewhere in the background are those of a proprietary nature. These concerns arise from a perceived lack of clarity by some traders regarding ownership of property that has been jointly developed by M-co and market participants. Some trader participants, especially the larger ones, argue that

to a large degree we [XX trader] paid for a significant part of COMIT through the fees we paid and the huge involvement we have had in its development. We still own a significant part of it, although there are some proprietary arguments that M-co try and use. But the market paid for the development of the system and became joint owners of the system. (Trader Participant)

The proprietary issues focus on two key areas. The first focuses on the issue of witnessing reducing costs from M-co as the systems and procedures mature.

We (traders) have to be very careful that M-co doesn't pick up revenue that they get from COMIT now and use that to develop different products for different markets that they sell somewhere else. They are very careful the way they do things to try and make sure that they can't be accused of this. We are paying good money for this, and we have seen the price go down over time after the huge start up costs were recovered. If we don't see the prices continue to go down, or if we see [sic] it start to go up, and then see M-co have huge successes in different markets, traders will be annoyed. (Trader Participant)

A second concern of traders surrounds surety in the continuance of M-co's service. A trader comments

All we want to see is that the service is continued. When M-co was sold to overseas investors and a series of companies were developed [M-co New Zealand and M-co International] it raised some concerns.

Interestingly, given the high level of rules and regulations that the market operates within there do not appear to be any clearly defined rules around property ownership. Traders acknowledge that M-co has the resources with COMIT and the expertise with its staff to extend the jointly contributed ideas for use in other industries. They are not averse to this, as long as the service at its current level is maintained.

It should be noted that M-co not only regularly focuses on how it can systematically grow and improve its internal performance to Trader Participants, but also how it can use the governance structure it has built through its systems, rules, regulations, and embedded relationships to leverage external opportunities. One M-co staff member reports, "I wouldn't say that New Zealand is saturated, but it is pretty close". As already mentioned, during the past few years M-co has experienced a change in shareholder and rapid expansion both within New Zealand and international markets. Another M-co staff member said

We continuously have to make sure that we have the processing systems and organisational structure in place to actually support growth. Some things we're doing first in anticipation and some things we're doing as the problem is identified. The big risk if you grow very, very quickly is to reinforce the growth by having highly skilled motivated staff on board who can operationalise the

growth. The trick is to expand the size of the business . . . and at the same time expand the reinforcing . . . I think that's the biggest challenge.

8.6 Conclusion

The data in this chapter link to the skeletal framework developed in chapter 6 in three important ways. First the nature of the information flow between traders prior to their entry into M-co was one where there were high information asymmetries (Williamson, 1985) resulting in structural holes (Burt, 1982) between traders who were mostly known to one another. Due to the complex and perishable nature of electricity as a product, highly time specific information (Sampler, 1998) was required to increase the likelihood of maximising returns for traders.

Second is the simultaneous building of a modular technological infrastructure and series of relationship processes to facilitate the flow of information. This process can be linked to the modularity concept (Sanchez, 1998) and also to Simon's (1982) development of decomposable systems where he calls for an increased understanding of the environment by breaking humans and machines, in this instance the business intermediary and the Internet into symbolised information processing systems. A further link is established between Simon's (1982) development of the bounded rationality term and the limitations and potential of traders to leverage the functionality of the Internet, to transmit large volume of complex data.

Third is the linking together of the modularised relationship and technological infrastructure building processes that were conducted by M-co leveraging both existing and new opportunities. Since high asset specific investments (Williamson, 1985) are required in the ongoing development of the technological infrastructure, one way to increase the likelihood of certainty (Williamson, 1985) is through the identification of new information gaps (Burt, 1982) in the environment external to the current network that could benefit from the structures and processes already developed.

Finally, the links between these findings and the skeletal framework developed in chapter 6 are combined with the links between the timber and general product network case studies, in chapters 9, and 10, respectively, this will provide a basis from which to analyse how value is created in a B2B (IE) network.

9. Case Study: Global Electronic Commodities Exchange Limited

“It’s unbelievably brilliant really!”

(A trader’s view of the network)

9.1 Introduction

This chapter provides a detailed account of the B2B (IE) network, Global Electronic Commodities Exchange Limited (Ecomex) that operates in the moderately volatile New Zealand timber industry. The chapter’s purpose is to identify and examine how value is created in this particular network form, both from the perspective of buyer and supplier participants and from the perspective of the business intermediary. The concept of value combines the duality of the Internet and business intermediary in creating the structure, processes, and content of information flow, embedded within this network form that ultimately leads to increased efficiencies and reduced transaction costs. First, the chapter describes the data collection method used. Second, the rationale for commencing Ecomex is explored. This exploration includes a brief overview of the New Zealand timber industry and Ecomex’s position within it. Third, the governance structure of Ecomex is illustrated. The brokering role of both the Internet and intermediary in the building of the rules, regulations, processes, and relationships that have resulted in Ecomex is investigated. Finally, both current and future value opportunities for buyers and suppliers, and the intermediary are discussed.

9.2 Data Collection and Analysis

Data were collected from interviews conducted with six intermediary staff, one strategic partner, and six trader participants in Ecomex. The intermediary staff interviewed included the founder and CEO, technology staff, administration staff, the operations manager and a strategic partner who had access to timber export opportunities in India. The trader participants, who were randomly selected from a list provided by the CEO included buyers and suppliers of timber located in New Zealand. Rich in-depth data were gathered through two semi-structured questionnaires with 25 items in each (see Appendices A and B). One questionnaire was administered to each of the 6 intermediary staff and a slightly

modified version to the strategic partner and the other questionnaire to trader participants. The responses to these questionnaires, together with information contained in the company reports and business plans (Global Ecomex, 2000, 2001) and entry to the website www.ecomex.co.nz provide the basis for the discussion in the remainder of this chapter.

The grounded theory data analysis technique (Glaser & Strauss, 1967) was used to analyse the data collected on Ecomex, in the same way as in the M-co case study. Furthermore, as with M-co, care has been taken to increase the likelihood of producing valid results by checking data source, method and researcher for consistency, in line with the triangulation technique advocated by Jick (1978) and Denzin (1979b). Methods used to increase the likelihood of accuracy include, accessing a comprehensive range of business intermediary participants and timber trader participants, while also being mindful of retaining consistency with the designations of staff being interviewed in the other case studies. For example, the CEO, information technology and marketing staff were interviewed in both M-co and Ecomex. Again, consistency was sought in the timing and location of the interviews with Ecomex intermediary staff and timber traders. All interviews were conducted in the office of each respective participant over a 2 month period from August to September December 2002. On each occasion rapport was built with participants in a relaxed, professional manner. Permission was sought and obtained on all occasions to audio-tape the interview process in order to maximise the retention of data from this process. Also, just as with the M-co case study, I gave all participants assurance that the information they disclosed would not identify them. The CEO was happy that I identified him with any quotes that he made. Accordingly, the quotes used in this chapter are coded as follows: chief executive officer (CEO), Ecomex intermediary staff (Management Staff), strategic partner (Partner) and timber traders (Trader Participants).

The analysis that follows in this chapter draws together data over an iterative process that has involved identifying both existing and emerging patterns across interview and written company material. Following the open coding process identified by Strauss and Corbin (1990) trends emerging from the collated data are

then woven together with some generalised theoretical categories and concepts identified in chapter 6. Care was taken to ensure that a comprehensive and accurate account of Ecomex was portrayed by contacting the founder of Ecomex and asking him to review the contents of this chapter for accuracy. This process was especially important since I gathered the data as a single researcher. The data in this chapter have been structured in such a way that they enable a meaningful comparison with the case studies in chapters 8 and 10, while also retaining the unique features pertaining to this particular network.

9.3 Formation Rationale

Ecomex Perspective

A key issue within the New Zealand timber industry immediately prior to Ecomex's commencement was one of supply exceeding demand. This oversupply led to subsequent inefficiencies and increased costs from information asymmetries in successfully searching for potential buyers in markets external to their existing trader relationships. Timber traders ideally required *density* in terms of having a large number of trading links, but in reality these links were typically sparse. Timber was, and continues to be, an important resource within New Zealand. It is ranked third as an export earner and covers over 1.7 million hectares of plantation forests, with Radiata pine accounting for over 90% (Shacklady, 2000). However, on a national basis this rich supply source exceeds demand, and consequently, overseas buyers are sought. New Zealand exports approximately 33% of harvested logs. The largest timber export markets are currently Korea, Japan, and China. (Global Ecomex, 2001). Furthermore, New Zealand's timber supply is predicted to expand from the current annual harvest of 20 million cubic metres to 30 million cubic metres by 2006, and 35 to 40 million cubic metres by 2015 (Venture, 2002). However, on a global basis, New Zealand is a relatively small producer contributing a mere 1% to 2% of the world's timber production (Global Ecomex, 2001).

At the outset, Ecomex identified the fragmented nature of the timber industry within New Zealand, with traders often experiencing frustration and high search and collation costs in fulfilling transactions (Global Ecomex, 2000). Members in

the timber industry include builders, construction companies, furniture manufacturers, saw millers, pulp and paper mills, and timber merchants; totalling over 26,000 participants in all.

So it is a fairly large industry if you include all those who buy and supply timber. The reality is that a piece of wood can change hands five times before it goes into a product and the value of that wood can go through from \$150 per ton to \$1200 per ton. And if you are talking of a finished product it can be \$6000 to \$8000 per ton in furniture. So everyone in the chain is a buyer and a seller. We went right across the industry. (CEO)

At a national level, timber industry members have often traded through either one, or both, of the two, large established New Zealand timber organisations, especially when exchanging relatively large quantities of timber. A second popular form of trade, especially with smaller traders and/or when dealing in smaller quantities of timber, has been to conduct deal closure with informal word-of-mouth contracts. The advantage of trading with large timber organisations is that they typically provide traders with *certainty* and subsequent efficiencies in transaction closure, in terms of quality, quantity and payment. However, often there has been relatively little scope for price negotiation, especially for small traders (Global Ecomex, 2001).

In contrast, the small trader-to-trader situation provides buyers and suppliers with the potential for *bargaining*. However, But this method inevitably contains heightened risk. Inefficiencies can arise through miscommunication between traders regarding product specification and failure to meet full payment, especially when parties are unknown to each other. A reasonably high level of distrust has developed in the industry between many traders, with experiences of some either failing to deliver or pay (Management Staff). In addition, there can be inefficiencies due to the high level of fragmentation of these small traders, where they simply remain largely unknown to each other (CEO). In both of these types of trade, and in general, the exchange of timber up until the early 1990s involved very little mechanisation, with telephone calls, facsimiles and on-site inspection being the norm. Furthermore, these small traders often experienced information asymmetries in terms of searching for, accessing, and keeping informed about

timber association news and general industry trends. One trader reports, “There’s three or four associations and I think some are better than others, but I’m not clear even if I used the computer which was which.”

These inefficiencies were especially pronounced for small timber traders who either spent considerable time, with little manpower, searching for information on buyers, or alternatively were left with the product, and then had scant administration skills and procedures to close the deals. Recognising the heightened transaction costs due to these inefficiencies and the need for some form of negotiated price mechanism on a product that has a changing value in terms of product quality, quantity, supply and demand, the founder of Ecomex saw an intermediary opportunity. He began by focusing on a particular sector and geographical area of the industry in which he had considerable prior experience - trade via portable saw millers in the central North Island. Two common forms of trade typically operated within this sector. First is contract trade, where a saw miller saws the timber for the owner of the trees and then moves on, leaving the owner with the sawn timber. Second is where the saw miller buys the standing trees, and then takes responsibility for felling, sawing and on-selling the timber. In early 1993, the founder of Ecomex attended a large saw millers meeting that included portable, as well as fixed site, saw millers in the central North Island. He noted

Everyone seemed to be buying a saw mill but no one was organising them. With over 60 saw millers, there were only three local buyers. No one was organising the buying and selling at that point. (CEO)

Due to these information asymmetries and general inefficiencies within the industry, there was a “call made at the forestry industry meeting” (CEO) to establish a central point to collate the information from buyers and suppliers. In answer to this call, the founder of Ecomex saw the opportunity to create a portable saw millers association in 1994. This attracted 175 small saw millers located throughout New Zealand. At this stage the key concern for saw millers was that of locating a market for their product.

I guess my background was rooting for the underdogs of the industry . . . They were cutting the product to get the best

they could out of the log, instead of cutting for what the market required. The other thing that was going on was that some suppliers were selling macracarpa, for example, for \$700-800 per ton and other guys . . . couldn't sell anything. Through a lack of information there were huge margins being made by some. (CEO)

From the original data base of 500 industry participants in the New Zealand saw millers association, the founder of Ecomex sent out a survey consisting of 30 open ended questions, to establish what was actually required. The survey identified the need to *search* for and then *collate* the wood products that were available and then to *communicate* this information to each party. If a saw miller received an order that he could not fulfil, the order could be sent to another local saw miller, rather than losing the customer from the region. "So there was a desire to have a networking effect going on there" (CEO).

There began Ecomex's role as the centralised information broker between timber traders, using the technological facilities of the facsimile and telephone only. The founder organised several activities to informally collate members of the timber industry together. One activity included a saw milling competition among the four main manufacturers in the timber industry that attracted over 2000 individuals, including thirteen different sawmills. The founder also began linking timber buyers and suppliers together through the manual receipt, collation and transmittance of facsimiles. This service was provided free of charge, as he was aware that traders would not want large asset specific investments. He reports

I think that having an association is not going to be of real value unless it can give them value back. So while they wanted information the biggest call was to get some market collation together. There were also complaints that the brokers within the industry and the merchant sector were not forthcoming with pricing information. Because if they had been the saw millers would not have been selling their stock at the prices that they were. The other thing was huge volatility in the market. The best margins are always there if the market is very volatile. If it is really low and really high there are nice fat margins there. (CEO)

Timber Trader Perspective

Timber traders within New Zealand essentially have a choice between three B2B (IE) networks, as well as the more conventional forms of direct and/or offline trade. Several factors appear to influence the choice of market that these traders select. The traders interviewed indicated that while they were interested in the potential benefits and efficiencies of electronic trading, they would not have chosen this trading medium if it were not for the fact that they were personally introduced to it. All the traders continue to use a combination of online and offline trade for several reasons. First, the traders all have some prior established trading relations that they wish to continue. And second, some traders require product that is not available via Ecomex. A builder trader said

There is certain product that they don't trade in. They don't offer bulk product like framing and that sort of thing. The likes of particle board flooring and roofing, the exchange wasn't set up for that. Possibly it could be used in the future to deal with things like that but I think you'll find a lot of the companies like 'Company A' (a large building supplier) considered it too much of a threat really.

All participant traders indicated that they would willingly join other timber exchanges, with comments like "you'd be crazy not to, to get the cheapest price" (Partner). Interestingly, however, no one had joined the other two timber electronic networks operating within New Zealand at the time of the interviews. It appears that a key reason for this is that traders are unwilling to initiate any investigation into these other networks.

It appears that a key motivator for traders to join Ecomex centred upon the increased likelihood that they could access new markets, and make subsequent cost savings in terms of searching. Intermediary staff are aware that their system provides timber traders with the potential to search for other traders and to locate them quickly and then to be able to complete the transaction more successfully when compared with offline trade methods, which is especially true when irregular quantities or grades of timber are concerned. One staff member suggests

It opens traders to a much bigger and broader market. First you need to locate traders. There are only so many people you can talk to on a telephone in a day. But with the electronic platform you scan through potentially thousands of different offers and

requests in the time that it might take you to talk to three or potential business partners. I think it's just the speed and the volume of information that you can access.

Without the Ecomex facility individual traders reported that they lacked the necessary resources to locate new markets. As one trader expresses it

I could see the marketing and buying potential, and I still can So, I thought well OK, this is a way of maybe finding timber at the right price, putting deals together for other people out of the organisation, either buying or selling. You have got to remember that a lot of the traders we were contacting both here and overseas either didn't have a computer at the time, or you couldn't tell much from their website.

Another trader reports, "I knew about the supply side . . . but I didn't know that the buyers existed. But as a result of the exchange, I can reach new buyers".

A further reason that traders joined Ecomex was to get an independent view on the market price, especially through the increased information transparency made possible under the dynamic pricing system. As a staff member suggests

Traders can use us, to see what the current market prices are. When there isn't a strong sense of market price, people might sell a portion of their product on the market to see what they can get for it. You may have a cozy relationship with a supplier, but what tends to happen over time, unless you're very careful, is that the conditions of sale tend to flow more in the seller's interest than the buyer's.

Intermediary staff actively seek to recruit as many prospective buyers and suppliers of timber to the network as possible. There is unanimous agreement among staff that this network ideally requires "a large number of buyers and there also has to be a large number of suppliers otherwise it won't work" (Management Staff). A buyer participant supports the above comment, suggesting that when there are more participants, "you've got more competition, but more importantly you've got more chance of actually getting a particular product that you want" (Trader Participant). When aiming to recruit as many trader participants as possible, intermediary staff at Ecomex are also aware of the importance of trying to achieve a balance between buyer and supplier numbers, ideally in terms of the nature, product type, and quantity of timber required. "We looked at buyers and

sellers and we obviously tried to find supply and then balance this with demand” (Management Staff).

One staff member reports that in the early days of the network there was hesitancy to join on the part of some merchant traders who typically saw their role as an intermediary in the timber industry for fear that this type of electronic network would make their services redundant. However, this reluctance to join changed once there was a clear understanding that their services were still required. That staff member stressed

You still need the merchants, it’s impossible to intermediate completely. Merchants are not cut out on the network. The infrastructure means they can still achieve a margin. Those relationships are still there and are part of the whole business process.

This view was also shared by the timber traders interviewed.

As well as this, Ecomex actively seeks large trader organisations

first, because everyone else will follow. You need the large industry players there and you can’t avoid it. And second, because only so much trade can happen with a hundred, or a thousand small traders, in comparison to the big ones in terms of volume. (Management Staff)

A wide range of traders are encouraged to join, in order to fulfil as many product specification areas on the trading platform as possible (CEO).

9.4 Governance Structure Development

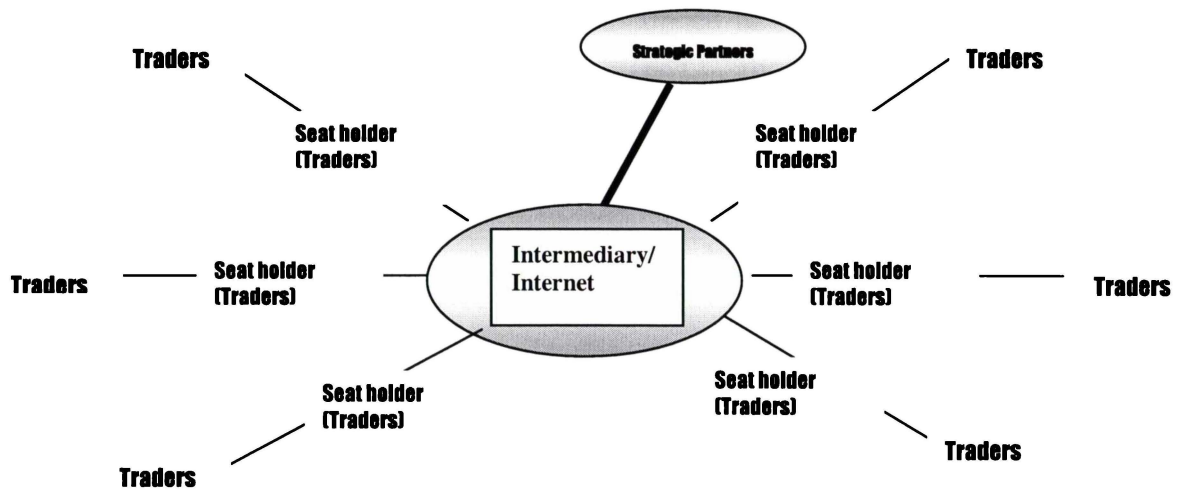
The creation of value from the brokering roles of the Internet and the intermediary staff within Ecomex in the development of the various rules, processes, regulations, and relationships that are embedded within the governance structure of Ecomex has been an iterative one. First, the structure of Ecomex is examined. Second, the trading platform is investigated. Third, the rules and regulations are reviewed. Last, the relationship processes are reviewed.

Structure

The structure of Ecomex is such that the Internet and intermediary staff hold the centralised positions (see Figure 5). Intermediary staff bring with them expertise

in the timber industry, general management, marketing, and a specialist in-house technology team. As well as this, they have a number of formal business relationships with marketing partners, several large reputable national and international timber associations, a computer company and legal and accounting specialists (www.ecomex.co.nz). Then there is a close link to strategic partners. Surrounding the greater administrative body are approximately 50 seat holders: these include: portable saw millers, logging contractors, construction companies, builders, and some large timber trader organisations. Seat holders are registered traders (buyer or supplier) of timber who regularly exchange significant quantities of timber to warrant their initial purchase of a trading seat and have agreed to abide by the rules of exchange set down by the intermediary. Traders who do not wish to become seat holders, such as those who deal in small or infrequent quantities, may still trade through the network via a seat holder. So in fact the seat holder becomes an intermediary to this trade, and there is a secondary intermediary operating in this network.

Figure 5: Governance Structure of Ecomex



Electronic Trading Platform

At the core of Ecomex is the complementary brokering role of the Internet in the development of an electronic trading platform. Rather ironically in hindsight, the founder recalls, “that the development of the electronic trading platform began with the idea to have a physical clearing yard”. This yard was to be in a central location where a cooperative made up of buyers and sellers of timber could meet to sell their timber. Ecomex contacted cooperative members and asked them to send in facsimiles (faxes) of either the timber they had for sale, or what they required. Traders started to send in faxes with the timber they were offering for sale. Others started telephoning with requests for timber. The founder of Ecomex would typically get out the box of faxes

and go flick, flick, flick and say – ‘oh yeah’ this looks like a match. So it started by putting some descriptions together from the buyers and sellers and started to do some deals.

When this semi-automated method of trade became popular the value of a physical clearing yard was questioned. This was especially the case when the timber appeared to be “good enough to sell the timber on” (CEO). Since there was little point in asking traders to “pay freight twice, once to the holding yard and then back out again” (CEO), the physical clearing yard never eventuated.

Facsimiles for requests and offers of timber continued to be sent to Ecomex in increasing volume, to the extent that during the 1993 to 1994 period, the founder of Ecomex hired office staff “to handle [aggregate and match] the large amount of faxes coming in for timber product for sales” (CEO). It then got to a point where Ecomex decided to install a computer system. This mechanism could be used to aggregate and store timber descriptions so that buyers and suppliers could “access this information and sort through the information [and match their needs] themselves” (CEO). A bulletin board system was set up. This step marked the beginnings of an electronic exchange.

We contracted a systems developer to develop the system. We supplied the industry rules and how the trading screen would appear. And got them to basically build the back end engine. A DOS based system, and a direct dial up through the telecom X25 protocol was set up. (CEO)

Then, in 1996 Ecomex moved from the Disk Operating System (DOS) to a Windows system when it was realised that “no matter how much money was poured into developing the system, all the functionalities required by the participants could not be fitted in” (CEO). This move became especially so, as the iterative process of feedback and feed forward identified the various timber specifications that could be used to improve trade. Rather than having a portal, with a bulletin board facility that contained all the information, a fat-client system was established. This system permitted users to have a full database housed on their personal computers. The user’s database could then interact with the full data base facility on the server, and give access more detailed data. Ecomex was aware that this system had the potential to be developed into a more general computer facility.

Ecomex’s trading platform has continued to evolve to such an extent that it now offers a comprehensive range of exchange functions. These include the regularly used Dynamic Negotiated Exchange Model, explained in full below. A One-to-Many Seller Centric Auction Model and a One-to-Many Buyer Centric Reverse Auction Model are offered. Ecomex also offers the Catalogue Aggregation Model. This model has the facility to provide a one-to-many buyer centric online catalogue. Moreover, a Request for Quotes (RFQs) Model is offered to enable electronic organisation of purchasing sources. Finally, Ecomex offers a Buyer Aggregation Model, whereby suppliers can choose to sell to selected groups of buyers. One timber trader commented, “I find Ecomex has all the solutions you could think of”.

The Dynamic Negotiation Model begins at the point of pre-sale where there are typically large information asymmetries between buyers and suppliers. Buyers and suppliers are typically unknown to each other, and often lack clarity around the specifications of the timber they either have to sell or wish to buy. In the initial stages of Ecomex

Seven out of ten times the buyers were happy with what they got. Therefore, 30% of the time the buyers were not happy with what they got, but in fact usually got what they specified. I realised there was a problem in specification. For

example, a buyer who wanted 20 ton of '4 by 2' timber might only specify the moisture content. But there are a huge number of other things that you can specify in timber. (CEO)

Recognising that if buyers did not specify what they wanted they would inevitably get what they asked for led Ecomex to develop a set of standard specifications. At least then buyers would be aware of what they were not specifying when they placed an order. Though the Internet has the functionalities to itemise such specifications, without the assistance of an external intermediary this process was not likely to succeed.

The set of specifications were developed for timber *as a product*. The aim was to develop precision regarding *what* buyers wanted, and *how much* quantity they wanted. Ecomex suggest that timber is a semi-standard product in terms of how it can be described. The sale of an entire forest or a standing tree may be described as being relatively non-standard when compared with describing processed timber lengths of timber.

There's a protocol for describing forests or standing trees that will give you some idea of what you are getting without actually going to see the forest. But once you cut the timber you can be more specific. You can have standard sizes, whatever the timber is made of, water content, treatments, finishes. So there are quite a lot of things to describe, but they are finite, and clearer to define in a sense. And once you have discovered them, you can describe a piece of timber in a way that the person that is buying it had a pretty good idea that what they are bidding on will be what they want, provided they know what they are doing themselves of course. At the same time you would be able to compare this lot with this description, with that lot with that description. (CEO)

In response to the need for product standardisation, Ecomex created and built into its trading platform, a facility that requires buyers and suppliers to identify themselves, and then enter their details under a very specific yet comprehensive range of dimensions. The dimensions may include location, species, grade, volume, delivery and possession details, offer and bid price, size, treatment, and profile of timber (Global Ecomex, 2000). These classifications in effect force suppliers to describe their timber in a particular way and avoid the issue of

individual suppliers entering into the computer system only what they believed was important. Standardised product data also provide buyers with *uniform information transparency* when seeking timber. A buyer comments, “The system enables you to define exactly what you want”. Ultimately this feature serves to facilitate the settlement process, with an increased likelihood of two satisfied parties. Global Ecomex suggest

This was a major discovery for us. By working with buyers and sellers we found if we structured our descriptions people brought and sold more. Buyers can now understand what they were buying. Even if they used the Internet between them they couldn't come up with this standardised system. If we did not do that, they did not buy as much because they could not trust the system. (Management Staff)

At point-of-sale a system was established, after recognising that even with the installation of processes that encourages entry of standardised product description, there continued to be information asymmetries. However, this time they surrounded mismatches in the timing of information transfers. Again, timber traders could use the functionalities of the Internet to assist in rectifying this deficiency, but due to the limited staff resources and often a lack of administration skills improvements here were likely to be minimal. The founder of Ecomex recalls

When we contacted the supplier we found that it had already sold the product. I was forking out a lot of money in wages at the time and I thought the idea was for the saw millers to enter their own product and then somehow to let the buyers access the data base as well.

Ecomex recognised the need to collate the physical clearing yard concept, the documented unspoken industry rules and the data base structure; into one platform where trade could be conducted in *real time*. This achievement brought with it the status of first mover for Ecomex, in the New Zealand timber industry, in offering an electronic pricing system that was truly *dynamic*.

The dynamic exchange system, built in response to buyer and supplier requests, provides traders with a range of subsystems. In its simplest form, a supplier can make an open offer. Using this method, bids are invited from all market

participants, where the price, product description, and supplier identity are made available and transparent to all parties. Alternatively, suppliers can choose to participate in semi-open offers. This method enables suppliers to list some of their prices and qualities of the product they have for sale. For example, six suppliers can enter bids ranging from \$68.00 to \$100.00 per ton. All information, apart from the identity of the suppliers and prospective buyers, is made transparent. At the point that individual negotiations begin, the transacting parties can opt to make part of the process nontransparent. Once again this is a process that is made possible by the Internet, but unlikely to succeed without the assistance of the intermediary in collating information across the supply chain in an anonymous fashion.

Staff at Ecomex believe there are two important *price-balancing* features operating, due to the increased information *transparency* made possible by the trading platform. First is an inevitable upward price spiral, as the supplier offering product at \$68.00 in the above example realises that his or her product is likely to be worth more. And so, after a few sales the margin between the sellers tends to become smaller. And second, suppliers are unlikely to undercut or short sell the market, since most often they are unable to supply the entire needs of the buyers.

Nobody from this country can supply all the needs of buyers. So they will have to buy from someone else . . . this system encourages the proper dissemination of information and is making trade transparent . . . the market is much more organised.
(Management Staff)

It is important to note that merchants involved in timber on-selling can still benefit from using the electronic trading platform. Information on the initial bids and offers and descriptions of the timber are made transparent to all. But beyond that point the one-to-one negotiations can be made private and subsequently non-transparent to others. This feature also still permits a supplier to sell to a preferred customer at a lower price. So, identity and price transparency are controlled at several levels. Suppliers making offers have access to the identity of all prospective buyers making bids on their timber. However, prospective buyers only have access to the value of the bids of others and not the identity, up to a point, after which the value negotiations also become non-transparent.

A new information gap was identified by the intermediary regarding the *settlement process*. Staff at Ecomex developed standardised systems and procedures for clearing the market, just as operates at pre and point-of-sale stages.

We needed to look at factors of the sale that are important, other than the product. When you sell something the product is only part of the description. You want to know what the payment process is. Where the product is now? How it is going to be shipped? Who pays for the shipping and insurance? What happens if it does not turn up when it is supposed to? Our disputes process and our ability to specify penalty costs for non-delivery came out of some real situations. For instance, when one of the big construction companies bought some construction timber and the guys delivered it early. You and I might think that delivering it early is good, but on the construction site delivering it early is not good, as they haven't got the room . . . so again out of actual things happening we looked at how can we improve the system? (Management Staff)

In the first iteration of Ecomex's trading platform, manual payments were made from buyers to sellers for the sale of timber in essentially the manner as with off-line trade. Then Ecomex began to receive complaints from sellers. Often buyers were contacting the sellers "and saying, I want to defer delivery for something like two weeks. That meant payment was deferred and the seller didn't get paid for another two weeks" (Management Staff). Feedback from the sellers indicated that they felt penalised for this late delivery, however, "there was no penalty on the buyers for deferring delivery, thereby deferring payment" (Management Staff). In response to this dilemma, Ecomex worked a daily storage rate into the next system. This enabled the seller to put a \$10.00 per cubic metre per day, penalty charge on their timber for any deferral in uplifting the product.

Further feedback from participants revealed that they wanted a trust account established that could hold the proceeds of the sale while the timber changed ownership. Initially, it was suggested that a solicitor's trust account be established; however

when I surveyed the seat holders, what came back were, as long as it wasn't a solicitor's trust account, they'd be happy. So the trust account was actually operated by two of the directors. (CEO)

The trust account provides a neutral holding place for funds deposited by the buyer at the point-of-sale. The buyer then has three days to inspect the timber and uplift it. Only after this time, and once the buyer has given final approval, are the funds forwarded to the supplier.

Rules and Regulations

The electronic trading platform and Ecomex's role as intermediary are embedded within a complex set of rules and regulations developed by the intermediary to enhance the decision making and level of *certainty* among its participants. These mechanisms serve to anchor the network by providing a set of parameters, and a sense of mutual transparency around the governance processes. As one intermediary staff member reports

An exchange without any rules is like a football match with no referee. You can imagine the chaos it will create, whereas with Ecomex everyone has to play by rules. If you don't play by rules then you cannot transcend [sic] business. The minute you sign on to Ecomex you have to abide by the rules; therefore, the whole trade becomes very organised.
(Management Staff)

Such a process within this trading arena is unlikely to be successfully completed by the traders alone, even with the assistance of the Internet.

During the initial stages of recruiting buyers and suppliers it was discovered

that there were no written rules in the industry, just a set of unwritten rules that everyone was supposed to have known. Those rules created a barrier for new people coming into the industry. Those new people were just supposed to know these unwritten rules. One of them was that you had to be in the industry for 4 years before you had any credibility. And part of that was that you have to learn the great set of unspoken rules. When I started to document them I found that everyone had a slightly different version in their heads. And that explained a lot of the disputes. (Management Staff)

Ecomex then set about establishing some generic timber industry specification rules, in consultation with the Forestry Research Institute. In doing so, it extended the certainty established within the specific rules and regulations developed for Ecomex into a nationally recognised set. The Ecomex rules include: instruction

around participant application; participant membership responsibility; how fees are charged; how transactions are conducted and settled, and how the delivery of timber is made. A staff member suggests that rules have been developed for “everything from arbitration and disputes, dispute avoidance, guarantees of quality and quantity for the buyer, guarantees of payment for the seller”. The rules also include parameters for staff accountability and responsibility “in ensuring that a transparent and neutral system is maintained” (Management Staff). The rules of Ecomex are underpinned by a set of guiding principles (see Table 5).

Table 5: Ecomex Rules

<i>Principles of the Rules</i>
<ul style="list-style-type: none"> • Rules to be developed to meet all participant (seat holder needs) • Unbiased • Robust and enforceable • Capable of being construed to assist in dispute resolution • Developed in ways that do not create barriers to entry • Fair to all parties, encouraging competition, minimizing transaction costs and facilitating the price discovery process. • Transparent in their evolution

(Adapted from: Global Ecomex Limited, 2000, p. 3)

Intermediary staff are also aware that all timber traders including themselves, must operate within a set of generic trade laws, including international rules, and regulations. Since single traders are unlikely to readily gain access to these sorts of information, Ecomex staff are aware that their sharing of this information provides further value to traders. These laws include, for example, “when you place an order and you sign off then you cannot walk away. So you are legally bound” (Management Staff). In addition, staff recognise that they need to be familiar with individual country laws when engaging in international trade. They suggest

There is no global market. It does not exist. Maybe for some particular product it may exist, but for most products there is no such thing. You have collections of local markets. You can force those collections into one body or entity but that is an unnatural thing. The New Zealand timber market is inherently different from the Australian timber market. They may be similar, but they are not the same. There are different laws, different expectations, different cultures, different payment and delivery methods. Some of these things are subtle until you get into them, but nevertheless they are important. (Management Staff)

All Ecomex rules and regulations are regularly updated. This updating can be in response to external changes in market conditions and industry laws, or as often happens, as a result of buyer and supplier feedback.

A further issue worthy of investigation is that of the nature of the proprietary rules present within Ecomex. Intermediary staff have chosen to protect their intellectual property through copyright. Under copyright, all that is required for legal protection is that the system, including the date that it is commercialised, is recorded. The decision to use copyright was based first on the elevated cost of other forms of protection such as patents, and second, on the transparency and ease of imitation if full systems disclosures are made in the electronic arena.

We looked at patents and there were a number of patents that we could put in place, but once you put a patent in place, everyone's aware of how you've gone about it, and it means that you then have to protect your patent, you have to prosecute, which incurs legal fees. And also the cost of patenting is not cheap, itself. So, we made the call . . . to protect our intellectual property by not letting anyone actually see how the back-end was stuck together. (Management Staff)

The issuing of copyrights over property is believed to provide adequate legal protection, in an arena where speed of development, and maintaining costs are paramount.

Relationship Processes

The building of the rules, regulations, and structure of Ecomex has been an iterative process that recognises the value of strong trusted relationships embedded within this structure. The location and nature of the value within these

relationships and the role, especially of the intermediary in fostering these links, is now discussed.

Since the inception of Excomex, intermediary staff have always believed that the building of *strong trusting relationships* between themselves and trader participants is paramount. In 1995, when Ecomex first began trade only 5% of timber industry participants owned a computer, let alone were aware of its potential for electronic trade. Trade was conducted primarily on a face-to-face basis, with some assistance from faxes and telephones. The exchange of timber typically occurred between established links, often with some inefficiency, especially when buyers could not be found for particular quantities and/or grades of wood. A trader said

Back then in 1995, or whenever, the new technology was space cadet stuff really, especially for the building industry. The building industry is made up of fairly down to earth type people.

A staff member recalls

So I'd say when we started, nobody had access to the Internet, not a single seat holder, other than the large corporations. Most of the seat holders bought their first computer to load the system on. So they had no computing experience.

Due to the *foreign* nature of electronic trade, staff at Ecomex were cognisant of the potential value in continuing to create ways to emphasise face-to-face contact where possible with a focus on building trust. Conventional face-to-face contact and newspaper advertising have become the norm in recruiting prospective participants. Participants may also be introduced to Ecomex via word-of-mouth contact from other industry members. This contact is then followed by face-to-face contact by a Ecomex staff member. One builder participant commented

Initially I didn't know anything about it. In the early stages a friend of mine who knew Matt [the founder] kept encouraging me to go along and have a look at this electronic trading mechanism that they had, back in 1995. Anyway, I went along, Matt came and saw us at home. He told me a little bit about it, and I got quite interested. I actually ended up buying some shares in the company, as well as trading on it, to buy timber.

Another trader participant recalled

I got to know about Ecomex through mutual connections in the portable saw millers association. I definitely preferred a face-to-face introduction. I wouldn't know where to start looking on the Web.

The value of face-to-face contact continues to be recognised, and practiced by Ecomex staff when timber traders join the network. Participants who decide to become seat holders receive an initial visit from Ecomex to install the electronic system onto their computer. This visit provides an opportunity to extend the face-to-face meeting into the start of what normally becomes a series of strong consultative feed forward and feedback sessions that simultaneously serve to build trusting relationships and valued systems. During the visit participants get to learn about the services offered by Ecomex. Staff will then explain the terms and rules of the network, and providing the seat holder expresses a willingness to abide by these rules, full participation rights are then granted. In addition, this process provides a way to monitor the potential level of honesty and motivation of the prospective trader. At this time Ecomex staff can also learn about the individual needs of each participant.

After joining, the consultative face-to-face approach is continued via regular training sessions and user conferences. These activities not only give participants the opportunity to get to know each other on a social basis, but they serve to foster value-adding links with other traders. A staff member at Ecomex recalls, "there were certainly lots of business relationships made here in this building, where we brought different people together."

The bringing together of participants provides opportunities to learn about new timber markets. Some traders learned of new markets for timber types, such as macarapa, while others have learned about potential markets for different timber grades. In addition, participants may learn about new methods for processing timber. One saw miller participant reports

I learned different methods of milling basically. People do things in different ways. One guy identified the potential for big long beams. I had been milling smaller pieces.

Moreover, trade via the electronic platform can provide access to new value adding links. One builder tells the story of a client who wanted a particular wood type and house design. By advertising for this wood type on the network, the builder learned, not only of the location of the wood, but was also invited to bring the client to view homes finished in this wood and design type. The client reports, "So we actually got to see an end product and what our house would look like. This was absolutely great!"

The consultative face-to-face approach is further reinforced through regular meetings, often in informal settings such as at a hotel after work, or on-site visits. It is through such regular and close contact between Ecomex and its participants that Ecomex is able to receive on-going feedback on its processes and systems.

We had a couple of logging contractors come in and their fingers were too big to operate a key board and they said the system would only be of use if they could operate the whole system with a mouse so we worked up a system for them. These are things that people in the technology world would not appreciate. (Trader Participant)

During one of these meetings a participant came up with the idea that Ecomex could provide participants with an index that listed the participant and the particular type of business he/she was in. Ecomex installed this system. Other user participants could then sign into this electronic index and diary their experiences

and say, excellent product or, write whatever stories they wanted to, which was relatively anonymous and non-incriminating. If there weren't any comments then one could assume no one got any real good business. But if it was good and positive then those positive comments were there. (Management Staff)

So, there continue to be reciprocal learning opportunities both between Ecomex staff and participants and also between individual participants. In fact the majority of incremental improvements and developments in terms of rules and regulations within the Ecomex system such as the establishment of the trust account payments system came about either from participants volunteering suggestions or through disputes between clients.

Furthermore, the value in building strong consultative face-to-face relationships is also apparent within Ecomex when first securing overseas market links. While the intermediary was aware of the geographical *reach* that the Internet enables, it was also aware that the reach to these potential links requires the development of trusted relationships first. In order to build these Ecomex sought the expertise of a strategic trading partner, an Indian timber trader who could assist in breaking into the Indian market. This partner has identified a niche market of buyers in India, from prior established face-to-face relationships. The partner is also familiar with, and can communicate information to staff at Ecomex at both national and international trade laws.

A number of countries, including India have now passed electronic trade rules. Conforming to international laws give [sic] banks confidence in documentation. (Partner)

In addition, the Indian trade partner has knowledge of the New Zealand and Indian political systems, and the potential trading advantages that can be derived from the similarities between these two systems. He is also aware that as New Zealand's timber supply capabilities are increasing, India's are decreasing. India currently has "a complete ban on all logging" (Partner). In addition, knowledge is required of organisations such as either the International Tropical Timber Organisation or the Organisation Forest Stewardship Council that certifies chain of ownership back to a sustainable harvest. An understanding of transport issues is also useful. The strategic partner suggests

A key problem with the sale of logs to the Middle East, particularly India is that you have to operate with a minimum of 35,000 cubic metres, which is a ship load. Less than a ship load does not work. You cannot do partial shipments. So very early on it is important to track down and get a group of buyers together who can order a full ship load.

Also part of the relationship building process is that of establishing *trust* within the computer systems used. At the outset, Ecomex staff were conscious that they were part of a potential culture change within the timber industry. It was, therefore, important to begin to instil trust in the use of the computer. Since most participants had bought their first computer to trade on this electronic network one of the first tasks was to demonstrate that the computer is a user friendly tool. A

seat holder recalls, “Well, the first challenge for me was learning how to bloody use a computer. Then I had to learn to use a printer”. The founder of Ecomex used himself as a test case, reporting

The time to actually show me how to use it was real quick, probably within an hour of just playing around the computer. And at that stage I was computer illiterate too.

Another trader participant sums up the overall feeling about using the computer.

I must admit that I was really surprised that they [fellow timber traders] took on the idea of the technology, and wanted to use it. I think they just wanted to do business, and if there’s a tool that they can do business with better, they’ll go for it, no matter what, and they’ll learn to use it and it doesn’t take long.

Trust was further instilled through the minimal capital outlay required by traders to install the computer system. A trader participant reports

Yes, I had to buy a computer, as I didn’t have one. That’s pretty basic. For \$1500.00, it got me going and that was it, and I still use the same computer today, for lots of other things as well.

However, staff at Ecomex are aware that it is not just about trusting the computer, “its about trusting the entire transaction process” (Management Staff). Ecomex stress this point, because many electronic networks around them have closed down. Prior to entering into online trade, buyers and suppliers need to trust the description criteria set out on the system.

Our emphasis on structuring the description is part of the trust mechanism, because it makes it easier for people to believe that they’re going to get what they expect. (Management Staff)

Trust is also required in transaction settlement processes.

For example, if a construction company purchases a product for framing timber at a certain specification, then they expect it to be delivered at a certain place, at a certain time. It is often of little use if the order turns up too early or too late, or gets sent to the wrong place. (Management Staff)

Moreover, trust is ultimately required in the financial settlement of each transaction. Most traders interviewed believe that Ecomex’s identification of a gap in terms of the need to establish a neutral trust bank account system was a sound one. It is now reported as one of the single key benefits of conducting trade through Ecomex. One trader comments

There are rat bags on both sides of the fence [in the timber industry]. You can 'cut bad' and you can 'sell bad'. Often we don't know the traders and if we do, can we always trust them? And if we used the Internet without Ecomex this wouldn't change anything, it would probably make it worse.

There is general agreement that the systems put in place by Ecomex "go a long way to addressing these [offline trust] issues" (Management Staff). As one trader said, the trust account system permits "you [as buyer] to immediately ring up the seller if it's not up to grade and say cancel the order". Moreover, a staff member suggests that the trust account has "created trust by default, rather than experience. A lot more doors have been opened in business relationships for traders".

A builder participant said that he began purchasing timber from new sources as a result of the trust he had in the network.

Normally I would buy off the bigger timber firms. But this [Ecomex] gave me the ability to talk to people all over New Zealand and purchase product from them. I was more than happy with the way the system worked and the fact that I had a bit of security in that my money was held separately and I didn't have to worry . . . the money never got paid over until I actually saw the product. The greatest fear that I had was that I was going to buy something that was rubbish. The reality is, I bought timber that was better than I could normally buy anyway, and I bought it cheaper too.

In some instances the electronic trading platform has served to instil mutual trust between traders. A staff member at Ecomex recalls

We had a situation where two participants did a contract outside of our system, and a third party who had also been bidding within the system found out about it. The word went around other seat holders, and those two people got 'sent to Coventry' for a little while. The seat holders were upholding our rules for us.

Then, in another situation the electronic trading platform served to re-instil confidence in a trader relationship that had waned in their offline trade. A staff member recalls

One seat holder (A) had an outstanding account with another seat holder (B). Then over a training session the seat holder (A) said, oh I see seat holder (B) is looking for . . . product. You know he

used to buy all of that stuff from us, but because we've had this outstanding account and it hasn't been paid, we don't even go there now. But I've gone there with a bid because I know he'll have to pay the money into your trust account, so I'll get paid. So it was such a positive plus, that a business relationship could actually re-function at a different level using the exchange as a tool to give security for.

Mutual trust between staff at Ecomex and participants is also fostered through the structure of the processes and systems. As one staff member reports

we have really tight controls in here. No one can go in and have a look at what's on the system. There's just no way you can do that. And even administrators are limited to what can be seen. These protections are in place to keep the integrity of our relationship with our seat holders. In the whole loading of bids and offers, there are owner only areas of information, and [that's] the whole integrity of the exchange is built on that really.

One trader reports

It's all very well to put the timber descriptions on screen, but in reality you need human contact. It's a bit naïve to purchase without a real inspection first. So we are placing huge amounts of trust in Ecomex.

Rather ironically, while some participant traders favoured the transparent and open systems installed by Ecomex, they do not suit others. One trader reported that due to the transparency of the system some less scrupulous timber traders "couldn't work in a decent margin for themselves". Such traders would bypass Ecomex and potentially take with them significant amounts of trade.

The administrator staff at Ecomex both value and honour the trusted position they have developed with traders and fiercely protect this. Though they readily acknowledge the centralised position they hold in terms of brokering information, the systems they have in place as already mentioned provided a mutual trust. The staff are aware that they occupy a new area, unlike those in some industries such as the stock exchange that have an established presence in the electronic arena. Therefore, these staff suggest they do not hold the power typically associated with those occupying a centrally embedded network position. Within Ecomex, at present, it appears that ultimately buyers hold most of the perceived power over operations. One staff member reports

Buyers by and large will pull in sellers. If you have a heavy weighting on seller numbers then it's not going to work. Something that is heavily weighted on the buyers isn't going to work either, but at least initially, it is easier to pull in sellers to a buyer dominated market, than vice versa.

Some trader views are reflected in the comment, "there's still huge potential in the domestic market. And sure, there is potential in the international market as well".

(Trader Participant)

9.5 The Value of Exchange

Ultimately the key measures of success in Ecomex are the benefits and resultant value placed upon this form of exchange by its participants, and, also whether this network form can simultaneously leverage both current and future opportunities. It appears that participant traders have experienced increased efficiencies from two key interrelated features offered by Ecomex. The first is the access or links provided to new markets external to their existing supply chain, thereby reducing search and collation costs.

Following a close second are the increased efficiencies enjoyed by traders from the processes and systems put in place by Ecomex within their existing supply chain. These efficiencies especially surrounds the installation of the flexible multi-price mechanism made possible by the Internet and guided by the intermediary especially in making trader information non-transparent where necessary. Further efficiencies surround the identification of the new information gap in providing a trust account and settlement procedures by the intermediary.

Creating the Vision

Intermediary staff attribute their success to two key areas. First is the creation of a clear vision whereby the founder of Ecomex began with "identifying a real business problem or need" (Management Staff) for market collation and improved trade efficiencies, in a targeted area within the timber industry, with portable saw millers. This situation was unlike many other fledgling Internet businesses of the time that "began with a bunch of technology people sitting around thinking that

this Internet stuff is neat, can we put something together that we could make some money from (Management Staff).

After he had identified this need within a sector of the timber industry, the founder of Ecomex began to develop a vision.

I wanted them [timber traders] to achieve the best price possible for their product, trying to achieve efficiencies within their business, and get them create as much business as possible. And I guess it's more of a concept than anything, is that level playing field I wanted for all traders. There is no such thing in reality. I was probably a bit naïve to ever think that a true level playing field could be put in place in New Zealand in the timber industry. It certainly never will. This system will probably go the closest towards that, as is possible.

The vision was developed in part from the founder's own knowledge of the state and stage of the timber industry and also from creating *strong links* with saw millers and reputed timber association members. A staff member said "we needed industry members onboard, because without them it wasn't going to work; we weren't going to get *buy-in*." The vision also required access to capital and technological expertise. However, this first required access to funds.

We traipsed around merchant banks and venture capitalists trying to raise money. Most people could not see the value in what we were offering. But at that stage back in 1996 there was not a lot of business going on via the Internet. (CEO)

In building the modular structure that has become Ecomex, the founder of Ecomex had his "eye on the future as well as the present" when planning the building of the trading platform. He not only wanted to build a trading platform that could meet the immediate needs of timber traders, he also wanted to build a base that could be leveraged as a global commodities trading platform in the future, links were made with a wide range of industries. "In the initial formation of the company we consulted with quite a diverse bunch of people from a variety of industries." (Management Staff)

The second area intermediary staff attribute their success is their governance structure, especially its iterative and on-going nature. Staff are conscious of their attempts to closely align the technological capabilities of the Internet with the

capabilities of the traders through the creation of strong relational links. It should be reiterated here also that both off and online rules and regulations are deemed important in facilitating the overall process. A staff member recalls

Our systems are user friendly. We tried to retain a very practical approach in developing our systems, while not being all things to all people. We wanted something that could have a general application here as well. The aim of moving from a very specific to a general system contrasted quite markedly with some big e-commerce companies at the time who were designing general-purpose systems that could later be customised. We met the needs of the saw millers. Then by doing the next, and the next, we learned very quickly what makes a good general system.

One trader reports on the Ecomex system

It's a very clever system. You define exactly what you want, right down to the very last detail. Because of this detail I think we often got timber destined for overseas markets, but the people we were buying off were the smaller millers, like myself who were looking for markets.

Another intermediary staff reports

We have developed all our systems in a step by step fashion, around what people want at the time. There are no restrictions on the functions that the computer could provide. The restrictions are often more financial ones, as development costs mount up quickly. And of course what people want.

Intermediary staff continuously aim to build strong, trusted, relational links with traders both offline and online. They are aware of the reciprocal benefits of sharing information with traders on the depth and functionality offered by their processes and systems and also in receiving feedback on its value to participants.

As a staff member suggests

Trading is essentially a relationship thing. People will trade with you when they know you, trust you and can understand and can negotiate. So negotiation is not purely based on price alone.

The founder of Ecomex suggests

You could put it [the trading platform] down to simple genius, but in actual fact, it was trial and error in factoring in everything, from disputes through to guarantees of payment. At the same time we wanted to maintain as much as possible of existing business methods without introducing anything that was perceived as a different way of doing business.

However, building a successful trading platform has not come without its ongoing challenges. Recognising the large *asset specific* investment required by the intermediary and the relatively small investment sought by traders presents an ongoing challenge for the intermediary in securing adequate funding to attract more buyers and suppliers. While there is universal agreement that participant trade in the timber network would benefit from increased numbers of buyers and suppliers, attracting these participants requires financial resources. Over the past 5 years a number of Ecomex staff have actively marketed the network, travelling the length and breadth of New Zealand. However, the on-going costs associated with this task continue to pressure an already tight revenue margin. At the outset, seat holders were required to pay \$5000 per seat, but in an attempt to attract more participants this charge has been dropped. This situation has resulted in mounting pressure on attracting a sufficient volume of trade, with transaction fees of a mere 1.5% per buyer and seller. It becomes even more difficult to secure sufficient funding to attract potential overseas buyers and suppliers. As a staff member reports

To attract interest we need to set up promotions in these different countries. The government will give \$3000 to \$4000 per year. We spend between \$30,000 and \$40,000 running these seminars. We are the first company to identify a new market niche in India. So we are performing an important role by expanding the market.

Funding is also required to continuously update the technology, systems, and rules.

One staff member sums up the situation

exchanges [electronic networks] don't make money overnight . . . it's like building a business. It's building trust, it's building relationships, and you have to have the capital investment to begin with, to carry you through, especially for [the] developing the technology.

Another issue confronting the intermediary, both directly in the timber sector is that of moving both potential and current participants through a major culture change in terms of accepting the Internet as a medium for electronic trade. This is especially a challenge

when people look out at the rest of the world markets and see that generally they aren't working. So regardless of whether we've got a slightly different model that we think is better than the rest, we are tucked in with all that's happening in the rest of the world.
(CEO)

Closely related to this need to change the mind set for many participants is the competition often from numerous prior established offline trading links. Most traders have well developed relationships with some of these links. And then some of the larger timber organisations stock a wider range of product. A staff member suggests that one of the key ways to work through this situation is to “find the right business partners in the commodities and make sure that they're industry participants in those commodities at the time”.

Creating On-going Value

Despite the challenges outlined above, the founder of Ecomex's vision to create a generic electronic commodity trading base started to come to fruition in 2000.

We began to get approaches to build or look at systems for other industries, not just from New Zealand, but from around the world. They realised that what we'd put together, not so much the software, but the rules and the mechanisms of trade were pretty unique. We were prepared to go in any direction that could use our skills. (Management Staff)

The Malaysian Government approached the intermediary within Ecomex to build a trading platform to trade palm oil. The Malaysian Government recognized the potential benefit Ecomex's electronic systems, rules, regulations and associated processes could provide. Conversely Ecomex recognized the significant trading volume potential with Malaysia being the world's largest edible oils producer. The joint venture, referred to as Ecomex Palm Oil Malaysia (EPOM) was formed. This arrangement provides Ecomex with 25% ownership and entry into the domestic palm oil market. Ownership of the remainder is divided between the semi-privatised information technology subsidiary of the Malaysian Government (HITEC) and several major industry participants such as the Federal Land Development Authority. Ecomex has also formed a joint venture with the international palm oil market, referred to as Ecomex Palm Oil Hub (EPOH), with 45% ownership. Other owners include once again, the Malaysian Government and

local Malaysian business. There are nine large palm oil companies that account for over 90% of production. Plans are underway to sell further trading licences to the three largest edible oil buyers in the world – India, China, and Pakistan.

As within the timber industry, Ecomex as intermediary in a new industry – palm oil - recognised the value of creating and fostering strong relationships. Discussions with the Malaysia Government had initially begun with face-to-face contact via a local Malaysian partner and business colleague of Ecomex's that "had government connections" (CEO). The joint venture then provided immediate access to local knowledge on custom, trade laws, and general values.

There was awareness that at the outset, within the palm oil industry in Malaysia senior management from each of the large palm oil producing companies were very positive about the potential value to be sought from electronic trade. However, the same degree of optimism did not prevail among all of the traders within each of these companies.

The managers in the large companies really liked the idea of having an electronic exchange where transparent selling could take place, but some of the traders were saying – 'we don't want this'. There's a lot of 'relationship buying and selling' that goes on there.
(Management Staff)

Traders within the palm oil industry, especially the senior ones, had typically built strong relational links with their buyers over the years. The relationships were

relatively cozy . . . with I guess friends or whatever, where they tended to buy and sell to those same people. A lot of the people at the 'coalface' felt threatened that they would be pushed out of their comfort zone. And their trade would be made transparent.
(CEO)

It was, therefore, important that these traders had conveyed to them that they could still retain their margins and a degree of privacy in a system that encouraged new levels of information transparency.

When intermediary staff were asked the question "Where to from here" the answers they gave were in much the same tone as they had given earlier. Essentially they were mindful of the present, while ensuring their systems and

processes were to leverage future opportunities. They were aware that the generic features of the system that they had built to date could be modularised and applied “by industry, by commodity, by country, and by culture” (Management Staff). It is also interesting to note that intermediary staff were not only focusing on looking to the future, then looking back approach for themselves, but they were also asking prospective traders outside the timber industry to do the same. Intermediary staff were asking these traders to identify the important component parts in their product categories and how they might be important to their buyers. They were then asking these same traders to look back from the end user’s final resources and capabilities to investigate if new and unique product categorisation combinations could be devised. An example was given of a potato chip manufacturer who could potentially establish an electronic network that had a number of different edible oils, spices, and potatoes suppliers within it. Knowing the end use capabilities of a particular combination of oil and potatoes could well require for example, a different spice combination to get the special taste for their brand of chips.

If we can get the buyer to codify some of those special mixes or combinations, without clearly disclosing their trade secrets then we can factor that into the design of our system. We can then provide a customised system for the buyer to describe the products they want without others knowing for example, the taste they are aiming for. (Management Staff)

It appears that the intermediary within Ecomex also adopts a *modular* approach in seeking new market opportunities almost in a *symbiotic* manner. It is intended that the contacts and relationships being developed in India within the timber network can extend to find new links for buyers at different levels in the International Palm Oil Hub. As the founder of Ecomex suggests

And that comes down to a fundamental difference between us and anyone else in that we operate on the principle of the pockets of interconnected markets, as opposed to one world market. And that will mean that each country’s marketplace will be different, but with the requirement to interrelate.

New links are also being forged with other large commodity industry members in India, for example jute, and companies interested in the intellectual property component of the platform.

Our intention has been to have the development centre in Malaysia and one in India. And to that end we've now had a proposal from an Indian joint venture partner who will give us an up front fee. (CEO)

A further interesting point is that the learning's in terms of systems, processes, rules, and regulations within either the timber or palm oil platform are leveraged to benefit the other, so again there is the potential for symbiotic benefits between them.

9.6 Conclusion

The data analysed in this chapter provide three important links to the skeletal framework developed in chapter 6, in a similar manner to that found in the previous case study in chapter 8. First, just as in the electricity industry, timber traders were found to be experiencing high levels of information asymmetries (Williamson, 1985), with structural holes (Burt, 1982) emerging between these traders, where there was a mix of strong and weak prior established relationships. Timber traders were found to have moderate information requirements in terms of product description and timeliness (Sampler, 1998), when compared to the more significant information requirements in the electricity industry due in the main to the highly perishable and intangible nature of electricity.

Second, links were also established to Simon's (1982) concept of decomposable systems as a way to begin to understand the relationship between the joint brokering roles of the Internet and the business intermediary. Connections can also be made between the value adding role of the electronic business intermediary and Spulber's (2003) work in the intermediary literature. Links can also be made between the potential and limitations of human behaviour in leveraging the Internet with the bounded rationality concept, as first identified by Simon (1981).

Third, the business intermediary in Ecomex was found to enter into an iterative series of modularised technology, and relationship processes and structures were identified in a similar manner to those found in the electricity network in chapter 8, thereby providing links to the modularity concept (Sanchez, 1998). The

business intermediary was found to leverage this combination of processes both in the current network and also for further opportunities, such as when entering the palm oil industry.

Finally, when the connections made between these findings and the theoretical framework in chapter 6 are combined with similar links identified in chapter 8 for the electricity network, a base begins to emerge to identify the value opportunities in B2B (IE) networks.

10. Case Study: BNZ/EDIS Electronic Network Provider

10.1 Introduction

Electronic Data Interchange Service (EDIS) is a B2B intermediated electronic network that provides an infrastructure for the exchange of data on stable price products and services between businesses. This chapter examines how value is created within EDIS both from the perspective of buyer and supplier participants and from the perspective of the business intermediary. The concept of value combines the duality of the Internet and business intermediary in creating the structure, processes, and content of information flow embedded within this network form that ultimately leads to increased efficiencies and reduced transaction costs. First, the chapter describes the data collection method used. Second, the evolutionary path of EDIS is examined as it moves from a business offering electronic data interchange (EDI) to a semi-computerised service (Adagio), and then to the fully computerised service it currently offers. Within this section the rationale and joint brokering roles of the Internet and intermediary staff are examined in the development of its various processes, rules, regulations, and structures. Last, the current and future value opportunities for buyer and supplier participants and the intermediary are investigated.

10.2 Data Collection & Analysis

Data were gathered from interviews with 3 business intermediary staff, 1 strategic business partner, and 10 buyer/supplier participants. The business intermediary staff included the 2 founders and the managing director of EDIS. The strategic business partner was a member of a large business consultancy in New Zealand. This management group was selected because of their combined depth and breadth of knowledge in the formation, current governance structure and future direction of EDIS. The buyer and supplier participants were randomly selected from a list provided by the management staff at EDIS. As with the previous two case studies, rich in-depth data were collected via two semi-structured interview questionnaires with 25 items in each (See Appendices A and B). One questionnaire was administered to the intermediary staff. A slightly adapted

version of this questionnaire was delivered to the strategic business partner. The second questionnaire was given to the buyer/supplier participants. The responses from these two questionnaires, together with general company data sought from promotional material (BNZ/EDIS, 2002) and entry to the website www.bnzedis.co.nz form the basis of the discussion that follows.

The grounded theory data analysis technique (Glaser & Strauss, 1967) has been used to analyse the data collected in EDIS, in the same way as with the two case studies in chapters 8 and 9. Also, as with the previous two case studies, care has been taken to increase the likelihood of producing valid results by striving for consistency in the data sources, methods, and research styles used, in line with the triangulation technique advocated by Jick (1978) and Denzin (1979b). Methods employed to increase the likelihood of producing accurate results include accessing a range of business intermediary participants and general product traders. To ensure a comprehensive range of data were gathered interviews were also conducted with the business consultancy strategic partner. Just as with the previous case studies, consistency was also sought in the timing and location of the interviews. All interviews were conducted in the office of each respective participant over a 2 month period from October to November, 2002. On each occasion rapport was built with participants in a relaxed, professional manner. Permission was sought and obtained from each participant to audiotape the interview, in order to maximise the retention of data from this process. Assurance was given to participants that their individual identities would be protected, hence the use of the terms, Management Team, Client Participant and Strategic Partner.

The analysis that follows brings together the data collected from the interview and company material in an iterative manner to highlight both existing and emerging patterns. Just as with chapters 8 and 9, the open coding process (Strauss & Corbin, 1990) is used to identify emergent trends from the collated data, together with some generalised theoretical categories and concepts identified in chapter 6. Care has been taken to ensure that a comprehensive and accurate account of EDIS was portrayed by asking a member of the management team to review the contents of this chapter for accuracy. This process was especially important since,

just as with the previous case studies, I gathered the data as a single researcher. The data in this chapter is formatted in a way that facilitates meaningful comparisons between the case studies in chapters 8 and 9, while trying to retain the unique features to emerge from this particular network.

10.3 The Evolutionary Path

EDIS: EDI

EDIS commenced business as a small family-owned enterprise in 1986 in response to a specific need it had identified in the business sector. Many organisations, especially large ones, were experiencing information asymmetries resulting in the inefficient processing of data, typically with established customer links. This situation included frequent errors and considerable time spent in matching product and quantity descriptions between orders and invoices, and then in linking this data to final settlement. In this instance, the exchange was typically between products rather than services, where the products had a fixed price and description, with high and frequent volumes of exchange.

The intermediary role undertaken by EDIS began with its developing software solutions and consulting advice for electronic data interchange (EDI) processes between businesses. The target market was primarily large manufacturing organisations and government agencies that could generally withstand the substantial software and installation costs, but which did not have the expertise to install such systems alone. Such organisations typically required an EDI system to facilitate the transaction process between themselves and their many smaller suppliers and/or buyers. In each instance the EDI link provided by EDIS was between a larger and numerous small organisations where there were prior established strong relational trading links.

The first stage in building EDIS' technological architecture involved entering into discussion with the large organisation to understand its requirements and establish what information was required to be transferred. The next task was to ensure that this data could be translated from a humanly readable format into a uniform machine readable format. Hence, the beginning of the complementary brokering

role between man and machine in developing a standardised electronic communication transfer process. This type of process was not commonly undertaken, even by large organisations alone, due to the time, administrative and technological expertise in its establishment and maintenance. The challenge was to create electronic documents that were sufficiently specific to avoid ambiguity, while at the same time ensuring that the requirements of each business were met, and the text was not overly complicated.

The standardised process developed through the EDI system via EDIS provided traders with *certainty*. For example, a buyer could review the description of the data from the supplier and then enter this information as a purchase order via a screen, or one of the various software translation products available. EDIS' EDI software would then translate this information into an electronic file in a standardised format that suits a variety of computing environments. The electronic version of the purchase order is then transmitted via a Value Added Network (VAN) that processes and next routes the transaction to the electronic mailbox of the supplier or receiver. The supplier organisation then uses its translation software to re-map the message from the standardised format into a form that the receiver's internal system can understand. When the order has been successfully processed, automated confirmation is sent back to the sender.

EDIS charges the large organisations that they have the primary link with a once only installation fee, and then a monthly charge calculated on the volume of goods exchanged. As a result of using EDI, EDIS customers report increased efficiencies in terms of heightened levels of accuracy, speed, and savings, especially in administration costs due to the automated exchange, processing, and fulfilment of purchase and sales data. One client participant organisation reports that due to this service they now have improved levels of inventory control. Another client participant suggests

Using EDI cuts down on manual work, with the customised, standardised format, especially for multi-transactions. This can incorporate our own business rules and product specifications.

EDIS: Adagio

In the early 1990s the founders of EDIS became increasingly aware that while they were “providing links for the high volume, large customers and suppliers” (Management Team) their service was not meeting the needs of many smaller organisations. Such organisations were experiencing similar information asymmetries in terms of data exchange on the purchase and sale of products; however, the volume of this exchange was considerably less than that of those larger organisations that were using the EDI link, and they could not withstand the high, associated costs. So, out of this concern, together with an awareness of the increasing functionalities of the Internet, EDIS saw an opportunity to extend their system to a set of Windows based software tools that had become available. The software, which was based on the Disk Operating System (DOS) became known as the Adagio system. All that was required of participants was that they had a modem attached to a machine they could use for the automated transfer of data.

The Adagio system operates in a similar manner to the EDI system. Buyers submit their purchase orders in a standardised document, *creatively* designed by EDIS in consultation with the supplier organisation’s requirements. These requirements typically include requiring the buyer to enter data in a series of standardised lines such as product description, product specification, required delivery date and price. Buyers can access this information prior to placing an order from either the paper based or extranet version from the supplier organisation. Once the order is entered, buyers then enter their password number and dial up EDIS. Under a push system the data is sent to EDIS who offer an intermediating function over a wide area network (WAN). EDIS creates the electronic order and sends this on to the supplier. An acknowledgement of receipt of the order is then passed back to the buyer.

Accordingly, EDIS adopted a complementary brokering role with DOS in the development of the Adagio system to offer multi-modem filter functionality at a time when trader organisations were typically restricted in terms of their technological and human resources to using a single modem that normally resulted in overload.

We'd used EDIS, I believe initially to be a hub, so if we have 250 fabricators wanting to send an order at the same time, they're going to get an engaged signal, and get sick of it, and not going to do it, so they're always going to get the order then, and then get on with their work, so that was the whole purpose of it. (Client Participant)

Organisations purchasing the Adagio system typically incur initial costs of approximately \$200 software installation fees and the cost of a computer if one is not already owned. Once established, a monthly negotiable fee is charged to each organisation which initiates the service via EDIS. The initiating organisation can also incur computer installation costs of approximately \$200 for each of the typically smaller organisations they choose to link to and transact with. The initiating organisations suggested that they typically applied the 80/20 rule (whereby 80% of business is done with 20% of clients) in selecting those customers they wanted to link to electronically. One organisation in the aluminum industry reports

At the moment there are 364 fabricators [buyers]. We are connected by Adagio to 64 of these users. These guys make up 56% of our total orders, so primarily they are our big customers. And the reason is that we pay quite a price for having it [Adagio installed] done. To get the other 300 customers electronically connected is not worth it for the cost that I would incur in doing it. We use faxes for them. (Client Participant)

Just as with the EDI system established by EDIS, the Adagio system provided for the electronic linkage of businesses that had strong and trusted prior established trading relationships both in terms of the processes used and the individuals within the organisations. However, due to the reduced installation and management costs, initiating organisations now included mid-sized, as well as, larger organisations. In addition, a networking system was emerging. Some organisations joined the Adagio system because their customers were already linked to the system. An EDIS staff member reports

Our aluminium customers were already using EDIS. And often customers don't want to use more than one system. The aluminium people use a certain software programme that has a glass component and a metal component. They were already ordering metal, so they said we want to order glass. So we responded to that and joined up with EDIS.

One building joinery business said

Those same fabricators as well as ordering through us electronically will be ordering their glass using EDIS as well. And in the very near future some customers will be ordering all their aluminum via EDIS from their supplier of their aluminum. (Client Participant)

EDIS: Online

Formation

Toward the end of the 1990s EDIS intermediary staff became aware of the increased opportunities they could offer customers, in terms of improved ways to broker existing information gaps and new information gaps, by extending their services from EDI and Adagio to a comprehensive online service. At the beginning of this period EDIS was finding, as were many others in the electronic arena, that there was considerable technological fragmentation and subsequent incompatibility between businesses largely due to the wide variety of different computer systems that operated. In addition, customers were becoming aware of the potential speed and ease of bi-directional communication exchange made possible via the Internet. There was growing recognition, as one member of the EDIS management group reports, that

One of the biggest challenges in e-business is that everybody out there uses different systems, and none of them are built to talk to each other, unfortunately. I don't know why the software companies didn't get together 10 years ago. So we've got this problem where for example SAP, MYOB, Excel, and People Soft systems don't talk to each other. Nobody can really send files back and forth, with invoices and purchase orders etc, very effectively or efficiently in terms of time. We've got this problem here called incompatibility.

In recognising the incompatibility issue, several other, especially larger computer service providers, began to offer technology integration services whereby organisations could electronically link to either their buyers or suppliers who may all operate different computer systems. However, such services normally came with extremely high up-front costs that were typically only afforded by the larger organisations, a trend somewhat reminiscent of the EDI era. In addition, since the electronic link was effectively installed between the larger organisation's

electronic system and the technology service provider smaller organisations were required to purchase their own tools if they wanted to communicate electronically with other organisations.

It enables a link to be put in place between another technology integration service provider [a competitor] and the ERP system of the purchaser organisation. But there are no tools under this system for the supplier organisation to talk to other organisations. (Management Team)

Armed with the knowledge that organisations no longer valued partial technology integration services that often came with little accountability and high upfront costs, and the experience that EDIS had built up in terms of knowledge and technological competence that could be leveraged from the EDI and Adagio systems, EDIS set out to develop their own online integration service. Mindful of this trend, and the financial performance of some other service providers, staff at EDIS “were keen to migrate all the [Adagio] software onto the Web, for obvious reasons” (Management Team).

EDIS staff were aware of the advantages that traders could enjoy from using the networked functionalities of the Internet, and as well as this, they were aware of the limitations of most traders in terms of their skills, staff and organisational resources and general inclination to use the brokering functionalities of the Internet alone. Furthermore, staff at EDIS were aware of the limitations of the Adagio model. Due to the push nature of the Adagio system, once an order had been sent it was not easily changed without an entirely new order being created. So amendments and additions to orders could be easily linked to original orders. As well as this, there was no free text capability due to the format of the lines on the order form. Furthermore, an Adagio client participant reported that there was a certain amount of inflexibility in the system, in terms of a time lag, whereby organisations would often only enter the system every 2 hours or so to receive orders.

There began the extension of the *intermediary* role within EDIS. From a company that began as a small husband and wife computer programming partnership, it

grew to its current operations whereby eleven staff are employed, four of whom are company shareholders. This close-knit team has expertise in the key areas of technology, marketing, and finance. The two founders of the company bring with them over 16 years of experience in the local market installing and refining EDI systems with the assistance of customer feedback. As one management team member suggests

coming from a traditional EDI core is quite different from a lot of the ways that their competitors have come into the industry. They have had the opportunity to cut their teeth on a lot of issues, such as how to handle credits, advanced shipping notices etc., so they have grown from there with an extremely solid base.

The other two shareholders who started with the company approximately 2 years ago provide complementary skills, offering expertise in raising finance, and managing and marketing the business.

When the two business shareholders joined they became aware of EDIS' limited marketing exposure. They believed that if EDIS was to grow, (especially with any speed, something they argue that is very important in this industry, and in a relatively small market such as New Zealand), then it was wise to develop some strategic partnership links. The Bank of New Zealand (BNZ) was approached and asked if it would be interested in forming a partnership, with the view of building an end-to-end financial solution for EDIS clients.

We asked BNZ if they would like to share transaction fees and bank settlement fees on mission critical transactions, whether it's their client or not. So for example, with the Bank Settlement solution that we've developed, if you're an ASB customer trading with one of your trading partners, which is a Westpac customer, we can do all the bank settlements for you on an invoice by invoice basis. We've developed a Bank Settlements system that integrates right into the heart of your ERP system, and your trading partners ERP system. This is unique. I'm not aware of anyone else that's done it. It took us quite a long time, quite a lot of money. (Management Team)

With a complementary skills set from BNZ, and the banking background of some of the EDIS staff, they worked together identifying new information gaps that could be leveraged both internally and also externally in the banking industry,

with regard to the settlement process. They found that the banking computer systems were “simply not configured to take huge amounts of data on an invoice by invoice system” (Management Team). So they developed a system whereby EDIS separates the descriptive and payment data and “sends the bank information on what’s been paid, partly paid, an unpaid” (Management Team) that goes through the banking system.

A further complementary feature of the strategic link with BNZ is the leverage of its “long established name and well known name. And that sort of credibility you can’t buy for any money” (Management Team). Upon entering into a 10 year agreement, EDIS re-branded their product to BNZ EDIS in order to gain instant recognition and credibility with the general public. Also, as part of the agreement, BNZ’s existing sales team of 250 staff undertook the task of selling the co-branded product. Under the revenue share agreement between the parties there is the potential for mutual gain as BNZ receives a share of the revenue on each completed end-to-end transaction solution and EDIS incurs variable rather than fixed marketing costs with the sales team. Furthermore, there is opportunity for BNZ to leverage this functionality by charging competitor banks for the partial settlement solution they provide. “BNZ has got an opportunity for the first time in the history of banking to make off its competitors’ clients on business to business transactions” (Strategic Partner). In addition, EDIS believes this partnership places it in a stronger position to achieve a critical mass of transacting organisations in a shorter time, an important issue to consider when raising finance for further developments.

As well as linking with BNZ, EDIS also have a strategic partnership with PriceWaterhouseCoopers (PWC), a large global consulting organisation. Once again there is the potential for complementary gain between these parties. EDIS can leverage the respected and well known PWC brand and receive expert advice, and in return PWC receives access to a larger pool of prospective clients, who may want to modify their computer or general management systems when they consider entering into the EDIS system.

We’ve outsourced several integrations to PWC at the moment.
There is typically a cost of somewhere between \$10,000 -

\$20,000 to integrate into your ERP system, including process engineering and a whole series of things as part of that. And PWC of course, actively market us to their customer base as well.
(Management Team)

So, in effect there are opportunities for three way gains through the sharing of co-specialised resources.

Governance Structure/Processes

The intermediary facility within EDIS permits the electronic linkage of just over 140 individual businesses. These businesses consist primarily of those operating in the product sector market, with some niches being formed in, for example, the building and food industries. At this point the primary customer base is located primarily within New Zealand. On all occasions EDIS provides a complementary brokering role together with the Internet, in linking organisations together that already have strong established trading relationships (www.bnzedis.co.nz).

A key feature of the EDIS online model is that it permits electronic communication between organisations that operate over a *fragmented* range of computer programmes, under the EDIS Connect™ functionality (see Table 6) (EDIS, 2002). Both large and smaller organisations can use the EDIS integration tools to electronically communicate with other organisations, in much the same way as the Adagio system does. However, the process is now instantaneous. A strategic partner with EDIS suggests the system can overcome the issue that

the reality is that apart from the fact that companies use a number of different [computer] programmes, there's hundreds of variants within each of these programmes, take XML for example.

So, in effect EDIS is performing the role of electronic collator. Though it would be possible for this task to be undertaken by individual organisations with computer technology skills, due to the large variety of programmes available and the *asset specific investments* required, many organisations are happy to employ the services of EDIS as broker.

As well as offering the Connect™ functionality, EDIS recognised a series of information gaps between traders that it could potentially leverage, by developing

a series of services, as shown in Table 6. Mindful of the fragmented nature of many transaction processes EDIS services provide an end-to-end solution. These tools include: online catalogue displays for prospective buyers, ordering, dispatching, invoicing, accounting integration systems, and full electronic settlement regardless of the banks used by each of the transacting parties and credit management (see Table 6). Additional services include EDIS Networks™ that permit re-branding within an identified niche or trading community and EDIS Optimiser™ that enables EDIS' transaction fees to be split in accordance with what has been agreed between the transacting parties.

Identifying a new external information gap at the local government level, EDIS entered into a further strategic partnership to offer Local Government OnLine Procure (LGOL Procure). This end-to-end e-procurement system provides local councils with the opportunity to transact electronically with their numerous suppliers in return for saving and purchase efficiencies. A key benefit of this system from the council's perspective is that they can elect not to pay transaction fees, and instead require their supplier to pay. LGOL has been designed to complement collaborative purchasing solutions in local government. Regional purchasing groups can use LGOL to link up with preferred national or local suppliers. Using EDIS, local councils' can "talk and enter into transactions with suppliers who may include government supplies board, small local suppliers, and Go-procure [a government e-procure marketplace]" (Strategic Partner). Furthermore, as with the other services offered by EDIS, councils are not locked in. No commitment is required by people.

Mindful of the desire for a low *asset specific investment* by traders and the high up-front installation fees charged by many of its competitors, EDIS as intermediary developed a low pricing structure. EDIS does not charge for its software. In addition, ongoing software updates and maintenance are also fee. The primary revenue source for EDIS is from the transaction fees that are charged out at approximately \$1.40 for up to 50 lines per each completed order. As outlined above under the Optimiser™ functionality, this fee is charged to the transacting parties who determine the portion of the fee that they each pay. Having a zero up-front installation fee enables EDIS to practise its philosophy of

attempting to “level the playing field for the small players” (Management Team). In addition, since the only revenue source for EDIS is through the volume of completed transactions, the business has a vested interest in continuing to maintain and extend customer service functionalities. The cost of utilising full electronic settlement is 25c per party. This excludes any charges imposed by the counterparty banks. EDIS has placed a lower ceiling on the volume of transactions that are put through its system so that helpdesk and related costs are met. Each primary customer is required to either spend or pay a monthly minimum amount of \$150.00. A member of the management team said, “We want people to do a reasonable volume of transactions.”

Table 6: EDIS Electronic Integration Services

<i>Electronic Integration Services</i>	
EDIS Catalogue™	Provides full supplier maintenance capability; provides full customer view capability, can integrate multi-vendor catalogues, provides full audit trail of catalogue changes and catalogue hosting at no extra cost.
EDIS Payments™	Provides full domestic electronic settlement regardless of bank affiliation, provides secure transaction environment with strong encryption and firewalls.
EDIS Credit Manager™	Provides creditor tools enabling automatic reissue of unpaid invoices within an agreed configurable period of days; currently being linked to Dun and Bradstreet, the world's leading credit information provider.
EDIS Integrator™	Provides e-commerce workflow analysis and documentation, customer database adapters for popular erp and accounting systems, full integration into back end systems performed internally or by employing the services of PriceWaterhouseCoopers.
EDIS Trader™	Provides order placement, acknowledgement, tracking and despatch, status reports on all outstanding orders and despatched orders; end-to-end shipment details; electronic invoicing.
EDIS Optimiser™	Offers tools that allow the transaction fee to be split in any agreed proportion between suppliers and customers
EDIS Connect™	Provides translator for XML, EDIFACT, ANSI X.12 and

Electronic Integration Services

	proprietary message formats; secure communication management, comprehensive audit functions – for seamless integration seamless transfer of data between you and your trading partners regardless of your partner’s existing system.
EDIS Networks™	Enables private hub ecommerce within a select trading community; the system can be re-branded to provide firms with an e-business network for their own customer base.

10.4 Value of Exchange

As a result of using the joint brokering functionalities of the Internet and EDIS customers report improvements in their trading relationships due to the increased accuracy, reduced order processing costs, in terms of speed, error reduction, and increased control over supply chain costs. One client participant reports

Thirty three% of our orders go through EDIS. Obviously it saves us time, as its 1/3 of orders that we don’t have to process manually. But the big thing is in terms of accuracy and the cost savings we can all make.

Another client participant said

We like the system because it’s nice and efficient with quicker lead times, delivery times, and turnaround times. As a result we have more happy customers. To some extent, it’s a physical thing in the time spent processing orders, it takes staff time trying to get around and ensure we get all the product information correct and processed.

Yet another client reports their customers are happy with the discount they give for using EDIS, in return for greater efficiencies and savings by the larger organisation.

Intermediary staff at EDIS suggest that some of their key value features centre upon their ability to offer customers *modularised* product offerings with standardised interfaces between businesses. These are features that many organisations would not be able to access and develop if they were to leverage the brokering role of the Internet alone. The EDIS Connect™ functionality provides opportunity for mutual gain between small, mid and large sized businesses as

their original computer system, such as EDI or SAP can be retained, while still linking to their trading partners via EDIS. So in effect, regardless of the size or technological base of two businesses, EDIS “can provide a seamless link to communicate electronically” (Strategic Partner). Larger businesses, for example buyers, can benefit from the administrative efficiencies of electronically linking to their preferred suppliers who choose to enter into the EDIS system. Small businesses can also benefit from the administrative efficiencies offered by EDIS, since they do not have to leave their system to visit the website of the large buyer/supplier to place an order.

The modularity of the EDIS product permits organisations to leverage the service as a *partial solutions provider* where for example, all of those buyers or suppliers may not wish to connect to trade electronically. A large supplier of hair and beauty products interviewed has three main customer types: large retailers, small retailers including pharmacies, and hairdressers. This large supplier uses EDIS’ EDI system to link to the large retailers and manual methods such as sales representatives and facsimiles to connect to its other customers. Over time it aims to get the sales representative to order through a lap top via the EDIS system which will assist customers in placing electronic orders. In the meantime, a staff member at the supplier participant organisation stresses

Customer relationships are key. As I say, we have a very conservative approach . . . Hairdressers do not want to worry about getting onto a PC. They are very creative people. We need to introduce these systems with care.

Just as large businesses may utilise EDIS as a partial or modular systems provider so too can smaller businesses. Several small buyers, who were initially introduced to EDIS via a larger supplier, are also linked to two or three other, often industry specific, electronic trading systems. In all of these instances the costs of electronic trade are borne by the larger supplier organisations, and in fact many of the smaller buyers are offered a discount of between 2-5% if they choose to order through these systems. Smaller businesses can also benefit from the ability of the EDIS functionality to *connect* to and print a single invoice for that business from a number of orders placed with different suppliers all linked via EDIS. For example, a small building products organisation may get a request from a builder for glass

and aluminum. They can then place an order with a glass supplier and an aluminum supplier all connected via EDIS and receive one invoice. However, geographical distance from the supplier to the customer and the nature of the product take precedence over the convenience of using the EDIS functionality.

The EDIS system also provides the potential for creating value links between primary and secondary organisations. One example is where the primary organisation is a purchaser of building products and the secondary organisation is an architect who can use the system to provide support information about the product. An EDIS management team member reports

So we've got our customer [purchaser] here, they want to buy the technical product, such as a building product. And the customer needs to know that the dimensions are right for the building. They need the architect to check it out. The architect is able to log in to the EDIS system and view product information such as pictures and CAD drawings in order to know to make [sic] an intelligent decision. His username and password will allow him to have access to the catalogue information and specs and everything but it won't allow him to buy anything. So that's an extra value add that you couldn't get just emailing.

Another example of a value link between organizations is between a small grocery distributor that imports product and a foreign exchange advisory organisation.

When it's time for that supplier to pay invoices for what they're buying overseas, they send their transaction information to this foreign exchange company. The foreign exchange company does number crunching comes back and says you should buy on this date. EDIS has put a direct link from the purchasing data of the supplier to the foreign exchange organisation. Before the biggest problem for the foreign exchange organisation was they couldn't get sound, regular information from the supplier. (Management Team)

Just as EDIS can create modularised products across businesses, so too can it offer modularity within single businesses. The product permits modulated information flows with tiered levels of information access or transparency depending upon the needs of the users. Each time members from user organisations log into the system they are required to enter their username and password that have in-built rules. So, in a large purchasing organisation

It could be that you've got the delivery person that just wants to check when the order is coming, where he may not get access to prices or other things. You may get the financial controller, who has access to the prices, or you could get a distributor who sits in the middle and needs to get access as well, but doesn't get access to the Foodstuffs pricing, he'd get access to his pricing. And so you can lock down whatever you need to lock down.
(Management Team)

Also, supplier organisations have the ability to put together a Web-based catalogue with prices, so that when customers log in

with their username and password, a large customer is going to get a different price from a little customer when they log in. So you could have five or six different pricing categories based on customer size, based on the volume of transactions you do. This results in different people getting different information.
(Management Team)

Staff at EDIS believe several key features of their organisation, when combined, may explain how their service is somewhat unique. The first is their ability to "get to create ways to get to the heart of others people's system and expertise requirements" (Management Team). As mentioned earlier, the business began back in 1985 as a small family enterprise that had computer programming expertise, and has since had the luxury of evolving and expanding its systems over time. A management team member said

I think the advantage is simply that the principles of this company have been in this space since 1985. Lots of other competitors jumped in 2 or 3 years ago, spending tens of millions of dollars, made rash promises and then went broke. What this company has done is quietly build the business, one step at a time. This has been powerful. I think the co-branding with BNZ's and PWC's attests to the sound base they have developed.

A second key feature, somewhat integrally related to the first, is the ability of EDIS staff to relate well to their customers. "We believe that we have a very good rapport with customers" (Management Team). Staff at EDIS are aware that many of the numerous technological iterations they have made to their system were developed out of the needs and observations of their customers.

We visit our major clients quite regularly because of course we're always doing upgrades, adding additional functionality such as the bank settlement function. We're going to be adding foreign exchange. We keep in touch regularly, finding out what their requirements are and letting them know what we're doing . . . the

new initiatives, and the new things we develop. I think we do a reasonable job there. (Management Team)

One participant client said

I just feel comfortable because even though they have the technological expertise they break it down in layman's terms for me, as a client, which is what you need sometimes.

The down to earth practicality and reliability of EDIS' founders has proven to be a successful method of attracting new clients and understanding their ongoing requirements. One satisfied client participant reports

I got to know Barry [a founder] when he was doing a job for another company. He was so efficient in installing it. There's no nonsense, that's never there. They're honest. They don't project that they are out there to make the big money.

Another client participant said she was attracted to EDIS because

He [the co-founder] just offers a professional, very efficient way of doing things. And I had the confidence that if you gave them a spec once, they would have a few questions and then carry it through. They just offer a very good service.

Staff at EDIS are not only aware of the importance of the value of their relationship with their clients but also the stage and state of the relationship between clients, especially when they join. As one client participant said

Unless you've got the culture and a behaviour map in your business already, you're never ever going to successfully do ecommerce. And inherently then, are you offering any better to your customer? No, it's just a medium with which you're offering it. And so many companies are trying to see ecommerce as offering a better service, and that's where they will fail.

Another client participant reports

If the culture of your business is customer focused, then you must build a high level of trust with them, because your customer is your reason for being. This includes having trust in the process. Then adding e-commerce on top of that is just facilitating business in a different way i.e. increasing efficiency or reducing cost. The value that it can add additional to that is obviously technical information, regular updates, all of that live online and readily available is a huge bonus. It's about doing what we already do but better.

In maintaining and regularly updating its functionalities, EDIS closely relates to both its customers and strategic partners, creating in a series of informal feedback, feed forward sessions. An EDIS management group member reports

The work of the systems has been based on a lot of work that we did with PWC including a lot of their actual clients. And we've refined that and so forth [sic]. So that's not based on hypothetical figures or situations, they're real and tangible numbers.

Furthermore a management team member adds

With our model, because our transaction fees are so low, we believe it's a genuine partnership, because we make nothing if your company integrates into its ERP system, but doesn't do it, anything from there. We haven't made a penny. The only way we make money is by companies using it, and using it significantly. So we believe we've almost got a partnership model, where we've got a vested interest to really work with the users to bring on their key trading partners. We think that's quite unique.

A third key feature of EDIS suggested by a management group member, and somewhat of an outcome of the features discussed above, is that it believes it is "are very good at creating ways to drive prices down". There are a number of mutual gains to be enjoyed between clients. This member reports

It's not the technology. The technology is cool and it does some neat things, but other people could copy this. It's the financial model. EDIS has outsourced all their sales and marketing to BNZ, and they've outsourced all their integration with PWC, so they've got very low overheads and they give their software away, and charge a very low transaction fee. It's just a competitive advantage. Banking as well, that's another one, where nobody else is doing integrated banking. Probably those two things, the financial model and the integrated banking are their two primary value drivers.

Another management group member suggests that where it currently costs a business

around \$50 to manually process invoices and paper purchase orders, by adopting this type of technology, they will reduce that to around \$20.00. Of that saving about 80% is staff time and the other 20% is spent on stationery items. Staff can now be redeployed.

A client participant confirms this

We have definite cost savings by using EDIS. Internal cost savings in the form of the cost of data input. I know it's substantially higher using people. That's the first thing. Why tie up people's time doing data entry, when they could be working proactively with customers? There is also less errors, like errors that occur through data input are far too high, and the cost of that is horrendous. So it's all of those things.

Challenges

Staff at EDIS suggest that their main challenge is "simply in terms of our transaction model". Large initial *asset specific investments* are required in terms of development costs for each product designed, and with a model of zero up-front charges to customers, these costs are recovered over time through transaction fees. A management staff member said, "to some extent, it is capital intensive. But on the other hand, a lot of our costs are eliminated using the business model that we've got." The shared marketing costs and subsequent increase in exposure to potential clients both in terms of volume and speed via the key strategic partnerships serve to reduce these costs. Despite these issues a management staff member suggests

We've always recognised that in the New Zealand environment companies couldn't afford hundreds of thousands, if not millions of dollars for ecommerce solutions. The best way to do get solutions is to try and get fast adoption and to get a critical mass. In this way we can provide the software for free, or the license to use that, with no upfront costs.

A second key issue for EDIS, somewhat related to the first, is the willingness of both existing and new customers to pay the transaction fees incurred under the online version. At this point some of the larger customers are happy with the transaction fee, reflected in, "we're more than happy with the fee, for the service" (Participant Client), while several of the other larger organisations have concerns over paying the increased transaction fees with the online system when compared to the Adagio system. One of these participant clients said

In the last 12 months, we paid \$16,000 - \$17,000 for a set monthly fee to EDIS, which is the ongoing \$20.00 per month or something for Adagio for each organisation we are connected to. Now that they've transitioned over to the new version, charging \$1.20, for the same customer base, very similar if only slightly increased amount of orders, that bill is now running at about \$60,000.

Another client participant reports, "It [the charges] went up a lot, something like 1000%." In response to this, EDIS has openly expressed a commitment to reducing transaction fee costs. But this has not stopped some existing Adagio customers who have well established in-house technology departments putting their decision to switch to the EDIS online version on hold.

I've got to put my strategy together. Until I'm convinced of the strategy and the fact that that \$60,000 isn't going to become \$180,000 in 5 months time, I'm not going anywhere (Participant Client).

These same customers readily acknowledge the benefits of leveraging the joint brokering roles of the Internet and EDIS, with comments such as

I think realistically in a 12 month period, from the minute we switch on the Internet version, we can easily expect to see 85-90% of our orders received electronically and make savings in terms of accuracy, speed, and convenience (Participant Client)

However, these customers, who typically are larger organisations with access to in-house technological departments with highly skilled persons, are questioning the value of retaining the brokering role of EDIS. "Put simply, they [EDIS] control your destiny. They can increase the transaction price at any time, and effectively put a huge overhead in your business, just like that" (Participant Client). These concerns happen at a time when not all businesses require external organisations to provide a multi-modem functionality, as the Adagio system does, for simultaneous incoming orders received over their single modem. Instead these businesses can leverage the low asset specific investments required for the Internet, such as the queue functionality offered by Microsoft, in much the same way as emails are sent and received. One large client participant organisation said

We just had one modem here and all our clients rang us direct. That would have worked, but a third of our work was

going through it. You'd need a lot of modems, or the phone would be busy all the time, and it would drive the customer's crazy and they'd give up. That was the job of Adagio, to filter these calls. Now that the Internet exists and you can have a Web server or an email version of EDI, you have to ask yourself what function Adagio serves.

Another Adagio participant client who is considering building its own in-house system, and thereby, using the sole brokering role of the Internet reports

It means you still have to pay for the traffic, or for someone to house your web server, but strategically you have to control your destiny, so you have to have a share, or a decision, or part of that process so you can't get screwed over.

In addition, despite EDIS' Optimiser™ functionality that provides a tool to split transaction fees, these larger organisations are not willing to pass on additional costs to their buyers

You can't start making customers pay every time they place an order. It's taken years to build this customer base. We offer our customers 5% discount when they order electronically. It's [electronic ordering] something we've invested a lot of money in to get them to use it, to make our life easier. (Participant Client)

In contrast, many of the larger organisations that operate the EDI system via EDIS are content with the status quo, and welcome the opportunity to retain their systems, and also to be provided with extended functionalities to link to other buyers/suppliers through EDIS Connect™. In addition, organisations with smaller information technology departments and/or those organisations that are still developing a technological culture support the continuance of EDIS' services. As one of the larger participant client organisation reports

We still have a very low trust of the Internet on an organisation wide basis, at present policy prevents us from using the Internet. We do have an intranet system that links us with our parent company. So we really value the services of EDIS.

Furthermore, though EDIS' Trader™ functionality makes it possible to transact or trade across the entire supply chain the reality is that not all forward driven clients that use EDIS to link to their end customers are in a position to persuade their suppliers to leave their prior established systems to complete the entire supply

chain transfer via EDIS. Currently EDIS adds value primarily through forward links from suppliers to their customers, and backward or reverse links usually from large buyers back to their suppliers as is the case with the LGOL partnership, whereby local councils use EDIS to link to their preferred suppliers. Those clients who are linked to their customer base via EDIS often have suppliers, who are located overseas, especially with global companies, who often have company written software ordering packages. In addition these transactions do not incur additional external costs per transaction, as is the case with EDIS. In other instances suppliers may require more technological competence in order to trade in this manner. One participant client organisation interviewed said, "We have suppliers in Europe, Thailand, and the USA. A lot of them just aren't ready [for electronic trade]. They're just not as technologically advanced". In these instances orders are placed either via fax, e-mail or telephone. However, overall, the businesses interviewed saw value in extending the seamless link back to their suppliers. Another participant client organisation said "If you've got strategic partnerships with your suppliers and your customers, then you have to link all three together, otherwise it doesn't work".

The Future

When EDIS management staff are asked about the future direction of the network there is almost a uniform response, "We're constantly creating and improving things, adding new functions that will never finish. Our systems have a generic element that allows us to quickly move to new opportunities when they come along." Over the past year EDIS has identified the information gap in the settlement stage of the transaction processing, adding the bank settlement functionality. Plans for the future include the development of several complementary features including foreign exchange functionality. The aim is for customers to view their foreign exchange transactions online and then use the complementary functionalities of the Internet to calculate the amount so that payment can be fulfilled immediately. At present organisations typically send their foreign exchange requests by facsimile to

the foreign exchange people, then they have to re-key it into their system. So we're opening that information up to this company. And what these foreign exchange guys want to do is now that

they've got this data coming in, they want to use BNZ. Companies won't have to go to the banks, fill out the complex foreign exchange forms they'll just do this online. (Strategic Partner)

In addition to the foreign exchange functionality, EDIS is also working on a preventative asset management module. The intellectual software for this program is owned by two of the EDIS shareholders who have transferred this business to EDIS. The program will operate under the current business model whereby clients will be offered the software free of charge and fees will be charged per transaction. Under this programme

for example an electrical contractor working in an isolated region can use EDIS software to look at all the work that's historically been done at the site. They can also look at the work that's scheduled to be done, and order parts before going to the site. The program can be used to look at all the wiring diagrams and technical specifications. When they are working on site they can enter this straight into the system. Then if they come back in 6 months time they can use the system to see what's been done. (Strategic Partner)

Staff at EDIS suggest there are no technology restraints on what they can develop. The restraints are instead either financial, in terms of development costs, human, in what clients are able to use, or the growing issue of a lack of bandwidth. One EDIS participant client said

It's [bandwidth] getting worse, it's not getting better. A 56K modem a few years ago was faster on the Web than it is now, especially with more traffic on the web . . . I'm having to wait for 30 seconds for a screen to come up.

Another client participant reports that "the dial-up is the fastest. The dial-up was, and probably still is, one of the fastest ways to get through". Yet another client participant suggests, "I see the bandwidth as the long term value proposition and also driving the standards in industries."

10.5 Conclusion

Just as in chapters 8, and 9, three key areas have emerged from the data analysis that link to the skeletal framework developed in chapter 6. First, as with chapters 8, and 9, general product traders were found to experience information

asymmetries (Williamson, 1985) in the exchange of information. On each occasion, the traders in this network had prior established strong relational ties. The general traders were found to require speed and accuracy in the exchange of product information. Since the products being exchanged had a high degree of stability in terms of price and description, the information requirements were found to have less complexity than they did in the previous two case studies.

Second, in a similar manner to the data analysed in chapters 8 and 9, links can be made to the intermediary literature (Spulber, 2003) and an understanding of the joint brokering role of the Internet and business intermediary by building on Simon's (1982) concepts of man and machine respectively. Likewise, links can also be made to the extent to which value can be captured from the functionalities of the Internet and Simon's (1981) concept of bounded rationality.

Third, evidence was found to support the modularised building of technological processes and relationships that were being leveraged for current and ongoing opportunities as EDIS expanded the product range it offered. This method of ongoing expansion that took into account the high ongoing costs involved in the building of technological infrastructure brings together the concepts of modularity (Sanchez, 1998) and asset specificity and certainty (Williamson, 1985).

After drawing together the data analysis from this chapter with the skeletal framework in chapter 6, and then combining this with the findings from chapters 8, and 9, a base is developed to identify and explore the value opportunities in a B2B (IE) network.

11. Analysis

11.1 Introduction

This chapter brings together the key issues identified in the strategy, strategic networks, and B2B (IE) networks literature with the findings from the three case studies. Its purpose is to provide an integrative analysis to address the central research question in this study: ‘What are the key points of value in B2B (IE) networks?’ Underpinning this central question are the following four lines of enquiry that form the basis of discussion in this chapter.

- What is the nature of the information flow required by buyers and suppliers and the location of the information gaps prior to their joining the three respective B2B (IE) networks?
- What are the separate and combined roles of the Internet and business intermediary in brokering the information flow across the gaps?
- How does a business intermediary identify and leverage current and future information gap opportunities simultaneously?
- What are the overall sources of value creation in the B2B (IE) network?

A brief recap of the context of the 3 preceding results in chapters 8, 9, and 10, respectively, identified that first, electricity traders operate in a highly dynamic environment and have a preference to use a bid/offer price mechanism prior to joining M-co. Timber traders were then found to operate in a moderately dynamic environment, and have a preference for a negotiated price exchange mechanism before joining Global Ecomex. Finally, general traders who went on to join EDIS had a preference for a fixed price mechanism. A further review of these three results chapters highlights the reoccurrence of the following theoretical concepts, introduced in chapters 3, 4, and 5, respectively. These concepts include: electronic commerce (reach, richness, transparency, speed); networks (centrality, structural hole theory, relational ties, modularity, brokerage, information flow, trust, beyond rationality), and TCE (bounded rationality, asset specificity, information asymmetry). The key theoretical areas identified are now integrated with an in-depth analysis of the research findings from both *within* and *across* the three B2B

(IE) network case studies. A theoretical framework is developed that highlights the key theoretical contributions of this thesis.

11.2 Information Flow/Gaps

Types/Nature

This section primarily builds on two key issues raised in chapter 6 regarding Burt's (1982) structural hole theory. These issues include examining the content and strategic characteristics of the information flow on either side of the information gap experienced by traders, and why might these gaps or holes might remain open. This section identifies the content of information flow, with two information sources, their strategic characteristics, and the information gaps and associated costs across this flow, for the three trader types. An important discovery in this section is the identification of two new behavioural filter types encasing the transaction channel that can potentially impact upon the expansion and/or contraction of information flow on either side of these *gaps*. These filters bring together the bounded and beyond rationality concepts identified in the TCE and social embeddedness literatures (Etzioni, 1988; Simon, 1979; Williamson, 1979) and Burt's (1982) structural hole theory.

Data analysis indicates the presence of two *information source* categories required by buyers and suppliers prior to joining the respective B2B (IE) networks. The first is an *outer environment* information flow between individual traders and transaction relevant information, located external to their existing value chain, and deemed important for decision making. Second is an *inner environment* information flow located between traders across each of their respective existing supply chains. The content of these two information flow categories is now incorporated in a discussion that identifies the information gaps across the three trader types.

Two types of non-redundant gaps or information asymmetries in the outer environment information flows are identified, including access to *new markets* and access to *additional information* (see Table 7). These two outer environment information gaps were found to be present in both electricity and timber traders,

who subsequently joined M-co and Global Ecomex. General traders were not found to regularly require information external to their existing supply chain for transaction decision making.

The new market information gaps experienced by these two trader groups may be attributed to the variation in supply and demand, the preference for dynamic pricing, and the perishable nature of each product type. The concern over linking up with as many other trading partners as possible, and in doing so, securing dense ties, as advocated by Baum and Oliver (1996) and Coleman (1988), was found to be more of a concern for the timber traders. These traders were required to undertake geographically distant searches, often to prospective traders external to New Zealand, incurring potentially high search costs. Electricity traders, in comparison, had a relatively limited number of potential traders with whom they could form links with, all located within the New Zealand context, which was due in large to the nature of the electricity product, thereby reducing their search costs in comparison. However, due to the preference for variable or dynamic pricing, electricity traders were keen to extend their number of trading links where ever or when ever possible.

The additional information gaps for electricity traders included searches for information on lake levels for hydro-generation, government rules and regulations, and seasonal consumer demands for electricity. When an absence of such information is combined with the very high levels of *uncertainty* in supply and demand, and the very perishable nature of this product, this situation has typically led to increased costs in search, communication and decision making, in terms of electricity generation and purchase, and ultimately, in the prices offered or accepted. When compared to the relatively high need for external additional information expressed by electricity traders; timber traders, who have a less perishable product, were found to require such information, but their need was considerably less. The more moderately volatile nature of the timber industry led traders to seek additional data on international market trends and timber association news to keep informed on industry happenings. An absence of such

information resulted in slightly elevated search, communication, and decision making costs for pricing for timber traders (see Table 7).

The second information gap is an inner environment gap, whereby information asymmetries were identified across the existing supply chains between buyers and suppliers across all three trader groups. For both electricity and timber traders this gap includes access to accurate information on availability and demand, the placement and collation of orders, and price setting. Due to the complex nature of timber, product description accuracy is required regarding tree species, timber dimensions, and water content. Likewise, the complex and intangible characteristics of electricity leads these traders to require data from fellow traders on their demand/supply situation, in order to maximise their bid/offer pricing calculations. General product traders reported information asymmetries in the accuracy of product description, availability, order collation, and placement. Costs incurred over the three trader types included communication, accuracy, and speed of decision making, which for the electricity and timber traders ultimately impacted upon the final exchange price.

The inner environment information gaps between buyers and suppliers have brought about *inter-information asymmetries* between the trading parties, since there is likely to be mutual gain from the exchange of information that each party currently holds, which is unlike the outer environment information gap where there may not always be mutual gain resulting from the exchange of information on either side of the structural hole. When suppliers reach out across the information gap to new buyers who also want to extend the number of their trading links there is likely to be mutual gain; however, when buyers already have a sufficient number of trading links to meet their requirements, this may not be the case. Similarly, there is likely to be more gain by the electricity trader in seeking additional information on energy regulations than there is for the government agency posting the information (see Table 7).

In addition to identifying the content of the information flow and the location of the information gaps across the three trader groups, the strategic characteristics of

the information flow are also examined. Two strategic information characteristics are identified as influencing why the information gaps might remain open between these buyers and suppliers. These characteristics include Sampler's (1998) concept of *time specificity* and a new concept identified as *source complexity*. Time specificity has incorporated within it, specificity in terms of *acquisition* and *use*. Information with high time specificity must ideally be immediately acquired and decreases in value unless it is used very shortly after first becoming available.

Electricity traders were found to have very *high* levels of time specific requirements, in terms of both acquisition and use, in both their outer and inner information gaps, supporting Sampler (1998). These highly time specific requirements can largely be attributed to the perishable, intangible nature of electricity, large variations in supply and demand, the large and frequent quantities exchanged, together with the preferred dynamic exchange contract method. In contrast, timber traders were found to have more *moderate* levels of time specificity requirements in both their outer and inner information gaps that arose from the high variations in supply and demand. Often there are large volumes of timber product exchanged, and there is a preference for dynamic pricing. However, when compared to electricity, timber is a tangible product with a slower perish rate. In comparison, the general product traders were found to have *lower* levels of time specificity requirements and these were present only in the inner environment information gaps. Consequently, a positive relationship was found between the level of time specificity required and the level of volatility surrounding the product. Higher time specific requirements were accompanied by the potential to incur higher costs in terms of accuracy, quality, and speed in processing and decision making surrounding supply and demand, and ultimately pricing.

The second strategic information characteristic, source complexity, reflects the value to be leveraged from the *volume* and *source variety* available. Electricity traders were found to require, and subsequently place, a very high value on obtaining source complex information in terms of both volume and source variety

over both the outer and inner gaps, including at each stage of the transaction process. In comparison, timber traders placed a more moderate value on acquiring source complex information in terms of volume and variety from both the inner and outer environment gaps (see Table 7). As with time specificity, the general product traders had the lowest requirements for source complex information when compared to the other two trader groups. The need for source complex information with general traders focused upon their securing accuracy and clarity in product description and collation within the inner environment. A positive relationship was also found here between the strategic information characteristic of source complexity required for the product types and the costs incurred at each of the gaps (see Table 7).

Table 7: Types and Nature of Information Gaps

<i>Information Gaps</i>	<i>Trader Types</i>		
	<i>Electricity Traders</i> (prior to joining <i>M-co</i>)	<i>Timber Traders</i> (prior to joining <i>Ecomex</i>)	<i>General Traders</i> (prior to joining <i>EDIS</i>)
Outer-Environment			
'New Markets'	Requires as many links as possible, all within New Zealand	Requires as many links as possible, many outside New Zealand	N/A
Costs	search (moderate)	search (high)	
'Additional Information'	Lake levels, government rules and regulations, seasonal demands	Timber association news, overseas buyer trends	
Costs	search, communication, decision making, & pricing (high)	search, communication, decision making, & pricing (moderate)	
Inner-Environment			
	Requires data on generation capacity/ buyer demand, throughout New Zealand to fix optimal price	Requires accurate product description, Supply/demand, to fix optimal price	Requires accurate product description, availability
Costs	Collation bids/offers, Communication, decision making,	Product description inaccuracy, Collation orders/	Product description inaccuracy, Collation orders/

<i>Information Gaps</i>	<i>Trader Types</i>		
	<i>Electricity Traders</i> (prior to joining <i>M-co</i>)	<i>Timber Traders</i> (prior to joining <i>Ecomex</i>)	<i>General Traders</i> (prior to joining <i>EDIS</i>)
	price setting	supplies, Communication, decision making, price setting	supplies, Communication, decision making
Strategic information Characteristics			
<u>Product Type</u>	Electricity, 'invisible', product that loses identify once passed along the national grid, (High perish rate)	Timber, wide quality, type range (Moderate perish rate)	General Products, tangible, fixed in nature (Low perish rate)
'Time specificity'	High	Moderate	Low- Moderate
'Source Complexity'	High	Moderate	Low

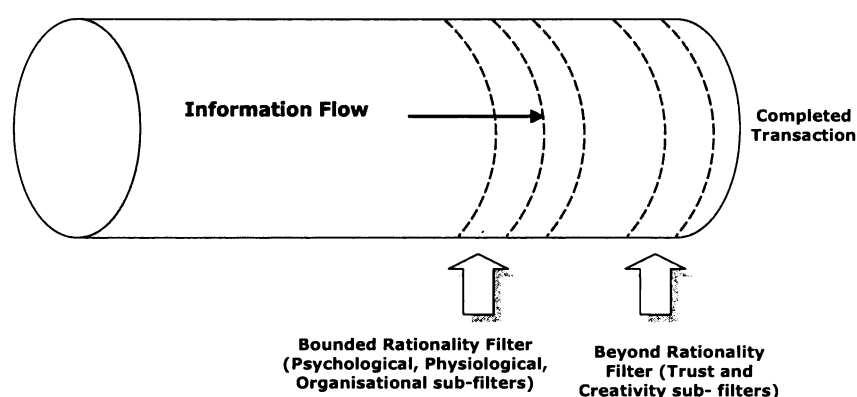
Behavioural Filters

A key finding in this study is the discovery of two behavioural filters that encase the buyer-supplier transaction channel prior to their joining a B2B (IE) network (see Figure 6). This finding addresses Burt's (2003) question asking, why information gaps or structural holes may remain open. Up until this point, the analysis has viewed information exchange as a two-way rational process devoid of the potential influences of human behaviour. However, the limitations or *bounded rationality*, as well as the *beyond rationality*, potential of human behaviour at the organisational level were found to influence the extent to which these informational gaps remain open, especially when combined with the content and strategic characteristics of information exchange.

The first filter identified is the bounded rationality filter that includes three overlapping sub-filters, *physiological*, *psychological* and *organisational*. This finding is based on TCE's interpretation of Simon's (1982) concept of bounded

rationality. The second filter is the beyond rationality filter that includes two sub-filters, *trust*, and *creativity*¹. The beyond rationality filter centres upon the work of Etzioni (1988), recognising that Simon's (1982) interpretation of bounded rationality also includes non-rational behaviour. These filters are found to expand and contract around the transaction channel, and thereby impact upon the nature and volume of the information flow between the trading parties.

Figure 6: Behavioural Filters



The bounded rationality psychological and physiological sub-filters are both described as mechanisms that expand and contract around the transaction channel depending upon the psychological and physiological bindings of the individuals, or what Etzioni (1988) refers to as the *I's* employed within a transacting organisation. Electricity traders were found to be the most likely of the three trader groups to have contracted physiological filters due to the nature of the content and strategic characteristics of the information flow required by this trading group. These traders typically want access to a large volume of information on a very frequent basis from a variety of sources from both within and external to their supply chain for decision making. Conversely, the physiological filter of the general traders, who usually require a smaller volume and degree of time specific information from their inner environment only, have lower levels of physical bindings. An electricity trader reported "this industry is information overload, really it's physically impossible for one trader to get to

¹ See Section 11.3 Brokering Information Gaps for an explanation of the creativity filter.

grips with it all, all the time.” In contrast, a general trader suggests “to some extent, it’s a physical thing in the time spent processing orders, it takes staff time trying to get around and ensure we get all the product information correct and processed.”

Similarly, the nature and strategic characteristics of the information flow that electricity traders require for decision making typically have more complexity and time specific requirements than for the other two trader types, resulting in a greater likelihood of the psychological filter contracting. A timber trader reported

It’s a time thing, as well as a processing thing, there is just so much data to process that when you put it all together it’s very complex, with what you are prepared to bid or offer, and seasonal demands etc.

It should be noted that in order for there to be physiological bindings, organisation members require some degree of expansion in their psychological filter in order to *know* that the information exists. These human or social factors serve to impact upon the transaction costs already identified, such as in the speed and quality of decision making, and ultimately pricing (see Table 7).

The bounded rationality organisational sub-filter includes the interrelated dimensions of goal setting and size at the organisational level, in addition to the psychological and physiological sub-filters of the individual organisational member described earlier. Extending and combining the work of Simon (1982), and Etzioni’s (1988), an assumption is made here that organisations comprise a group of individuals or *I*’s that overlap into a common *We* in terms of the organisational setting.

The organisational goal setting sub-filter was found to be present across all three trader groups, expanding and contracting around the information flow along the transaction channel. Some individual organisations within the timber and general traders were found to have contracted organisation sub-filters in their access of information, due to management decisions that set a directive placing a low priority on technological investment. As one general product trader reported “We still have a very low trust of the Internet on an organisation wide basis. At present

policy prevents us from using the Internet.” A timber trader who went on to participate in the timber network, Ecomex said “I had to buy a computer, as I didn’t have one”.

The second organisational sub-filter, size, was also found to impact upon the information flow. For example, both timber and electricity traders were found to experience new market information gaps in the New Zealand context; however, due to the smaller size of many of the timber traders which employ 10 ten or fewer staff, when compared with the larger electricity traders, the search costs for the timber traders were greater, thereby contracting this filter around their information flow. The founder of Global Ecomex reported on the smaller traders “they were cutting the product [timber] the best they could” but did not have the resources to know what the market required.

A beyond rationality trust sub-filter is identified as encasing the transaction filters of all three trader types. This filter was found to contract around the transaction channel in situations where there were low levels of trust operating between buyers and suppliers, and conversely to expand when trust levels were high, impacting upon the data flow. Two trust types are identified – relational trust and process trust. At one end of this two level continuum are general product traders, found to operate with high levels of trust in terms of both process and relationships (see Table 8). These traders had strong relational links and preferred the fixed price method of exchange. Next on the continuum are electricity traders who all agreed that they had moderate levels of trust in terms of their relational links with fellow traders. However due to their preferred method of non-fixed pricing, they all believed that they could not entrust generation/supply information as this would not enable a fair price to be established and might lead to opportunistic behaviour. Then at the other end of the continuum are the timber traders who often reported low levels of both relational and process trust. A high level of relational distrust in terms of opportunistic behaviour between timber traders appears to have evolved over time, which has led to distrust at the individual level with Etzioni’s (1988) *I* concept, and then in turn developed into a culture of distrust at the industry level.

Table 8: Trader Trust Types

<i>Trust Levels</i>	<i>Relational Trust</i>	<i>Process Trust</i>
<i>High</i>	<p>General Product Traders Strong prior-established relational ties <i>"If the culture of your business is customer focused, then you must build a high level of trust with them, because your customer is your reason for being" (Trader Participant).</i></p> <p>Electricity Traders Most traders known to each other, with mainly reasonably strong relational ties. <i>"It's not so much that we don't trust each other, I think everyone has a healthy respect for each other. (Trader Participant)</i></p>	<p>General Product Trader <i>"This includes having trust in the process. (Trader Participant)</i></p>
<i>Moderate</i>		<p>Electricity Trader <i>"It's more about putting trust into the process. We don't want to let others know our identity and equally we are not interested in theirs, it's about maximising and arriving at a fair price that we either pay or offer for our product." (Trader Participant)</i></p>
<i>Low</i>	<p>Timber Traders Some known/unknown traders, therefore a mix of strong and weak relational ties. <i>"Often we don't know the traders and if we do, can we always trust them?"(Trader Participant)</i></p>	<p>Timber Trader <i>"There are rat bags on both sides of the fence [in the timber industry]. You can 'cut bad' and you can sell bad." (Trader Participant)</i></p>

11.3 Brokering the Information Gaps

After identifying the nature of the content of the information flow required by traders, the analysis now identifies and systematically examines both the individual and combined brokering roles of the Internet and the business intermediary in the formation of the B2B (IE) network. First, the extent to which the Internet alone can successfully bridge these information gaps and extend or

contract the behavioural filters is examined. It is especially important to examine the value contribution of the Internet, in light of the focus this mechanism has received for the relatively low asset specific investment required for ownership (Afuah, 2003), and its new and extended functionalities of increased reach, richness, transparency, accuracy, and speed (Evans & Wurster, 2000). Next, the individual role of the business intermediary, and its combined role with the Internet in brokering the information flow is investigated. This investigation includes the identification and management of new information gaps.

Internet: Brokering Role

As highlighted earlier, the outer environment information gap was found to be of most concern to the timber traders, especially small ones who operated in geographically isolated locations, when trying to locate new markets to sell their timber. These traders typically incurred large search costs in locating potential buyers due to the high degree of fragmentation and sparse number of established trading links. They acknowledged that they could leverage the brokering role of the Internet to reach buyers either within New Zealand or overseas with speed and convenience, on a 24 hour 7 day a week basis, reporting that they could potentially download rich, transparent trading data from the websites of prospective buyers or from timber association websites on product requirements and offerings. The functionalities of the Internet were found to expand the bounded rationality filter (psychological, physiological, and organisational) of these traders at the beginning of the transaction; however, the extent of these expansions was found to be somewhat limited.

The timber traders interviewed typically did not have a strong background in using computer search engines, thereby contracting the psychological and organisational filters. Often these traders did not have the physical population in the office to spend time doing market searches, thereby resulting in restricted physical and organisational filters. The actual presence of prospective trader websites and the richness of content on these sites were further limiting factors. As such, traders were typically constrained by the organisational sub-filter, whereby organisational goals of small timber traders often did not include having

a website, let alone a comprehensive one. As one staff member at Ecomex said, “You have got to remember that a lot of the traders we were contacting both here and overseas either didn’t have a computer at the time, or you couldn’t tell much from their website.”

Though the transparency functionality of the Internet has typically been promoted as a positive feature (Shapiro & Varian, 1999), mixed responses were found from timber and electricity traders regarding its value, without the assistance of a business intermediary. Both trader groups reported limitations in viewing information in the inner and outer environment flow. A view commonly held in the timber industry, reported by one trader that “there are rat bags everywhere in the industry” (Trader participant) was not found to be overcome by the increased transparency offered by the Internet. When this factor is combined with the potential of reaching out to and meeting new potential traders for the first time via the Internet, possibly in a far off country, with no initial opportunity to develop a *face-to-face* relational trading link, the non-rational trust filter was found to remain constricted, when the Internet was used without the assistance of a business intermediary. In somewhat of a contrast, the electricity traders who had expanded organisational filters due to their larger size and their general level of technological competency and expanded relational trust sub-filters found value in using the Internet to locate new markets. However, these same traders reported very limited value in leveraging the very high levels of transparency possible across the inner environment of the supply chain for price setting purposes.

The Internet was found to provide a brokering role to both timber and electricity traders to reach across their outer environment additional information gap. Timber traders used the Internet to locate industry information and trends from various sites, including timber associations at the pre-sale point in the transaction process. However, the same constraints on the filters were found to be present as when searching for new markets. While sometimes a trader was able to locate a timber association website that offered transparency with its offerings, that trader had no way of determining the trustworthiness of that organisation, thereby constricting the non-rational filter. A timber trader reported “there’s three or four associations

and I think some are better than others, but I'm not clear even if I used the computer which was which".

Electricity traders who were found to require access to additional information both before the electricity was sold and at the point of sale said they could use the Internet to locate a variety of information, for example, the seasonal lake levels for hydro-generation. By using the information brokering role of the Internet these traders could effectively increase their processing, indexing, or memory capabilities. However, the complexity of the information required in the electricity industry in terms of the sheer number of points it can be sourced from, its volume, and rapidity of decay, typically meant that individuals within organisations could only usefully leverage the brokering role of the Internet up until a particular point at which time the bounded rationality filters could expand no further, reaching information overload. These findings support Simon's (1981) call for a balance between computer outputs and the processing capabilities of individuals.

Traders within the three groups were found to either have, or be able to gain, access to the Internet as a potential broker to reach across their respective inner environment information gaps with increased speed. However, due to the variety of computer programs available, the timber and general product traders in particular, often lacked a general level of standardisation that resulted in the computers being unable to *talk* to each other. This was especially found to be the case with the general product traders. For those traders who had compatible systems the Internet did permit a faster and more voluminous exchange of rich data for decision making.

All three trader groups were found to leverage the richness, and the transparency, functionalities offered by the Internet in linking across the inner environment gaps. However, again limitations were found regarding the extent to which value could be derived from these functionalities. It was found that traders did accrue value from the exchange of rich data that was complex and time specific in nature, but the value of this exchange was found to be dependent upon the extent to which their psychological and physiological behavioural filters could be

expanded. In the absence of a business intermediary, all three trader types, but more especially the electricity and timber traders experienced limitations in capturing and interpreting data. The value to be derived from the transparency functionality was found to be directly related to the level of expansion or contraction in the beyond rational trust filters. Electricity traders had a high level of relational trust between them, but low levels of process trust in maximising the sales price in the absence of a business intermediary. Timber traders experienced low trust levels that led to contracted relational and process trust filters that the Internet alone was unable to readily expand.

Electricity traders were found to have the greatest potential to leverage value from the functionalities offered by the Internet in terms of accessing complex, time specific, voluminous data required for decision making across the transaction process. Conversely, these same traders who operated in the most volatile environment in terms of dynamism of trade also had the highest potential for contraction of their bounded rationality psychological and psychological sub-filters and beyond-rationality trust-process sub-filters. A neutral third party intermediary could potentially assist traders in maximising the benefits of the Internet, while simultaneously working to expand these two filters.

Timber traders who operated in a moderately dynamic or volatile environment were also found to be able to increase the quality and quantity of decision making through the functionalities offered by the Internet. However, two key factors continued to bind these traders. First was the ability to search and then have trust in locating new markets without prior established face-to-face links in the outer environment. This lack of trust in the inner environment with known traders when transacting via the Internet remained an issue. The timber trader who suggested that there were rat bags in the industry went on to say “and if we used the Internet without Ecomex this wouldn’t change anything, it would probably make it worse.” Second were the inaccuracies and inconsistencies in describing the timber product that the individual traders were not able to overcome when using the Internet. A staff member at Ecomex reports “Now buyers can understand what they were buying. Even if they used the Internet between them they couldn’t come

up with this standardised system.” The presence of these factors has opened opportunities for a third party intermediary.

General product traders who exchanged products that were typically fixed in terms of price and description were found to benefit from the brokering functionalities of the Internet alone, by the extent to which they could expand their own bounded rationality filter. Those organisations that had placed a higher value on technological resources and capabilities were more likely to have expansive organisational goal setting filters. Staff in these organisations were more likely to recognise the importance of speed and accuracy involved with standardised coding of product types and be able to action this, and so, have little need for a second broker in the form of a business intermediary. One trader reported “Put simply, they [EDIS] control your destiny. They can increase the transaction price at any time.” However, other traders who belonged to organisations that placed a lesser value on in-house technological expertise were unable to maximise the coding functionalities of the Internet, their bounded rationality filters remaining constricted and so, providing an opportunity for a third party intermediary. These general product traders who all had prior established strong relational links with trading partners and were willing to share trader information operated with expansive relational and process trust sub-filters, providing little need for third party intervention in this area.

Overall, the Internet as a sole information broker was found to offer variable value to the three trader groups in terms of increased speed, accuracy, quality and subsequent efficiency in decision making. Much of this value was dependent upon the content and strategic characteristics of the information required and the extent of contraction or expansion of the bounded and beyond rationality filters. Interestingly, all trader groups said they were aware of the vast number and complexity of Internet functionalities, and were also very receptive to new and innovative ideas. But these same traders acknowledged their own limitations in terms of creatively exploring how to maximise the value offered by the Internet, hence, leaving room on most occasions for a second party broker or business intermediary. Having identified the potential value role of the Internet, however,

as highlighted by Simon (1976) any benefits of technological investment, especially if a business intermediary is employed as a part of this process, need to outweigh the costs involved.

Business Intermediary/Internet – Broker Role

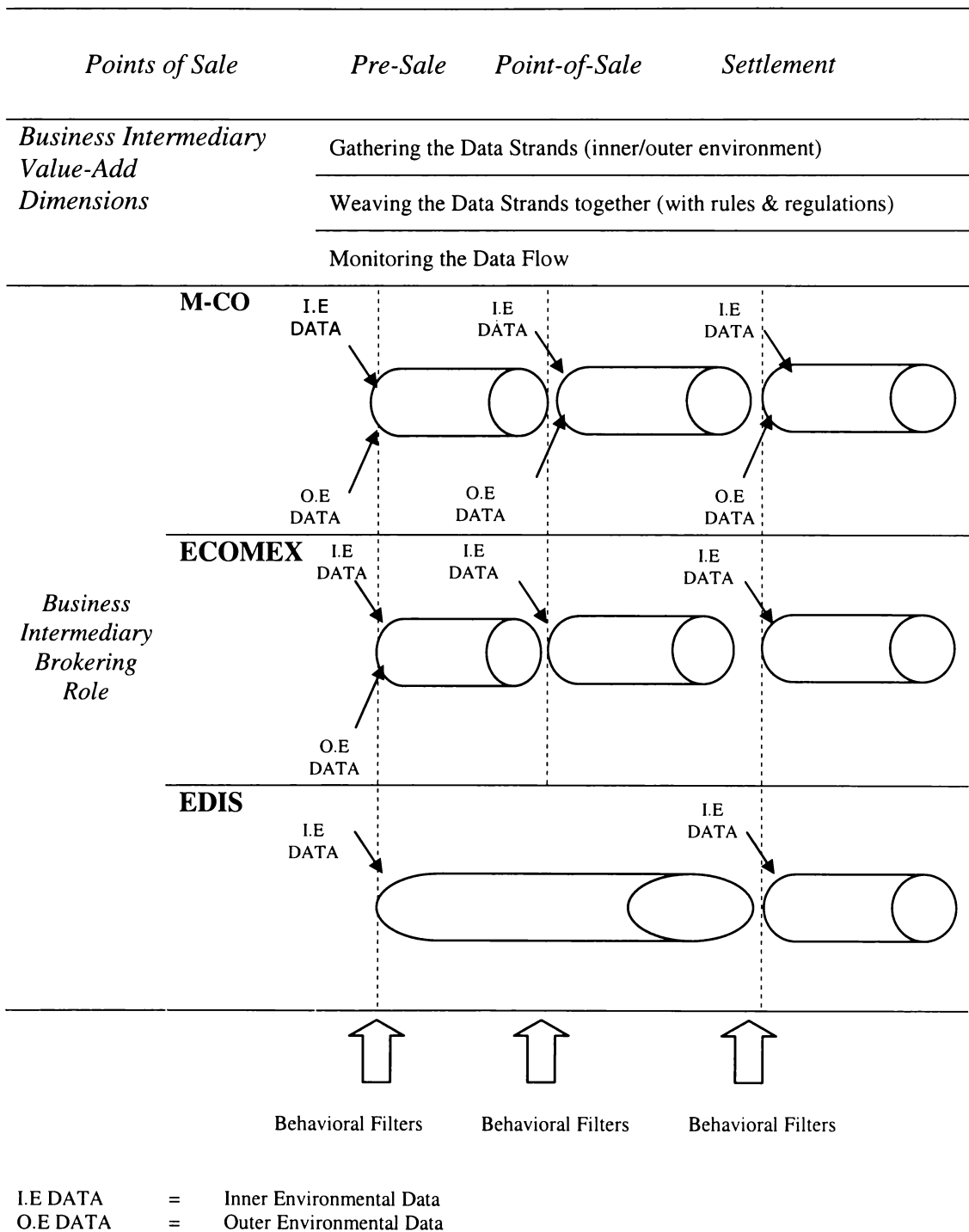
The brokering role of the business intermediary, together with the brokering role of the Internet in the B2B (IE) network is discussed within a three dimensional framework (see Figure 7). These dimensions which operate across the entire transaction process include: *gathering the information strands* from the asymmetries identified earlier in the inner and outer environment gaps; *weaving these strands together* with rules and regulations; and then *monitoring the information flow* across the transaction process, identifying new information gaps and innovative ways to fulfil existing gaps.

The process of gathering the information strands requires the business intermediary to identify and understand the nature and extent of the information asymmetries on either side of the gap between buyers and suppliers in both the inner and outer environments and how they might add incremental value. The timber business intermediary identified that, prior to their involvement some of the traders could access the functionalities of the Internet in terms of bridging the outer environment new market information gap to reach prospective trading partners. However, most continued to experience relatively high search costs. As already mentioned, the trust and bounded rationality filters had remained somewhat contracted, even when using the Internet.

When analysing the attempts made by the three business intermediaries to expand the behavioural filters of traders, a new beyond rationality creativity sub-filter was discovered to encompass the transaction channel. Based on Simon's (1996) argument that human thought involves more elegant forms of thought rather than merely search, which includes the ability to "discover . . . [to] formulate problems . . .to have intuitions . . . and insights about them" (p. 167); this behavioural sub-filter combines the overlapping concepts of insight and intuition and creativity.

Upon closer examination, it appears that before a business intermediary can begin to expand the bounded rationality sub-filters of buyers and suppliers, it first need to assist in expanding the two beyond-rationality sub-filters, in the order of expanding the creativity sub-filter first, and then the trust sub-filter.

Figure 7: Value-Add Role of Business Intermediary



Creative and innovative methods for gathering the information strands from the outer environment - new market information gap - and weaving these together with processes were undertaken by the timber intermediary. For example, a strategic partnership was formed with an Indian trader. This strategic relationship commenced via mutual contacts and a strong face-to-face relational link was forged. The Indian trader also had strong face-to-face alliance links in the Indian market. Processes such as this serve to expand the trust relational sub-filters held by individual trader organisations, extending Etzioni's (1988) concept of *We* in the area of trust to the business intermediary in the network. Other actions by the business intermediary also served to instil and expand the trust sub-filter, like the regular face-to-face consultative approach with traders. The installing of trust and confidence in traders led one to confide that "their fingers were too big to operate a keyboard", so the timber business intermediary was able to make the necessary adaptations and then provide lessons on its use to the trader. This knowledge led the business intermediary to successfully expand the bounded rationality psychological and organisational sub-filters for this particular trader. Through continued face-to-face and word-of-mouth searches the business intermediary was able to list the names of numerous traders on their personalised search engine, thereby extending the value that other timber traders could derive from the using the brokering role of the Internet.

In brokering the outer environment additional information gap, the electricity and timber intermediaries identified the often high search costs, varying degrees of trust in the information sources, and levels of motivation in cooperating to seek information, thereby contracting both the bounded and beyond rationality filters. Though the Internet was found to provide similar benefits as when brokering the outer environment new markets gaps, the intermediaries identified ways they could add further value to the transaction process. One way was to reduce the search costs for traders by expanding the number and nature of information strands or sources. Though the Internet has the functionality in terms of search engines to expand these sources, its value was found to be limited by the extent that traders were able to extend their bounded rationality filters to leverage them, and then once found, to trust these sources. For example, in terms of improving

existing information available, the timber intermediary provided a filter, only listing those timber associations deemed reputable. In terms of extending information, the timber intermediary was able to pass on new information on international trade laws via the Indian trader strategic partner. A second way that the business intermediary can enhance value by improving data availability via the Internet is through bundling. For example the electricity intermediary enlisted the assistance of the computer to bundle or collate the voluminous information amounts available to traders in the MyCOMIT system, thereby expanding the bounded rationality filters.

When performing the brokering role across the inner environment information gaps, business intermediaries for all three trader types, were found to have the opportunity to work with the Internet in a complementary manner to reduce the costs across these gaps (see Table 7), as well as to create new gaps to fulfil. Just as when brokering the outer environment information gaps, two of their initial value adding functions appear to be in extending the beyond rationality creativity and trust filters and then working toward extending the bounded rationality filters.

A key role of the business intermediary in brokering the inner environment was found to be the creation of standardised interfaces between traders. This action began with gathering the strands of data from traders regarding each trader's computer program type, focusing on ensuring that they could *talk* to, and *understand* each another. The creation of standardised interfaces has been a key area identified by the intermediary within EDIS, where they can add value to transacting traders. By weaving together their creative and relationship building capabilities they devised a series of computer programs. Then after instilling trust in their traders regarding the processes they offer, trader's could then use these programs to link, for example, their XML system to a customer's EDIFACT system. The development of standardised interfaces also extends to the coding of products. As the timber intermediary points out

There's a protocol for describing forests or standing trees that will give you some idea of what you are getting without actually going to see the forest. But once you cut the timber you can be more

specific. You can have standard sizes, whatever the timber is made of, water content, treatments, finishes.

The general product intermediary, EDIS has developed a rigid line-by-line criterion that suppliers are required to complete regarding the features of their product. When these intermediary tasks are combined with the functionality of the Internet traders are able to enjoy increased speed, accuracy, and improved decision making through expanded bounded rationality filters.

The value in developing standardised interfaces also extends to all three business intermediaries, establishing both formal and informal rules and regulations, online and offline. The electricity intermediary was found to weave together the most extensive set of formalised rules and regulations, in terms of complexity and volume. These rules surrounded information disclosure in terms of timing. For example, forecast electricity prices may be updated every 5 minutes until 2 hours prior to trade and no later than this, while point-of-sale prices can be updated every 30 minutes. These time frames, which were decided upon after feedback and feed forward sessions with traders, served to maximise the extension of their bounded rationality filters without the traders entering into a situation of information overload when making final price calculations. Rules were also found to surround the disclosure of anonymity. Bid and offer details are taken from traders and collated in an anonymous fashion. The intermediary is mindful that

You can't say lets have a look at the aggregated offers of all the generators in the lower south island because there are only two. So you aggregate up and have South and North Island together.

Fines are imposed on all electricity traders and the business intermediary if they are not followed, as set out under a formalised rules procedure. The strong relationships developed by all intermediaries, together with the feedback, and feed forward sessions, serve as informal boundaries within which discussion is encouraged on ways to improve services. Consequently, these boundaries serve to both contain undesirable behaviour while simultaneously maximising creativity which I argue goes to enhance the overall level of both trust and certainty in behaviour and the processes offered.

Many timber and all electricity traders would argue that the key benefit of leveraging the joint brokering functionalities of the Internet and business intermediary is the weaving together and ultimate design of the rules, regulations, and computer functionalities that go to make up the dynamic pricing mechanism. This mechanism combines the features described above, in terms of maximising the information flow to traders, while ensuring they have the capacity to interpret and use this data. The mechanism also includes additional features such as the MyCOMIT system developed by the electricity intermediary in conjunction with the computer. This is an example of where the computer has been programmed to use its knowledge by processing the information fed in and then combining this with its intuition, and creativity, referred to by Simon (1982). The outcome in this instance is the production of new personalised information for trader decision making. Based on Fransman's (1998) argument that knowledge is the outcome of processed information requiring intuition and creativity, it is suggested that the knowledge generating capabilities of the computer work on a continuum from information processing through to a limited level of knowledge creation.

All three business intermediaries were found to identify a new inner environment information gap at the point of settlement, whereby they developed banking and settlement facilities. Due to the complementary functionalities of the business intermediary and the Internet, each B2B (IE) network was found to offer traders an end-to-end solution and, in doing so, further expanded the bounded rationality filters for their respective traders. The establishment of a trust account and settlement features has been found to be especially valuable for timber traders who have operated in a general industry environment with low relational trust levels. As the timber intermediary reports, "the trust account has, created trust . . . a lot more doors have been opened in business relationships for traders." Consequently, in all the settlement functionality offers increased trust, speed and convenience in fulfilling the transaction process.

A further action of all three business intermediaries has been the expanding of the organisational sub-filter around the inner environment gap for smaller organisations. Often smaller traders who have low trading volumes and

insufficient capital for the high outlay required for systems such as EDI could not enjoy the same benefits of electronic trade. However, these same smaller traders can now link to other larger established traders in a B2B (IE) network, and thereby leverage their relational and technological links. Examples include the seat-holders in the timber network who encourage other smaller traders to trade via their connections. Likewise, smaller electricity traders can do the same. EDIS reports examples of the larger organisation establishing the initial link and then smaller organisations leveraging this link as well.

After gathering the information strands from the inner and outer environment gaps, and then weaving them together with rules and regulations to create processes and systems, a final value-add opportunity for the business intermediary is to oversee or monitor the entire transaction process. The aim here ultimately is to maximise the expansion of the bounded rationality and beyond rationality filters to a point that maximises and even extends the ability of traders to transact. A systematic and somewhat cyclic process appears to take place across all three networks through a series of more informal feedback and feed forward systems as well as more formalised systems such as with the Surveillance and Rules committees in the electricity network. However, one important factor in any potential loop back to the beginning of the transaction process is a focus on expanding the beyond rationality filters of both creativity and trust for the intermediary and traders.

11.4 Modularised Brokering Opportunities

This section examines the antecedents, governance processes and structures, and outcomes for the three business intermediaries as these centralised organisations simultaneously identify and leverage information gaps both in their *great inner environment* and *great outer environment*. The great inner environment consists of the inner and outer environment information flows already identified for each respective existing B2B (IE) network. The great outer environment includes the information flows that exist beyond the current network structures for each B2B (IE) network. The commonly held belief that organisations require processes and structures that will survive current environmental uncertainty (Venkatramin &

Subramaniam, 2002) is combined with the knowledge that low asset specific investments are required (Afuah, 2003) for quick connect Internet-mediated business (Sanchez, 2003). In addition, Burt's (1982) structural hole theory is linked to the modularity and transaction cost economics literature.

Analysis indicates that the business intermediary took the lead role in the initial development of each respective B2B (IE) network. In the presence of generally heightened levels of *uncertainty* in the electronic environment, together with varying degrees of *information asymmetry* across the three trading groups, a high and consistent level of *certainty* was identified over several factors for each business intermediary. The first measure of certainty surrounded the identification of a key strategic concern, regarding gaps in the information flow required by traders in each respective group. Ecomex started by "identifying a real business problem or need" (CEO) that involved a lack of timber product collation, while EDIS identified the issue of incompatibility in trader computer systems and inaccuracy in product description. This was coupled with further certainty surrounding the large ongoing asset specific investment required by each business intermediary to develop a technological platform to leverage the joint brokering role of the Internet. A third certainty surrounded the knowledge that traders would be prepared to make a limited, and sometimes relatively low, asset specific investment in return for the services of a business intermediary. It is, therefore, argued that the concept of uncertainty is captured within the drive for certainty in creating value at the start up stage of a B2B (IE) network.

Though trader participants across all three networks were not prepared to make excessive financial or asset specific investments, a relationship was found between the level of asset commitment and the level of information asymmetry present within each respective trading group. A positive relationship was found between the level of both financial and asset specific investments each trader group was willing to commit to and the level of information asymmetry present. Electricity traders who used the auction price mechanism and operated in a highly volatile environment, with high levels of information asymmetry, were prepared to make relatively high asset specific technology investments and pay relatively

large annual fees. However, general traders, who operated in a more stable environment using the fixed price mechanism, were prepared to make considerably less and sometimes minimal asset specific and financial investment.

Combining the ever present uncertainty in the greater environment with the varying levels of asset specific and financial investment that traders were prepared to make led all business intermediaries to investigate ways that they could maximise their own longevity, with increased certainty, both within their current network form and beyond. Each business intermediary was found to be striving to achieve a balance between the relatively large ongoing asset specific investment required in the technological infrastructure for each network, and the level of investment each trader group was prepared to make. One way of achieving this balance was by continuing to identify new informational gaps in both the great outer environment and great inner environment gaps.

In order to maximise their level of certainty and spread their asset specific investment, all three business intermediaries were found to enter into two modular processes that occurred simultaneously and parallel to one another. Both of these processes began with each business intermediaries identifying ways that they could this time expand their own bounded and beyond rationality filters, instead of merely focusing on those of their trader participants. The first modular process for business intermediaries began with searching across their great inner environment to identify either new information processing gaps, such as the building of a trust account with the timber intermediary, or the extension of existing gaps, for example the provision of customised data by the electricity intermediary. Both of these actions served to expand the behavioural filters of traders and increase the value of information exchange in each trading group. By reaching out to traders in each respective network the business intermediary was often able to identify new and novel information source or process requirements that served to expand the beyond rationality, creativity sub-filter of the business intermediary. One example in the timber network is where the intermediary had developed a strong trusted relational link with a number of traders. Several traders had mentioned that the key board on the computer was too small for their

large fingers. This discovery led the business intermediary to devise a novel idea to facilitate the information exchange process, whereby traders could use the computer mouse instead of the key board. These findings support Freeman (1979) and Powell et al. (1996) who argue that the centralised figure is more likely to hold a privileged position with regard to information exchange, however, they are counter to Burt's (1982) argument where non-redundant information is more likely to come from weak relational links.

Happening simultaneously for each business intermediary was a second modular process that involved scanning for the presence of information gaps in their great outer environment. Each business intermediary sought information from the great outer environment by reaching out to and linking up with a wide variety of relational ties situated beyond their current B2B (IE) network. This action permitted each business intermediary to expand their own beyond rationality creativity filters. The relational links were found to contain a mix of both strong and weak ties including business associates within and across industry professionals, new acquaintances and friends. Interestingly, each business intermediary was careful to foster links with only those organisations that they had either had prior business dealings with or were referred to by other trusted individuals or organisations. Consequently, business intermediaries ensured that there was expansion in either their relational or process trust sub-filters before they were prepared to enter into any informational exchange that could lead to an expansion in their own creativity filter.

From these activities, a modular *relationship building process* is identified as occurring for each business intermediary, as they forge relational links in both their great inner and great outer environments. Examples of great outer environment relationship building opportunities include the general product intermediary who formed a strategic partnership with a trading bank and business consultancy. These relationships brought with them opportunities for mutual gain in extending the number of potential trading links on either side of the information gap in their great inner environment and thereby reducing the likelihood of decay of their producing a valued brokering service. These strategic partnerships also

brought with them value in terms of being associated with an established brand name that worked to expand the beyond rationality trust filters of the trader participants toward this business intermediary. Likewise, the relationship between the timber intermediary and the Indian timber merchant also provided mutual gain in terms of increased number of potential trading links. All these links were found to increase with certainty the value new value link opportunities for each business intermediary, and thereby reduce the risks associated with asset specific investments.

A second modular *architecture building process* is identified as simultaneously happening, in the great inner and outer environments of each respective business intermediary. In the great inner environment two modular processes are identified. The first involves the building of a series of *standardised interfaces* in the form of rules and regulations to facilitate the flow of information. These standardised interfaces can take on a *process form*, such as the rules that electricity traders need to abide by, or a *technological structural form*. The electricity intermediary has developed a technology platform that blocks the transparency functionality of the Internet, providing anonymity to traders at the time of trade. A further example of a technology structure is the introduction of a trust account by the timber business intermediary. All of these features serve to expand the bounded and beyond rationality filters, and thereby add value to current traders. In addition, the generic nature of such features enables each respective business intermediary to leverage these modular processes in future network opportunities.

The modular architecture building process in the great inner environment extends into the development of standardised interfaces or bridges across the outer environment of trader participants, often in the form of industry standards, especially in the timber and electricity networks. The founder of the timber B2B (IE) network said “there were no written rules in the industry, just a set of unwritten rules that everyone was supposed to have known . . . we supplied the industry rules.” These brokering processes provided traders positioned in the inner environment of the B2B (IE) network with value in terms of an overall sense of security and certainty. As well as this, such processes placed each business

intermediary in a position of heightened certainty in being able to leverage the generic aspects of these processes when forming bridges to broker new opportunities in their outer environment. For example, the electricity intermediary went on to leverage opportunities in this industry in Australia. Furthermore, the development of industry standards increased the likelihood of a lead brokering role for each business intermediary in each of their respective industries.

Each business intermediary was also found to combine its modularised relationship and architectural skills to identify and build links or bridges across the information gaps present in their great outer environment that were either within their current industry or across a new industry. The timber intermediary successfully leveraged these modularised skills to leverage opportunities in the palm oil industry as well as the timber industry by entering into a strategic partnership with the Malaysian government to build a palm oil trading platform. This action enabled the timber intermediary to leverage its centralised brokering role over the two network forms, sourcing novel information in one network that could be used in the other with increased access to new information flows and information processes. The electricity business intermediary went on to leverage further opportunities in the energy industry, this time in the renewable energy market in Australia. These examples illustrate that longevity has been brought about by *methodically* focusing on the development of a modular set of strong relational and process skills, especially in light of the high ongoing asset specific investments required in the technological infrastructure. These findings also demonstrate that certainty is not required in the direction that the modular process takes place.

11.5 Overall Points of Value

This section identifies the key points of value in the B2B (IE) network. A multidimensional framework is developed that recognises the *network* as the primary unit of analysis. Captured within the network are three secondary units of analysis, an *informational* unit, a *relational* unit, and a *central core* unit. Each of these secondary units of analysis is underpinned by a set of dimensions (see Table

9). It is suggested that not only these dimensions, but perhaps more importantly the interrelationship between them holds the key to identifying how value can be maximised for trader participants in the B2B (IE) network. Led by the centralised business intermediary figure, the understanding and application of these dimensions and their interrelationships were found to improve trader decision making, a result that ultimately resulted in their achieving increased efficiencies and reduced costs across the transaction process.

Table 9: Sources of Value – B2B (IE) Network

<i>Secondary Units of Analysis</i>	<i>Dimensions</i>
<i>Relational</i>	<ul style="list-style-type: none"> • Participants • Quality of prior relationships (strong/weak) • Presence of bounded rationality and beyond rationality behavioural filters (extent of contraction/expansion)
<i>Informational</i>	<ul style="list-style-type: none"> • Great Inner and Great Outer environment information flow sources • Strategic Information Characteristics (time and source complexity) • Locations of information gaps: in great inner environment across transaction channel (pre-sale, point-of-sale, post-sale), and great outer environment.
<i>Central Core</i>	
Internet	<ul style="list-style-type: none"> • Functionalities of speed, transparency, reach, and richness of quality of information transfer • Limited creativity/intuition/decision making
Business Intermediary	<ul style="list-style-type: none"> • Quality of prior relationships (strong/weak) • Presence of own bounded rationality and beyond rationality behaviour filters (extent of contraction/expansion)
Joint Brokering Role: Business intermediary and Internet	<ul style="list-style-type: none"> • Gather the information strands after assessing both the informational and relational unit dimensions and the

<i>Secondary Units of Analysis</i>	<i>Dimensions</i>
	<p>interaction between them.</p> <ul style="list-style-type: none"> • Weave the informational unit and relational unit data together with rules, regulations, and processes available from the interaction between the business intermediary and the Internet. • Continually monitor the informational and relational units for new opportunities, especially any information gaps that may appear in the great outer environment

The network is identified as the overall *structural* unit of analysis. The business intermediary and Internet were found to jointly occupy the centralised position in this hub-n-spoke network structure, with trader organisation participants located at nodal points around the peripheries. The term *trader* is used since insufficient evidence was found to warrant separating the buyer and supplier groups across each of the respective networks. The informational unit of analysis contains the dimensions of information sources, strategic information characteristics, and information gaps in the great inner and great outer environment information flows. In the relational unit of analysis the dimensions include: participant organisations, the quality of any prior relationships between them, and the presence of bounded rationality and beyond rationality behaviour filters. Then the central core unit of analysis has within it both the separate and combined brokering roles of the Internet and business intermediary. The Internet contains the functionality dimensions of speed, reach, richness, transparency and accuracy of information exchange, while the business intermediary includes the dimensions of prior relationships and the extent of contraction of expansion of their own behavioural filters.

Viewed separately the informational unit, relational unit, and central core unit provide only a partial understanding of the value that can be captured within the B2B (IE) network structure. For example, just being aware of the strategic information characteristic requirements between traders in the electricity network,

is alone, unlikely to provide opportunities to maximise value for this trading group. Nor is it likely that these traders will maximise the value to be leveraged from this network by merely having knowledge that the functionalities of the Internet will provide for increased speed and richness of information exchange. Hence the true value in this network form lies in the complex web of interrelationships between these 3 secondary units of analysis. The business intermediary was found to take the lead role in gathering the informational, relational together, with the Internet and then weaving these units together with rules, regulations and processes that required ongoing monitoring. These findings support Quinn et al.'s (1996) star burst model, where value is placed on the centralised figure taking the lead role in the dissemination of information. Furthermore, these findings link together Etzioni's (1988) *I* and *We* concept. It is suggested that in taking the lead role, the business intermediary, initially positioned itself as an *I*, then quickly works to create a network of *We*'s by creating links between traders across the great inner environment. Happening simultaneous to this is a further process in the great outer environment, where the business intermediary, again starts as an *I* to create, as quickly as possible a series of *We*'s to leverage opportunities in this environment.

11.6 Summary

This chapter has examined the central research question 'What are the key value opportunities in the B2B (IE) network?' An in-depth analysis was conducted across the four lines of theoretical enquiry developed in the skeletal framework in chapter 6, together with the findings from the three results chapters 8, 9, and 10. An examination of the information flow and relational characteristics of participants, together with the joint brokering roles of the business intermediary and Internet in developing governance structures and processes, provides a refined framework to identify where value is situated in this network form. The next chapter highlights the key methodological and theoretical contributions made in this thesis.

12. Conclusion

12.1 Introduction

This chapter highlights the major theoretical contributions to emerge from an investigation into the central research question: “What are the key points of value in the B2B (IE) network?” The strategy, strategic networks, and B2B (IE) networks literatures, together with the three case studies, have provided a basis to investigate how value is captured in this electronic network form. The thesis has examined the dynamics between man and machine, with the business intermediary and Internet respectively, representing physical symbol systems that generate, store, and disseminate information. A central focus in this study has been on just how these processes can be optimised when taking into account the rational and beyond rational decision making potential of both network participants and the business intermediary in this centralised network structure. The impact and interrelationship between these dynamics and their overall contribution to the methodology, research, and management theory is now provided.

12.2 Methodology

Structuration theory was selected as the ontological base for this thesis because of its recognition of the duality of structure between the business intermediary and the Internet. The Internet has been viewed as a tool that works interdependently within the socially embedded practices of organisations. Structuration theory, therefore, provides an effective lens to examine the interaction between individuals and the Internet to investigate the value drivers in B2B (IE) networks. Three case studies were used in this thesis to increase the likelihood of collecting a rich data base, and also for theoretical replication (Eisenhardt, 1989). Value within the patterns of information flow, the centralised role of the business intermediary and Internet in brokering this flow, and the development of subsequent governance structures were examined over these three network case studies. While each network was governed by the centralised business

intermediary, each had as a point of difference the price mechanism used, with the bid/offer system being used in M-co, the negotiated system being favoured in Ecomex, and the fixed price mechanism being used in EDIS.

Positioned within the mid-range theory perspective, a skeletal framework was developed, as advocated by Laughlin (1995). This framework identified *a priori* research in the strategy, networks, and emergent B2B (IE) networks literatures (see chapter 6). The collated literature from this literature provided a platform to address the central research question in this study. The value of such a framework is in its simultaneous recognition of the contribution of existing research, while remaining open to change and diversity, with further investigation. Upon collection of rich case study data across the three networks, the information was then analysed using the grounded theory technique. This process involved systematically moving between *a priori* research and field data in an iterative manner to classify and code emergent patterns until a point of saturation was reached. This situation came about when any incremental improvement became minimal. Strauss and Corbin (1990) describe this point as reaching a stage when theory “closely approximates the reality it represents” (p. 57). The resulting process was substantiated in a conceptual model (see chapter 11) that represents a progressive stage towards theory development.

Inevitably, there are limitations in the qualitative method of research. The construction of human knowledge in the research process has been suggested by Greene (1994) to be carefully entwined with the personal values and perceptual frameworks of the researcher. To ensure a substantive focus, care was taken to establish both balanced and detached neutrality from the literature and case study data, as recommended by Guba and Lincoln (1989). In the interview, this process involved developing a socially sensitive approach by not only building and maintaining a trusting professional relationship with interviewees, but also by continually being aware of the subjectivity embedded within their responses.

The methodological contribution this thesis makes is in its classification and description of the information exchange patterns and how they relate to knowledge in a centralised transaction network structure. Structurationist theory provides strength due to its, duality of structure concept, enabling the value creating contributions of the business intermediary (man) and the Internet (machine) to be recognised and observed. The rich case specific narratives gathered in the three case studies enabled both within-case investigations into the uniqueness of each network, as well as for more generalised and rich cross-case comparison. The study has provided a theoretical lens to enrich understanding on how individuals can work in an electronic environment to optimise decision making and ultimately the attainment of value in the process.

12.3 Central Research Contributions

The integration and analysis of the key theoretical concepts in the strategy, strategic networks, and B2B (IE) networks literatures, together with the research findings across the three case studies addressed four lines of enquiry that underpinned the central research question in this study, as follows:

1. What is the content and nature of the information flow required by buyers and suppliers, and the characteristics of the information gaps, prior to their joining a B2B (IE) network?

Two primary sources of information content flow were identified across the B2B (EI) network, including an outer environment information flow and an inner environment information flow. The outer environment flow included access to information on new markets and additional information for transaction decision making. Access to an outer environment information flow, and gaps along this flow, were found within the timber and electricity trading groups. Access to an inner environment information flow, and gaps across this flow, were found at the points of pre-sale (accuracy in product description, availability and quantity, order collation and placement) and point-of-sale (price determination and market clearing) across all three trading groups. Two strategic information characteristics

were identified, including time specificity and product complexity. Furthermore, two behavioural filters were identified as encasing the trader transaction channel, bounded rationality (physiological, psychological, organisational) and beyond rationality (creativity and trust). These behavioural filters were found to influence, and be influenced by, the nature, location, and strategic characteristics of the information flow on either side of the information gaps and hence the size and nature of the information gaps. In sum, the electricity traders were found to experience the greatest number and nature of information gaps, followed by timber traders, and then general traders.

2. What are the separate and combined brokering roles of the Internet and business intermediary in brokering the information flow for the traders across three different B2B (IE) networks?

The information brokering role of the Internet alone was found to provide trader participants with increased reach, richness, accuracy, speed, and transparency in information exchange. However, the value that trader participants could leverage from these Internet functionalities was found to be bound by the presence of the bounded rational and beyond rational behavioural filters and the nature of the data required. As a consequence, despite the relatively low asset specific investment required by traders to invest in the Internet, the limitation of its functionalities left open the opportunity for the services of a business intermediary at various stages across the transaction process. Business intermediaries in all three networks were found to provide traders with incremental value, over and beyond that made possible by the brokering role of the Internet, by gathering the information strands from the gaps already identified, and also by identifying new information gaps. Through the development of strong relationships with traders and by creatively weaving together the data required with processes and systems, business intermediaries were able to expand the behavioural filters of the trader organisations, thereby maximising their value exchange. Finally these business intermediaries were able to monitor the entire process in an iterative manner.

3. How does a business intermediary identify and leverage current and future information gaps simultaneously?

The business intermediaries were all found to create modularised brokering opportunities by identifying either current or future information gaps in both their great inner environment information flows and their great outer environment information flows. Combining this ongoing information gap search, with the building of an electronic trading platform and rules and regulations that were as generic in nature as possible enabled business intermediaries to leverage new brokering opportunities in a number of directions with increased speed. The modularised brokering process were found to increase the likelihood of certainty of longevity in an environment filled with uncertainty that included the relatively low asset specific investment most traders were prepared to make.

4. What are the overall sources of value creation in the B2B (IE) network?

An analysis of the three research questions presented above identifies three key areas of value in the B2B (IE) network that include informational, relational and a central core. Understanding these areas and the interrelationships between them holds the key to identifying how value can be maximised for trader participants in the B2B (IE) network in terms of improved decision making that ultimately leads to overall increased efficiencies and reduced costs across the transaction process.

12.4 Key Theoretical Contributions

This thesis has attempted to contribute to theory development by examining the theoretical foundations of value creation in a B2B (IE) network. Drawing on a wide body of literature from the strategy, strategic networks, and B2B (IE) networks literature, and the case study data, common patterns of value creation in this network form were identified. The discussion that follows highlights my analytical and theoretical attempt to bridge the B2B (IE) networks and strategy and strategic networks literature. This attempt ends with an examination of how the integrative B2B (IE) network value framework developed in chapter 11

contributes to Venkatramin and Subramaniam's (2002) call for a new unit of analysis in the strategy literature.

The discovery of the two behavioural filters surrounding the information flow on either side of the information gaps between traders across the transaction process addresses a question raised in Burt's (1982) structural hole theory, "Why might structural holes remain open between individuals or organisations?" Combining both the potential and limitations of human behaviour with the three dimensions identified in the informational unit of analysis, information source flow, information strategic characteristics and information gaps, serves to explain why traders may always be working toward a state of fulfilment of the information gap that separates them. Furthermore, the discovery of these two behavioural filters brings together the bounded rationality concept cited in the TCE literature, with Etzioni's (1988) beyond rationality concept in the economics sociology literature, to provide a full interpretation of Simon's (1982) bounded rationality concept.

The identification of a beyond rationality trust sub-filter extends the work of social network theorists such as Burt (1982) who argue that strong relational links are more likely to be associated with high overall levels of trust and redundant information exchange. This study discovers two sub-dimensions within the trust sub-filter: those of process and relational trust. High levels of relational trust were found between electricity traders who had strong prior developed links. However, process trust was found to be low in this trader group without the assistance of a business intermediary. Furthermore, the lack of process trust in this trader group was found to be associated with requirements for information from a large number of information sources, with high levels of time and source complexity, and a large number of information gaps. Interestingly, the discovery of non-redundant information gaps between traders, especially the electricity and general product traders who had prior established relationships, refutes Burt's (1982) argument for the greater value of the broker being between those parties connected by loose ties.

This study extends Simon's (1962) concept of decomposable systems where he argues for increased understanding of the environment. Here the Internet and the business intermediary in the B2B (IE) network are viewed as symbolised information processing systems of machine and humans respectively. The Internet was found to provide increased speed, reach, richness, and transparency to all trader groups prior to their entering a B2B (IE) network, as advocated by numerous authors (Phillips & Meeker, 2000; Shapiro and Varian, 1999). However, a key finding is that the value of these individual Internet functionalities in the information exchange process was found to be bound by the nature of the information flow dimensions identified earlier, and the extent of expansion or contraction of the two behavioural filters surrounding the transaction channel.

The findings in this study tease apart the assertions made by Spulber (2003) and Malone et al. (1987) who all argue for the overall increase in efficiencies and reduction in transaction costs for those intermediaries employing information technologies. When examining the separate and combined roles of the Internet and business intermediary respectively, support was not found for these more generalised assumptions. As already mentioned, the individual Internet functionalities were found to have limited value for traders in many instances, without the assistance of a business intermediary. Consequently, the value of the Internet was found to be limited to the extent to which the business intermediary could identify the dimensions within the informational and relational units of analysis and the extent of expansion or contraction in the business intermediary's own behavioural filters. For example, the identification of new information sources that could provide potentially rich information to electricity traders along the Internet channel first required an expansion of the business intermediary's own beyond rationality filter in locating this information. Then, only at that time was the business intermediary in a position to assist with the expansion of trader behavioural filters.

In contrast to Peng et al. (2000), who from a TCE perspective found business intermediaries provided greater value in facilitating the exchange of low complexity products between distant markets, this study found the highest value

potential to be held by the electricity intermediary who operated in a market where traders were geographically close to one another and the exchange of electricity as a product was highly complex. The findings in this study do, however, support Amit et al's. (1998) research where a disproportionately high number of venture capitalist intermediaries were identified operating in high complexity industries such as communications and software.

This study both extends Sawhney and Parikh's (2000) argument for the presence of a mechanised middle in an electronic network, and also links their argument to the intermediary literature. In accordance with Sawhney and Parikh (2000) who suggest that the value in an electronic network resides at the peripheries rather than at the mechanised centre a mechanised middle was found. In fact three mechanised middles were identified across the transaction process. In the intermediary literature Spulber (1998) identifies three key areas across the transaction process where intermediaries are likely to maximise their value contribution: at the points of pre-sale, point-of-sale, and post-sale. Business intermediaries were found to have the opportunity to provide their value adding activities at each of these points, with the Internet providing three mechanised middle opportunities, to link these points together. Consequently, the greater the number of mechanised middles found across the transaction process, especially when combined with the dimensions identified in the informational unit of analysis, the greater the number of opportunities for business intermediaries to add value on either sides of these. The electricity intermediary which operates in a highly volatile, perishable product market was found to have the most opportunities.

A link is built between Burt's (1982) structural hole theory and the literature on modularity (Sanchez, 1998, 2003) to examine how a business intermediary in a B2B (IE) network might simultaneously leverage current and future opportunities. It was found that the business intermediary in each network continued to attempt to identify information gaps in their great inner environment and great outer environments, thus extending Burt's work, by focusing on the value of brokering information gaps both within and across network settings. This study also extends

the modularity literature by identifying a parallel modularised relationship and architecture (structures/processes) building process that happens simultaneously in the great inner and great outer environments. By systematically working through a series of modularised relationship and architecture building steps each business intermediary was found to be in a position to maximise their ability to leverage new information opportunities, and thereby methodically move with overall certainty, in a general environment characterised by high levels of uncertainty, and the requirement for large ongoing asset specific investment in technology platforms.

The final theoretical contribution this thesis makes centres upon the development of a dynamic model that identifies the network as the primary unit of analysis, with three secondary units of analysis, the informational unit, the relational unit, and the central core unit, each with separate underlying dimensions. Though these secondary units are important as individual entities in their own right, what is more important is the understanding of the interaction between these units, in order to realise the full value creation potential in a B2B (IE) network. This interaction process was found to be led by the business intermediary, positioned in the central core. Together these findings support and integrate the work of several authors. First they support the call made by Venkatramin and Subramaniam (2002) to investigate whether a new unit of analysis in strategy should be devised, and if so, whether it should be the network and what the underlying dimensions might be. Second they support Amit and Zott's (2001) suggestion that research on e-business and on more general networked competition take an integrative approach. Third they support Quinn et al's. (1996) starburst model where they argue that value is disseminated from the central core. Last, these findings begin to tease apart Etzioni's (1988) *I* and *We* concept, with the business intermediary taking the lead role as an *I* to creatively unleash and lead the *We*'s with the trader participants.

12.5 Research Implications

This thesis has provided an exploratory step to understand the key points of value in a B2B (IE) network. Since these findings arise from the confines of three electronic network case studies, all based in one geographical location, and the area of study is one with particular interest, especially as electronic networked trade continues to grow, several interesting and challenging opportunities arise for further research such as: a) Can these findings be replicated by quantitative methods? b) What are the sources of competitive advantage in an online or offline network? c) where are the sources of competitive advantage when linking together the individual, the organisation and the network? This study focused on the organisation and the network. Future studies should more closely examine Etzioni's (1988) *I and We* concept over these three areas. Furthermore these studies should link together the strategy and psychology literatures. And d) How are the secondary units of analysis identified in this study managed, whereby the value of their interaction is maximised in a network when there is no clear centralised intermediary figure?

12.6 Summary

I began by developing a skeletal framework from *a priori* research in the strategy, strategic networks, and B2B (IE) networks literatures and then combined these findings with case study data using the grounded theory approach. The grounding of these data led to the development of the integrative value creation framework identified for the B2B (IE) network. When viewing this framework it must be remembered that just as with the role of the business intermediary, my interpretations as researcher and the choice of the three B2B (IE) networks studied, are both bound and stretched by my own bounded and beyond rationality sub-filters. However, I do suggest that the development of theoretical frameworks such as this is very important as networked trade becomes more prevalent in both the electronic and non-electronic arena.

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Appendix A. Questionnaire: Business Intermediary

1. Why and when did you form a B2B (IE) network?
2. How would you describe the overall infrastructure of your network?
3. Do you have any particular rules or guide lines that you used either at the beginning, or now, to recruit buyers/suppliers?
4. Have you aimed to recruit as many buyers and suppliers as possible?
5. What is the nature of the trading links that you have established? What is the number of links? Is anything going to limit you attracting more trading links to your network?
6. From a buyer/supplier perspective would you say that there is a maximum number of transacting partners to be had, after which there is very little incremental value to them?
7. How would you describe your skills and capabilities?
8. How would you describe the relationship you have with buyers/suppliers and other strategic partners?
9. How has the relationship between buyers and suppliers changed as a result of network membership?
10. How important is the issue of trust between yourself and the participants? Do you have any processes or systems that you use to identify and/or instil trust?
11. Where or what sources of information do you use to drive/make changes to the B2B electronic network?
12. Can you describe the technology system that you had when you started the B2B electronic network? Why and how has this changed?
13. The internet provides increased levels of speed, reach, richness and transparency. What do you think this means to traders if they were to use the internet alone without your services? What advantages/disadvantages do you see? What systems and/or processes do you have in place to accommodate this?
14. What do you believe are they key ways that you currently add value to traders in the absence of the internet? Has this changed over time?
15. To what extent would you say that the structures that you have put in place have influenced your ability to perform?
16. What do you think are the major challenges within this network type? Have these challenges changed over time? How do you respond to current/future opportunities?
17. What impact has the industry size, stage, buyer/supplier concentration etc had on your ability to perform as B2B electronic network?
18. How have the specific assets of suppliers/buyers and others, including technology/and general skills, influenced your ability to perform?

Appendix B. Questionnaire: B2B (IE) Network Traders

1. Why did you decide to join a B2B (IE) network?
2. Why did you decide to join this one in particular?
3. What percentage of business would you consider you conduct through this medium compared to offline or other channels? Why?
4. Do you belong to more than one electronic network?
5. Have you needed to invest in any particular specialised assets to participate in this form of trade?
6. Are you connected via the network to known as well as unknown buyers/suppliers? If so, what difference does this make, if any? How important is trust?
7. How important is it that the network provides a large number of suppliers (& vice versa).
8. Have you experienced any challenges in taking part in the B2B (IE) network? Explain
9. To what extent is it different transacting via this medium than offline, direct online? What investments or adaptations have you been required to make in order to join this network?
10. To what extent has your economic performance changed since participating in the network?
11. To what extent has your relationship with competitors or other transacting parties changed as a consequence of participating in the B2B (IE) network?
12. What kinds of benefits do you think you would get if you just used the Internet without the business intermediary? Have you experienced this situation?
13. What kinds of benefits do you think you would get if you just used the business intermediary without the business Internet? Have you experienced this situation?

Appendix C. M-co Market Participant List

<i>Market Participants</i>	<i>Purchasers</i>	<i>Generators</i>	<i>Traders</i>
Contact Energy	✓	✓	✓
Counties Power			✓
Genesis Power	✓	✓	✓
Industrial Energy			✓
Meridian Energy	✓	✓	✓
Might River Power	✓	✓	✓
RMB Australia			✓
Todd Energy	✓	✓	
Natural Gas Corporation		✓	✓
TrustPower	✓	✓	
Tuaropaki Power			✓
Wairarapa Electricity			

(M-co Annual Report: 2001, p. 3)

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