# Sustainability of Collaborative Networks in Healthcare:

# A Resources and Capabilities Perspective

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A thesis submitted to

Auckland University of Technology

in fulfilment of the requirements for the degree of

Doctor of Philosophy (PhD)

2013

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# ATTESTATION OF AUTHORSHIP

I hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person (except where explicitly defined in the acknowledgements), nor material which to a substantial extent has been submitted for the award of any other degree or diploma of a university or other institution of higher learning.

Josephine Chong

# ACKNOWLEDGEMENTS

My first debt of gratitude must go to my PhD supervisor Professor Bill Doolin, who believed in me and took a leap of faith by accepting me as his student despite my very apparent shortcomings. I like to thank his guidance and care during my four years of PhD study in AUT. Without his direction of my research, this thesis would never be possible. He is, and will always be, more than a supervisor to me.

I would also like to express my gratitude to my secondary supervisor, Associate Professor Simon Mowatt. As my second supervisor, he has always been very supportive of my work. His constructive feedback has helped me to construct a better thesis. I am very thankful for his guidance.

During my time at AUT, I was also privileged to be given the opportunity to learn from, and work with, some of the very best scholars in the IS discipline. These include Professor Felix Tan, Associate Professor William Wong, Dr Angsana A. Techatassanasoontorn, Dr Antonio Díaz Andrade and Dr. Dr Harminder Singh. Their guidance has served me well and I owe them my heartfelt appreciation.

I wish to thank my family. First, I want to thank my mum who has supported me in every possible way she can. I also acknowledge my brother and sisters for supporting my academic aspirations.

I would also like to extend my thanks to my friends for their support and encouragement throughout the years. In no particular order, these include Jeradine Tan, Dr. Noraizah Abu Bakar, Dr Sophia Duan, Swati Nagar, Danae Anderson, Jacklyn Lim, Jenny Huang and Ivan Indriawan.

Ethical approval for this research was obtained from the Auckland University of Technology Ethics Committee under application AUTEC 09/133 on 6 July 2009 (amended 26 July 2010).

# ABSTRACT

This research focuses on inter-organizational collaborative networks. Organizations are increasingly forming inter-organizational networks, because of the benefits accruing to organizations through acquiring, complementing or sharing resources and competencies. In spite of a rich literature on the motives and benefits for forming inter-organizational networks, the post-formation management of such networks has been relatively less explored. Further, while attention has been given to the advantages accruing to an individual organisation through its participation in a network, the concept of inter-organizational networks that collaborate to pursue a joint strategic objective is less well explored. This thesis aims to understand how collaborative inter-organizational networks are sustained. That is, how they manage their on-going inter-organizational relationships in the collaborative pursuit of a common objective.

To address this research aim, a conceptual framework is developed that proposes key initial concepts in exploring sustained collaborative network processes. The extensive theoretical literature on strategic collaboration, resources and capabilities that has been accumulated over several decades is reviewed and used to develop a conceptual framework for answering the research question: *How are network-level resources and capabilities utilised to sustain inter-organizational collaborative networks?* Rather than focusing on individual organizations' utilisation of network resources as a basis for competitive advantage, the emphasis is on collaboration and the use of resources and capabilities developed by a network to sustain the network while it pursues a common goal or joint strategic objective.

A multiple case study research design, involving semi-structured interviews and documentation review, is used to study four healthcare collaborative networks in New Zealand and Singapore. The four cases cover collaborative networks in healthcare product development and healthcare service delivery, and include both sustained and non-sustained networks. A thematic analysis of the qualitative data collected in each case study is used to refine the conceptual framework developed in the study, and to explore the dimensions and properties of its proposed resources and capabilities. Both within-case and cross-case analyses are conducted to establish the utility of the conceptual framework for understanding and explaining collaborative network sustainability. This thesis presents a number of theoretical and practical contributions and provides suggestions for future research on this topic.

# Chapter 1: Introduction

## 1.1 Rationale for the Research

For many years, the formation and performance of strategic alliances and networks has been viewed as an important phenomenon by academics and industry practitioners. Forming an inter-organizational network is presented as a strategic approach to enhance an organization's competitive advantage by co-specialising its existing resources with resources and skills that are accessed through the inter-organizational relationships. According to Gulati et al. (2000), all firms are embedded in one or more networks, in which they co-operate with others to create value by gaining information and complementary competencies. Therefore, networks are considered to be particularly important in the complex and turbulent contemporary business environments (Hoffman and Schlosser, 2001; Pavlovich and Akoorie, 2003). For example, from an industry perspective, the growth and development experienced by emerging markets has led to an increased demand for infrastructure facilities in these economies. This has created opportunities for infrastructure suppliers and, as the infrastructure projects are largely characterised by government involvement, the mode of entry for private investors is through public-private partnerships. This type of collaborative arrangement between government, local and international private investors allows domestic firms in the emerging markets to access the necessary skills and capital, know-how and innovative abilities that are critical for the successful development and growth of infrastructure facilities in these economies (Betts et al., 2011).

Some strategic management scholars have studied how network membership can improve an organization's competitive advantage and performance through the sharing of resources (Chen and Chen, 2003; Gulati, 1999; Hoffmann, 2007). Others have focused on how co-operation and the sharing of resources in an inter-organizational network can produce mutual benefits and a relational advantage that is jointly generated (Dyer and Singh, 1998). Such an approach focuses on strategic collaboration and the creation of collaborative advantage (Lado et al., 1997).

A large amount of research has been conducted on the motives for and benefits of inter-organizational collaboration, and the factors needed for successful collaborative relationships. However, the post-formation implementation and management of collaborative networks has been relatively less explored, so that our knowledge of their evolution over time and the developmental processes through which they are managed and sustained remains limited (Das and Teng, 2002; Doz, 1996; Kale and Singh, 2007; Reuer and Zollo, 2000; Taylor, 2005, Turrini et al., 2010). Given the importance of collaborative networks, there is a need for research into how such collaborative relationships are sustained such that they become viable inter-organizational entities that can pursue their collective objectives (Kale et al., 2009; Reuer and Zollo, 2010; Taylor, 2005; Turrini et al., 2010).

## 1.2 Research Aim

Accordingly, this thesis aims to understand how inter-organizational collaborative networks are sustained. For the purpose of this research, sustainability refers to a network's ability to manage and maintain its on-going inter-organizational relationships in the collaborative pursuit of a common objective.

In order to address this primary research aim, the resource-based view of the firm (RBV) (Barney 1991, 2001; Grant 1991) was adopted as an initial theoretical sense-making lens (Eisenhardt, 1989). RBV was selected as it is a well-established theoretical approach to studying how organizations can complement their existing resources with the acquired resources from other organizations to achieve competitive advantage (Gulati, 1999; Gulati et al., 2000; Lavie, 2006). Used in this way, the focus is on how organizations participating in a network can gain competitive advantage through exploiting the network's pool of valuable resources.

This thesis builds on this prior body of work in three important ways. First, rather than focusing on competitive advantage and how network membership will improve an organization's competitive position and performance through the sharing of network resources, attention shifts to collaborative advantage (Lado et al., 1997) and how organizations embedded in networks of relations share resources in order to a achieve a joint strategic objective. In a typical collaboration, different network members bring various strategic resources to the network, which, when combined with the resources of other partners, result in a synergistic effect whereby the combined resource endowment is more valuable, rare and difficult to imitate than the resources are before they are combined.

Second, this thesis draws on the notion of resources and capabilities to propose initial constructs of the resources and capabilities that are needed to sustain a collaborative network. In order to provide greater conceptual clarity to the constructs, a distinction is made between the first-level 'resources' possessed by a network and the second-level 'capabilities' that are required to co-ordinate, leverage and enhance the productivity of the first-level resources (Araya et al., 2007). In particular, the dynamic capabilities view (Teece et al., 1997) is used to propose the concept of network-level capabilities that are developed and built by the network as a collective entity in order to sustain its collaborative relationships and efforts. Such capabilities are dynamic by nature since their development is embedded in network processes and they evolve over time in response to changing environments and on-going challenges faced by a particular network (Barreto, 2010). They represent a form of network learning and are necessary for a sustained collaborative network.

Third, rather than focusing on the individual firm, this thesis utilises a 'whole' network level of analysis (Provan et al., 2007) to focus on how a collaborative network collectively utilises the

combined set of resources through the dynamic capabilities it develops to effect a positive and sustained collaboration. While RBV and the dynamic capabilities view have emphasised the importance of resources and capabilities at the 'firm level', for instance in how a firm can acquire the resources needed to achieve competitive advantage or build the capabilities needed to deal with changing environments, the thesis defines a type of resource and capability that is acquired or developed, controlled and utilised at the 'network level'. The resulting conceptual framework is used to answer the following research question: *How are network-level resources and capabilities utilised to sustain inter-organizational collaborative networks?*

A research design based on multiple case studies of collaborative networks in the healthcare industry is used to sharpen the initial constructs proposed around the research question (Eisenhardt, 1989). Four case studies are examined in this thesis. Two collaborative networks that focused on healthcare product development and two that focused on healthcare service delivery were studied. Selection of the four case studies involved both literal and theoretical replication (Yin, 2003) in order to study each type of healthcare collaborative network and to contrast sustained and non-sustained collaborative networks. The findings from the four case studies are used to refine the conceptual framework and empirically investigate its utility for understanding and explaining sustained collaborative networks. Three of the collaborative networks were located in New Zealand, while the fourth was based in Singapore. While the healthcare industry in Singapore differs from that of New Zealand in certain aspects, both face similar issues in terms of the development and use of collaborative networks for healthcare service delivery and product development.

## 1.3 Research Context: Collaborative Networks in Healthcare

According to the consulting company Frost & Sullivan (2007), the most collaborative industries from a global perspective are professional services, financial services and healthcare. Frost & Sullivan similarly evaluated these three industries as the most collaborative industries for the Asia-Pacific region. Collaboration is crucial for these industries as a result of an increasingly competitive socio-economic environment, globalisation, and increased product and service complexity (Das and Teng, 2000b; Hoffmann, 2007; Pullen et al., 2012). As a result of inter-organizational collaboration, organizations are able to gather and acquire new resources and know-how knowledge that can improve their organizational competitive advantage in constantly changing socio-economic landscapes (Arya and Lin, 2007). Collaboration has been shown to be a key driver of company performance (Frost & Sullivan, 2007). Collaboration, including the formation of collaborative networks, is also becoming more prevalent with the globalisation of the world economy. This is because collaborative networks are able to generate economies of scale and expand coverage of service regions (Mitsuhashi and Greve, 2009). Finally, in terms of service complexity, customers are increasingly expecting services that are offered to them in a

'one-stop' approach; for example, in financial services (Geib et al. 2006). Consequently, there is a need for banks and financial organizations to form collaborative networks in order to provide seamless and value-added services to such demanding customers (Alt and Reitbauer, 2005).

Given the focus of this thesis, an industry with a high level of collaboration and in which networks were important would form a useful context for this research. Focusing on a single industry or sector controls for sector effects and helps focus attention on the constructs of interest (Pullen et al., 2012). Given its highly collaborative nature in the Asia-Pacific region, healthcare was selected as the research context. Collaboration is crucial for the healthcare industry as a result of an increasingly complexity of patient care that is engendered by the changing socio-economic environment and increased healthcare product and service complexity (Davey, 2011; Mouttham et al., 2012; Rycroft, 2007). The intent is not to examine collaborative networks within healthcare as representative of such networks across all industries, but to use the healthcare industry as a context in which collaborative networks are very relevant and thus which is more likely to shed light on the phenomenon being studied - how such networks are sustained.

The healthcare industry represents a significant percentage of the gross domestic product (GDP) in many countries. In 2009, the global total expenditure on health as a percentage of GDP was 9.4%. The United States of America had the highest spending of GDP on health (17.6%) while New Zealand spent 10.0% of GDP on health, and Singapore allocated 4.1% of GDP to health (World Health Organization, 2012). When public spending on healthcare is considered, government expenditure on health as a percentage of total government expenditure for the United States of America was 17.1%, New Zealand was 19.8%, and Singapore was 8.3%. Health expenditures of this magnitude engender economic and social impacts to a nation, underlying the importance of healthcare as a context for research, policy and practice. In particular, a key driver for government action is the need to reduce or curb healthcare costs while improving care delivery and promoting equity of access to healthcare services. This needs to be achieved in the face of changing patterns of healthcare, a rising global burden of chronic health conditions, and continually increasing expectations for improved healthcare outcomes (World Health Organization, 2012).

One approach to addressing these issues is the growing trend internationally towards the adoption of patient-centred healthcare systems, in which care is customised according to patients' needs and values, knowledge is shared and information flows freely, patients have an active role in deciding about and planning their medical care, and collaboration between healthcare professionals and patients is a priority. Such systems enable patients and their healthcare professionals to facilitate a two-way communication process whereby patients' needs

and values and healthcare professionals' knowledge and information can be shared transparently among the participants and patients' family members. Ultimately, effective clinical decisions can be made together by both patients and healthcare professionals (Plsek and Wilson, 2001). Patient-centred healthcare systems are believed to have a wide range of benefits in achieving improved healthcare outcomes while curbing healthcare costs. These include improved patient care and quality of life, particularly in controlling chronic diseases without increasing healthcare costs, facilitating more equitable access to healthcare that addresses the socio-economic disparities in healthcare outcomes, and overall better vale for healthcare expenditure (Epstein et al., 2010).

Effective patient-centred healthcare systems rely on achieving improved interactions between patients and their healthcare professionals, increasing connections between healthcare professionals so that they act collaboratively to meets patients' needs, and patient-centred information systems and technologies that integrate information about a patient's health, context, conditions and treatment and make that information available to both patients and a wide range of healthcare professionals (Epstein et al., 2010). Allowing patients to have increased access to related healthcare information helps them be more active in managing their health and treatment, as well as helping to reduce the costs of their healthcare. Patients have greater empowerment to choose what is best for them when they are better informed about their healthcare services and pricing. Greater information sharing also benefits the effective communication and co-ordination of the increasingly diverse group of healthcare professionals, potentially drawn from both the public and private sectors, caring for an individual patient.

The above suggests that providing efficient and cost-effective healthcare delivery entails cohesive collaboration between patients, their families and various healthcare professionals and providers (Safan, 2003). With regard to the need for greater connections between healthcare professionals, Kilo (1999) outlines the benefits of collaboration in a healthcare context as: (1) collaboration can diffuse and accelerate the existing clinical knowledge to the actual provision of care, (2) collaboration enables synergism as it provides opportunities for health professionals with diverse yet synergetic clinical skills to collaborate to solve difficult clinical issues, and (3) collaboration creates an active learning environment whereby clinical knowledge can be assimilated and disseminated among the various healthcare stakeholders.

For example, chronic diseases have been identified as a growing worldwide health problem associated with aging populations, increased longevity, and behavioural risk factors such as unhealthy diets, physical inactivity and obesity (World Health Organization, 2012). However, it is increasingly challenging to deliver chronic disease related healthcare services because: (1) the treatments for chronic illness are getting more complex; (2) the changing of healthcare landscape has made the co-ordination and integration of chronic care delivery to the patients and

their families more demanding; and (3) patient care a undergoing a  transition from a single healthcare provider's provision of medical consultation to a collaborative medical consultation by several healthcare providers (Ouwens et al., 2005; Plochg et al., 2006).  For these reasons, the quality and efficiency of chronic disease related healthcare services delivery requires collaboration between various healthcare stakeholders (Mouttham et al., 2012, Provan et al., 2003).

The formation of healthcare networks is increasingly being seen as a solution for the effective and efficient delivery of chronic disease related services and other healthcare services, particularly in the face of continually increasing healthcare costs (Alexander et al., 2003; Racine, 2006; Scheirer, 2005). The formation of collaborative clinical networks is seen as a way to improve healthcare services by co-ordinating and delivering services across professional and organizational boundaries at local, regional and national levels. Such networks are becoming common in many countries as they aim to provide and deliver integrated and co-ordinated a range of specialised patient-centred healthcare services (Cunningham et al., 2012; Goodwin, 2008). Clinical networks maximise the use of scarce specialist resources, enable patient care standards and guidelines to be developed and shared collaboratively, and improve the co-ordination of patient care. The complexity and diversified structure of these inter-organizational and inter-professional relationships poses a challenge to marinating such networks because of the difficulty in aligning the interests, needs and incentives of each network stakeholder.

Network-based collaboration also plays a crucial role in facilitating successful healthcare product innovations, including the information systems and technologies that underpin a patient-centred healthcare system. A high level of collaboration is needed given the complexity of healthcare products and their development process (Pullen et al., 2012). Bringing together multiple collaborating partners in an innovation network can combine sources of knowledge and experience, lower the cost of innovation, spread the risks of development, increase the speed of innovation, and exploit wider markets (Davey et al., 2011; Rycroft, 2007). Increasingly, collaboration between a network of healthcare stakeholders, including solution providers, information providers, healthcare organizations and government health agencies is required to develop new healthcare products.  For example, in many countries, efforts are being made to develop electronic health record systems and healthcare portals to digitally manage and exchange patient data between multiple authorised users, often including the patients themselves (Chou and Chou, 2002; Häyrinen et al., 2008).  Internet-based or mobile patient health records provide patients with access to and control over their own health information and electronic medical records. Such technologies enable patients to better manage their health and to share their health information with approved healthcare providers (Kharrazi et al., 2012).

Projects to enhance the quality of healthcare face significant risks and challenges, whether improving communication and managing patient related information through integrated networks (Pare et al., 2008; Pirnejad et al., 2008) or developing and deploying healthcare information systems and technologies (Al-Ahmad et al., 2009). Prior research has identified a range of technological and organisational factors that can contribute to the success or failure in such healthcare projects. Potential technological issues include the complexity of clinical software and hardware (Pare et al., 2008; Sicotte et al., 2006), health information systems' graphical user interface design quality (Ludwick and Doucette, 2009), the usability of health information systems (Goldberg et al., 2011), and the quality of health information systems (Ludwick and Doucette, 2009). Potential organizational factors include definition of the project's goals and objectives (Gauld, 2006), project leadership and management (Sicotte et al., 2006), and clinician involvement (Al-Ahmad et al., 2009; Pare et al., 2008).

## 1.4 Structure of the Thesis

The thesis is organized into nine chapters. Chapter 1 has established the significance of the topic and the rationale for undertaking this study. It outlined the research aim and discussed the choice of healthcare as the industry in which this study is based. Chapter 2 reviews the relevant literature on strategic collaboration, inter-organizational networks, and resources and capabilities, in order to construct the theoretical foundation for the research. The results of the literature review are used to propose specific constructs that constitute a conceptual framework for analysing and explaining how collaborative networks are sustained. Chapter 3 presents the study's post-positivist philosophical stance, together with the methods of data collection and data analysis used in the research. The multiple case study research design is then outlined and discussed.

Chapters 4-7 present the analyses of the four case studies. Chapter 4 analyses the HealthPort collaborative network, which was formed to develop a web-based healthcare portal in New Zealand. Chapter 5 analyses a second collaborative network for healthcare product development. The MobiHealth network was established to develop a mobile patient health record in Singapore. Chapter 6 shifts the focus from healthcare product development to healthcare service delivery. The chapter analyses MediNet, a collaborative network for co-ordinating delivery of a national medical service in New Zealand. Chapter 7 analyses the final collaborative network studied, SurgiNet, which was formed to improve the delivery of a national surgical service in New Zealand.

Chapter 8 builds on the preceding within-case analyses and presents a cross-case analysis that discusses and compares the relevant findings across the four collaborative networks studied. It evaluates the resources available to each collaborative network and the level of capabilities developed to deploy them in each case. It then examines the extent to which the four

collaborative networks were sustained, in terms of three tensions or pairs of competing forces (Das and Teng, 2000a), and explores the relative importance of each type of network capability in balancing these three tensions across the four collaborative networks. Chapter 9 concludes the thesis with a brief summary of the study and how the research question was answered. It discusses the theoretical and practical contributions of the research, before outlining the limitations of the study and suggestions for future research.

# Chapter 2: Literature Review

Chapter 2 is a review of relevant theory and prior work that is applicable to this research. Research literature in the context of strategic alliances, inter-firm relationship management, resources and capabilities, and network governance, have been examined to identify initial theoretical concepts with which to explore sustained collaborative networks. Building on this literature review, a conceptual framework is developed that proposes a range of resources and capabilities needed for a sustained collaborative network.

## 2.1 Inter-Organizational Relationships

As the business environment becomes more dynamic, complex and inconstant, organizations are increasingly entering co-operative and strategic relationships with other organizations in order to improve their competitive positions and organizational performances (Das and Teng, 2000b; de Man and Duysters, 2005; Lado et al., 1997). Inter-organizational co-operation enables organizations to acquire, complement or share with each other resources and competencies as a response to the contemporary business environment.

Our understanding of inter-organizational co-operation is grounded in a large body of scholarly work on strategic alliances. Strategic alliances play a particular important role in dynamic industries such as biotechnology, telecommunications, manufacturing and finance (Hoffmann, 2007). The term alliances can encompass various co-operative relationships between two or more organizations. An alliance is strategic when it is the means by which an organization seeks to implement, in part or in whole, elements of management's strategic intent (Hamel and Prahalad, 1989). The term strategic can also be seen as reflecting a strategy to co-specialise organizational resources and capabilities with resources and capabilities that are accessed through the alliances in order to better achieve organizational performance; for instance, an entry into a new market streamlining operations or activities (Pavlovich and Akoorie, 2003). Todeva and Knoke (2005) have classified thirteen basic forms of inter-organizational relations from prior theoretical and research literatures, and the common forms are presented in Table 2.1. Formalisation of the governance of the inter-organizational relations decreases as one moves down the table, between hierarchy and market (Todeva and Knoke, 2005).

The formation of strategic alliances has significantly increased over the last two decades (Elmuti and Kathawala, 2001; Gulati and Gargiulo, 1999; Hoffmann, 2007; Kale and Singh, 2007; Rothaermel and Boeker, 2008). According to Dyer et al. (2001), the top 500 global business firms average 60 major strategic alliances each. As a result, there has been much scholarly interest in studying the motivations for organizations to enter strategic alliances. The most common explanations for organizations to form strategic alliances are summarised in Table 2.2.

Table 2.1 Forms of Inter-Organizational Relations

| Form | Description |
| --- | --- |
| Hierarchical relations | Through acquisition or merger, one firm takes full control of another's assets and co-ordinates actions by the ownership rights mechanism. |
| Joint ventures | Two or more firms create a jointly owned legal organization that serves a limited purpose for its parents, such as R&D or marketing. |
| Equity investments | A majority or minority equity holding by one firm through a direct stock purchase of shares in another firm. |
| Co-operatives | A coalition of small enterprises that combine, co-ordinate, and manage their collective resources. |
| R&D consortia | Inter-firm agreements for research and development collaboration, typically formed in fast-changing technological fields. |
| Strategic co-operative agreements | Contractual business networks based on joint multi-party strategic control, with the partners collaborating over key strategic decisions and sharing responsibilities for performance outcomes. |
| Cartels | Large corporations collude to constrain competition by co-operatively controlling production and/or prices within a specific industry. |
| Franchising | A franchiser grants a franchisee the use of a brand-name identifies within a geographical area, but retains control over pricing, marketing, and standardized service norms. |
| Licensing | One company grants another the right to use patented technologies or production processes in return for royalties and fees. |
| Subcontractor networks | Inter-linked firms where a subcontractor negotiates its suppliers' long-term prices, production runs, and delivery schedules. |
| Industry standards groups | Committees that seek the member organizations' agreements on the adoption of technical standards for manufacturing and trade. |
| Action sets | Short-lived organizational coalitions whose members co-ordinate their lobbying efforts to influence public policy making. |
| Market relations | Arm's-length transactions between organizations co-ordinated only through the price mechanism. |

(Adapted from Todeva and Knoke, 2005)

Ultimately, the motives listed above can be narrowed down to two basic motivators for the formation of strategic alliances (Ebers, 1997). The first motivator is to increase revenue where organizations cannot achieve positive organizational performances alone due to a scare pool of resources or lack of access to resources. Strategic alliances are an effective way to improve resource endowment. As asserted by Chen and Chen (2003), strategic alliances can provide organizations with access to desired strategic capabilities, resources that are able to create synergies that can enhance or reshape competition within the market. The second basic motivator is to lower transaction costs. When organizations form strategic alliances, transaction costs can be reduced as a result of small number bargaining. This is because strategic alliances enable organizations to gain collaborative strength which allows economies of scale (Kogut, 1988) as well as economise on governance costs (Dyer and Singh, 1998). According to Mclvor (2008), a high level of uncertainty can lead to a higher transaction cost. Strategic alliances can facilitate inter-organizational learning and knowledge transfer which can improve organizational skills and competencies, consequently leading to a lower level of uncertainty.

Table 2.2 Rationales for entering Strategic Alliances

| Rationale | Sources |
|---|---|
| Entering new markets | Hemphill and Vonortas (2003); Powell et al. (1996); Todeva and Knoke (2005); Varadarajan and Cunningham (1995) |
| Circumventing legal or regulatory barriers | Taylor (2005); Todeva and Knoke (2005) ; Varadarajan and Cunningham (1995) |
| Enhancing strategic flexibility | Hemphill and Vonortas (2003) |
| Structuring competition | Hemphill and Vonortas (2003); Todeva and Knoke (2005) ; Varadarajan and Cunningham (1995) |
| Acquiring new products or distribution channels | Todeva and Knoke (2005); Varadarajan and Cunningham (1995) |
| Speeding product development and time to market | Powell et al. (1996); Varadarajan and Cunningham (1995) |
| Sharing costs and increasing efficiencies | Hemphill and Vonortas (2003) ; Varadarajan and Cunningham (1995) |
| Pooling complementary resources | Hemphill and Vonortas (2003); Powell et al. (1996); Todeva and Knoke (2005) ; Varadarajan and Cunningham (1995) |
| Accessing skilled labour and expertise | Ahuja (2000a); Taylor (2005) |
| Accessing new technology | Ahuja (2000a); Powell et al. (1996); Todeva and Knoke (2005) |
| Learning new skills | Ahuja (2000a); Todeva and Knoke (2005) ; Varadarajan and Cunningham (1995) |
| Reducing or diversifying risk | Hemphill and Vonortas (2003); Powell et al. (1996); Taylor (2005); Todeva and Knoke (2005) ; Varadarajan and Cunningham (1995) |
| Obtaining economies of scale | Taylor (2005); Todeva and Knoke (2005) |
| Achieving vertical integration | Todeva and Knoke (2005) |
| Developing and promoting technical standards | Hemphill and Vonortas (2003); Taylor (2005); Todeva and Knoke (2005) |

### 2.1.1 Inter-Organizational Networks

Research on strategic alliances has traditionally focused on alliances between two organizations. However, multi-organization alliances are becoming increasingly prevalent in the global economy (Elmuti and Kathawala, 2001). Indeed, all firms are embedded in one or more networks, in which they co-operate with others to create value by gaining information and complementary competencies (Gnyawali and Madhavan, 2001; Gulati et al., 2000). Multi-organization alliances are often referred to as inter-organizational networks. As Casson (1997) and Ebers (1997) note, the term 'network' is sufficiently general and abstract to cover many different understandings of inter-organizational relationships.

Researchers are increasingly taking a strategic focus on networks to understand their importance to organizations in providing access to external resources or their implications for organizational performance (Elmuti and Kathawala, 2001; Gnyawali and Madhavan, 2001; Möller and Svahn, 2003; Zaheer and Bell, 2005). There are many empirical studies that show that networks can

provide opportunities for organizations to learn from each other by gathering information and acquiring new skills, knowledge and resources to improve organizational competitiveness in terms of improved products or services, better innovation, enhanced technology and market development. (Arya and Lin, 2007; Powell et al., 1996; Provan et al., 2007; Walter et al., 2007; Zaheer and Bell, 2005).

Networks can boost organizational competitiveness in several ways. First, inter-organizational networks enable a wider scale and scope of information to be exchanged as well as access to a larger pool of resources and capacities (e.g. technology, manufacturing or marketing capabilities and financial resources). This enables organizations to position themselves in a stronger competitive stance (Chen and Chen, 2003; Gulati, 1999; Hoffmann, 2007). Second, networks facilitate inter-organizational learning. Organizations that are less competent can enhance their knowledge, capabilities and skills through learning from the more competent organizations. This may help less competent organizations to implement strategies that lead to improved performance as well as to create new resources (Ireland et al., 2002). Third, networks are easily adapted to knowledge-rich environments (Möller and Svahn, 2003). As contended by Grant (1996), organizational knowledge can create sustained competitive advantages.

Inter-organizational co-operation in the form of networks has been studied from a range of theoretical perspectives. The following section briefly outlines four such perspectives that can contribute to understanding inter-organizational networks. These are a resource-based view of the firm (Barney, 1991), the concept of dynamic capabilities (Teece et al., 1997), transaction cost economics (Williamson, 1985), and network forms of organization (Podolny and Page, 1998; Powell, 1990).

## 2.2 Theoretical Perspectives for Understanding Inter-organizational Networks

### 2.2.1 A Resource-Based View

According to Penrose (1959), a firm is more than an administrative unit. Instead, a firm is composed of a collection of specific productive resources. She further argued that a firm has to develop an ability to combine its available productive resources so as to exploit market opportunities, enabling the firm to gain competitive advantages. Building upon Penrose (1959), Wernerfelt (1984, p. 171) argues that "[f]or the firm, resources and products are two sides of the same coin." Wernerfelt emphasises that a firm's competitive position is not only determined by its products, but also it is determined by the resources that go into their production. That is to say, firms can earn above normal returns by exploiting and acquiring resources that are important to its production. In addition, he asserts that the possession of rare resources imposes a barrier to other organizations and one approach to gaining these rare resources is through mergers and acquisitions.

The resource-based view of the firm (RBV) is grounded in the seminal work of Penrose (1959) and Wernerfelt (1984), which provides a basis for understanding competitive heterogeneity between firms. Penrose (1959) asserts that firms are heterogeneous units that comprised of unique sets of idiosyncratic resources. Wernerfelt further argues that firms can earn super normal profits through effective development of internal resources and efficient allocation and deployment of these firm specific resources for productive opportunities. Ljungquist (2008) regard resources as inputs that enable an organization's value process to be driven to an improved competitive position. This can only be achieved when the organization is implementing a value creating strategy that cannot be simultaneously implemented by other organizations, which might not possess the appropriate resources (Barney, 1991; Das and Teng, 2000b).

The resource-based view of the firm (RBV) has become an established and influential theoretical framework for describing and explaining the relationship between resources and competitive advantage (Barney, 2001). In the RBV, resources are firm-specific assets, knowledge, processes and capabilities that organizations use to select, develop and implement their strategies. By enabling organizations to exploit their internal strengths, overcome internal weaknesses, respond to environmental opportunities and neutralise external threats, the RBV argues that an organization's portfolio or bundle of firm-specific resources enables it to generate and appropriate economic rents (Amit and Schoemaker, 1993), which are the means by which an organization achieves positive organizational performances and competitive advantage (Barney, 1991; Lado et al., 1997). Scholars often refer to the search for such strategic resources, the utilisation of which enables an organization's value-enhancing strategies and the accrual of better than normal economic returns, as rent seeking behaviour (Lado et al., 1997).

In the RBV, the basis for competitive advantage is possession of, or access to, a bundle of resources that are heterogeneous and immobile (or at least imperfectly mobile). Heterogeneity implies that strategically relevant resources vary between firms in an industry, and that some resources are superior to others. Resources are immobile if they are non-tradeable because they are idiosyncratic to the firm or because their property rights are ill-defined. Resources are imperfectly mobile if they are less valuable to other firms because they are specialised to firm-specific needs or co-specialised with firm-specific assets, or their transfer would entail high transaction costs (Barney, 1991; Chi, 1994; Peteraf, 1993). Barney (1991) further argues that to have the potential for sustained competitive advantage, resources must be (a) valuable in exploiting opportunities or neutralising threats; (b) rare among a firm's competitors; (c) imperfectly imitable, so that they cannot be easily be replicated by other firms; and (d) non-substitutable by alternative, strategically-equivalent resources.

The RBV has been critiqued as providing only a partial account of competitive advantage in the case of inter-connected organizations because it takes an atomistic approach that focuses on individual organizations. Such a focus overlooks that organizations' strategic resources may extend beyond their boundaries and neglects the networks of relationships in which organizations are embedded (Arya and Lin, 2007; Dyer and Singh, 1998; Gulati, 1999; Lavie, 2006). Hence, a growing number of scholars have attempted to apply the RBV as a theoretical lens in analysing networks (Arya and Lin, 2007; Das and Teng, 2000b; Gulati et al., 2000; Hemphill and Vonortas, 2003; Hoffmann, 2007; Ireland et al., 2002; Sarkar et al., 2001; Stieglitz and Heine, 2007). Typically, the RBV is extended to a network perspective by considering the network resources that accrue to firms through their participation in inter-firm networks, and the extent to which they are the basis for sustained competitive advantage (Gulati, 1999; Gulati et al., 2000; Lavie, 2006). Organizations participating in a network can gain sustained advantages, which in turn lead to revenue maximisation, through lowering transaction costs or exploiting their network partners' pool of strategic resources:

> Alliance partners brought distinctive resources to the alliance, which, when combined with the resources of the partner, resulted in a synergistic effect whereby the combined resource endowment were more valuable, rare and difficult to imitate than they had been before they were combined. Consequently, these alliances produced stronger competitive positions than those achievable by the firms operating individually. (Dyer and Singh, 1998, p.667)

Along this line, Hemphill and Vonortas (2003) assert that if organizations can sustain resource heterogeneity they are able to reap the benefit of competitive advantage. This is because the combination of an organization's resources with complementary resources from other organizations can either boost its strengths or ameliorate its weaknesses.

## 2.2.2 A Dynamic Capabilities View

Besides focusing on the concept of resources, RBV also emphasises the notion of capabilities. Resources are "stocks of available factors that are owned or controlled by the firm", while capabilities are "a firm's capacity to deploy *Resources*, usually in combination, using organizational processes, to effect a desired end" (Amit and Schoemaker, 1993, p. 35; emphasis in original). Similar to the characteristics of resources, capabilities are considered to be strategic if they are specifically possessed by an organization; that is to say, capabilities are heterogeneous, valuable, rare, inimitable and non-substitutable (Amit and Schoemaker, 1993; Teece et al., 1997). Nelson and Winter (1982) contend that organizations can sustain competitive advantage through leveraging organizational routines and processes to deploy the resources.

Numerous scholars have built upon the work of Nelson and Winter (1982) to study the concept of capabilities in organizations (Amit and Schoemaker, 1993, Collis, 1994; Eisenhardt and Martin, 2000; Majumdar, 2000; Makadok, 2001; Teece et al., 1997). One particular perspective on capabilities is the gradual evolutionary path involved in the capability development process. Typically, historical and antecedent context and situations experienced by the organization are embedded in the path of capability development (Collis, 1994; Peteraf, 1993; Zollo and Winter, 2002). In particular, learning from the organizational routines that are embedded in the capability development path provides a basis for organizations to have a capacity to better co-ordinate and deploy the available resources so as to achieve their organizational goals. However, Nelson and Winter's (1982) notion of capabilities has been criticised for a lack of attention in addressing dynamic environments.

Today, most organizations are facing a turbulent and complex business environment, and the original concepts of RBV are too static to respond to this market dynamism (Barreto, 2010; Eisenhardt and Martin, 2000; Priem and Butler, 2001). As such, Teece et al. (1997) theorise the concept of dynamic capabilities, as an extended version of RBV, to address this problem. By 'dynamic', they refer to "the capacity to renew competences so as to achieve congruence with the changing business environment', while 'capabilities' stresses the 'role of strategic management in appropriately adapting, integrating, and re-configuring internal and external organizational skills, resources, and functional competences to match the requirements of a changing environment" (Teece et al., 1997, p. 515). Dynamic capabilities are typically built rather than bought or otherwise acquired. They are established through the organizational processes that are shaped by the organization's asset position and the specific paths that the organization has taken previously to develop the particular dynamic capability. This means that dynamic capabilities are heterogeneous across organizations (Barreto, 2010). An organization can sustain competitive advantage when it develops a dynamic capability that is able to create and renew its current asset position and modify the path dependencies which allow better strategic alternatives in response to changes in the business environment (Teece, 2007; Teece et al., 1997).

### 2.2.3 Transaction Cost Economics

Transaction cost economics (TCE) was developed by Williamson (1985) who focused on transaction costs efficiency. TCE focuses on the governance structure used to organize, conduct and control transactions between organizations, such as sellers and buyers (Johanson and Mattsson, 1987). Extending TCE to a network perspective, transactions would refer to whether organizations should buy or make strategic resources. Organizations would collaborate with others when the cost of buying the needed resources is lower than the internal production and vice versa. These economic costs can be maximised by an appropriate governance mechanism, hierarchical governance or market governance. Market governance deploys contract law to

minimise transaction costs while hierarchical governance minimises transaction costs by using the contract law of forbearance that resolves any conflicts internally (Williamson, 1991). The choice between market and hierarchy is determined by three factors: asset specificity, uncertainty that is associated to bounded rationality and opportunism, and frequency.

First, asset specificity is defined as "durable investments that are taken in support of particular transactions, the opportunity cost of which investment is much lower in best alternative uses or by alternative users should the original transaction be prematurely terminated" (Williamson, 1985, p. 55). Hierarchical governance is preferred when organizations exchange transaction-specific assets because these assets incur higher economic costs such as switching costs and contracting hazards (David, 2004). Furthermore, the re-deployment of these highly transaction-specific assets is low which can increase the transaction cost as a sunk cost. Second, bounded rationality refers to environmental uncertainty as organizations may not have the available and necessary information to respond to a changing collaborative environment and to predict future developments or external contingencies. Environmental uncertainty incurs a higher transaction cost which is in the form of modifying the contractual agreements which can often be incomplete. Hierarchical governance is preferred when the environment is becoming increasingly complex. Opportunism refers to the behaviour uncertainty that assumes participating organizations are exploiting the transaction for their own benefits. Hierarchical governance is preferred when there is a high level of behaviour uncertainty. Third, frequency refers to "the volume of transactions processed through a given exchange arrangement" (Williamson. 1985, p. 110). Frequent transactions increase economic costs in terms of monitoring the exchanging of resources. Hierarchical governance is preferred when there is a high level of frequency.

In summary, assuming asset specificity, uncertainty and frequency, the hierarchical approach is a less costly approach to use for governing transactions that are specific and have a high level of uncertainty and frequency. Market governance is preferred when assets are non-specific, sufficient information is available to provide environmental certainty, and transactions are less frequent.

According to TCE, inter-organizational relationships entail a hybrid governance structure that is a combination of the hierarchical and market governance (Dekker, 2004; Williamson, 1991). The significant advantage of selecting the hybrid governance is that "the parties to such contracts maintain autonomy, but the contract is mediated by an elastic contracting mechanism" (Williamson, 1991, p.271).

However, the 'hybrid' approach of TCE has been criticised as inadequate to explain the management of inter-organizational relationships. The focus of transaction cost economics is on

the notion of contract law that underpins the economic costs of collaboration (Williamson 1985, 1991). The implication is that formal authority is the only examined element; that is, how market or hierarchical governance structures can effectively regulate opportunistic behaviours and respond to inter-organizational changes. However, a collaborative network is embedded in a rich and influential social context, so that it can be argued that informal and inter-personal structures are more significant for managing the inter-organizational relationship (Dekker, 2004). Such relationships are not so much determined by structural circumstances as by the interaction processes of individuals in the related organizations (Johanson and Mattsson, 1987).

### 2.2.4 A Network Perspective

RBV, dynamic capabilities and TCE examine the antecedents and consequences of inter-organizational relationships using the concepts of resource attributes, capability attributes and transaction attributes. Such analyses are conducted at the level of the organization and inter-organizational dyad. Other researchers focus on issues of network outcomes and effectiveness at the level of the inter-organizational network (Carpenter et al., 2012; Provan et al., 2007; Zaheer et al., 2010). Network analysis of inter-organizational relationships tends to focus on network structures and governance. Inter-organizational relationships at a network level have distinct structural properties and represent a network form of organization arrangement beyond those of markets or hierarchies (Podolny and Page, 1998; Powell, 1990).

As noted above, treating a network as a distinct organizational form is a departure from the TCE approach of a network as an intermediate or hybrid form of organization positioned somewhere between the two basic institutional forms of co-ordinating economic activities: markets and hierarchies (Williamson, 1991). Powell (1990, p. 297) argues that:

> Firms appear to be changing in significant ways and forms of relational contracting appear to have assumed much greater importance. Firms are blurring their established boundaries and engaging in forms of collaboration that resemble neither the familiar alternative of arms' length market contracting nor the former ideal of vertical integration.

Organizations in a network engage in recurring exchange relationships of finite or unspecified duration. They "individually retain residual control over their resources, yet periodically negotiate, sometimes even jointly decide on, their use" (Ebers, 1997, p.21). This is in line with Phillips et al. (2000, p. 24), who see a network as "a co-operative relationship among organizations that relies on neither market nor hierarchical mechanisms of control". Instead, the network form of organization is characterised by elements of obligation and trust between the exchange partners (Podolny and Page, 1998), emphasising "the role played by reciprocity and collaboration as alternative governance mechanisms" (Powell, 1990, p. 299). As asserted by

Perri 6 et al. (2006, p. 2), networks "resemble markets in being multi-organizational and relying on voluntary choice around participation, but resemble hierarchies in that integration is supported to some degree, relations horizontally are co-operative and price mechanisms are attenuated permitting long-term relations of commitment". Möller and Svahn (2003) suggest that networks have more flexible governance and are better at processing information than market or hierarchical forms of organization.

According to Grandori and Soda (1995, p.184), networks are regarded as "modes of organizing economic activities through inter-firm co-ordination and co-operation". Relevant and reliable information must be facilitated in order to have for an effective co-ordination of economic activities (Casson and Cox, 1997). Network structures can have an impact on the richness of information. According to Hoang and Antoncic (2003, p.170), network structure is defined as "the pattern of direct and indirect ties between actors". Typically, these network ties have two underlying concepts: strength of ties and structural holes. The strength of ties is determined by "the amount of time, the emotional intensity, the intimacy and the reciprocal services" (Granovetter, 1973, p. 1361). Weak ties are characterised by a shorter time frame, a lower level of emotion and intimacy and a small amount of reciprocity. Granovetter (1973) found that weak ties provide a basis for organizations to obtain new and diverse information and ideas, while strong ties tend to facilitate redundant information. When organizations are mutually connected to each other and have frequent interactions, they tend to share the same source of information. Hence, the spread of information is redundant. Following the same line of argument, Burt (1992) contends that bridging structural holes gives organizations the benefit of obtaining information from those organizations that lie outside of their immediate contacts. Furthermore, spanning structural holes allows organizations to gain access to a diversity of resources. Significantly, the bridging position in a network enables the participating organizations to have "network benefits that are in some degree additive rather than overlapping" (Burt, 1992, p.65). Network structures are crucial elements for enhancing inter-organizational relationships as they can determine the effectiveness of inter-organizational information transfer, which in turn, provides a basis for better facilitation of co-operation within the network (Provan et al., 2007).

Networks can be seen as modes for governing economic exchanges (Grabher and Powell, 2004; Grandori and Soda, 1995). Most economic behaviours are embedded in social relationships therefore it is important to understand their economic exchanges in a relational context (Granovetter, 1985). As network-based inter-organizational relationships are embedded in a larger social context, their logic of economic exchanges is different from the logic of markets and hierarchies. Typically, the logic of exchange for inter-organizational networks is based on a combination of "co-operative and competitive elements, autonomy and dependence, trust and control" (Sydow and Windeler, 1998, p.267). Importantly, the notion of social embeddedness is rooted in this form of economic exchanges (Granovetter, 1985). Thus, exchanging economic

activities at a network level can be governed either structurally through contractual agreements, regulations and bureaucratic mechanisms; or relationally through trust, loyalty and reciprocity (Gulati, 1998; Nielsen, 2005; Poppo and Zenger, 2002; Powell, 1990; Reuer and Arino, 2007; Uzzi, 1997).

Trust can influence the costs for managing and co-ordinating the exchange of economic activities and the exchanging of inter-organizational information. Mutual trust as a governance mechanism provides a basis for partners to act in a trustworthy manner in terms of fulfilling their obligations to the exchange. When partners have positive expectation that each other would act for the mutual benefit of all parties, this tends to reduce the transaction costs that are associated with the monitoring and re-negotiating of the exchange (Sako, 2006). Thus, deploying trust as network governance mechanism has an advantage over formal governance mechanism such as markets and hierarchies. In addition, trust can affect the flow of information between organizations. Integrated and transparent information allows a better co-ordination of economic activities that can motivate partners to work closely with each other within the network (Casson and Cox 1997, Cox et al., 2003). However, before organizations are willing to share high quality of information with each other, a high level of trust is needed to develop within the network (Shapiro et al., 1992).

Elements drawn from the above four theoretical perspectives are used in this thesis to develop a conceptual framework for understanding the post-formation management of inter-organizational collaborative networks and how they may be sustained. Figure 2.1 summarises these key concepts.
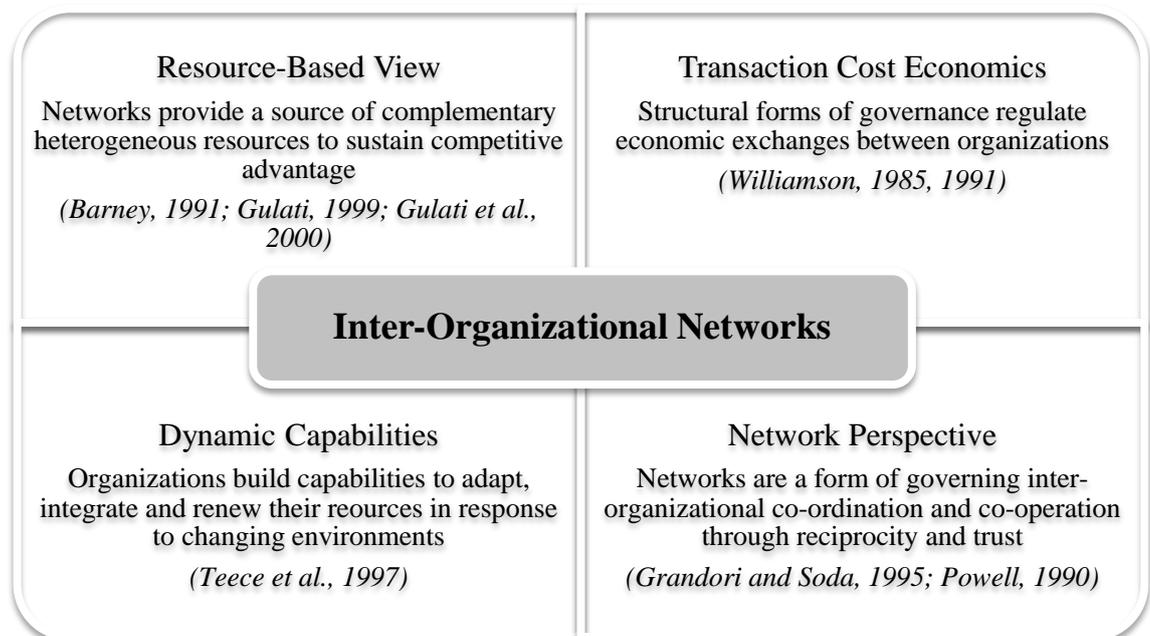


Figure 2.1: Theoretical Perspectives for Understanding Inter-organizational Networks

## 2.3 Collaborative Networks

Much of the work on strategic networks focuses on the extent to which differential access to external resources can complement an organization's internal resources, and how organizations with superior network memberships enjoy greater benefits than organizations without such memberships (Arya and Lin, 2007; Das and Teng, 2002). Thus, the focus remains on an individual organization or on an organization's dyadic relationships with other network members. However, multi-organization networks cannot necessarily be reduced to a collection of dyadic ties (Lavie, 2006), and some authors have argued for the consideration of the role of resources at the 'whole' network level of analysis (Provan et al., 2007). That is, rather than focusing on how network membership will improve an organization's competitive position and performance through the sharing of network resources, attention shifts to how organizations embedded in networks of relations share resources in order to a achieve a joint strategic objective. Such an approach focuses on collaboration and the concepts of collaborative networks and collaborative advantage, rather than competitive advantage.

Although collaboration can be defined in various ways, the definitions of collaboration found in the literature share a common basis in which collaboration refers to working together in a mutually advantageous relationship. For example, Kanter (1994, p. 97) defines collaboration as "creating new value together". One of the most frequently cited definitions collaboration is that of Gray (1985, p. 912): "the pooling of resources by two or more stakeholders to solve a set of problems which neither can solve individually". Himmelman (1996, p. 22) extends this definition of collaboration into an inter-organizational context as: "a process in which organizations exchange information, alter activities, share resources and enhance each other's capacity for mutual benefit and a common purpose by sharing risks, responsibilities and rewards". Thus, collaborative networks can be seen as "multi organizational arrangements to solve problems that cannot be solved, or solved easily, by single organizations" (Agranoff, 2006, p. 56). This definition provides two elemental facets of collaboration in networks: collaboration occurs between organizations – it is an inter-organizational phenomenon, and collaboration leads to benefits for all involved organizations (Bititci et al., 2004).

Working from a resource-based perspective, Arya and Lin (2007, p. 698) define a collaborative network as "a collection of loosely connected or closely knit organizations that share resources" to achieve some strategic objective. Similarly, Provan et al. (2007, p. 482) refer to "a group of three or more organizations connected in ways that facilitate achievement of a common goal". Thus, from a resource-based perspective, the emphasis is thus on examining the set of network-level resources and capabilities that support the networked organizations in their pursuit of a common goal or joint strategic objective, rather than on individual organizations' utilisation of those resources as a basis for competitive advantage over other organizations.

This view of networks as inter-organizational relationships based on "strategic collaboration with the goal of deriving mutual benefits" has given rise to the notion of "collaborative advantage" (Lado et al., 1997, pp. 110-111). Positioned as an "alternative paradigm" to the organizational pursuit of competitive advantage, collaborative advantage is derived from jointly generated relational rents. Such relational rents are the product of synergistic exchange relationships and cannot be generated by an organization alone (Dyer and Singh, 1998). Thus, while competitive advantage drives individual rent-seeking behaviour, collaborative advantage encourages relational or collaborative rent-seeking behaviour (Lado et al., 1997). Collaborative advantage encourages organizations to deploy the collaborative relationship as a type of knowledge-based resource in enabling them to work together towards common goals and mutual benefits. Typically, the joint value creation from collaborative partners is derived from relation-specific resources that can be characterised as inimitable, non-substitutable, and imperfectly mobile.

The concept of collaborative advantage has also been explored in the literature on public sector inter-organizational networks (Huxham, 1996), where it has been defined as "the creation of synergy between organizations towards the achievement of common goals" (Huxham and Macdonald, 1992, p. 50). This is similar to definitions found in the strategic management literature, although Huxham and Macdonald (1992), from a public sector context, suggest that collaborative advantage need not be limited to situations of competition between organizations. Collaborative advantage simply requires a situation or problem that can be approached better with collaboration than without. Collaborative advantage is achieved when an objective is met that could not be met by the individual organizations acting alone, and also when each organization's objectives are met better than it could alone (Huxham, 1993; Huxham and Macdonald, 1992; see also Lasker et al., 2001; Weiss et al., 2002).

**2.3.1 Sustained Collaborative Networks**

Prior research has been conducted on the motives for and benefits of inter-organizational collaboration, and the factors needed for successful collaborative relationships (Ahuja, 2000a; Das and Teng, 2000b; Lado et al., 1997; Mohr and Spekman, 1994; Taylor, 2005). However, the post-formation implementation and management of collaborative networks has been relatively less explored, so that our knowledge of their evolution over time and the developmental processes through which they are managed and sustained remains limited (Das and Teng, 2002; Doz, 1996; Kale and Singh, 2007; Reuer and Zollo, 2000; Taylor, 2005, Turrini et al., 2010).

The existing research on post-formation management of networks is summarised in Table 2.3, and can be categorised into a number of perspectives. The first perspective is trust building. Authors in this perspective propose that trust is crucial in curbing opportunistic behaviours

(Kale and Singh, 2009; Mohr and Puck, 2010; Muthusamy and White, 2005; Neilson, 2007). A second perspective is the inter-dependency between collaborative partners, focusing on partner complementarity and collective strengths that help to effect and establish partnership relationship (Das and Teng, 2002; Mohr and Spekman, 1994; Nielsen, 2007). The third perspective is related to the relational aspect of the collaborative network. This perspective suggests that the characteristics of partners' inter-personal relationships, bonding, commitment, conflict management, co-ordination of collaborative activities, inter-partner legitimacy and communication provide the basis for effective co-operation and knowledge sharing (Das and Teng, 2002; Kumar and Andersen, 2000; Mohr and Spekman, 1994; Muthusamy and White, 2005; Ring and Van de Ven, 1994; Schreiner et al. 2009). A fourth perspective focuses on governance structures and emphasises the control and power sharing that is important for organizing the collaborative arrangement, such as the allocation of roles and responsibilities and the sharing of decision making power (Mohr and Puck, 2010; Reuer and Zollo, 2000).

Table 2.3 Prior Research on Post-Formation Management of Collaborative Networks

| Reference | Emphasis |
|---|---|
| Ring and Van de Ven (1994) | On-going negotiation of mutual expectations and commitment |
| Mohr and Spekman (1994) | Partner complementarity, communication and reducing inter-partner conflict |
| Spekman et al. (1996) | Alliance management, inter-personal relationships and adaptation |
| Kumar and Andersen (2000) | Management of meaning to generate and sustain legitimacy |
| Reuer and Zollo (2000) | Governance and control |
| Das and Teng (2002) | Collective strengths and reducing inter-partner conflict |
| Muthusamy and White (2005) | Commitment, trust and power-sharing |
| Nielsen (2007) | Collaborative knowledge, trust and partner complementarity |
| Kale and Singh (2009) | Co-ordination and building inter-partner trust |
| Schreiner et al. (2009) | Co-ordination, communication and partner bonding |
| Mohr and Puck (2010) | Control and trust |

As asserted by Doz and Hamel (1998), to manage an on-going inter-organizational relationship is more crucial than to craft its initial formal design. Given the increasing incidence of inter-organizational collaborative networks and their relatively high rate of failure, there is a growing interest in the how collaborative networks are managed and sustained over time, such that they become stable, viable inter-organizational entities (Das and Teng, 2000a; de Man and Duysters, 2005; Kale and Singh, 2007; Kale et al., 2009; Provan and Milward, 2001; Reuer and Zollo, 2000; Turrini et al., 2010). Das and Teng (2002) suggest that stabilisation is only one of four possible outcomes for an inter-organizational collaborative relationship: stabilisation, decline, reformation, and termination. The authors note that the latter two outcomes may not necessarily be undesirable outcomes if the collaborative relationship has reached a specific predetermined timeframe or it has achieved its original objectives. Stabilisation implies a degree of maturity and successful (continuous) adaptation to the environment in which the inter-organizational collaboration exists.

A number of authors address the sustainability of inter-organizational collaborative relationships (Table 2.4). Das and Teng (1997) suggest that sustaining strategic alliances requires a balance between co-operation and competition. Alexander et al. (2003) argue that collaborative networks can only engender long-term benefits by sustaining the inter-organizational relationships and activities over a significant period of time. Similarly, Pessoa (2008) contends that cross-sector partnerships must entail on-going collaborative efforts before mutual goals can be realised. Kumar and van Dissel (1996) further suggest that mutual benefits can only be achieved on the basis that the collaborative arrangement is fair, beneficial and the co-operation is on-going. Finally, Lewis et al. (2008) argue that a collaborative network can only be sustained when there is effective partnership management and an equal distribution of power.

From the above, it can be concluded that realising the benefits of a strategic collaboration between organizations requires the post-formation management of the inter-organizational relationships so that they are sustained over time. However, while a prolonged collaborative relationship is likely to be associated with a successful collaborative outcome or network performance, the sustainability of a network is not in itself a measure of the network's performance (Alexander et al., 2003). The aim of this thesis is to understand how inter-organizational collaborative networks are sustained, rather than to evaluate the success or otherwise of their collaborative efforts.

Table 2.4 Prior Research on Sustaining Collaborative Inter-Organizational Relationships

| Reference | Emphasis |
|---|---|
| Kumar and van Dissel (1996) | Collaboration benefits can only be realised if the collaboration is sustained over time; requires proactive management of potential co-ordination and conflict risks. |
| Das and Teng (1997) | Both co-operation and competition are necessary for sustaining strategic collaborations. |
| Alexander et al. (2003) | Importance of shared vision/goals, leadership and managing change on sustaining continuous collaborative activities over a period of time. |
| Lewis et al. (2008) | Sustained collaborative relationships require effective partnership management, power sharing and shared agendas. |
| Pessoa (2008) | Sustained collaborative efforts require on-going interactions, shared objectives, and strategic mutual dependence. |

For the purposes of this thesis, a sustained collaborative network is defined as a stable inter-organizational entity involving multiple organizations that successfully manage on-going inter-organizational relationships in the collaborative pursuit of a common objective. Ineffective network management could lead to unplanned or premature termination of the collaborative relationships, with adverse consequences for the collaborating organizations' ability to achieve their objectives or to reap the potential benefits accruing from engaging in the collaborative network. In addition, non-sustained networks can also produce a legacy that discourages future

collaborative attempts (Alexander et al., 2003). However, the sustainability of a collaborative network does not imply an indefinite life for the network. In this sense, network sustainability is similar to Huxham et al.'s (1994) concept of collaborative maturity. Collaborative maturity is not dependent on the length of time that a collaborative network has existed, but is achieved when the participating organizations have learned how to work together effectively. Similarly, Alexander et al. (2003) suggest that it is important to establish what is being sustained. For example, a network might be sustained despite the withdrawal of one of its members or after the (successful or unsuccessful) termination of a particular initiative it has undertaken. Alexander et al. (2003, p. 133S) also point out that "sustainability is by definition a future-based concept and cannot be assessed directly (other than in retrospective fashion)." This means that in many ways, researchers are assessing the potential for collaborative network sustainability rather than network's ultimate sustainability.

Collaborative networks face a number of risks or challenges to their sustainability in the form of conflicts and opportunism (Das and Kumar, 2009; Das and Teng, 2001). These arise from the voluntary basis of participation, a relative lack of barriers to exit the network, cultural differences between the participating organizations, and the potential tension between organizational goals and those of the network (Alexander et al., 2003, Judge and Ryman, 2001). These challenges can be understood using the internal tensions perspective proposed by Das and Teng (2000a) to explain sustained strategic alliances. Following these authors, collaborative networks can be sustained if a balance is maintained between three pairs of competing forces: co-operation versus competition, rigidity versus flexibility, and short-term versus long-term orientation. Balancing each pair of contradictory forces so that neither dominates resolves the tensions inherent in a strategic alliance or collaborative network that can lead to instability (Das and Teng, 2000a).

Competition is defined "as pursuing one's own interest at the expense of others", while co-operation is the "pursuit of mutual interests and common benefits" (Das and Teng, 2000a, p. 85). Typically, if collaboration is characterised by high competition and low co-operation then its inter-organizational relationship tends to be structured as a zero-sum game (Lado et al., 1997). Co-operation is difficult in this competitive environment because individual rent-seeking behaviours are participating in a "learning race" through which they want to have a maximised exploitation of the partners' distinctive competencies while creating barriers around their distinctive core resources and capabilities (Gulati et al., 2000). Opportunistic behaviours and reduced commitment arising from "the misaligned incentives of self-interested agents" (Gulati et al., 2012, p. 532) can lead to a failure to co-operate and ultimately a non-sustained collaborative relationship (Das and Teng, 2001). On the other hand, collaboration that entails a high level of co-operation and a low level of competition encourages collaborative rent-seeking behaviours who tend to adopt a non zero-sum game relationship (Lado et al., 1997). However,

co-operative relationships may not always necessary be advantageous. There is always a risk that learning partners might exit the collaborative network after they have acquired all the know-how and competencies from guileless transferring collaborative partners (Das and Teng, 2000a). Once the learning partners have learnt enough, they would leave the network as there is no more incentive for them to stay. This can hinder the realisation of the collaborative network's expected goals and objectives. The balance between the force of competition and co-operation can be termed as co-opetition (Zineldin, 1998). As such, co-opetition is a critical mechanism in sustaining a collaborative network.

Rigidity is defined as "the degree of connectedness of partners with each other in an on-going relationship", whereas flexibility is "the degree to which partners firms are able to modify the structural arrangements in the alliance in order to adapt to changing conditions" (Das and Teng, 2000a, p. 87). Structural rigidity can exercise a strong control over the collaborative relationship that is been regulated under a set of distinctive norms, values and rules. Rigidity helps better align partner's interests, reinforce their commitment and impede opportunistic behaviour (Das and Teng, 2000a). In sum, a high level of structural rigidity can improve inter-organizational relationship bonding. However, the disadvantage of rigidity is that it restricts the ability of the collaborative network to adapt to environmental uncertainties or changes. Instead, a more flexible collaborative relationship structure that has less stringent norms and rules provides more flexibility in the implementation of collaborative activities and deployment of resources. A degree of structural flexibility can greatly enhance a collaborative network's agility in a turbulent and dynamic business environment. Nevertheless, inter-organizational relationships can also be destabilised if a network is too flexible. A high level of flexibility is associated with weaker authority structure, difficulty in co-ordinating partners, less commitment and partner bonding, and undefined allocation of property rights, all of which may lead to instability in a collaborative network (Das and Teng, 2000a). Thus, both rigidity and flexibility, and a relative balance between them, are needed for a sustained collaborative network.

The third internal tension relates to a balance between short-term and long-term orientations in a collaborative network. A short-term orientation encourages the exploitation of a transitional collaborative relationship for quick results, whereas a long-term orientation promotes investment in a semi-permanent collaborative network in order to build good working relationships (Das and Teng, 2000a). Inter-organizational relationships cannot be sustained in a short-term orientated collaborative network as it "would soon become a gold rush, where nobody cares about sustainability (Das and Teng, 2000a, p.88). With the resources of the network quickly exploited, the network will be transformed or dissolve. Moreover, organizations which prefer to engage in short-term collaboration tend to express less interest in developing a collaborative relationship. In fact, the motive of such organizations is to pursue fast and tangible results (Ring and Van de Ven, 1994). In contrast, a more long-term orientated

collaborative network enables the collaborative partners to cultivate trust, increasing commitment to the network and discouraging opportunistic behaviour. However, a long-term orientation in a collaborative network can neglect the short-term performance of the network and also mean that collaborative organizations have to wait for a long period of time before they can reap the benefits of their investments. Consequently, this may cause demoralisation and a lower level of commitment, so that opportunistic behaviours might evolve (Das and Teng, 2000a). Hence, a sustained collaborative network is founded on a balance between short-term and long-term orientations.

## 2.3.2 Studying Sustained Collaborative Networks

As mentioned above, much of the research on inter-organizational networks that utilises a resource-based perspective has tended to emphasise how the participating organizations in a network can complement their existing set of strategic resources with resources from their partners to yield sustained competitive advantage. Such studies look at the selection of and investment in appropriate strategic resources at an antecedent stage in order to determine network success. In contrast, this study takes a post-antecedent perspective and focuses on the resources that must be possessed at a network level in order to sustain collaborative relationships in the pursuit of the joint objective of the network. As such, it answers calls for further research on network sustainability (e.g. Turrini et al., 2010).

This study examines collaborative networks at a 'whole' network level of analysis. As such, the focus is on the entire network rather than on the individual organizations that comprise the network or on analysing the network as a set of dyadic ties (Carpenter et al., 2012; Provan et al., 2007). This is not to say that the properties of the participating organizations do not influence the development of the whole network. Specifically, the study seeks to understand how the participating organizations collectively bring about positive collaborative structures and processes within a network, such that the collaboration is sustained over time. According to Provan et al. (2007), research on networks can be classified into four types (Table 2.5). In terms of Table 2.5, this study focuses on relational or network variables at the collective or network level. Thus, this study focuses on the whole network, and how the network collectively builds the capabilities needed to utilise the network's existing set of resources to sustain its collaborative relationships.

Table 2.5 A Typology of Inter-Organizational Network Research

|  | *Individual organizations* | *Collectivities of organizations* |
|---|---|---|
| *Organizational variables* | Impact of organizations on other organizations through dyadic interactions | Impact of individual organizations on a network |
| *Relational or network variables* | Impact of a network on individual organizations | Whole networks or network level interactions |

(Adapted from Provan et al., 2007)

Within this approach, network-level resources are assumed to be various assets available to the collaborative network that support network sustainability. These resources can be either owned by an individual organization and shared with its partners or acquired and held by the network as a collective entity. The key point is that the use of such resources in sustaining collaborative networks is at the level of the whole network, rather than at the level of, and for the exclusive benefit of, the individual organizations that comprise the network. Network-level capabilities are developed by the network and represent the capacity and readiness to deploy and exploit these bundles of resources. Network-level capabilities are dynamic in the sense that they evolve over time and are shaped by the path that a network takes in adapting to changes in its particular circumstances and external environment. These capabilities are leveraged (Sirmon et al., 2007) to sustain the network and thus achieve the joint strategic objective. By exploring the different types of network-level resources and capabilities necessary for sustained collaborative networks and how they contribute to network sustainability, this study answers the call for further empirical research that differentiates between resources and their different characteristics (Kraaijenbrink et al., 2010).

## 2.6 Resources

Araya et al. (2007, p.630) define resources as "the group of tangible and intangible elements or factors an organization possesses and are available to be utilised according to existing firm's capabilities that enable their best exploitation". These resources can be financial, physical, human, technological, reputational and organizational (Barney, 1991; Grant, 1991). A fundamental aspect of Araya et al.'s definition is that resources are distinguished from the capabilities that enable an organization to deploy its resources. However, both resources and capabilities represent capacities for action (Kraaijenbrink et al., 2010). Das and Teng (2000b) distinguish between two types of resources. Property-based resources are financial, physical and human resources to which an organization has clear property rights or rights to their use.  In contrast, knowledge-based resources rely on the protection of knowledge and information barriers and are more vulnerable to transfer between organizations. Knowledge-based resources are intangible and less imitable, and include technological and managerial resources, such as "tacit know-how, skills, and technical and managerial systems", and "organizational resources, such as culture and learning capacity" (Das and Teng, 2000b, pp. 42-43).

It is assumed that adequate property-based resources such as financial and human resources are necessary but not sufficient in sustaining a collaborative network. Instead, this study focuses on the role of knowledge-based resources in developing a sustained collaborative network.  Based on a review of the literature on strategic resources, this study proposes that three particular types of knowledge-based resources are relevant in sustaining a collaborative network: (1) technological resources used to support and facilitate communication and co-ordination between

members of a collaborative relationship (Bajwa et al., 2007; Todeva and Knoke, 2005; Das and Teng, 2000a); (2) relational resources important in managing the collaborative relationship by increasing connectedness and reducing conflicts and opportunistic behaviour (Cullen et al., 2000; Das and Teng, 2000a; Robson et al., 2006); and (3) governance resources required in structuring and regulating the collaborative network (Das and Teng, 2000a; Kale and Singh, 2009; Poppo and Zenger, 2002). The emphasis in this study is not on how these moderators can drive a collaborative network to achieve positive organizational performances by either attaining or sustaining competitive advantage as this has been empirically supported by many studies. Rather, it is focused on how these three types of knowledge-based resources can foster a positive and on-going collaborative inter-organizational relationship. In other words, it is looking at how these resources can work together in order to sustain a collaborative network.

### 2.6.1 Technological Resources: Supporting Communication and Co-ordination

In the past decade, organizations have leveraged their technological resources to create positive organizational values, to enhance innovation and to facilitate organizational learning and knowledge (Bhatt and Grover, 2005; Dewett and Jones, 2001; Chi and Holaspple, 2005; Pham and Jordan, 2007). Technological resources are regarded as knowledge-based resources (Das and Teng, 2000a) and such pose a difficulty for competitors to imitate or substitute due to knowledge barriers. When technological resources are inimitable and non-substitutable, they enable organizations to sustain competitive advantages. In general, technological resources such as information and communication technology (ICT) and information systems (IS) are deployed for organizational operations and processes. ICT consists of different types of communication media and devices which serve as a platform to link IS that consist of a variety of software platforms and databases to their users (Dewett and Jones, 2001). In a collaborative network, organizations inter-link their IS to manage the inter-dependencies of operations and processes and this is known as inter-organizational IS (Chi and Holsapple, 2005).

Organizations use a variety of ICTs, such as the Internet, intranets, extranets, knowledge portals, group decision support systems, electronic meeting systems and workflow management systems, to support their collaborative organizational relationships and enable them to be more flexible and more networked (Bajwa et al, 2007; Dewett and Jones, 2001; Fink, 2007). This growing trend is driven by a range of technological benefits (Bafoutsou and Mentzas, 2002; Cheng et al., 2006; Fink, 2007; Chi and Holaspple, 2005): (1) reduced communication costs as the exploitation of audio and video conferencing and web conferencing enable communication without face-to-face interaction; (2) enhanced facilitation of knowledge sharing and trust building; (3) increased innovation as ICT improves organizational communication, including the collection, integration, transfer and application of employees' knowledge, amplifying the knowledge base available and its utilisation; and (4) enhanced decision making as the

exploitation of decision support systems, electronic document management, and electronic meeting systems facilitates enhanced decision quality, better utilisation of resources and administrative efficiency. However, as argued by Munkvold (2005) the main driver for the deployment of ICT in collaborative networks is to support communication between organizations.

Communication can be defined broadly "as the formal as well as informal sharing of meaningful and timely information between firms" (Anderson and Narus, 1990, p. 44). It is a process in which the shared information can be converted into proprietary knowledge (Mohr and Spekman, 1994), which enables a better mutual understanding between the partners, better task co-ordination and execution, integrative conflict management and inter-firm learning (Bessagnet et al., 2005, Legler and Reischl, 2003; Midwinter and Sheppard, 2000). Communication plays a significant role in supporting organizational collaborative activities such as information sharing and integration, decision sharing, process sharing and resource sharing. In addition, Vatanasombut et al (2008) claim that communication can build up trust as it can increase the credibility, timeliness and accuracy of information to be exchanged. Similarly, Cox et al. (2003) emphasise the centrality of information in creating and maintaining trust in inter-organizational networks. Indeed, Cox and Mowatt (2004) suggest that ICT-enabled information transparency not only lowers the transaction costs between partners, but reduces opportunism and information asymmetries, thus potentially allowing partners in an incipient network "to negotiate as if they were already in an established trust-based relationship" (p. 16). ICT can improve inter- and intra- organizational communication by reducing communication barriers as it can facilitate both the synchronous and asynchronous flow of communication. Synchronous communication takes place when all participants can access or exchange information at the same time whereas asynchronous communication takes place when all participants access or exchange information and provide feedback at different points in time. Thus, ICT allows the simultaneous flow of information in multiple directions and across functional boundaries, meaning that communication transcends time and space.

Information processing is a process in which organizations collect, gather and interpret raw data and subsequently synthesis it into accurate, concise and relevant information (Tushman and Nadler, 1978). Organizations process information to accomplish organizational tasks, to co-ordinate organizational activities, to understand the external environment and to make organizational decisions. Effective and efficient information processing can endow organizations with the capability to reduce both external and internal uncertainties. In particular, Tushman and Nadler (1978) assert that information uncertainty occurs when there is absence of information, while Galbraith (1974, p.28) proposes that "the greater the uncertainty, the greater amount of information that must be processed among decision makers during task execution in order to achieve a given level of performance". When organizations face internal

or external uncertainties, the best solution is to gather more information so as to reduce the information gap. However, organizations should seek an appropriate amount of information as overload of information will induce the information processing to be more painstaking. This is because an excessive amount of information will overwhelm the decision making process as decision makers cannot surmise relevant information (Daft and Lengel, 1986).

The second reason for organizations to process information is to reduce equivocality. The difference between information uncertainty and information equivocality is that the former refers to a lack of information while the latter refers to ambiguity. Information equivocality arises in situations where there are multiple and conflicting interpretations which can stem from differences in implicit theories and schema, personal interests, power considerations or selective perceptions (Thomas and Trevino, 1993). High equivocality indicates confusion and a lack of understanding (Daft and Lengel, 1986). It is vital for organizations to reduce information equivocality as it can affect the success of alliances (Thomas and Trevino, 1993), as well as the relationships between product development or innovation processes and structures that will determine organizational performances (Koufteros et al., 2005).

According to Daft and Lengel (1986), effective communication can be influenced by information amount and information richness. Information amount reduces uncertainty whereas information richness reduces equivocality. They argue that a correct amount of information enables better management co-ordination and control which leads to reduced uncertainties. However, during equivocal situations, even when there is a large amount of information, this information can be useless if it cannot be interpreted. Therefore, it is important to converge on a common interpretation of the available information. Information richness refers to the ability of the available information to be changed to an understanding within a time interval (Daft and Lengel, 1986). Consistent with, Evans and Wurster (1999) define richness as the depth and detail of information that can be obtained, offered and exchanged between partners. In sum, information is rich when it is detailed and in-depth and it can provide a mutual interpretation to any users who utilise it.

In contemporary organizations, ICTs have become integral for information processing. As contended by Tippins and Sohi (2003, p. 745), ICT is known as a "resource to facilitate the effective collection and utilisation of information". The internet, intranets and extranet and other forms of inter-organizational systems are widely used to assimilate and disseminate information which is immediate, cost-effective, more accessible, transparent, rich in format and versatile (Bafoutsou and Mentzas, 2002; Mentzas et al., 2001). In addition, IS allow information to be created, deposited, stored, and retrieved and transmitted.

ICT plays an important role in sustaining a collaborative network by facilitating effective communication networks so as to disseminate rich and resourceful information to the various stakeholders. As such, organizations need to build a communication channel which can conduct information across space and time so that more real-time collaborations can occur within the network. In addition, however, the inclusion of information- rich mechanisms such as two-way, face-to-face meetings or use of natural language enables verbal and non-verbal cues and facilitates faster feedback and exchange of ideas. As argued by Daft and Lengel (1986), the effectiveness of a communication medium is affected by three factors: (1) instant feedback which allows questions to be asked and corrections to be made instantaneously; (2) multiplicity of information cues, the number of ways in which information can be communicated such as physical appearance, voice inflection, body gestures, and (3) rich-information processing mechanisms, which have the highest capacity to deliver shared meaning and allow for emotions and interpretations to be shared among the stakeholders. Consequently, this leads to a reduction of equivocality. In the similar vein, Fink (2007) contends that leaning and innovation can be enhanced if the communication medium enables immediate feedback, a multiplicity of information and the possibility of effective simultaneous conversations.

To sustain inter-organizational collaborative relationships, a collaborative network needs to deploy knowledge-based ICT resources to support, facilitate and enhance the communication process across organizational boundaries so as to achieve efficient inter-organizational information processing. Effective inter-organizational communication and information processing will lead to a mutual understanding between the collaborative partners, better task co-ordination and execution, integrative conflict management and inter-firm learning which are vital in sustaining a collaborative network (Bessagnet et al., 2005, Legler and Reischl, 2003; Midwinter and Sheppard, 2000). This study proposes that for a collaborative network to be sustained, it should possess three key ICT-based resources: ICT infrastructure, ICT competence and ICT managerial skills.

### 2.6.1.1 ICT Infrastructure

An ICT infrastructure provides the technological foundation for the support of collaborative networks (Thimm and Rasmussen, 2009). It consists of the technologies, systems, applications and services (Bharadwaj, 2000; Melville et al., 2004) shared between network members and used to support communication and the exchange of information across time and space in a collaborative network (Bharadwaj et al., 1999; Bhatt and Grover, 2005). Prior research has shown that a strong ICT infrastructure will enhance network performance as it can support an efficient flow of communication and information between organizations which is necessary for the supporting of a collaborative network's operations (Barua et al., 2004; Chi and Holsapple, 2005; Dewett and Jones, 2001; Pham and Jordan, 2007). As asserted by Bajwa et al. (2007), a strong ICT infrastructure is capable of transferring complex information whereas weak ICT

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infrastructure is only to handle simple information which will result an inefficient and ineffective communication.

ICT infrastructure includes technological platforms or networks and inter-organizational information systems that enable more accessible, transparent and efficient information processing to be facilitated in a collaborative network (Dewett and Jones, 2001). Information processing is more efficient because explicit knowledge which has been captured, integrated and codified by the inter-organizational systems can convert it into resourceful and timely information that can be processed, transferred, stored and retrieved by the collaborative network. Communication technologies such as electronic meeting systems and audio and video conferencing are needed to support synchronous communication in which information can be acquired, gathered and exchanged in real-time inter-organizational interactions within a collaborative network (Chi and Holsapple, 2005). Electronic mails, whiteboards and message broads, as well as workflow and groupware technology may also be deployed in collaborative networks to facilitate asynchronous communication and the acquisition and exchange of information without the constraint of times differences (Bajwa et al., 2007; Thimm and Rasmussen, 2009). Use of ICT-based, inter-organizational task information-sharing routines and knowledge-transfer mechanisms within a collaborative network enhance innovation (Dyer and Singh, 1998), and facilitate the effective co-ordination of network activities "by improving the clarity and predictability of partner actions, reducing frustration, and increasing decision-making speed" (Kale and Singh, 2009, p. 50).

### 2.6.1.2 ICT Competence

Technological competence reflects the abilities of the members of a collaborative network to understand, use and exploit the ICT infrastructure available within the network (Ritter and Gemünden, 2004). There is a tendency for organizations to believe that simply investing heavily in their ICT infrastructure will enable them to reap more potential positive organizational performances. Instead, attention also needs to be paid to what ICT is appropriate, how it will be used and what changes to processes and working practices will occur when ICT is implemented (Mahdizadeh et al., 2007). This implies that it is critical for organizations to equip their employees with relevant ICT technical skills so that they can effectively utilise them for successful ICT implementation and use (Bharadwaj, 2000; Mata et al., 1995).

By extension, a collaborative network needs to ensure that the participating personnel of collaborating organizations have the necessary ICT knowledge and skills to use the ICT infrastructure to support the needs of the network, enhance innovation, efficiently process and leverage information, communicate, and co-ordinate activities across the network. If users can efficiently deploy ICT, information quantity and richness will increase within a collaborative network (Bharadwaj, 2000; Yazici, 2002). An effective communication process enables a

mutual understanding to be created within the inter-organizational relationships and a lower level of conflict in a collaborative network. If the collaborative network has an inadequate or inefficient of ICT competence, technical problems with communication and information processing may not be resolved, resulting communication barriers and inefficient or ineffective collaboration.  A lower degree of co-operation may lead to a termination of the inter-organizational relationship (Das and Teng, 2000a).  Therefore it is important for a collaborative network to develop skills and competence in how to leverage ICT so as to facilitate an effective communication process to foster a high degree of co-operation between the collaborating organizations.

ICT skills can be built from accumulated experience, learning by doing and learning by repetition (Bharadwaj, 2000; Bhatt and Grover, 2005).  Thus, technological competence can be positively influenced by ICT training, which also boosts the ICT users' awareness, readiness and acceptance of ICT (Barau et al., 2004; Yazici, 2002).  It is well established in the technology acceptance model (TAM) literature that user levels of technology acceptance increase with perceived ease of use and perceived usefulness of a technology (Davis, 1989).  It is important to note that perceived usefulness can be influenced by perceived ease of use as when a user finds that a system is easy to use only then he or she will regard it as a useful system.  And in order for the user to be able to utilise the system easier, adequate training is needed.  This is supported by Venkatesh and Davis's (2000) empirical study in which the authors concluded that training can boost a user's perceived ease of use of a system.  As such, this suggests that the key role of ICT training is to allow users to enhance their understanding of how to make best use of ICT applications to enhance their work role and performance. In the case of collaborative networks, ICT training could involve a combination of general training in personal communication and productivity applications and operational training in specific collaborative applications and systems deployed by the network (Teo and Ranganathan, 2003).

### 2.6.1.3 Managerial ICT Skills

Technological competence is not sufficient for the effective use of ICT infrastructure and applications. In addition, managerial ICT skills are needed to conceive, deploy and exploit ICT to support and enhance organizational and, by extension, network activities (Bharadwaj, 2000; Bharadwaj et al, 1999; Mata et al., 1995).  Important managerial ICT skills include the ability to understand and anticipate the communication and co-ordination needs of the various members of a collaborative network, the ability to source and deploy appropriate ICT applications, and the ability to co-ordinate activities using these applications in a supportive way (Mata et al., 1995; see also Gulati et al., 2012). Such skills can often be inimitable, non-substitutable and imperfectly mobile as they tend to be tacit and developed over extended periods of time, through the accumulation of experience and by trial and error learning (Mata et al., 1995).

Managerial ICT skills also encompass learned abilities, expertise and knowledge in project management and leadership (Bharadwaj, 2000; Melville et al., 2004). In a collaborative network context, these include the ability to manage ICT resources in supporting and facilitating the communication and co-ordination process. As a collaborative network comprises several organizations, a leader is needed to oversee the deployment and use of the ICT resources in keeping communication flowing effectively. Such a role involves helping members of the collaborative network to understand the communication and co-ordination procedures used by the network, as well as helping them learn to work together using the ICT applications (Mata et al., 1995). Significantly, the role of the leader involves knowing how to co-ordinate ICT resources more efficiently in enabling the collaborative partners to interact more actively and closely. For instance, the know-how to leverage ICT infrastructure and applications in designing a communication structure that enables a variety of communication channels to be created facilitates effective communication between the collaborative partners. Also, the leader needs to have the skills in co-ordinating the ICT resources to develop an open communication process. Through it, the collaborative partners can have a good understanding of what, why and how they can act in the collaborative activities. Ultimately, the level of co-operation can be enhanced.

### 2.6.2 Relational Resources: Increasing Connectedness

Many scholars have contended that a range of organizational resources are vehicles for positive organizational performances (Barney, 2001; Das and Teng, 2000a; Hoffmann, 2007; Kale and Singh, 2007; Stieglitz and Heine, 2007). As supported by the empirical study of Carmeli and Tishler (2004, p. 311), organizational resources "play a significant role in generating competitive advantage and above-normal performance for a firm". However, to what extent and how organizational resources will sustain collaborative networks is less well explored. It is an important topic, as with a growing number of organizations entering inter-organizational collaborative relationships, it is vital for them to know how to effectively use their organizational resources to sustain their co-operative and collaborative activities. As argued by Cullen et al. (2000), it is insufficient to sustain collaborative networks just by focusing on the management of the hard side such as the financial and operational issues; the soft side of management plays a significant role as well. Building on the work of Morgan and Hunt (1994), Robson et al. (2006, p. 586) contend that the "softer style of alliance management accentuates the cultivation of socio-psychological or behavioural attributes … that are beneficial in the alliance working relationship". In particular, successful inter-organizational collaboration results from the development of relational capital between the collaborating partners (Chen et al., 2009).

As such, this study postulates that the deployment of appropriate knowledge-based relational resources to manage the soft side of the inter-organizational relationships can reduce conflicts and opportunistic behaviours that would be likely to threaten the sustainability of a collaborative network. Drawing on prior studies that have explored the importance of partner characteristics, cultural and commitment on the formation of collaborative networks (Arya and Lin, 2007; Beugelsdijk et al., 2009; et al., 2009; Das and Teng, 2002a, b; Kale and Singh, 2007; Ring and Van de Ven, 1994), this study suggests that three relational resources are relevant for the building of sustained inter-organizational relationships in a collaborative network: partner complementarity, network culture, and attitudinal commitment.

### 2.6.2.1 Partner Complementarity

A number of researchers have argued that the selection of a partner plays an important role in the success of collaborative relationships (Chen et al., 2009; Duisters et al., 2011; Ireland et al., 2002; Kale and Singh, 2009; Kelly et al., 2002; Nielsen, 2004). Indeed, the failure of many collaborative relationships has been attributed to inappropriate partner selection at the formation stage (Kale and Singh, 2009). In particular, partner complementarity has a positive influence on collaborative relationship performance.

Partner complementarity refers to the contributions of resources, assets or skills that each partner brings to the collaborative network that enable the network to achieve its goals and objectives (Kale and Singh, 2009; Shah and Swaminathan, 2008). Synergy may be created when network members contribute complementary or dissimilar resources that can be effectively utilised in the collaboration (Das and Teng, 2000b; Lunnan and Haugland, 2008). If "collaboration facilitates bringing together complementary skills from different firms" (Ahuja, 2000b, p. 429), then partner complementarity can engender a degree of inter-dependency among the collaborating partners in a network (Sarkar et al., 2001). A high degree of inter-dependency between the participating organizations can have a positive impact on the level of connectedness among the partners, help to curb opportunistic behaviours and reduce conflicts among the various collaborative partners since effective co-ordination is needed to manage the inter-dependency (Chen et al., 2009; Schreiner et al., 2009). In contrast, conflicts can intensify and opportunism can arise if the complementary resources, assets or skills are unequally distributed among the network members. In such a situation, a collaborative network is less likely to be sustained. Although the majority of interest has been in complementary resources, Das and Teng (2002) suggest that supplementary or similar resources may also be valuable in a collaborative relationship if the aggregated resources reach a critical level for competiveness.

While partner complementarity is likely to have a positive influence on network stability (Das and Teng, 2000b), it requires a degree of organizational complementarity in order to realise the consequential benefits (Dyer and Singh, 1998). Such organizational complementarity relies on

sufficient compatibility in the partners' operational, management and decision-making processes, systems and resources to enable co-ordinated inter-organizational action and reduce the costs of co-ordination (Dyer and Singh, 1998; Elmuti and Kathawala, 2001; Gulati et al., 2012; Kale and Singh, 2009). Existing research has examined on how these compatible partner characteristics can contribute to a collaborative network success (see e.g. Dyer and Singh, 1998; Kelly et al., 2002; Pateli, 2009; Sarkar et al., 2001; Taylor, 2005).

A partners' relative power in a collaboration can also be significant in sustaining the inter-organizational relationship. Power refers to "the extent of influence that one party has over the other in terms of influencing decision variables that are significant to achieving the objectives of alliance" (Muthusamy and White, 2005, p.423). Relative power among the collaborating partners may be based on the relative distribution of resources contributed to and controlled in the network (Das and Teng, 2000a; Taylor, 2005; Todeva and Knoke, 2005). That is, an organization that has a greater contribution of resources tends to possess more control over the network's operation. Power differentials tend to encourage more partner conflicts (Sarkar et al., 2001) and a lower level of cohesiveness, so that a collaborative network is not likely to be sustained when it is based on an unequal power relationship between the network members.

### 2.6.2.2 Network Culture

A number of researchers have argued the importance of organizations having compatible cultures or sharing cultural similarities as a precursor to a successful collaborative relationship (Beugelsdijk et al, 2009; O'Reilly, 1989; Shachaf, 2008). As contended by Harvey and Griffith (2002), compatible cultures or cultural similarities can increase trust and commitment and ease communications between network partners. Partners are more willing to share important information when they share similar cultural values (Chen et al., 2009). A collaborative network encompasses more than one organization and each has its distinct organizational culture. As Beugelsdijk et al (2009) have pointed out, organizational cultural differences may encumber the development of a common empathy consequently this will induce a negative effect on the relationship. The extent to which the organization cultures differ in a collaborative network is known as cultural distance. A wider cultural distance will bring about lower levels of integration and cohesion in a collaborative network (Shachaf, 2008). As a result, it will lead to inefficient flows of information and a constrained communication process within the network. Frequently, an inefficient and ineffective communication process will strain the development of the collaborative relationship. Therefore, it is crucial for organizations to integrate each organization's culture into a shared network culture, as this can boost the effectiveness and sustainability of the collaborative relationship.

A network culture is one where the partners in a collaborative network possess the mutual values and norms that facilitate effective collaborative relationships. Such conditions include

elements such as a common sense of mission, agreement on the importance of the collaborative purpose, a set of shared values around collaboration, an awareness of each organization's goals and needs, and an ability to manage change (Huxham, 1993). Implicitly, a collaborative culture provides the means to bridge the cultural distance between the partners in the collaborative network, enhancing connectedness and ensuring co-operative and collectivistic behaviour. A network possessing an appropriate culture of collaboration is more likely to be a sustained collaborative network.

This study adopts Denison and Mishra's (1995) model of four cultural traits, encompassing involvement, consistency, adaptability and mission, to examine how these four characteristics can effectively cultivate the network culture needed to sustain a collaborative network. A high level of *involvement* in a collaborative network facilitates an increased sense of ownership of and responsibility to a collaborative network by its members. In turn, this induces them to be more active in participating in network decisions, processes and routines, increasing organizational commitment to and connectedness within the collaborative network.

*Consistency* is a trait that unifies the various organizational cultures brought together in a collaborative network. This characteristic involves the co-ordination and integration of each culture's assumptions, beliefs and practices. Sources of integration range from a limited set of rules about when and how to agree and disagree, through harmonised operating systems, policies and practices (Taylor, 2005), to a combined culture with high conformity with little or no dissent. Consistency plays an important role in sustaining a collaborative network as a divergence of individual organizational values and beliefs, managerial practices, decision making styles, or strategic orientations, has the potential to create operational conflicts that may can reduce the effectiveness and stability of a collaborative relationship or even, if not resolved, lead to its termination (Beugelsdik, 2009; Das and Teng, 2000b, 2002).

An *adaptability* trait enables a collaborative network to build a capacity for internal change so as to respond agilely to an uncertain or a turbulent external environment. To counter such external threats, the collaborative network must develop norms and beliefs to support its capacity to receive and interpret signals from its environment and translate them into cognitive, behavioural and structural changes. It needs to have a mandate to flexibly adjust and adapt to changing circumstances and conditions (Taylor, 2005). A sense of *mission* involves a shared long-term purpose and vision of what the network will be and do in the future. This has two aspects. First, a mission provides a sense of meaning and a host of non-economic reasons for why the collaborative network's work is important. Second, a sense of mission defines the appropriate course of action for the collaborative network and its members. It ensures that members of a collaborative network work together towards a common goal, increasing commitment and co-operation and reducing conflicts in inter-organizational relationships.

### *2.6.2.3 Attitudinal Commitment*

Commitment plays a significant role in facilitating successful long-term, co-operative inter-organizational relationships (Ring and Van de Ven, 1994; Shah and Swaminathan, 2008). With a high level of reciprocal commitment, partners are more co-operative in working towards the defined goals (Chen et al., 2009). In a general sense, commitment can be defined as the willingness on the part of partners to make short-term sacrifices to realise long-term benefits in the relationship (Holm et al., 1999). Drawing on Bateman and Strasser (1984), who cite the work of Kanter (1994) and Porter et al. (1974), commitment in the context of a collaborative network can be seen as reflecting the member organizations' dedication and loyalty to the collaborative relationship, acceptance of the goals and values that govern the collaborative relationship, and desire to maintain ongoing network membership. Commitment thus involves a willingness to invest time and effort in making a collaborative relationship function effectively (Robson et al., 2006): "Partners must be prepared to contribute as much as they receive and be seen to be committed to ensure that they do not default in their initial undertaking" (Taylor, 2005, p. 474). Lunnan and Haugland (2008) suggest that a sustained collaborative relationship requires increasing involvement and commitment over time.

Attitudinal commitment is the psychological attachment of one partner in a relationship to another, and consists of two dimensions: calculative commitment and loyalty commitment (Gilliland and Bello, 2002). Calculative commitment refers to the economic side of commitment, which is driven by the benefits of investment in relation-specific, non-recoverable assets in an inter-organizational relationship. Organizations will be proactive in a collaborative network only when they can anticipate themselves in gaining some form of economic reward (Cullen et al., 2000). In contrast, loyalty commitment has an emotional or affective component; it is driven by the feelings and attitudes of the participants towards the specific relationship and reflects the emotional and social sentiment that is needed to support and protect the other parties in the relationship (Gilliland and Bello, 2002). A psychological identification in an inter-organizational relationship context refers to the organizations' feelings of obligation to remain in the collaborative network (Allen and Myer, 1996). Organizations will feel morally obligated to remain in the collaborative network when they are committed to the inter-organizational relationship's norms and values (Ring and Van de Ven, 1994).

Calculative commitment plays a critical role in the initial stage of the development of an inter-organizational relationship, with the instrumental expectation of future extrinsic economic rewards binding the collaborative partners together and motivating them to remain in the relationship (Cullen et al., 2000; Gilliland and Bello, 2002). However, an excess of calculative commitment will inhibit the development of a collaborative network as when collaborative partners feel that there are insufficient economic gains to be anticipated, they will discontinue

the inter-organizational relationship (Wu, 2006). In order to offset the negative effects of reliance on calculative commitment, a collaborative network needs to encourage loyalty commitment to create a state of emotional attachment to and psychological identification with the network. Loyalty commitment acts to motivate collaborative partners to continue to seek the benefits of an on-going relationship and thus exert their maximum efforts to cultivate and maintain the inter-organizational relationships (Gilliland and Bello, 2002; Robson et al., 2006). As asserted by Cullen et al. (2000, p. 227), "if partners go beyond fair exchange and develop an attitudinal [loyalty] commitment to the relationship, the relationship can often sustain periods of unequal exchange".

### 2.6.3 Governance Resources: Regulating the Relationship

As mentioned, a collaborative network's sustainability depends on its technological resources to support and facilitate communication and co-ordination, and relational resources to bridge the connectedness of the inter-organizational network relationships. However, by themselves, these knowledge-based resources are insufficient to regulate the collaboration. A loosely regulated collaborative network would potentially encourage the occurrence of transaction and co-ordination hazards that consequently can lead to the failure of the collaborative network (Kale and Singh, 2009). An appropriate governance approach is considered to be significant in structuring and controlling the collaborative network so as to inhibit such hazards (Dekker, 2004; Faems et al., 2008). Typically, collaborative inter-organizational relationships can be regulated through formal structural controls and relational governance mechanisms such as trust (Mohr and Puck, 2010; Poppo and Zenger 2002). Structural governance "focuses on the structural design of single transactions and emphasises the importance of contracts", while relational governance "focuses on relational processes within on-going inter-firm relationships and emphasises the importance of trust for safeguarding and co-ordinating alliances" (Faems et al., 2008, p.1053). Although structural control and relational governance are often positioned as alternatives for regulating inter-organizational relationships, the relationship between the two is complex (Puranam and Vanneste, 2009). Indeed, a number of authors suggest that structural and relational governance can play complementary roles in collaborative relationships (Kale and Singh, 2009; Lui and Ngo, 2004; Poppo and Zenger, 2002).

### 2.6.3.1 Structural Governance Mechanisms

Typically, the structural governance approach adopted in inter-organizational relationships can be categorised into two forms: hierarchical and market. Osborn and Baughn (1990) propose that equity alliances (where partners share or exchange equity), also known as quasi-hierarchies, would deploy joint ventures as a hierarchical governance mechanism, whereas non-equity alliances, also known as quasi-markets, are often associated with contractual agreements as a market governance mechanism (see also Gulati, 1998; Gulati and Singh, 1998). According to

transaction cost economics, a balance between efficiency and protection is the fundamental factor in determining the adoption of a structural governance approach (Williamson, 1991). Efficiency refers to the minimisation of the sum of total transaction costs and production cost, whereas protection refers to the awareness of collaborative partners' opportunistic behaviours. Generally, transaction cost economics proposes that a market governance mechanism, i.e. contractual agreements, is more efficient than a hierarchical governance mechanism, i.e. hierarchical supervision, as it provides a more efficient, or lower cost, mechanism for managing economic exchanges (Chen and Chen, 2003; Kale and Singh, 2009; Kale et al., 2000). However, Gulati and Singh (1998) argue that in practice a varying degree of hierarchical controls can occur across different alliance structures. By extension, this study proposes that some degree of hierarchical governance may be present in collaborative networks that do not involve the sharing or exchange of equity.

Hierarchical governance "can facilitate co-ordination by providing robust authority structures and enforcement mechanisms, dedicated staff, and opportunities to devise structures and procedures that fit the purpose of the alliance" (Gulati et al., 2012, p. 549). Hierarchical controls include command structures and authority systems, incentive systems, standard operating procedures, and non-market pricing systems that facilitate the co-ordination of partners by clarifying decision-making procedures, minimising communication and reducing uncertainty (Gulati and Singh, 1998). A network co-ordinator may be established in a central structural role to co-ordinate the collaboration and provide a leadership function (Winkler, 2006). Indeed, Provan and Milward (2001, p. 418) argue that formally constructed networks are "often led, co-ordinated, and governed by a central, local administrative entity". The authors suggest that the presence of such a "network administrative organization" is a general indicator of network viability, helping "to guide, co-ordinate, and legitimise network activities or to monitor service provision" (p. 419). Without it, network governance is increasingly reliant on network members' commitment and co-operation.

Contracts or other formal written agreements are an important way of structuring inter-organizational relationships by stipulating rights and obligations, defining roles and responsibilities, outlining acceptable behaviour, specifying practices of interaction, and making provisions for network co-ordination, operation and dispute resolution (Duisters et al., 2011; Gulati et al., 2012; Kale and Singh, 2009; Reuer and Arino, 2007; Schweitzer and Gudergan, 2011). A lack of shared understanding of each collaborative partner's roles and obligations can impede the effective co-ordination of collaborative partners (Kale and Singh, 2009), in turn negatively affecting interaction between partners and hence poor predictions of collaborative partners' actions (Schreiner et al., 2009). Contractual agreements reduce the level of competition within a collaborative network by limiting the gains from collaborative partners' opportunistic behaviours. A tightly specified contractual agreement can curb collaborative

partners from acting opportunistically by detailing the penalties for opportunistic behaviours and increasing the costs of self-interested activities. Contracts can also increase the transparency of inter-organizational relationships and transactions by clearly specifying what is and what is not allowed (Das and Teng, 2000b; Faems et al., 2008; Leiblien, 2003; Lui and Ngo, 2004; Poppo and Zenger, 2002; Reuer and Arino, 2007).

However, contractual agreements can often be incomplete. That is, the contracts may inadequately address the collaborative partners' responses to future contingencies and uncertain conditions over the duration of the contract (Mayer and Argyres, 2004). There is a possibility that these uncertain conditions could be associated with an occurrence of collaborative partners' opportunistic behaviours. When such a circumstance takes place, a hierarchical governance mechanism would be preferable. As noted, equity alliances such as joint ventures entail information symmetry as they possess shared ownership and shared decision making, and consequently opportunistic behaviours can be reduced (Chen and Chen, 2003; Osborn and Baughn, 1990). In such situations, contractual agreements would incur a higher cost as the collaborative network has to revise or re-negotiate the previous crafted clauses of the original contracts so as to hamper the risk of collaborative partners' opportunistic behaviours (Leiblien, 2003).

From the RBV perspective, the balancing between the acquisition of inflow resources and the protection of outflow resources is the fundamental factor in determining the adoption of a structural governance approach (Das and Teng, 2000b). To a further extent, the types of the resources involved can have an implication in the selection of whether a hierarchical or market structural as the governance mechanism. Typically, if property-based resources are the primary resources to be contributed to the collaborative network by various partners then contractual agreements are preferred. Contracts serve as a better safeguarding mechanism since the legal properties are protected by the written specification of promises, obligations, mutual rights (Das and Teng, 2000b). Likewise, equity alliances would be preferred as the safeguarding mechanism if knowledge-based resources are the main resources to be contributed to the collaborative network. This is because knowledge-based resources entail a higher level of tacit knowledge and skills which cannot be protected by property laws (Das and Teng, 2000b).

*2.6.3.2 Relational Governance Mechanisms*

According to social exchange theory, a relational governance approach is concerned with the management of the relational process within a collaborative network (Pateli and Giaglis, 2007). Relational governance is important in regulating a collaborative network as structural governance mechanisms may be inadequate in regulating the collaborating partners' behaviour on a long-term basis. This is because customised contractual agreements cannot contractually specify appropriate actions in the event of unexpected changes in behaviours or events. When

such situations occur, relational governance plays a role in complementing the adaptive limits of contractual agreements by fostering continuance of the collaborative network (Poppo and Zenger, 2002). Further, the use of relational governance enables a more flexible contract application approach (Faems et al., 2008). Thus, collaborative networks can use relational governance mechanisms to complement contractual agreements in controlling opportunistic behaviour and dealing with unspecifiable contractual terms and conditions or when writing, monitoring and enforcing contractual governance is costly (Dyer and Singh, 1998; Poppo and Zenger, 2002, Reuer and Arino, 2007; Todeva and Knoke, 2005). The facilitation of relational governance relies on two specific self-governance control mechanisms as safeguarding and co-ordinating mechanisms: reputation and goodwill trust (Dekker, 2004; Dyer and Singh, 1998; Faems et al., 2008; Ireland et al., 2002; Kale and Singh, 2009).

An organization's reputation can enhance partners' confidence in the likelihood of co-operation and increase their willingness to contribute resources to the collaboration. Reputation can be the result of an organization's position in the industry or knowledge of an organization from previous direct relationships or common partners (Das and Teng, 2002; Pateli and Giaglis, 2007; Royer and Simons, 2009). Reputation serves as a means for participating organizations to validate various collaborative partners' characteristics and thus understand and predict their behaviour with more confidence (Ireland et al., 2002).

Previous research has identified trust as one of the most essential characteristics in facilitating the development and survival of collaborative relationships (Bryson et al., 2006; Judge and Ryman, 2001; Mohr and Spekman, 1994; Nolan et al., 2007; Vangen and Huxham, 2003). Trust among members of a collaborative network "is crucial to overcoming competitive rivals' initial suspicions about possible partner opportunism" (Todeva and Knoke, 2005, p. 134). Trust is based on the belief in a partner's ability to behave appropriately and fulfil their role in a collaborative relationship, and their intention to do so. The former is known as competence trust, and the latter as goodwill trust (Cullen et al., 2000; Lui and Ngo, 2004; Nooteboom, 1996; Sako, 2006). Das and Teng (2001) assert that goodwill trust reduces the relational risk and likelihood of opportunistic behaviour in a collaborative network. Goodwill trust represents the perception that members of a collaborative network will refrain from opportunistic behaviour and will act for the mutual benefit of all parties (Sako, 2006). Shapiro et al. (1992) regard such a type of trust as an identification-based trust that goes beyond a deterrence-based or calculative-based trust, which is based on an assumption of self-interest, or even knowledge-based trust, which is developed through the accumulation of knowledge of the other party (see also Gulati, 1998; Lander et al., 2004; Ratnasingham, 1998). Identification-based trust is developed through closer integration whereby each party "has fully internalised the other's preferences" (Shapiro et al., 1992, p. 371). With a high level of goodwill trust, collaborative partners have a stronger emotional attachment to their inter-organizational relationships. This increases the likelihood

that a collaborative network will be sustained since the collaborative partners will tend to act in the best interests of the collaborative network (Dekker, 2004, Das and Teng, 2001). As a result, the efficient and effective transfer of knowledge and resources in the collaborative network will be facilitated, and a harmonious collaborative environment can be created (Lander et al., 2004) in which a high degree of information sharing and exchange occurs (Shapiro et al., 1992). As a mechanism for resolving conflicts, guiding joint activities and enhancing information exchange, the development of trust between collaborating partners may be facilitated by direct personal interactions and the development of personal relationships between organizational representatives (Kale et al., 2000; Lunnan and Haugland, 2008).

## 2.7 Capabilities

As noted earlier, although the terms resources and capabilities are often used interchangeably in the literature on sustaining competitive advantage, this study follows a number of authors working within the RBV approach in making a distinction between the two terms (e.g. Amit and Schoemaker, 1993; Araya et al., 2007; Grant, 1991; Makadok, 2001). These authors argue that capabilities are idiosyncratic competencies that are essential for allocating, deploying, co-ordinating and exploiting resources to achieve a desired end. To possess the necessary resources is not sufficient; an organization needs to have distinctive capabilities to be able to productively utilise resources (Grant, 1991; Majumdar, 2000; Schreyogg and Kliesch-Eberl, 2007). As defined by Grant (1996, p. 377), capabilities are "the ability to perform repeatedly a productive task which relates either directly or indirectly to a firm's capacity for creating value through effecting the transformation of inputs into output." Thus, capabilities are distinctive (formal and informal) routines, processes or ways of co-ordinating and combining resources (Teece at al., 1997). As such, capabilities are a special, higher-level type of resource.

Further, capabilities tend to be developed over time, rather than purchased or acquired, and are tacit and embedded in an organization's history, culture and experience so that their transfer or imitation is difficult (Amit and Schoemaker, 1993; Bharadwaj et al., 1999; Grewal and Slotegraaf, 2007; Majumdar, 2000; Makadok, 2001). In this sense, capabilities can be thought of as complex, collective behavioural patterns that "represent a repository of historical experiences and organizational learning" (Schreyogg and Kliesch-Eberl, 2007, p. 914). They are "knowledge in action" (Butler and Murphy, 2008, p. 333). As asserted by Grewal and Slotegraaf (2007), knowledge is stored through the accumulation of learning-by-doing and learning from historical experiences in these routines or processes. An efficient integration of knowledge will facilitate an effective creation of capabilities. To be able to generate capabilities, organizations have to integrate knowledge through a process of acquisition, creation and exploitation and conversion of both tacit and explicit knowledge through mutual interactions (Ireland et al., 2002, Nonaka, 1994).

There is a substantial literature on capabilities in which scholars assert that organizations need to develop dynamic capabilities as crucial sources of sustained competitive advantage (Ambrosini and Bowman, 2009; Barreto, 2010). As a generic concept, dynamic capabilities refer to "the firm's ability to integrate, build, and re-configure internal and external competences to address rapidly changing environments" (Teece et al., 1997, p.516), although Zollo and Winter (2002) suggest that dynamic capabilities can also respond to situations that are subject to lower rates of change. Sensing and seizing opportunities or managing threats "requires the allocation, re-allocation, combination, and re-combination of resources and assets" (Teece, 2007, p. 1341). Thus, the notion of dynamic capabilities emphasises dynamic improvements to the activities of the organization through constantly changing organizational routines and a path-dependent process of learning (Collis, 1994).

Teece et al. (1997) suggest that three types of routines are important in constituting a dynamic capability. Co-ordination routines select, allocate and integrate resources in co-ordinating an organization's activities, while learning routines generate new knowledge around improving the performance of activities. Re-configuration routines involve sensing new opportunities or the need for change, and re-configuring resources and transforming existing processes to adapt to these changed conditions (Schilke and Goerzen, 2010). Organizations can learn how to develop the crucial know-how of re-adapting their resources to a changing environment through these organizational routines, which are often referred as operational and learning patterns (Brown and Eisenhardt, 1997; Eisenhardt and Martin, 2000). More importantly, skills and experiences captured from these existing organizational routines can be codified and transferred as tacit knowledge to re-modify the resource base in responding to the turbulent business environments (Zahra et al., 2006). Thus, learning and learning behaviours, including experience accumulation, knowledge articulation and knowledge codification, are important aspects of the dynamic capabilities used by an organization to develop, modify and adapt its operating routines (Zollo and Winter, 2002). As Butler and Murphy (2008, p. 332) observe: "Learning routines or processes involve repetition and experimentation to enable tasks to be performed better and more rapidly – this occurs at individual, group, organizational, and inter-organizational levels."

Various studies have shown that firms can develop distinctive capabilities in diverse areas such as technology, marketing, management, research and development, product development, relationship management, and governance (Butler and Murphy, 2008; Di Benedetto and Song, 2003; Griffith and Harvey, 2001; Helfat, 1997; Kale and Singh, 2007; Mayer and Salomon, 2006; Petroni, 1998). This study does not attempt to focus on a complete set of all possible capabilities that a firm or collaborative network might develop. Instead, it focuses on three specific capabilities: technological, relational and governance, that relate to the co-ordination, deployment and enhancement of the technological, relational and governance resources needed

for a sustained collaborative network. This study will investigate how these three capabilities are developed and leveraged to sustain collaborative networks.

### 2.7.1 Technological Capability: Effectively Co-ordinating Collaboration

There is a substantial research literature on IT- related firm capabilities (Bharadwaj et al., 1999; Bharadwaj, 2000; Bhatt and Grover, 2005; Feeny and Willcocks, 1998; Lee and Kelley, 2008; Li et al., 2006; Pham and Jordan, 2007; Ross et al., 1996). These studies emphasise that while valuable knowledge-based technological resources can improve an organization's efficiency and effectiveness, it is only through the development of technological capabilities that sustained competitive advantages are achieved, leading to longer-term positive organizational performances. As asserted by Bharadwaj et al. (1999), technological capability is not the specific set of sophisticated technological functionality possessed by an organization, but rather an enterprise-wide ability to leverage technology to differentiate an organization from its competition.

With regard to sustained collaborative networks, the ability to mobilise, deploy and co-ordinate in combination, ICT infrastructure, ICT competence and managerial ICT skills represents a network-wide technological capability (Bharadwaj, 2000). Such a capability allows a network to utilise these ICT-related resources to facilitate communication and co-ordination, share information and knowledge across its members, and direct its collaborative efforts more effectively (Di Benedetto and Song, 2003). Just as developing a competency to implement IT effectively in specific market contexts is more important to firm performance than simply investing in IT (Tippins and Sohi, 2003), developing the capability to combine and implement the necessary ICT-related resources in the context of a collaborative network is important for those resources to be utilised to sustain the collaborative relationships.

In effect, ICT infrastructure, ICT competence and managerial ICT skills are co-specialised resources (Tippins and Sohi, 2003) that together assist a collaborative network to function effectively. An ICT infrastructure yields limited benefits as a stand-alone resource. It needs to be deployed alongside technologically competent users and managers. Further, however, the combination of these three resources needs to be implemented within appropriate communication and co-ordination processes in ways that support and maintain the collaborative network. The value of such resources is thus dependent on the learning and experience involved in developing the relevant network-wide technological capability to deploy them effectively in the network processes to support and enhance the level of co-operation within a collaborative network. It is this network-wide technological capability that provides the basis for network communication, information processing, co-ordination, as well as the ability to dynamically adapt these network processes to changes in the network environment or conditions (Bharadwaj et al., 1999; Bhatt and Grover, 2005). Technological capability thus serves as a co-ordinating

mechanism in which technological resources are synchronized through a process of planning, deploying and managing to support and facilitate effective communication and co-operation between the collaborative partners. Inefficiencies in the communication process engender conflicts between the collaborative members, as a by-product of information asymmetry (Mohr and Spekman, 1994; Yazici, 2002).

The effectiveness of leveraging ICT-related resources is also dependent on the interaction between those who provide and manage the technological resources and the users of the technologies (Bhatt and Grover, 2005). The former must have a sound understanding of the network's operation, activities and goals so that they can work hand-in-hand with the technology users and envision how the ICT-related resources can be leveraged to contribute to co-ordinating and integrating the network's activities (Bharadwaj et al., 1999; Wade and Hulland, 2004). This may involve cultivating a network culture in which the deployed technological resources are utilised consistently and effectively.

### 2.7.2 Relational Capability: Learning to Collaborate

Collectively, the relational resources of partner complementarity, network culture and attitudinal commitment, described above, form a set of social or relational capital (Chen et al., 2009; Cullen et al., 2000; Ireland et al., 2002; Kale et al., 2000) on which a collaborative network can base and maintain its inter-organizational relationships. However, the presence of such resources is necessary but insufficient for such relationships to be nurtured and maintained. The collaborative network must also develop a relational capability in utilising these resources in order to competently manage and sustain the network over time (Capaldo, 2007; Kale et al., 2009; Ritter and Gemünden, 2003, 2004). While prior research has primarily focused on the development of a firm-based alliance management capability (de Man, 2005; Kale and Singh, 2007; Schilke and Goerzen, 2010; Schreiner et al., 2009), this study is interested in the development of a network-based relational capability. This study proposes that developing such a capability involves a learning process based around a capacity to enhance the leveraging of the relational resources needed to bridge the connectedness of the inter-organizational relationships involved in the collaborative network; that is, learning to collaborate (Doz, 1996; Mayer and Argyres, 2004). As Rycroft (2007, p. 568) notes, "the most successful networks are also fast organizational learning systems. And co-operation often seems to enhance fast learning."

According to Das and Kumar (2007), there are three types of learning processes in a strategic alliance and, by extension, a collaborative network. The first type of learning process is known as content learning which enables a collaborative partner to acquire and internalise knowledge from the collaborative network. The content leaning process reinforces the calculative component of commitment to the inter-organizational relationship. As the learning of this knowledge can increase the possibility of achieving positive organizational performances

therefore the collaborative partners are motivated by the perceived economic reward (Cullen et al., 2000).

The second type of learning is known as partner-specific learning, and involves learning about a collaborative partner. When collaborative partners learn more of each other this allows a better mutual understanding of each other's characteristics, such as organizational and cultural fit as well as organizational and operational processes, potentially important in partner selection and the development of a network culture. Furthermore, the emotional attachment component of attitudinal commitment can also be developed when the participating organizations learn more about each other and their norms and values (Emden et al., 2005). As Das and Kumar (2007, p. 690) assert, "learning about one's partner is crucial because the motivation and ability of a member firm to act in ways that will maximise joint value creation are clearly of some importance in sustaining and deepening commitment in the alliance."

The third type of learning is known as alliance management learning where collaborative partners learn to effectively manage the collaborative network. This involves "the accumulation of mutual experience with and knowledge about how to manage inter-organizational co-operation" (Child, 2003, p. 459). Such learning can arise from prior alliance experiences, including past practices and skills involved in co-operating and collaborating with other organizations (Anand and Khanna, 2000; Sampson, 2005; Schilke and Goerzen, 2010). This type of learning can also involve an active learning environment, in which the participating members in a network constantly acquire, gather, share and disseminate the know-how of alliance management skills to strengthen the connectedness of the inter-organizational relationships in a collaborative network (Nielsen et al., 2008). An active learning environment reinforces a network culture where the collaborating partners share the norms and values needed to effectively manage the collaborative network. Such learning processes represent a dynamic capability that helps a network extend and improve its network and relationship management competence (Kale and Singh, 2007, 2009).

### 2.7.3 Governance Capability: Developing Effective Network Governance

Network governance, governing the relationships between a network of multiple collaborating organizations that interact in different ways, is challenging and potentially more complex than governing dyadic relationships (Bergenholtz and Goduscheit, 2011). The ability of collaborative network partners to effectively align appropriate governance mechanisms with the exchange activities and transactions that the network is engaging plays an important role in sustaining the network until the joint objective is achieved (Dyer and Singh, 1998). Such effective network governance represents a governance capability (Mayer and Salomon, 2006) that can both lower the costs of transacting between members of a collaborative network and provide an incentive for engaging in value-creating behaviour (Dyer and Singh, 1998).

Sustaining a collaborative network requires reconciling the structural tension between rigidity and flexibility. These forces compete in the area of governance. Structural control arrangements provide rigidity in aligning interests, discourage opportunistic behaviour and distribute the benefits of collaboration. In contrast, relational governance mechanisms enhance flexibility in the collaborative network by helping to control risk, encouraging the commitment of resources and enabling adaptation to changing conditions (Das and Teng, 2000a). Similarly, various structural and relational governance mechanisms serve as effective co-ordinating mechanisms in mediating a balance between co-operation and competition within a collaborative network. For example, specifying channels for inter-organizational communication in a contractual agreement can facilitate the level of co-operation within a collaborative network. At the same time, contractual agreements can reduce the level of competition within a collaborative network by limiting the gains from collaborative partners' opportunistic behaviours. The choice of governance arrangements is also relevant with regard to the timeframe of the collaborative relationships. For example, a longer-term orientation allows time for the psychological attachment of attitudinal commitment and identification-based trust to be developed. In the shorter term, a collaborative network may rely on calculative-based commitment and deterrence-based trust arising from formal contractual provisions.

A number of authors have highlighted that more effective governance can be engendered by a combination of structural and relational governance (Dekker, 2004; Faems et al., 2008; Poppo and Zenger, 2002; Reuer and Arino, 2007). For example, contractual agreements can enhance relational governance as "the specification of contractual safeguards promotes expectations that the other party will behave co-operatively and thus complements the informal limits of relational governance" (Poppo and Zenger, 2002, p. 712). On the other hand, "excessive contractual formality may erode the accumulation of trust by implying insufficient confidence in others' integrity … and by denying them opportunities to demonstrate their trustworthiness" (Gulati et al., 2012, p. 548). Reuer and Arino (2007) suggest that relational governance can substitute for weaker contractual provisions (e.g. around co-ordination rather than enforcement), so that stringent contractual terms may still be important for monitoring and constraint collaborative partners' opportunistic behaviours. As structural control and relational governance play complementary roles in regulating collaborative networks, a governance capability can be seen as the ability to manage the balance between structural and relational governance forms (Todeva and Knoke, 2005) in performing the "set of co-ordinating and monitoring activities [that] must occur in order for collaborations to survive" (Bryson et al., 2006, p. 49). The heterogeneity in goals and interests, power distribution and decision competencies found in inter-firm networks, together with their often low degree of formalisation, means that governing network relationships is inherently difficult, complex and ambiguous, and that a capability to do so needs to be learnt over time through experience and reflection (Pittaway et al., 2004; Vangen

and Huxham, 2003; Winkler, 2006). The misunderstandings and conflicts that are likely to arise between organizations compel a collaborative network to develop skills and abilities in managing and "coping with complex lateral relationships spanning legally autonomous entities" (Todeva and Knoke, 2005, p. 134). To be sustained, a collaborative network must develop efficacy in negotiating, implementing and enforcing formal contracts and agreements, while "building trust and collaborative decision-making norms" (Alexander et al., 2003, p. 132S). The former are market governance mechanisms that can equip collaborative partners with the capacity to monitor each other's actions and deter opportunistic behaviour, thus sustaining co-operation and collaboration (Reuer and Arino, 2007). Organizations, and by extension networks, can develop capability in designing complex, detailed agreements and contracts and negotiating appropriate contractual terms (Argyres and Mayer, 2007). For example, network members' experiences of misunderstandings may prompt the inclusion of specific provisions around inter-organizational communication in their contracts or formal agreements (Gulati et al., 2012). Further, through on-going routines around structuring and regulating its collaborative relationships, a collaborative network can internalise the tacit knowledge of how to receive and interpret signals from the uncertain environment and how best to deal with such changes in environmental conditions, and translate them into cognitive, behavioural and structural changes in the network's governance routines (Denison and Mishra, 1995).

Network governance is a constant requirement for sustaining a collaborative network, as post-formation dynamics may expose the limitations of the original governance arrangements. A governance capability is required "to improvise and elaborate co-ordination mechanisms as the relationship evolves" (Gulati et al., 2012, p. 553). Initial co-operation agreements may also need to be adjusted in response to the changing goals of network members, changing levels of commitment or trust within the network, or attempts by some network members to exploit openings for opportunistic behaviour (Gulati et al., 2012). Further, there are varying levels of goals in a collaborative network, including the ostensible goals of the collaboration, the goals of the organizations belonging to the network, and those of individuals participating in the collaboration. Organizations and individuals do not necessarily disclose their true motives for participating in the collaborative network (Winkler, 2006).

## 2.8 Conceptual Framework

The aim of this thesis is to understand how inter-organizational collaborative networks are sustained. A sustained collaborative network is a stable inter-organizational entity involving multiple organizations that manage and maintain their on-going inter-organizational relationships in the collaborative pursuit of a common objective. Rather than being concerned with network performance and competitive advantage, the focus of the research is on how an inter-organizational network manages and sustains its inter-organizational relationships while

collaborating in the pursuit of a common objective. Further, rather than treating a network as a set of dyadic relationships, such as a leader-follower relationship or a hub-and-spoke arrangement, this study examines the nature of collaborative networks at a 'whole' network level of analysis; that is to say, focusing on the entity that is a set of collaborative relations and how it can be sustained by the group of collaborating organizations. Finally, this thesis proposes the notion of network-level resources and dynamic capabilities to explore collaborative inter-organizational networks are sustained. Thus, the research question underlying the study is: *How are network-level resources and capabilities utilised to sustain inter-organizational collaborative networks?*

To answer this research question, an initial conceptual framework was developed that proposed key resources and capabilities needed to sustain a collaborative network. Based on prior conceptualisations of firm-based resources (e.g. Barney, 1991; Das and Deng, 2002b; Grant 1991, Kale and Singh, 2009; Poppo and Zenger, 2002), two types of resources that appeared relevant to a sustained collaborative network were proposed: technological resources and organizational resources. Three technological resources were identified as potentially relevant to supporting the information processing and communication processes in a collaborative network: ICT infrastructure, ICT technical skills and ICT training. Similarly, three organizational resources were identified as potentially relevant to increasing the connectedness among the organizations in a collaborative network: network culture, attitudinal commitment and trust. Capabilities were conceptualised as the ability to learn to co-ordinate, deploy and enhance the organizational and technological resources in order to sustain the collaborative network.

Development of the conceptual framework was an iterative process. The initial case study analyses triggered further reading in the literature on inter-organizational networks and informed the refinement and expansion of the conceptual framework into its current form. A third type of resource and capability, governance resources and governance capability, were added to the framework in order to better explain the sustainability of the collaborative network in the first case study. Organizational resources and capability were renamed relational resources and capability to better reflect their role in sustaining a collaborative network. Trust became an inherent part of governance resources and partner complementarity was added to the set of relational resources. ICT technical skills and ICT training were considered to better reflect a single resource, ICT competence, and managerial ICT skills was added as a further technological resource. Finally, network sustainability was conceptualised in terms of balancing the three pairs of competing forces proposed in Das and Teng's (2000a) internal tensions perspective on inter-organizational relationships.

The final form of the conceptual framework developed in this study is shown in Figure 2.2 and summarised below. The figure depicts the key theoretical concepts used to explore how

collaborative networks are sustained. The conceptual framework proposes that the availability of appropriate technological, relational and governance resources across the network, together with the development of the relevant network capabilities needed to leverage these available resources, facilitates a sustained collaborative network. The conceptual framework is used to inform and guide the case study research and analysis that was conducted in this research.

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┌──────────────────────────┐              ┌──────────────────────────┐
│ Technological Resources  │              │   Relational Resources   │
│  • ICT Infrastructure    │              │  • Partner Complementarity│
│  • ICT Competence        │              │  • Network Culture       │
│  • Managerial ICT Skills │              │  • Attitudinal Commitment│
└──────────────────────────┘              └──────────────────────────┘
             │                                          │
             ▼                                          ▼
      ( Technological )                          (  Relational  )
      (  Capability   )                          (  Capability  )
             │                                          │
             ▼                                          ▼
        ┌──────────────────────────────────────┐
        │   Sustained Collaborative Network     │
        │   Co-operation  =  Competition        │
        │   Rigidity      =  Flexibility        │
        │   Short-term    =  Long-term          │
        └──────────────────────────────────────┘
                          ▲
                    ( Governance  )
                    ( Capability   )
                          ▲
             ┌──────────────────────────┐
             │   Governance Resources   │
             │  • Structural Mechanisms │
             │  • Relational Mechanisms │
             └──────────────────────────┘
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Figure 2.2: Conceptual Framework of a Sustained Collaborative Network

Technological resources comprise: (1) an *ICT infrastructure* to support the communication process and achieve strong inter-organizational information processing; (2) the *ICT competence* needed to utilise the ICT infrastructure and facilitate a dynamic communication process that can lead to an effective decision making within a collaborative network; and (3) *managerial ICT skills* for understanding the communication needs of the network and efficiently and effectively co-ordinate collaborative activities. Relational resources are needed to ensure a level of connectedness among the participating organizations through: (1) *partner complementarity*, which can have an impact on the network stability; (2) *network culture*, in which collaborative partners have compatible organizational cultures or share cultural similarities; and (3) *attitudinal commitment* by the participating organizations to the network's norms and values and to maintaining collaborative relationships. Lastly, the role of governance resources is to regulate the collaborative relationship through: (1) *structural governance mechanisms* such as contracts and agreements that stipulate rights and obligations, define roles and responsibilities, and make provisions for network communication, co-ordination, operation, enforcement and dispute resolution; and (2) *relational governance mechanisms* such as goodwill trust and reputation, which act to self-enforce governance in a collaborative network.

To a further extent, specific dynamic capabilities must be developed by the network to deploy and utilise these resources in order to sustain the collaborative network. The three types of capabilities proposed are technological capability, relational capability and governance capability. *Technological capability* is a network-wide capacity that enables the network to co-ordinate and combine ICT-related resources to direct its collaborative efforts more effectively. *Relational capability* involves a process of learning to collaborate and enhance the connectedness of the collaborative relationships. *Governance capability* is a network governing capacity that is able to balance structural and relational governance mechanisms so as to regulate the inter-organizational relationship more effectively.

Following Das and Teng (2000a), a stable and sustained collaborative network requires the balancing of three pairs of competing forces that act as internal tensions in collaborative arrangements: co-operation versus competition, rigidity versus flexibility and a short-term orientation versus a long-term orientation. The key theoretical concepts in Figure 2.2 and their sources are summarised in Table 2.6.

Table 2.6 Key Theoretical Concepts

| Concept | Function | Sources |
|---|---|---|
| *Technological resources* | Use of ICT to support communication and co-ordination in the collaborative network | Bafoutsou and Mentzas (2002); Cheng et al. (2006); Chi and Holsapple (2005); Fink (2007); Munkvold (2005) |
| ▪ *ICT infrastructure* | Technologies, systems, applications and services that support communication and information processing in a collaborative network | Barua et al. (2004); Chi and Holsapple (2005); Dewett and Jones (2001); Pham and Jordan (2007) |
| ▪ *ICT competence* | Abilities of the members of a collaborative network to understand, use and exploit the available ICT infrastructure | Bharadwaj (2000); Ritter and Gemünden (2004); Yazici, (2002) |
| ▪ *Managerial ICT skills* | Ability to understand the communication and co-ordination needs of the network and to deploy appropriate ICT applications to support network activities | Bharadwaj (2000); Mata et al.(1995); Melville et al. (2004) |
| *Relational resources* | Relational capital to increase the connectedness of the collaborative network | Cullen et al. (2000); Robson et al. (2006) |
| ▪ *Partner complementarity* | The contribution of resources, assets or skills that each partner brings to the collaborative network that enable the network to achieve its goals and objectives | Chen et al. (2009); Das and Teng (2000b); Dyer and Singh (1998); Kale and Singh (2009); Kelly et al. (2002); Pateli (2009); Sarkar et al. (2001); Schreiner et al. (2009); Shah and Swaminathan (2008); Todeva and Knoke (2005) |
| ▪ *Network culture* | Mutual values and norms that facilitate effective collaborative relationships | Denison and Mishra (1995); Huxham (1993) |
| ▪ *Attitudinal commitment* | The psychological attachment of one partner in a relationship to another | Allen and Myer (1996); Cullen et al. (2000); Gilliland and Bello (2002); Ring and Van de Ven (1994) |
| *Governance resources* | Mechanisms for regulating the collaborative relationship | Kale and Singh (2009); Lui and Ngo (2004); Poppo and Zenger (2002) |
| ▪ *Structural mechanisms* | Hierarchical controls, contracts and formal agreements that define and regulate network responsibilities, operations and dispute resolution | Chen and Chen (2003); Gulati and Singh (1998); Kale et al (2000) Reuer and Arino (2007) |
| ▪ *Relational mechanisms* | Relational processes within on-going inter-organisational relationships that emphasise trust and reputation | Dekker (2004); Dyer and Singh (1998); Ireland et al. (2002); Kale and Singh (2009); Sako (2006) Todeva and Knoke (2006) |
| *Technological capability* | Network-level capability for leveraging ICT-related resources to effectively communicate and co-ordinate collaborative efforts | Bharadwaj (2000); Di Benedetto and Song (2003) |
| *Relational capability* | Network-level capability for leveraging relational capital in learning to collaborate | Das and Kumar (2007); Doz (1996); Mayer and Argyres (2004) |
| *Governance capability* | Network-level capability for leveraging governance mechanisms in developing effective network governance | Dekker (2004); Faems et al.(2008); Poppo and Zenger (2002); Reuer and Arino (2007) |
| *Network sustainability* | A sustained collaborative network involves a balancing of three internal tensions: co-operation vs competition, rigidity vs flexibility, and short-term vs long-term orientation | Das and Teng (2000a) |

# Chapter 3: Methodology

This purpose of this chapter is to describe and explain the research methodology and design for this PhD study. The chapter begins with an explanation of the research structure followed in this study. This is followed by a discussion of the purpose of the study. Next, the research philosophy underpinning the study is outlined, followed by a discussion of justification for the research methodology selected in this study. The methods of data collection and data analysis used within the selected research methodology are then described in detail, and issues of validity and reliability are addressed. The final section presents the study's research design.

## 3.1 Research Structure

The methodology of a study is closely related to the research aim of the study. The purpose of a methodology is to plan a set of research activities that include the methods that will be used for collecting and analysing the data needed to address the research aim. This is an important aspect of the research process because if there are any flaws in planning and executing the research design the research aim may not be adequately addressed.

The methodology for a research study is driven by the *purpose* of the study. For example, is it exploratory research to generate information on a poorly understood phenomenon, descriptive research to accurately portray the characteristics of the phenomenon of interest, or explanatory research to test cause-and-effect relationships among variables (Cavana et al., 2001; Yin, 2003; Zikmund, 2003). Underpinning the study's methodology is the *research philosophy* of the researcher, which includes the ontological and epistemological assumptions that determine how the research will proceed. These assumptions influence the selection of a specific *research methodology*, often categorised as qualitative or quantitative, or some combination of both. Different research methodologies lend themselves to particular *research designs*, each of which involves specific research *methods* for collecting and analysing the data needed to address the research aim. This approach to structuring the methodology of a research study was adopted in this PhD research and formed the basis of the structure of this chapter.

## 3.2 Research Purpose

The purpose of this PhD research can be categorised as exploratory. An exploratory study is conducted when there is little or no information available regarding of the phenomenon that is being studied. It is an initial study that seeks and gathers information so that an understanding of the dimensions of the phenomenon can be obtained. Where some understanding of the phenomenon exists, subsequent research is conducted so as to further investigate aspects of the phenomenon of interest (Cavana et al., 2001).

The aim of this research is to develop a detailed understanding of how inter-organizational collaborative networks are sustained. For the purpose of this study, sustainability refers to a network's ability to maintain on-going inter-organizational relationships in its pursuit of a collaborative outcome. As noted earlier, while our understanding of organizations' motives for and benefits of forming collaborative networks is well theorised, the sustainability of collaborative networks is less well understood and little empirical research has been conducted in this area. Accordingly, this PhD research aims to address this gap in the extant literature by conducting an exploratory study to investigate how collaborative networks are sustained.

## 3.3 Research Philosophy

A research study is shaped by a researcher's research philosophy, which constitutes a set of research guiding principles that encompass the researcher's ontological, epistemological and methodological assumptions (Denzin and Lincoln, 2005). Ontological assumptions are concerned with the nature of the social world and what can be known about it (Ritchie and Lewis, 2003). That is, does the phenomenon of interest exist objectively and independent of human cognition, or subjectively in that it is socially constructed through human interaction. Epistemological assumptions relate to the nature of knowledge and how it can be acquired (Ritchie and Lewis, 2003). If the phenomenon to be studied is viewed as objective, knowledge of it is discovered and evaluated by empirically verifying or falsifying theoretical propositions about it (Orlikowski and Baroudi, 1991). If the phenomenon to be studied is viewed as subjective, the researcher develops an interpretation of the phenomenon by closely observing and interacting with the human actors in order to understand how they socially construct reality (Rowlands, 2003). Methodological assumptions are concerned with the nature of the methods of data collection and analysis best suited for generating valid conclusions about the phenomenon of interest.

Three broad research philosophies or paradigms are generally identified within the extant literature: positivist, interpretivist and critical (Cavana et al., 2001; Orlikowski and Baroudi, 1991). The characteristics of these three paradigms are presented in Table 3.1. The intention here is not to rehearse the characteristics of each in detail. Instead, they are discussed in relation to the research philosophy used in this study and in the subsequent discussion on the research approach followed. From a positivist perspective, social reality is objective and human behaviour is governed by law-like properties (Ritchie and Lewis, 2003), so that a general system of human activity can be predicted (Cavana et al., 2001). In the interpretivist research paradigm, social reality is subjective in that human beings construct their social world through their subjective and inter-subjective interpretation of it (Orlikowski and Baroudi, 1991). Thus, human behaviour cannot be predicted (Johnson and Onwuegbuzie, 2004) and social phenomena are best understood through people's subjective meanings rather than the researcher's objective

definitions (Rowlands, 2003). Critical research is focused on uncovering structural contradictions and conflicts in the social world and seeks to transform an oppressive social reality (Orlikowski and Baroudi, 1991).

Table 3.1 Characteristics of Research Paradigms (adapted from Cavana et al., 2001)

| | Positivist | Interpretivist | Critical |
|---|---|---|---|
| **Assumptions** | Objective world that science can measure and 'mirror' with privileged knowledge | Inter-subjective world that science can represent with concepts; social construction of reality | Material world of structured contradictions and/or exploitation, which can be objectively known only by removing tacit ideological biases |
| **Aim** | To discover universal laws that can be used to predict human activity | To uncover the socially constructed meaning of reality as understood by an individual or group | To uncover surface illusions so that people will be empowered to change the world |
| **Stance of researcher** | Stands apart from the research subjects so that decisions can be made objectively | Becomes fully involved with the research subjects to achieve a full understanding of subjects' world | Involved with the research subjects so that surface illusions can be identified, but urges subjects to change their world |
| **Values** | Value-free; their influence is denied | Values included and made explicit | Values included and made explicit |
| **Types of reasoning** | Deductive | Inductive | Deductive and inductive |
| **Research plan** | Rigorous, linear and rigid, based on research hypotheses | Flexible, and follows the information provided by the research subjects | The imperative for change guides the actions of the researcher |
| **Research methods and type (s) of analysis** | Experiments; questionnaires; secondary data analysis; quantitatively coded documents; statistical analysis | Ethnography; participant observation; interviews; focus groups; conversational analysis; in-depth case studies | Field research, historical analysis; dialectical analysis |
| **Research quality criteria** | Conventional benchmarks of 'rigour'; internal and external validity; reliability and objectively | Trustworthiness and authenticity | Historical situations; erosion of ignorance and misapprehensions; action stimulus |

This PhD study draws on a post-positivist research philosophy. Post-positivism lies somewhere between the positivist and interpretivist paradigms, and is a more recent research philosophy that has emerged in response to the critiques directed at positivism by interpretivist researchers (Guba, 1990). Post-positivism shares many of positivism's characteristics, including the ontological assumption that reality is objective and is deterministic based on a priori theories (Creswell, 2007). As pointed out by Fischer (1993, p. 333), objective reality is dependent on a "particular constellation of pre-suppositions, both theoretical and practical, that pre-structure

empirical observations". Nevertheless, post-positivism also acknowledges that our understanding of that objective reality is dependent on the human researcher observing that reality. Multiple methods and sources of data provide a more accurate picture of reality (Guba, 1990). In terms of epistemology, knowledge is still predominantly deduced through the empirical testing of theories or hypotheses, but discovery and theory building is also possible (Guba, 1990). At the same time, post-positivist researchers increase the relevance of their research by involving themselves in natural settings (Guba, 1990) and getting close to their research subjects in order to understand their experience of the social world. Post-positivism's methodological assumptions are usually associated with qualitative data collection and analysis (Creswell, 2007) in an effort to produce richer interpretations and explanations of social phenomena.

## 3.4 Research Methodology

Based on his or her philosophical paradigm, a researcher will adopt either a quantitative research methodology, a qualitative research methodology, or a mixed method research methodology (in which the two preceding approaches are combined). The differences between quantitative and qualitative approaches are presented in Table 3.2. A brief outline of these three research approaches is presented, followed a detailed description of the research methodology used in this PhD research.

Table 3.2 Differences between Quantitative and Qualitative Research (adapted from Tolich and Davidson, 1999)

|  | Quantitative Research | Qualitative Research |
|---|---|---|
| Assumptions | Social facts have an objective reality<br>Primacy of method<br>Variables can be identified and measured | Reality is socially constructed<br><br>Primacy of subject matter<br>Variables are complex, inter-woven, and difficult to measure |
| Purpose | Generalisability, prediction, causal explanations | Contextualisation, interpretation, understanding the actor's perspective |
| Approach | Begins with hypotheses and theories<br>Manipulation and control<br>Theoretical observation<br><br>Uses formal instrument<br>Experimentation<br>Deduction<br>Analyses components<br>Seeks consensus and the norm<br>Reduces data to numbers (quantitative)<br>Abstract language and jargon | Ends with hypotheses and grounded theory<br>Emergence and portrayal<br>Research is always from someone's perspective<br>Researcher is the instrument<br>Naturalistic<br>Inductive<br>Searches for patterns<br>Seeks pluralism and complexity<br>Minor use of numbers<br><br>Descriptive write up (qualitative) |
| Researcher Role | Detachment and impartiality<br>Objective portrayal | Personal involvement and partiality<br>Empathetic understanding |

Quantitative research evolved in the natural sciences but has also been adopted by researchers to study social phenomena (Flick, 2002). In general, quantitative research approach is built upon a positivist philosophy, and thus adopts a deductive approach, in which the researcher formulates a theoretical framework that allows him or her to make some explicit theoretical propositions or hypotheses. Structured instrumentation and statistical methods are then used to measure, quantify and analyse the phenomenon of interest. Common research designs are surveys, which produce generalisable inferences about a phenomenon in a defined population by studying a sample of that population, and experiments, which enable a cause-and-effect relationship to be established by manipulating the independent variables under controlled conditions to test propositions or hypotheses.

Qualitative research may be used to study social phenomena from a range of research philosophies, although many qualitative researchers are guided by the interpretivist paradigm. Qualitative research generally takes an inductive approach in which detailed observations of the phenomenon of interest are used to derive relevant concepts, propositions and theory. Qualitative data is collected in the form of text and talk (Flick, 2002), and then analysed, either manually or using computer-assisted qualitative data analysis software, by coding and categorising the data into themes so that a better understanding of the phenomenon of interest can be derived (Cavana et al., 2001). This often involves the qualitative researcher interacting with the research participants in a particular contextual setting in order to learn about the participants' social circumstances in relation to the phenomenon of interest (including their experiences, perspectives and histories) (Ritchie and Lewis, 2003). In a sense, the qualitative researcher is the primary instrument of data collection (Tolich and Davidson, 1999). The researcher's close involvement with participants is often considered to be a shortcoming of qualitative research as the research may be considered more subjective and the research results biased (Cavana et al., 2001; Johnson and Onwuegbuzie, 2004).

There are four main research designs used in qualitative research:

- Grounded theory involves "developing 'emergent' theories of social action through the identification of analytical categories and the relationships between them" (Ritchie and Lewis, 2003, p.12).
- Ethnography entails "understanding the social world of people being studied through prolonged immersion in their community to produce detailed descriptions of people, their culture and beliefs" (Ritchie and Lewis, 2003, p.12).
- Case studies are used to study social phenomena in the context in which they occur, particularly when undertaking exploratory studies that enable the researcher to better understand the research problem in the phenomenon of interest (Yin, 2003).

- Action Research is a form of "applied research where the researcher and those being researched determine the problem and assess possible solutions. The researcher is not 'detached' from the research setting but rather is intimately involved and interventionist" (Tolich and Davidson, 1999, p.5).

Increasingly, researchers are integrating quantitative and qualitative research in a mixed method research methodology. The rationale for doing so is to complement the weaknesses of each research approach with the strengths of the other, so that more comprehensive and concise theoretical and practical knowledge can be acquired (Johnson and Onwuegbuzie, 2004). Mixed method research designs can involve concurrent or sequential quantitative and qualitative phases, with one phase being dominant or each phase having equal weighting in the research process (Johnson and Onwuegbuzie, 2004). A mixed method research approach can increase the generalisability of the results through triangulation of both quantitative and qualitative data. However, as Johnson and Onwuegbuzie (2004) point out, researchers need to have the necessary skills and understanding in order to be able to mix both research approaches appropriately.

### 3.4.1 This Study

This PhD research adopts a qualitative research methodology. This is justified on a number of grounds. First, qualitative research is consistent with the post-positivist research philosophy adopted here. Second, it is appropriate to adopt a qualitative research approach because of the exploratory purpose of this study (Cavana et al., 2001; Yin, 2003). As Strauss and Corbin (1998) point out, a qualitative approach enables a better understanding of any phenomenon about which little is known. This is because a qualitative research approach has the capability to explore the views of participants, which may not be accessible by quantitative measures. Third, because qualitative research is associated with 'how' questions (Yin, 2003), a qualitative research approach is appropriate for addressing the stated research aim of this PhD study.

Of the four qualitative research designs introduced above, the case study research design was chosen as the best approach for undertaking this exploratory study for the following reasons. First, as defined by Yin (2003, p. 13), "a case study is an empirical inquiry that, investigates a contemporary phenomenon within its real-life context, especially when the boundaries between phenomenon and context are not clearly evident". Second, according to Benbasat et al. (1987, p. 370), case studies are "an appropriate way to research an area in which few studies have been carried out". Third, case studies enable the researcher to answer 'how' and 'why' questions in order to gain a better understanding of the nature and complexity of the phenomenon of interest (Yin, 2003). In order to answer the 'how' questions of this PhD study, the researcher needed to go into the field to observe and analyse the phenomenon of interest; that is, how inter-organizational collaborative networks are sustained. Fourth, a case study enables rich, detailed,

and in-depth information to be captured, which is crucial to enhancing the researcher's understanding of the phenomenon of interest being explored (Berg, 2007).

Stake (1995) identifies three types of case study: intrinsic, instrumental and collective case studies, suggesting that the type of case study research method used by a researcher should depend on the purpose of his or her study. An intrinsic case study is conducted when a researcher has an intrinsic interest in a particular case and wants to develop a better understanding of it, rather than to build theory or understand a generic phenomenon. An instrumental case study is conducted when a researcher wants to advance understanding of a phenomenon of interest in order "to provide insight into an issue or to redraw a generalisation" (Stake, 1995, p. 437). The purpose of an instrumental case study is to "help the researcher better understand some external theoretical question, issue or problem" (Berg, 2007, p. 291). As such, the instrumental case study facilitates a researcher in enhancing his or her understanding of the phenomenon of interest. A collective case study is the extension of instrumental study to multiple cases. Stake (1995) contends that collective case study enables a researcher to better theorise a phenomenon as the similarities and dissimilarities of individual instrumental case studies can converge on common characteristics. In terms of Stake' (1995) classification, this PhD study involves collective case study, in that a number of instrumental case studies are conducted to gain a better understanding of the sustainability of collaborative networks, given the lack of prior empirical studies on this phenomenon. While each case study has a degree of intrinsic interest in terms of its particular context and characteristics, its primary purpose is as an instrumental case study, in combination with others, to develop a theoretical understanding of collaborative network sustainability.

Collective case study is an example of a multiple-case study research design (Yin, 2003). A single-case design utilises a critical case (to test a well-formulated theory), an extreme or unique case, a representative or typical case, a revelatory case (to access a previously unobserved phenomenon), or a longitudinal case (Yin, 2003). In contrast, a multiple-case study design enables a researcher to investigate a specific phenomenon of interest in various settings and/or conduct a cross-case analysis (Darke et al., 1998). A multiple-case study design strengthens the resultant interpretation or theorisation by replicating the pattern-matching between and across the cases, thus increasing confidence in the robustness of the theory (Yin, 2003). This PhD study utilises a multiple-case study design.

## 3.5 Data Collection Methods

Methods of data collection commonly used in case study research include documentation, archival records, interviews, direct observation, participant-observation and physical artifacts (Yin, 2003). The strengths and weakness of each of these data collection methods are presented in Table 3.3.

Table 3.3 Case Study Data Collection Methods (adapted from Yin, 2003, p. 86)

| Data Collection Method | Type | Strengths | Weakness |
|---|---|---|---|
| Documentation | Letters, memoranda, agendas, administrative documents, newspaper articles, or any document that is relevant to the investigation | Stable – can be reviewed repeatedly<br>Unobtrusive– not created as a result of the case study<br>Exact – contains exact names, references, and details of an event<br>Broad coverage – long span of time, many events, and many settings | Retrievability – can be low<br>Biased selectively, if collection is incomplete<br>Reporting bias – reflects (unknown) bias of author<br>Access – may be deliberately blocked |
| Archival Records | Service records, organizational records, survey data, and other such records | Stable – can be reviewed repeatedly<br>Unobtrusive – not created as a result of the case study<br>Exact- contains exact names, references, and details of an event<br>Broad coverage – long span of time, many events, and many settings<br>Precise and quantitative | Retrievability – can be low<br>Biased selectively, if collection is incomplete<br>Reporting bias – reflects (unknown) bias of author<br>Access – may be deliberately blocked<br>Accessibility due to privacy reasons |
| Interviews | Open-ended (unstructured), focused (semi-structured), and survey (structured) | Targeted – focuses directly on case study topic<br>Insightful – provides perceived causal inferences | Bias due to poorly constructed questions<br>Response bias<br>Inaccurate due to poor recall<br>Reflexivity – interviewee gives what interviewer wants to hear |
| Direct Observation | Casual data collection activities or formal protocols to measure and record behaviours | Reality – covers events in real time<br>Contextual – covers context of event | Time consuming<br>Selectively – unless broad coverage<br>Reflexivity – event may proceed differently because it is being observed<br>Cost – hours needed by human observers |
| Participant-Observation | A special mode of observation in which the researcher takes on multiple roles | Reality – covers events in real time<br>Contextual – covers context of event<br>Insightful into interpersonal behaviour and motives | Time consuming<br>Selectivity – unless broad coverage<br>Reflexivity – event may proceed differently because it is being observed<br>Cost – time needed by human observers<br>Bias due to investigator's manipulation of events |

| Physical Artifacts | Tools, instruments, or some other physical evidence that may be collected during the study as part of a field visit | Insightful into cultural features Insightful into technical operations | Selectivity Availability |
|---|---|---|---|

In undertaking case study research, various authors recommend using multiple data collection methods in order to improve the validity and reliability of the research through triangulation (Eisenhardt, 1989; Yin, 2003). As defined by Silverman (2000, p.177) "triangulation refers to combining multiple theories, methods, observers, and empirical materials to produce a more accurate, comprehensive and objective representation of the object of study". Most qualitative research uses at least methodical (multiple methods) and data (multiple empirical materials) triangulation. Denzin and Lincoln (2005, p. 5) point out that methodical triangulation adds "rigour, breadth, complexity, richness, and depth to any inquiry", enabling a researcher to enhance his or her understanding of the phenomenon of interest. Eisenhardt (1989, p. 538) further asserts that "the triangulation made possible by multiple data collection methods provide substantiation of constructs and hypotheses (propositions)". As contended by Yin (2003, p. 99), "with data triangulation, the potential problems of construct validity also can be addressed because the multiple sources of evidence essentially provide multiple measures of the same phenomenon".

In this PhD study, methodical triangulation is achieved by combining two data collection methods: interviews and documentation. According to Yin (2003), in case study research the researcher needs to enter the field and converse with participants so as to attain their views of the phenomenon of interest. Interviews provide a relatively structured method that enables a researcher to access participants' views and interpretations of actions and events by asking participants direct questions related to the purpose of the study. Indeed, interviews are often the primary data collection method used in case study research. A well-designed interview can be used to discover rich and complex information, which is suitable for an exploratory study. In addition, the review of available documentation in a case study was also used, in order to corroborate the data gathered from interviews, and improve the reliability and validity of the research findings (Yin, 2003). As pointed out by Ritchie and Lewis, (2003, p. 35), documentation is an appropriate method for triangulating with interviews, as it is "particularly useful where the history of events or experiences has relevance, in studies where written communications may be central to the enquiry".

### 3.5.1 Interviews

Research interviews are commonly classified according to the degree of structure in the interview. In an unstructured interview, a researcher enters the field without a pre-defined set of

interview questions, as he or she assumes that "not all subjects will necessarily find equal meaning in like-worded questions – in short, that subjects may possess different vocabularies" (Berg, 2007, p. 94). There is little standardisation involved in an unstructured interview program (Bailey, 2007). The researcher may ask each participant a different set or number of questions, the interview time can vary enormously, and the number of interviews may vary between participants. Unstructured interviews are useful for gaining preliminary insight into the phenomenon of interest, on the basis of which, more in-depth investigation can be conducted (Cavana et al., 2001). The shortcomings of the unstructured interview are that it can be time consuming and can provide an opportunity for participants to be diverted from the researcher's aim of the study so that relevant information is not covered (Cavana et al., 2001).

In contrast, in a structured interview, the researcher enters the field with a pre-defined set of interview questions. The layout of the interview questions, such as their wording and order, follows exactly as stated in the study's protocol. The researchers assume that "the questions scheduled in their interview instrument are sufficiently comprehensive to elicit from subjects all (or nearly all) information relevant to the study's topic(s)" (Berg, 2007, p. 93). There is much more standardisation involved in a structured interview (Bailey, 2007). The researcher asks each participant the same set and number of questions, interviews take a similar period of time, and the number of interviews does not vary between participants. The shortcomings of the structured interview lie in the pre-determined interview questions, which may not necessarily obtain a full picture of the situation at hand once the researcher enters the interview (Cavana et al., 2001).

Considering the shortcomings of both unstructured and structured interviews, it was decided that using semi-structured interviews in this PhD study would be an appropriate choice. Semi-structured interviews lie between the unstructured and the structured interview. The researcher enters the field with a pre-defined set of interview questions designed to elicit the data needed to be collected from the participants. However, the wording and order of the interview questions may vary, providing the researcher with the flexibility to re-word and re-order the interview questions during the course of the interview to suit the way in which the interviewing is unfolding. Semi-structured interviews also allow the researcher to follow up new lines of inquiry that may emerge during the interview, and engender greater freedom for the participant to provide information in a more natural conversational manner. At the same time, the existence of a pre-defined set of questions improves the likelihood of more completely addressing all aspects of the situation at hand.

### 3.5.2 Documentation

Documentation is an unobtrusive data collection method that does not involve direct interaction with the study participants. There are three advantages of using this data collection method. First, it is a relatively cheap means of collecting data as the data has often already been collected prior to commencement of a study. Second, less time is required to gather the data than using other methods. Third, in addition to providing data for making inferences about a phenomenon of interest, documentation enables a researcher to corroborate data by providing specific details that enable a researcher to cross-check information obtained to in an interview or other data method (Yin, 2003).

## 3.6 Qualitative Data Analysis

Qualitative research such as a case study tends to produce large volumes of data that are not readily amendable to mechanical manipulation, analysis, and data reduction (Yin, 2003). A data analysis method is needed to make sense of the data. Content analysis is one qualitative analysis method commonly used by case study researchers for textual investigation, particularly in relation to interview transcripts and documentation (Silverman, 2000). As defined by Berg (2007, p. 303), content analysis "is a careful, detailed, systematic, examination and interpretation of a particular body of material in an effort to identify patterns, themes, biases, and meanings". Content analysis was the primary data analysis method adopted in this PhD study.

The basis of content analysis is a thematic coding process that involves coding, categorising and organizing data according to the conceptual themes that emerge from the data or are drawn from an a priori theoretical framework. The themes can be recurring patterns, topic viewpoints, topic emotions, concepts or events that are developed through systematically coding similarities in the data (Bailey, 2007; Cavana et al., 2001). As Strauss and Corbin (1998, p. 3) note, coding is a process in which "data are fractured, conceptualised, and integrated to form theory".

Following Strauss and Corbin (1998), open coding was used in this PhD study as an analytic process through which concepts are identified and their properties and dimensions are refined. A researcher begins the open coding process by organizing the raw data into themes through initial coding of the text line by line, sentence by sentence, or paragraph by paragraph. When a theme is identified, that segment of data is coded with a short description of the noted occurrence and its position in a particular text. Subsequently, the researcher uses the method of constant comparison to constantly compare the coded segments with each other until a common theme is identified. Frequently, open coding produces a large number of common themes, which the researcher subsequently categorises into more abstract explanatory concepts called categories. Once a category is identified, the researcher will then classify it to its properties and

dimensions into sub-categories which can answer "how" and "why" questions related to the phenomenon of interest (Strauss and Corbin, 1998).

In summary, Figure 3.1 presents the various elements of the research approach used in this PhD. Details of the specific research design utilised are provided in the next section.

**Research Topic**
➢ Sustainability of collaborative networks

**Research purpose**
➢ Exploratory

**Research philosophy**
➢ Post-positivist

**Research methodology**
➢ Qualitative

**Research design**
➢ Multiple-case study

**Data collection**
➢ Semi-structured interviews
➢ Documentation

**Data analysis**
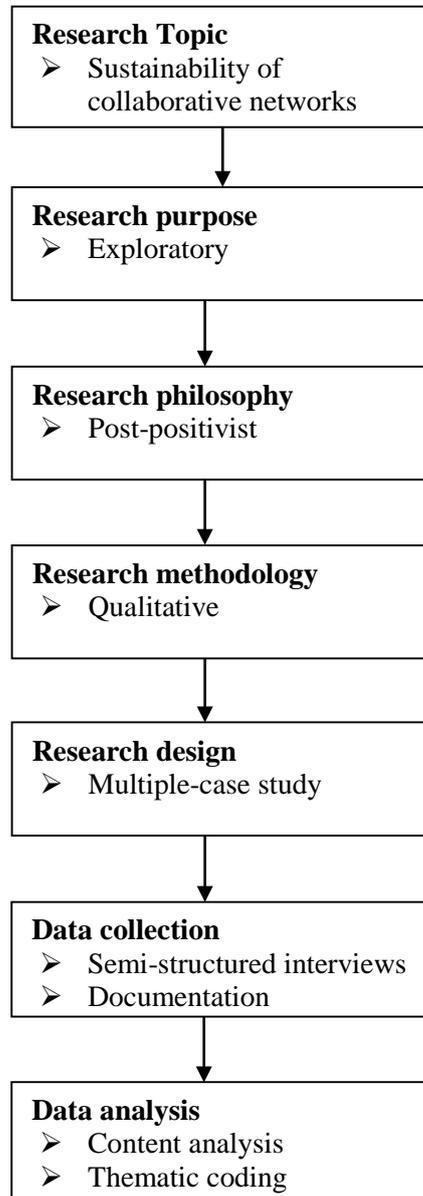➢ Content analysis
➢ Thematic coding

Figure 3.1: Research Approach Used in this PhD

## 3.7 The Research Design

This PhD study adopts Eisenhardt's (1989) case study research design approach to guide the conduct of the research. This comprises an eight-step procedure that spans the research process: (1) getting started, (2) selecting the case studies, (3) crafting instruments and protocols, (4)

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entering the field, (5) analysing the data, (6) shaping propositions, (7) enfolding the literature, and (8) reaching closure. Although Eisenhardt (1989) based her approach on inductive theory building from case study research, she incorporates "a priori specification of constructs, triangulation of multiple investigators, within-case and cross-case analyses, and the role of existing literature" (Eisenhardt, 1989, p. 533). This PhD research develops a tentative a priori conceptual framework and uses a multiple case study research design to refine and empirically validate this tentative framework, including defining and measuring the relevant constructs that emerge as important in the study.

### 3.7.1 Getting Started

A key part of the research process is to identify the research question that underpins the research and to specify a priori constructs that are likely to be relevant to the study. The purpose of a research question is to focus the research and to "move" the researcher in a direction that addresses the aim of the study (Yin, 2003). As Eisenhardt (1989, p. 536) asserts, "without a research focus, it is easy to become overwhelmed by the volume of data". A priori specification of relevant constructs similarly guides the researcher's interpretation and focus. It also enables the researcher to more accurately evaluate constructs and ensures that potential issues of relevance are not overlooked (Eisenhardt, 1989). Yin (2003) confirms that case study research should make use of a conceptual framework to define the priorities to be explored.

In this PhD study, the primary aim was to understand how inter-organizational collaborative networks are sustained. In order to address this research aim, the following research question was formulated: *How are network-level resources and capabilities utilised to sustain inter-organizational collaborative networks?*

In addition, a conceptual framework was developed at an early stage in the research process (before any field work was undertaken) based on the extant empirical literature on resources and capabilities in strategic alliances and networks (see Chapter 2 and Figure 2.1). This conceptual framework underpins the entire study and, together with the research question, is used to inform the data collection and analysis performed in the multiple case studies conducted.

### 3.7.2 Selecting the Case Studies

The selection of the case studies that form part of a multiple-case study research design is crucial as suitable case studies are required to enable the researcher to gain a detailed and appropriate understanding of the phenomenon of interest (Stake, 1995). Many factors can determine the case study selection strategy and process, such as the study's purpose, research questions, propositions and theoretical context. In particular, a researcher needs to pay attention to the sampling strategy used. A multiple-case study research design typically uses a non-probability sampling strategy for selecting suitable cases to study from the target population

based on their characteristics that are relevant to the research questions and a detailed exploration of the phenomenon of interest (Ritchie and Lewis, 2003). Purposive sampling is one type of non-probability sampling strategy that is used in situations where the researcher uses his or her knowledge or expertise to select cases from a specific population to meet the purpose of the study (Berg, 2007). In multiple-case study research designs, purposive sampling is used to select theoretically useful case studies that: (1) "replicate previous cases"; (2) "extend emergent theory"; (3) "fill theoretical categories"; or (4) "provide examples of polar types" of cases (Eisenhardt, 1989, p. 537). Such cases could be information-rich so that they express the phenomenon intensely, typical or representative of the phenomenon, based on a particular criterion of interest, stratified in that they belong to different sub-groups, or confirming and disconfirming cases that can support or refute an initial analysis (Bailey, 2007).

Underlying the rationale for multiple-case study research designs is a replication logic (similar to that used for multiple experiments as opposed to the sampling logic of a survey). This replication logic means that case studies are selected on the basis of whether similar results are predicted (literal replication) or contrasting results are expected for predictable reasons (theoretical replication) (Yin, 2003).

In case study research, the unit of analysis is critical as it "identifies what constitutes a 'case' and a complete collection of data for one study of the unit of analysis forms a single case" (Darke, 1998, p. 280). According to Yin (2003), the unit of analysis in case study research is related to the way the initial research questions are defined and the kind of generalisations desired of the research. In this PhD study, the unit of analysis is the collaborative network. Four case studies of a collaborative network were selected using purposive sampling based on their ability to (1) reveal the phenomenon of collaborative network sustainability and (2) meet the specific criterion of being a collaborative network in the healthcare context. Collaborative networks are seen as having the potential to provide efficient and effective healthcare products and services in the face of continually increasing healthcare costs. There is a growing trend internationally towards the adoption of patient-centred healthcare systems, in which care is customised according to patients needs and values, knowledge is shared and information flows freely, and collaboration between healthcare professionals and patients is a priority (Plsek and Wilson, 2001). Each potential case study was identified either through the University Library's Kompass database of company information or various Web and media reports.

The four case studies selected were also stratified in that they belonged to different sub-groups in two particular respects. First, at the time of the study, the collaborative networks could either be sustained or not sustained, and thus both cases needed to be included in the sampling and multiple-case design. Second, collaborative networks in healthcare can be used for two distinct purposes: collaborative development of healthcare products and collaborative healthcare service

delivery. Again, it was important to include case studies from both of these sub-groups. Of the four case studies used in this PhD research, two focused on healthcare product development and the other two focused on healthcare service delivery. In three of the case studies, the collaborative network had been sustained up to the point of study, while in one case study, it was not. Both literal and theoretical replication rationales were applied in selecting the four case studies. While ideally, in a four case study design, there would be at least two individual cases from within each sub-group, "so that the theoretical replications across subgroups are complemented by literal replications within each subgroup" (Yin, 2003, p. 52), in reality there were not a ready supply of relevant cases available to the researcher, prior knowledge of the network sustainability was not always possible, and there were limitations imposed by the duration and scope of the PhD study.

The case studies are listed below in the order in which they were conducted. The collaborative networks, and their participating organizations and representatives, have been given pseudonyms to help disguise their identity and preserve participant confidentiality. The two healthcare product development case studies involved flows of both information and technology as the network members collaborated in a private sector environment on the development of a healthcare IT product. In the two healthcare service delivery case studies, the environment was public sector healthcare and the main flows between the network members were information-based. The public sector healthcare case studies also involved a significant degree of governmental oversight and regulation.

*HealthPort*: The HealthPort network was the first case study undertaken. This network was selected as a representative case study of a collaborative network in healthcare product development and because it provided an example of a network that was not sustained. Its role was to empirically challenge and validate the initial conceptual framework derived from the extant literature. Accordingly, this case study served to refine the conceptual framework and provide greater clarification of aspects of it (Yin, 2003).

*MobiHealth*: The second case study was selected for the purpose of theoretical replication of HealthPort case study. Although MobiHealth was also a collaborative network established to develop a healthcare product, it forms a contrasting case study to HealthPort in that the MobiHealth network was sustained at the time of the study. Attaining contrasting (but predictable) findings to the HealthPort case study (network not sustained) from this case study (network sustained) would signify that conceptual framework was robust in terms of being able to explain both sustained and non-sustained networks.

*MediNet*: The third case study was selected as a contrasting case study to the MobiHealth case study. Like the MobiHealth network, the MediNet collaborative network was sustained at the

time of the study. However, in contrast to the product delivery focus of the MobiHealth network, MediNet was formed to deliver a medical healthcare service. Thus, the MediNet case study was chosen for the purposes of theoretical replication to ascertain whether the conceptual framework was robust in terms of being able to explain collaborative networks from both healthcare product development and healthcare service delivery contexts.

*SurgiNet*: Like MediNet, the SurgiNet collaborative network was formed to deliver a healthcare service, this time a surgical service, and the collaborative network was sustained at the time of the study. Thus, this final case study was a literal replication of the MediNet case study. Attaining similar findings for these two case studies would provide empirical support for the conceptual framework.

### 3.7.3 Crafting Instruments and Protocols

Before field work proceeds, the data collection instruments and any protocols that will be used in the study need to be developed. As noted earlier, it is advisable to use multiple data collection methods and sources of data in order to triangulate the data collected and corroborate research constructs and propositions (Eisenhardt, 1989; Yin, 2003). In this PhD study, interviews and documentation were the data collection methods used.

An interview guide was developed to help structure the interviews and provide a list of questions to be asked during the course of each interview. These questions related to the background of the individual and his or her organization, the healthcare context in which the collaborative network operated, the individual's and the organization's role and involvement in the collaborative network, and the resources and capabilities that were utilised by the collaborative network (based on the conceptual framework developed for this study). Following each interview in the first case study, the researcher and her supervisor met together to discuss the information covered in the interview, and to revise and improve the interview guide where necessary. A copy of the final interview guide is provided in Appendix A.

The researcher also developed a protocol for the ethical conduct of the research. This included a participant information sheet that gave a description of the research and how the participants would be involved, how the participants' rights would be protected including their identity and confidentiality of the information they provided, and the need to obtain participants' informed consent. A consent form was also developed for participants to sign to indicate their agreement to participate in the research and to the conditions under which the interview would be conducted (e.g. audio-taping with permission and the researcher taking notes). Copies of both the participant information sheet and consent form are included as Appendix B. Ethical approval was given by the AUT Ethics Committee on 26 July 2010.

### 3.7.4 Entering the Field

During data collection in case study research, the researcher 'enters the field' in order to obtain information from research participants about the phenomenon of interest.

In this PhD, fieldwork involved an interview programme, which was undertaken between July 2009 and April 2012. Interviews were conducted with people involved in developing, implementing and using each collaborative network. Based on the recommendations of the contact people for each network and information gathered during the interviews, a list of potential interviewees was generated. These people were then invited to participate in the research. Relevant documentation about each network was also gathered either from the Internet or from individuals associated with each network.

Interviews were semi-structured, based on a pre-defined interview guide. Where possible, face-to-face interviews were held at a mutually convenient location, usually at the organizational premises of the interviewee. Where the geographic location of the interviewee meant that this was not possible, a telephone interview was conducted. The average length of each interview was approximately 1 hour. Interviews were audio-taped (with the interviewee's permission) and transcribed in full. Detailed notes were also made during each interview. A total of 32 interviews were conducted, spanning 29 hours of interview time. For each case study, details about each interview that was conducted are presented in Table 3.4.

During each interview, the researcher spent some time explaining the purpose and contribution of the research to the participants. Open discussions were conducted towards the end of each interview to allow the interviewee to ask any questions and add any comments he or she considered to be relevant. The reason for doing this was to ensure that there was an opportunity to explore potential resources and capabilities not previously highlighted in the conceptual framework.

Data review and preliminary data analysis was conducted during the course of the interview programme within each case study in order to identify themes, missing information, or issues that needed to be clarified. As noted by Eisenhardt (1989, p.539), overlapping data analysis with data collection in this way provides "the researcher a head start in analysis but, more importantly, allows the researcher to take advantage of flexible data collection". It also allows researcher to know what data needs to be collected subsequently (Tolich and Davidson, 1999).

After each interview, the researcher transcribed the audio-recording for the interview and reviewed the notes made during the interview. Notes were then made concerning details of the interviewee, organization name, interview place, time, duration, and other possible observations

of interest. Any new or interesting areas that emerged were highlighted and included in the interview guide for future interviews.

Table 3.4 Interviews Conducted in This Study

| Date | Length (mins) | Interviewee | Organization | Type of interview |
|---|---|---|---|---|
| **Case Study 1: HealthPort** | | | | |
| 24 July 2009 | 30 | Chief Executive Officer | HealthTech Consortium | Face-to face |
| 9 October 2009 | 60 | Business Development Manager | Content Provider A | Face-to face |
| 14 October 2009 | 60 | Chief Information Officer | Primary Health | Face-to face |
| 16 October 2009 | 60 | Project Consultant | ITConsult | Face-to face |
| 21 October 2009 | 40 | Health Manager | SoftCom | Telephone |
| 11 November 2009 | 80 | Chief Executive Officer | Systems Provider A | Face-to face |
| 22 September 2010 | 60 | Chief Executive Officer | HealthTech Consortium | Telephone |
| 22 September 2010 | 80 | Program Manager | HealthTech Consortium | Telephone |
| **Case Study 2: MobiHealth** | | | | |
| 14 December 2009 | 60 | Business Development Director | GlobalComm | Face-to face |
| 18 December 2009 | 70 | Chief Executive Officer | MediSoft | Face-to face |
| 21 December 2009 | 50 | Director | MediSolutions | Face-to face |
| 5 January 2010 | 50 | IT Consultant | MediSolutions | Face-to face |
| 23 July 2010 | 40 | Chief Executive Officer | MediSoft | Face-to face |
| 15 November 2010 | 50 | Business Development Director | GlobalComm | Face-to face |
| **Case Study 3: MediNet** | | | | |
| 10 May 2011 | 70 | Network Leader | MediNet | Face-to face |
| 2 June 2011 | 80 | Medical Specialist | Northern Medical Unit | Face-to face |
| 8 June 2011 | 50 | Health Professional | Northern Medical Unit | Face-to face |
| 10 June 2011 | 50 | Website Manager | Content Provider A | Face-to face |
| 16 August 2011 | 40 | Network Administrator | MediNet | Face-to face |
| 19 August 2011 | 35 | Health Professional | Central Medical Unit | Telephone |
| 5 September 2011 | 40 | Health Professional | Midland Medical Unit | Telephone |
| **Case Study 4: SurgiNet** | | | | |
| 26 September 2011 | 70 | Network Leader | SurgiNet | Face-to face |
| 23 November 2011 | 50 | Network Consultant | SurgiNet | Telephone |
| 24 November 2011 | 60 | Network Co-ordinator | SurgiNet | Telephone |
| 6 December 2011 | 75 | Service Clinical Leader | Ministry of Health | Face-to face |
| 12 December 2011 | 70 | Service Manager | Ministry of Health | Telephone |
| 13 December 2011 | 60 | Medical Director | HealthNZ | Face-to face |
| 14 December 2011 | 45 | Clinical Leader | Central Surgical Centre | Telephone |
| 21 December 2011 | 35 | Clinical Leader | Southern Surgical Centre | Telephone |
| 16 January 2012 | 30 | Nursing Director | District Health Broad B | Telephone |
| 17 January 2012 | 55 | Chief Executive Officer | District Health Broad A | Face-to face |
| 4 April 2012 | 35 | Clinical Leader | Northern Surgical Centre | Face-to face |

### 3.7.5 Analysing the Data

The research design for this PhD was a multiple-case study consisting of four case studies of collaborative networks in the healthcare context. Multiple-case designs involve both within-case analysis and cross-case analysis (Eisenhardt, 1989; Yin, 2003). A within-case analysis of each of the four collaborative networks was conducted, the results of which are presented in Chapters 4 to 7. The within-case analyses had three purposes (Eisenhardt, 1989): (1) becoming familiar with each collaborative network as a case study in its own right; (2) developing detailed case study descriptions; and (3) identifying relevant categories in each case study before conducting a cross-case analysis. Chapter 8 presents the cross-case analysis, which involved comparing the categories generated in the within-case analyses across all four case studies, looking for patterns such as similarities and dissimilarities in categories between the various theoretical and literal replications that comprised the multiple-case design.

Although Eisenhardt (1989) discusses three distinct steps, in this study analysing the data, shaping the propositions, and enfolding the literature, formed an iterative process. The researcher moved back and forth between the data, the concepts suggested by the existing literature, and the themes and patterns emerging from the case study analysis.

As noted earlier, content analysis was the main data analysis method used to examine the data. This involved a thematic coding process based on open coding (Strauss and Corbin, 1998) of the data collected, primarily using categories derived from the conceptual framework developed for this study. This framework proposed particular resources and capabilities that enable the sustainability of a collaborative network. The interview transcripts were read and re-read to identify statements which reflected how the exploitation of these resources and development of associated capabilities appeared significant to the participants and/or the researcher in sustaining the collaborative network. Each statement was systematically coded to the appropriate category from the conceptual framework. Constant comparison of the coded data segments with each other enabled the researcher to define the properties and dimensions of each category using more detailed codes. Where a new category or sub-category emerged inductively from the data analysis process, relevant literature was drawn on to propose additional concepts or properties and dimensions, which were then incorporated into a modified conceptual framework. These new constructs were then available for coding in subsequent data analysis. Table 3.5 provides an example of how the researcher coded data from the first case study, HealthPort, to various categories of resources. More detailed coding allowed identification of a number of sub-categories, effectively properties and dimensions of these resources.

Besides the interview data, documentary data was also used to analyse the data. These documentary data allowed the researcher to get a richer contextual understanding of how the

networks had formed and the background information of those participating organizations. They were used to complement and affirm claims made by the interviewees.

Table 3.5 Example of Coding Categories

| Data segment | Category | Sub-categories |
|---|---|---|
| *For some of us we actually make full use of Collab particular for documents sharing. It was communicated to the key players that this was the tool for document sharing.* (Project Consultant, ITConsult) | ICT infrastructure | Document sharing |
| *ITConsult obviously are the better lead because they are the project manager as well and they did a pretty good job trying to pull things together.* (Business Development Manager, Content Provider A) | Managerial ICT skills | Leadership |
| *We had a good understanding and we all thought that we had a good feeling about a common goal as a shared goal and vision.* (Chief Information Officer, Primary Health Organization) | Network culture | Mission |
| *A number of members had worked together on previous collaboration projects. So there were some experiences within the project team about working together in collaborative project and what they might look like.* (Programme Manager, HealthTech Consortium | Relational governance | Reputation |

### 3.7.6 Shaping the Propositions

Shaping the propositions involves comparing them with the data collected. The central idea is that researchers systematically compare proposed concepts with the evidence from each case study, iterating towards propositions that closely fit the data (Eisenhardt, 1989). As noted, the process of constant comparison of coded data enabled the researcher to define the properties and dimensions of each main category proposed in the study's conceptual framework, a process Eisenhardt (1989, p. 541) calls "the sharpening of constructs". This process occurred in each within-case analysis, and comparison across the four cases further refined the conceptual framework and the resources and capabilities proposed as relevant to collaborative network sustainability.

In particular, the within-case analysis of the first case study, HealthPort, was important in shaping new and existing propositions in the study's conceptual framework. For example, in analysing the data from this case study, it became clear that the original set of technological and relational resources proposed as relevant for sustaining a collaborative network was insufficient to explain why the network in the case study was not sustained. Examination of the data suggested that governance resources were also relevant and the conceptual framework was modified accordingly to accommodate these new constructs. In another example, the original list of technological resources focused on ICT infrastructure, ICT technical skills, and ICT training. Analysis of this case study suggested that management of the ICT infrastructure and resources was an important aspect of sustaining the collaborative network relationships. Thus, ICT technical skills and training were combined into a single resource, ICT competence, and a

new resource, managerial ICT skills was created based on both the case study data and the extant literature in this area. The validity of these new and re-defined resources was then verified in the analysis of the subsequent case studies.

### 3.7.7 Enfolding the Literature

Comparing and contrasting the findings of a research study with the extant literature is an important aspect of any study, with the aim of building internal validity, improving generalisability and raising the conceptual level (Eisenhardt, 1989). In this PhD research, reference was made at a number of stages to the existing literature on resources and capabilities, strategic alliances and inter-organizational relationship management.

Early in the research process, a detailed review of this literature was undertaken and used to develop a conceptual framework of sustained collaborative networks and to derive the research question that underpins this study. The knowledge obtained during this process also shaped the selection of case studies, as well as data collection (for example, the framing and definition of interview questions) and data analysis (in performing the thematic coding process). When the need for new or re-defined categories emerged in the case study analyses, the relevant literature was drawn on to propose initial concepts to address the apparent gaps. Importantly, the conceptual framework that was developed from the literature review also served as a higher level analytical device to facilitate an empirically-grounded theoretical explanation of how collaborative networks are sustained (or not).

### 3.7.8 Reaching Closure

Ideally, researchers should stop adding cases once theoretical saturation is reached (Eisenhardt, 1989) and little or no new understanding about the phenomenon of interest is produced (Strauss and Corbin, 1998). Eisenhardt (1989, p. 545) notes that "in practice, theoretical saturation often combines with pragmatic considerations such as time and money to dictate when case collection ends." Eisenhardt (1989) suggests that four cases is a realistic number to produce theory of sufficient complexity and convincing empirical grounding. In this PhD study, four cases studies offered a combination of product and service-based collaborative networks, and included at least one network that was not sustained. This was considered to be adequate to empirically confirm the usefulness of the conceptual framework given the limitations imposed by the duration and scope of the PhD study.

Within each case study the researcher stopped collecting data when the available interviewees from each participating organization in a collaborative network had been approached. In many instances, a single organizational representative was the logical (sometimes only) person with sufficient participation in and knowledge of the collaborative network involved to provide an informed perspective on it. This necessarily limited the number of potential interviewees in a

given case study. However, Guest et al. (2006) suggest that six to twelve interviews can be sufficient to achieve data saturation using a carefully selected purposive sample of interviews.

## Chapter Summary

This chapter has described the research methodology and design used in this PhD study. The empirical findings from the within-case analysis of each of the four case studies conducted as part of this PhD research are presented in Chapters 4 to 7. Representative participant quotes from the interviews are used to illustrate various points, and where appropriate distinct or contrasting views were also presented. The cross-case analysis and discussion are presented in Chapter 8.

# Chapter 4: HealthPort

This chapter describes the findings and discusses the analysis of a case study of collaborative healthcare product development. The first three sections present the background of the collaborative network involved in this product development and that of the participating organizations, before outlining the trajectory of the network. The remainder of the chapter presents and analyses the findings from the case study. The analysis is organized around the conceptual framework outlined earlier in the thesis.

## 4.1 Network Background

There are growing concerns in New Zealand about the increasing number of patients with chronic health conditions, particularly related to associated health expenditure, the continuing gap between health workforce demand and capacity, and growth in the aging population. First, the delivery of chronic disease management and care to chronically ill patients constitutes a large proportion of the healthcare budget, and this continues to increase as the level of chronic health conditions worsens. Second, the New Zealand healthcare workforce is facing a challenge in coping with the increasing numbers of patients with chronic conditions. Third, an aging population in New Zealand is further aggravating the situation since the burden of chronic diseases is often borne by the elderly. The adoption of a patient-centred primary care system may be able to resolve these issues. Unlike a traditional healthcare system, a patient-centred healthcare system enables patient empowerment – one whereby care is customised according to patients' needs and values, knowledge is shared and information flows freely, and collaboration between healthcare professionals and with the patient is a priority (Plsek and Wilson, 2001). It is within this context that the HealthPort network was formed to develop a healthcare portal intended to empower healthcare consumers and engage them in taking a more active role in managing their own health conditions.

HealthPort was formed in 2008 with the objective of designing a personal healthcare portal that would provide a low-cost means for healthcare consumers to self manage their health conditions at home. Ultimately, this could lead to a reduction in their associated healthcare costs in terms of hospitalization and transportation. In addition, hospitals would have a lower rate of acute admissions, enabling healthcare providers to better allocate their financial, human and infrastructural resources. These benefits would only be brought about if the intended health portal empowered healthcare consumers to acquire and use accurate and reliable healthcare information to make effective decisions in relation to their health status supported by their doctor.

Eight organizations participated in the HealthPort network to develop a healthcare portal (see below). The proposed portal was designed to allow users to interact with the portal's facilities using a web browser. Various provider systems would supply content and applications that would interact with the portal via an integration engine. The portal interface and each provider system would connect to the integration engine via a series of adaptors built by the provider organizations. A personal health record would be uploaded from a user's doctor's patient management system. In addition, a range of healthcare applications were to be implemented around cardiovascular disease. These included information, goal setting tools, feedback and behaviour reinforcement, and access to support groups, in relation to smoking cessation, weight loss through physical activity, and dietary management for cholesterol reduction. The portal also provided an online health log to remind users when to take their prescribed medication and to monitor medication adherence and other healthcare activities. In addition, the portal would facilitate a cheaper and faster communication channel for healthcare consumers in seeking and receiving counselling and advice from healthcare professionals.

The HealthPort network's healthcare portal project was envisioned to have two phases. The first phase would be a proof of concept. This stage was associated with the development and testing of the healthcare portal. Ultimately, a technical demonstration of the portal would be performed at an international sales conference run by the project's sponsor. The second phase involved the rolling out of the portal into a clinical environment. The healthcare portal would be introduced to a number of primary healthcare practitioners, and thus to their patients as well. Subsequently, an evaluation would be conducted to assess the effectiveness and benefits of the portal. In addition, the second phase would focus on improving the healthcare portal, either through refinement of its existing features or exploration of further functionality.

## 4.2 Participating Organizations

**HealthTech Consortium**

HealthTech Consortium is a national grouping of organizations interested in health IT, and was formed in 2002. Its mission is to position New Zealand as a leader in providing and deploying of innovative health IT. The Consortium recognises that its mission can only be achieved through collaboration between a wide range of organizations, including software and solution developers, government agencies, health policy makers, health funders, infrastructure companies, healthcare providers, and academic institutions. HealthTech Consortium had four roles in the healthcare portal project: (1) to lead the project by recruiting and assembling the participating organizations; (2) to provide governance for the project through detailing a contractual framework and funding agreements; (3) to devise a

business model to support the commercial development of the project; and (4) to oversee the management and execution of the project.

HealthTech Consortium had a number of reasons to participate in the collaboration. First, the portal development project was considered to be a good vehicle to demonstrate the efficacy of the Consortium as a facilitator of collaborative and innovative health IT solutions. Second, HealthTech Consortium wanted to attract more Consortium members through this collaborative project. In particular, it aimed to attract smaller IT health vendors who had difficulties in profiling themselves in the healthcare industry.

**Content Provider A**

Content Provider A is an online health information provider that has operated in the health industry since 2004. Its mission is to enable healthcare customers to have a better understanding and using of New Zealand health services. It provides information in relation to the referral of secondary and tertiary healthcare services which are supported and provided by general practitioners, public/private medical specialists, public/private hospitals and District Health Boards (DHBs). Through its online tool, healthcare consumers can gather and organize the latest (DHB) referral and clinical guidelines, protocols and contacts and private specialists and their practice details. The availability of such referral to healthcare services provider information was considered beneficial to healthcare consumers and was included as part of the functionality of the proposed healthcare portal. Hence, the role of Content Provider A was to administer healthcare consumer search and referrals to specialist provider information through an adaptor that connected its application with the portal's integration engine. In particular, Content Provider A was responsible for providing referral to counselling and service information on smoking cessation, and provision of a directory of dieticians and nutritionists for dietary and cholesterol management.

Content Provider A aimed to achieve both economic and social goals through its participation in the HealthPort network project. Content Provider A anticipated that after a successful proof of concept, the healthcare portal could be further implemented at a national level, representing an opportunity to increase its revenue earnings. This in turn would intensify the organization's business network. Content Provider A also recognised that participation in the network was a means to gain exposure to and knowledge of the advanced technology that was being deployed in the portal project. In addition to the monetary benefits, Content Provider A envisaged that the healthcare portal could be of real social benefit to New Zealand healthcare consumers in self-managing their health.

**Content Provider B**

Content Provider B was a developer focused on streamed video and automated telephony. It delivered audio and video based communication solutions to industries such as healthcare and real estate. Given that, Content Provider B was responsible for the building an adaptor to facilitate an interactive voice response coaching tool for the portal users. It was expected that the coaching could benefit the users in developing a self-focused care and motivate them to maintain their specific patient interventions.

**Primary Health**

Primary Health is a primary health organization established in the north of New Zealand. It provides primary healthcare services to a large population through a cluster of 500 general practitioners and 400 practice nurses. Recognising its considerable experience in delivering primary healthcare services, Primary Health played the role of client for the network's portal project, steering the design of both primary and forward looking healthcare consumer care plans. Moreover, Primary Health would feed back to the collaborating organizations what relevant specifications could be needed for the healthcare portal. Besides its role of as a client, Primary Health would be involved in user acceptance testing of the portal and validation of the project's outcome.

Primary Health's involvement in the project was attributed to two factors. First, the organization believed that the portal fostered the delivery of a patient-centred healthcare system that could help manage the growing number of healthcare consumers with chronic conditions such as cardiovascular disease. Second, Primary Health viewed the healthcare portal as an effective means of allowing all healthcare providers to access and to share a common database of healthcare consumers' health information.

**ITConsult**

ITConsult is a leading IT consultant company in New Zealand, with a business network that extends into Australia, the United Kingdom and the United States. It provides IT services and solutions in many industries and sectors, such as education, government, financial services, telecommunication, and healthcare. ITConsult played as the role of project manager for the HealthPort network, and was also accountable for building the healthcare portal's architecture. In particular, this entailed: (1) designing the integration engine for the portal; (2) integrating the various collaborative organizations' adaptors to the integration engine; and (3) providing technical assistance to the other collaborating organizations.

ITConsult's mission of "enhancing people's lives" was the underlying driver for its involvement with the portal development project. The founder and CEO of ITConsult has

always been passionate about New Zealand's healthcare industry, and recognition that the healthcare portal could engender many benefits for healthcare consumers motivated ITConsult to participate in the HealthPort network. To a further extent, ITConsult believed that collaboration was the only effective approach to delivering and enhancing health IT products. Thus, as another motivation, ITConsult hoped that its involvement in the portal project would signal to other potential collaborative partners that it was a strong player in terms of collaboration.

**SoftCom**

SoftCom is an international IT and software solution provider. SoftCom has increased emphasis on the healthcare industry and has developed teams with expertise in the technical strategies of IT health applications. Besides supporting and contributing to various health IT initiatives through the provision of expert human resources, it also funds IT health related projects. SoftCom was the project sponsor, providing basic infrastructure such as a server environment and an online collaborative tool. As the sponsor of the project, SoftCom was also involved in the user acceptance testing and in ensuring that the healthcare portal was functioning in accordance to the proof of concept objectives. In addition, SoftCom played a role in marketing the health care portal at one of its international symposiums.

There were three factors motivating SoftCom to participate in the portal project. First, SoftCom did not have a health team in New Zealand, and therefore it needed to collaborate with local health IT organizations in order to support its New Zealand health initiatives. Second, participation fostered its learning and knowledge of ITConsult's integration engine. Third, the collaboration enabled SoftCom to meet and get to know more small to medium sized health related organizations, expanding its business network in New Zealand in this industry.

**Systems Provider A**

Systems Provider A is a global healthcare software and system provider which has operated in the healthcare industry for 26 years. Systems Provider A recognises the importance of a patient-centred system given the increasing expenditure on healthcare. As such, it focuses its expertise on developing patient management systems, which have been delivered throughout primary and secondary healthcare, mental health and corporate health. Systems Provider A was included in the HealthPort network as its patient management system enabled the health portal's users to retrieve a read-only copy of their personal health records. The other role that Systems Provider A played in the network was to contribute its existing developmental portal product and oversee the construction and functionality of an adaptor between the web-based portal product and the integration engine.

Systems Provider A was motivated to participate in the project because it anticipated that the healthcare portal was an effective strategy for sustaining New Zealand's healthcare industry and addressing issues such as a shortage of doctors and improving productivity. Systems Provider A also anticipated that its involvement in the project would signal to other potential collaborative partners that it was strong player in developing and delivering industry-proven health IT products.

**Systems Provider B**

Systems Provider B is one of the leading healthcare system providers in New Zealand, operating in the healthcare industry since 1999. It aims to provide knowledge management and decision support systems that can enable healthcare organizations to exploit evidence-based health information in enhancing the delivery of healthcare services. In particular, Systems Provider B focuses on developing decision support systems for care management in relation to chronic health conditions that support all aspects of primary and secondary healthcare, corporate health and community health. For these reasons, the role of Systems Provider B in the HealthPort network was to develop an adaptor to enable the portal to leverage the company's existing health decision support systems in addressing a patient's specific chronic health problem.

## 4.3 Network Trajectory

In September 2007, HealthTech Consortium began recruiting prospective collaborative organizations to participate in the healthcare portal project. A key collaborative objective was that the health portal would ultimately benefit healthcare consumers. HealthTech Consortium went through a formal process of inviting potential participants to bid for the various components of the healthcare portal. The collaboration started with the negotiating and drafting of contractual and funding agreements between HealthTech Consortium and the subsequently identified collaborative partners. In addition, the HealthTech Consortium was tasked with developing a business model to support the commercial development of the project. While waiting for the HealthTech Consortium to formulate the agreements and work out the business model, the other collaborative partners began to identify respective functional roles for the project. For instance, Content Provider A, Content Provider B, Systems Provider A and Systems Provider B were accountable for designing and building of each specific adaptor to the integration engine provided by ITConsult. IT Consult was responsible for mapping each adaptor's functionality to its integration engine, which it would also adapt to the portal product supplied by Systems Provider A. Eventually, Primary Health would perform user acceptance testing of the clinical aspects of the portal while SoftCom would oversee its technical user acceptance testing.

In accordance to the pre-contractual agreement, the ultimate objective of the first phase of the project was to showcase the healthcare portal proof of concept in one of SoftCom's international symposiums. The partners successfully collaborated in building the healthcare portal proof of concept and demonstrating its technical feasibility in April 2008. That is to say, the network's collaboration was successful in the first phase. However, the collaborative network did not persist past this point and the second phase of the project was never completed. Instead, the network terminated when one of the participating organizations, Systems Provider A, decided to continue developing and commercialising its own healthcare portal product rather than proceed with the collaborative network's healthcare portal. That is, the HealthPort collaborative network was ultimately not sustained and failed to achieve its original collective objective.

## 4.4 Technological Resources and Capability

### 4.4.1 Technological Resources

With respect to **ICT infrastructure**, the HealthPort network utilised a software tool for virtual teamwork provided by SoftCom to support and facilitate co-operation among the collaborating organizations: *"We use Collab* [a pseudonym] *as a technology to allow people to use online space to collaborate"* (Health Sector Manager, SoftCom). According to the interviewees, Collab was primarily being exploited by the collaborative network as an inter-organizational information system to store, retrieve and share the project documents used to develop the portal proof of concept. As the Project Consultant from ITConsult described: *"We actually make full use of Collab, in particular for documents sharing. It was communicated to the key players that this was the tool for document sharing".* However, while Collab proved to be useful for document and information sharing, communication between the senior representatives of the collaborating organizations tended to involve email and regular telephone conferencing: *"Mainly when I looked at Collab, it was not used too much for communication. It was used to share documents around"* (CEO, Systems Provider A).

Although no training was provided, members of the collaborative network seemed to have a good level of **ICT competence** in relation to the use of Collab. This was because most of the organizations had come from a technology-based background or were familiar with the tool: *"The communication tools are easy to use. If you favour technology, you are OK. No training is provided"* (Business Development Manager, Content Provider A). The CIO of Primary Health commented: *"We kept the common documents on Collab and that was quite handy, actually. I really liked that sort of thing. I had used it before and have used it since."*

In contrast, the findings of the case study suggest that an inadequate level of **managerial ICT skills** partially impeded the use of the ICT infrastructure for communication between the collaborating organizations. At the outset, the network had failed to identify a focal leader who could manage the use of the available ICT resources to facilitate the communication process. This could explain why the main project communication channel had been used mainly as a repository system in delivering technical-related information. As described by the CEO of Systems Provider A: *"From a communication perspective there was not really anyone in charge of it ... The developers were using it* [Collab] *for technical communication* [but] *the wider project and important stuff never got communicated."* With some management of the communication process, use of the online communication facilities of Collab could have been co-ordinated to enable effective communication between the senior representatives of the network partners. Without that management, it appeared that, for example, the discussion facility was used by some of the larger organizations to communicate among themselves, to the perceived exclusion of other network members: *"The use of the chat room provides a problem as* [some organizations] *will use it to communicate among each other ... My impression is that they favour some parties and keep others' communication out a little"* (Business Development Manager, Content Provider A).

Another aspect of managing the communication process involves the co-ordination of operational project activities, a leadership role that appeared to be lacking initially in the HealthPort network: *"One of the reasons it was slipping was because there was not strong project management from the start ... It was not clear who the project manager was in fact and which organization had responsibility for project management"* (Project Consultant, ITConsult). Several of the interviewees commented that co-ordination related tasks such as setting priorities and meeting project deadlines were poorly managed. For example, the CEO of Systems Provider A commented: *"People did not turn out for meetings, meetings never started on time ... I found that the meeting was time wasted because there was no management of what we were going to achieve today. Time means money in a commercial perspective"*. It was only part way through the first phase of the project, when the Project Consultant from ITConsult became involved, that this situation improved: *"So, we had weekly meetings. I would send out minutes. I would chase people up on actions"* (Project Consultant, ITConsult).

### 4.4.2 Technological Capability

The HealthPort network needed to develop the capability to utilise the technological resources that it had available, in the form of ICT infrastructure, competence and management skills, to establish effective communication between network members and co-ordination of the network's activities. Arguably, HealthPort never quite developed the

network-wide technological capability needed to sustain the collaboration. Without an effective and managed communication process, communication between the collaborating organizations risked being less than full and open, and co-ordination of project activities could not be efficiently achieved. Both synchronous and asynchronous communication channels can be utilised to enable collaborative partners to work together co-operatively. The HealthPort network leveraged the Collab tool to operate an efficient asynchronous communication process to assimilate and disseminate technical information and documents associated with the healthcare portal proof of concept. In contrast, most non-technological information was poorly communicated using Collab. Indeed, this asynchronous communication channel produced relatively closed communication within a subset of the collaborating organizations, leading to a perceived information or communication gap for other network members.

In particular, a number of interviewees expressed that it was critical not to have asymmetric information in non-technical issues such as proprietary ownership of the resultant healthcare portal and the financial incentive system for participation in the network. As the Project Consultant from ITConsult explained: "*The openness of communication is very important. You need to be open about the commercial initiatives, what is actually available in terms of funding those kinds of things.*"

Without the use of a technological resource such as Collab to support communication around non-technical project tasks and issues, synchronous communication, in the form of face-to-face meetings, became crucial in reinforcing co-operation between the network organizations. Face-to-face meetings enabled the collaborating organizations to have an explicit idea of what project activities were required, which had been carried out, and how they would affect the project development. In particular, issues such as the enforcement of the contractual framework needed to be communicated through face-to-face meetings. As the Business Development Manager of Content Provider A commented: "*I think it would be better if communication would have been more face-to-face; shorter and tighter meetings more often, just to get everything going. It is very important to do that*". A synchronous communication process through face-to-face meetings would also encourage the partners to invest more of their time into the collaborative relationship, increasing their commitment to the project:

> *One of the lessons learnt is that if we are going to phase two* [of the project] *I would absolutely insist on those more regular face-to-face meetings. During the duration of the project which was about six to eight months, we only managed to have about two or three face-to-face meetings, simply because of people's*

*commitments elsewhere. In terms of a project manager's point of view, to me, it is a risk.* (Project Consultant, ITConsult)

The above quote suggests that the experience and learning involved in the first phase of the HealthPort project may eventually have led to the development of a network-wide capability to deploy its technological resources so that they were used consistently and effectively to support and enhance the level of co-operation within the network. Unfortunately, the network terminated before this could occur.

## 4.5 Relational Resources and Capability

### 4.5.1 Relational Resources

In terms of **partner complementarity**, the selection of the network partners for HealthPort was attributed by the interviewees to the complementary skills and expertise that each of them could potentially contribute in developing a successful healthcare portal. In particular, each participant would be contributing intellectual property in the form of technology and/or content. As the Programme Manager of HealthTech Consortium described:

> *We identified the kind of capabilities that we would need and then invited consortium members to indicate whether they would be interested in participating and the type of roles they would be interested to do. From there, we put together the project team and make sure we had the capabilities we needed.*

The healthcare portal was facilitated by a main Portal Adaptor which was a gateway for the healthcare consumers to access information in enabling them to make better healthcare decisions. The Portal Adaptor was connected to the integration engine which was sequentially driven by four adaptors that were built by a specific organization. As an expert system integrator, ITConsult supplied the portal integration engine and was responsible for the integration of the various organizations' adaptors to it. Content Provider A was responsible for providing information for healthcare consumers in relation to the intervention programmes selected for the portal proof of concept, such as a directory of dieticians and nutritionists and a list of counselling services. With the knowledge in voice and video based applications, Content Provider B would contribute its existing interactive voice response coaching application, intended to motivate healthcare consumers to enrol and stay with a specific intervention group. Systems Provider A contributed their existing portal product in development and would oversee and manage the basic construction of the health portal. As Systems Provider B was experienced in healthcare decision support systems for specific chronic health conditions, and contributed a patient risk assessment application that could synchronise with the a consumer's personal health record. From the outset, the participating organizations did not contribute any overlapping resources, assets and skills. The

contributions of complementary resources should have engendered a high level of inter-dependency among the HealthPort network partners, leading to an increased level of connectedness. Further, a number of the organizations had worked together before. Through repeated interactions of this nature, these partners were familiar with established communication processes and routines, which facilitated better co-ordination of collaborative activities.

However, the relative importance of the respective contributions to the project meant that HealthPort exhibited unequal power relationships. This was not what HealthTech Consortium had intended: *"We provided the contracting framework which allowed all the vendors who had made up the project team to participate in the project as a group of equals rather than as a prime sub-contractor relationship"* (Programme Manager, HealthTech Consortium). Systems Provider A had been recruited to the HealthPort network by HealthTech Consortium because it was the market leader in New Zealand for patient management systems used by the primary health sector. As the Programme Manager of HealthTech Consortium commented: *"A failure to involve them was a bit like: Hey, you got a project up and going but it never involved people with 75% market share in the segment"*. In light of this, Systems Provider A was able to cultivate the characteristic of a dominant partner, which would influence the distribution of power in the HealthPort network as the project progressed through the first phase. Specifically, it was able to exploit its dominant position to control over the co-ordination of collaborative activities. This led to a conflict between Systems Provider A and some of the other organizations in the network over the progress being made on the health portal: *"[They could] refuse to let any of us see what the portal looked like until it was done"* (Project Consultant, ITConsult). The asymmetrical distribution of power allowed Systems Provider A to continue developing in parallel its own portal product, and ultimately secede from the network.

With respect to **network culture**, it was evident that a shared mission had created a close-knit collaborative environment, at least at the outset of the portal project. As indicated by CIO of Primary Health: *"It really comes back to the beginning that we had a good understanding and we all thought that we had good feeling about a shared goal and vision"*. This mission trait was evident in the organizations' mutual objectives, both social and commercial, for participating in the HealthPort network. In terms of the social objective, many of the interviewees expressed the opinion that building a successful healthcare portal was a significant project that ultimately could produce significant benefits for New Zealand healthcare consumers. For example, the reason given for ITConsult's participation in the HealthPort network was because the *"Chief Executive Officer's vision was to enhance*

*people's lives and this vision can be eminent in the health sector"* (Project Consultant, ITConsult).   As the Business Development Manager of Content Provider A reflected:

> *It was about let's start this and see where this goes but knowing what was going to be the endpoint was something going to be beneficial for you as a New Zealander managing your health.  And most people thought that was a brilliant idea.*

The participating organizations also had a mutual commercial objective in benefiting from expanding their organization's business scope and opportunities, and building stronger business relationships with other health IT organizations.  The following extracts illustrate different organizations' perspectives and commercial motivations for participating in the project:

> *This was an opportunity to get into some real technology that would add something that could then possibly be taken to elsewhere, overseas.* (Business Development Manager, Content Provider A)

> *As a large organization with pretty limited resources in terms of our ability to scale and engage with small and medium partners,* [participation] *facilitated connections that we have otherwise would have struggled to engage in a meaningful way.* (Health Sector Manager, SoftCom)

To a certain extent, the shared objectives also meant that at least some of the organizations were potentially willing to change their norms and values so as to nurture the collaborative relationship. Hence there was a degree of adaptability as part of the initial network culture:

> *If we look back, there was a fair level of understood shared vision and objective of where this wanted to go.  There was something that we need to mould it to and change when we went along, but people were happy to do that.* (Business Development Manager, Content Provider A)

Thus, initially at least, the partners exhibited a high level of involvement in the network. Recognition that they would be able to gain a shared proprietary ownership of the resultant healthcare portal, encouraged the partners to develop a sense of psychological ownership towards the project.  However, as the project progressed, the partners tended to reduce much of their involvement as it became increasingly apparent that the business model could not be fulfilled in accordance with the contract framework and attention shifted to projects with more tangible returns.  According to the Project Consultant of ITConsult: *"There were some of the vendors who are very pushed for time because they have other commercial initiatives that provided a return. They were more obviously more focused on that."*

In the longer term, however, was a weak consistency trait characterised the absence of a unified network culture. That is, the various organizations' cultures, assumptions and practices were not well integrated to produce a combined culture with high conformity and little or no dissent. This was particularly evident when it became apparent to some network members that one of the organizations were pursuing a course of action that was not compatible with the collaborative culture attempted around the portal project. As emphasised by the Business Development Manager of Content Provider A: *"It was never having a cohesive effort. Probably it was because one player involved in the project team had different goals and objectives"*. The two sets of norms and values engendered a low level of co-ordination and integration between this organization and the other organizations, which tended to espouse the view that collaborative efforts were crucial in providing better health solutions since the healthcare industry in New Zealand was relatively small. For example: *"We believe in collaboration to be a component that adds value to the use of the health system"* (Business Development Manager, Content Provider A). Some of the interviewees believed that the seceding organization did not have this collaborative attitude: *"They were very competitive rather than 'passionate or visionary', and not able to see beyond competitiveness"* (CEO, HealthTech Consortium). One reason offered for this organizational behaviour related to this organization's dominant position in the health IT industry. As explained by the Program Manager of HealthTech Consortium: *"They were used to running their own projects and perhaps not used to being effectively a sub-contractor or a team member rather than running their own project"*.

In general, a sustained collaborative network requires increasing levels of **attitudinal commitment** on the part of its members. Such commitment thus involves a willingness to invest the time and effort needed to make a collaborative relationship function effectively. However, over time, the commitment of various network members seemed to wane: *"The level of commitment was low as some members were busy hence they were absent at the fortnightly meetings"* (Business Development Manager, Content Provider A).

The potential for both calculative and loyalty commitment was present in the collaborative network. In particular, many of the organizations exhibited a good level of loyalty commitment at the initial stage of Phase 1 of the portal project. The collaborative network's mutual social objective to enhance New Zealand's patient-centred healthcare system created an initial strong emotional attachment to the project that certainly seemed to drive at least some of the organizations' willingness to put effort into developing a successful healthcare portal. As noted, the expectation of future economic returns was also a driver for participation in the network and formed the basis for calculative commitment to the project. However, as the project progressed an imbalance between calculative and loyalty commitment become increasingly apparent. Loyalty commitment was tested as concerns

about the commitment of all the participating organizations began to occur and some began to question whether they would be able to gain a share of the proprietary ownership of a resultant healthcare portal. The subsequent over-reliance on calculative commitment meant that the network was vulnerable when the members began to feel that there were not many economic gains to be anticipated, and the network was eventually discontinued.

### 4.5.2 Relational Capability

The relational capital discussed above needed to form the basis of sustained collaborative relationships between the participating organizations. Utilising that relational capital involved learning to collaborate and thus developing the capability as a network of effective relationship management. Analysis of the HealthPort network suggests that some learning processes did occur. For example, there were opportunities for content learning by some of the organizations, with Primary Health acquiring and internalising knowledge of the technical applications of the portal integration engine: *"Technically we learnt more about the integration engine and the applications of the health portal from ITConsult"* (CIO, Primary Health). Similarly, SoftCom was also interested in this intellectual property developed by ITConsult from their last collaboration: "[We] *wanted to take a piece of work like that, which had already been completed, and apply that in the project"* (Health Sector Manager, SoftCom). Content learning like this is a key determinant in the development of calculative commitment and can be effectively leveraged to create a level of connectedness within collaborative networks like HealthPort.

The HealthPort network offered the opportunity not only for learning from a collaborative partner, but also learning about collaborative partners. This partner-specific learning could serve as the basis for an organization to work in good faith with collaborative partners:

> *There was quite a bit of learning in the early stages in forming groups. For example, ITConsult was great to work with and Systems Provider B was good to work with. And we know their culture and they are open. And most of those people we continue to work with.* (Business Development Manager, Content Provider A)

Other organizations showed evidence of learning related to the management of a collaborative network. For instance, the Business Development Manager of Content Provider A emphasised that through their experiences in the HealthPort network they had learnt that the size of a collaborative network was an important influence on the partnership relationship: *"If you want to get things done you go probably to a smaller group to work together. Now we are working with something and this is happening. The more people you get involved the chance to derail is always there"*. Likewise, the CIO of Primary Health suggested that a short-term orientation could play a role in undermining the sustainability of

an inter-organizational relationship: *"I took some [learning] out of it … If you take a longer term perspective it is less likely that you get come unstuck."*

Prior collaborative experiences, especially with other network members, provided an important alliance management resource. As the Programme Manager of HealthTech Consortium commented:

> *A number of members had worked together on previous collaboration projects. So there were some experiences within the project team about working together in a collaborative project and what that might look like. This certainly helps because we were not starting from ground zero with everybody learning how to do it altogether.*

ITConsult similarly emphasised that its past collaborative experiences were an important part of the alliance management learning that they could bring to the HealthPort network: *"In terms of Systems Provider B and Primary Health and us, past collaboration experiences helped in the degree of flexibility and reasonableness that people displayed toward this project."* (Project Consultant, ITConsult). Indeed, the Project Consultant from ITConsult advocated *"a degree of reasonableness"* as a type of alliance management skill that encouraged a co-operative attitude among network partners: *"If someone feels something is reasonable then they tend to say yes. If you push people too hard, you are being unreasonable and inflexible, then people will tend to push back"*. To an extent this seemed to be an effective approach as the Business Development Manager of Content Provider A expressed that ITConsult *"did a pretty good job trying to pull everyone together and create the right culture."*

Overall, however, the HealthPort network lacked and was unable to develop the know-how and alliance management skills to successfully adapt to one of its member's behavioural uncertainty as a result of a change in its strategic direction. Ultimately, the network was unable to influence that particular organization's attachment to the portal project. As the CEO of HealthTech Consortium concluded: *"The organization had failed to make any relationships out of the project."*

## 4.6 Governance Resources and Capability

### 4.6.1 Governance Resources

Network directorship and governance was a role allocated to HealthTech Consortium, the organization that had assembled of the HealthPort network members. The Consortium oversaw the development of various documents and agreements intended to act as **structural governance mechanisms** for regulating the collaboration on the healthcare portal project. These included a project scope document that detailed the project's scope, goals, and plans

for achieving those goals, and the network partners' respective responsibilities and accountabilities. The purpose of the document was "to outline the expected benefits … and the level of investment required to support the project" so that the network members and project funders could "make an informed decision about their investment in the project" (HealthPort project scope document, p. 3). HealthTech Consortium put in place a contractual agreement with each of the collaborating organizations, which specified each participant's project deliverables. Funding agreements with the various sponsors of the project were also developed. As this was a non-equity innovative collaboration, the contracts detailed the protection of the intellectual property (IP) rights of each network participant. It was explicitly specified that the partners would be able to keep their existing IP. Each collaborative partner would have a joint licence to possess any new IP created in collaborative work on the project, while the various sponsors of the project would be granted the permanent licence. The result was a series of complex contractual arrangements:

> *There was complexity around new products, products enhancement, new IP created as part of this project and who got what and the end result of it. Those were all specified as part of the contract … It was probably the most complicated contracts that I had done.* (Programme Manager, HealthTech Consortium)

In addition, the contractual framework was intended to include a business model to support the commercial exploitation of any resultant healthcare portal product. The business model had the potential to act as a financial incentive system for longer term participation in the project. It was to be developed by an economic consultancy firm that was specifically engaged by HealthTech Consortium. The intended basis of the business model was that the partners would be awarded returns according to the value of each component they contributed in the development and construction of the healthcare portal. Crucially, however, the project scope document left the development of the business model until a projected third phase of the project at some future stage.

In addition to these structural governance mechanisms, HealthPort appeared to utilise reputation as a **relational governance mechanism** to regulate the partners' behaviours in the network. As the health IT industry in New Zealand is relatively small, most of the participating organizations were aware of each other by reputation and, as noted earlier, many had prior collaborative experiences with each other. Reputation enabled the organizations to validate various collaborative partners' characteristics in curbing the occurrence of opportunistic behaviours. Many of the organizations in the HealthPort network had a reputation for being collaborative. An organization's awareness of a potential partner's reputation for collaborative behaviour would act as a relational norm in justifying whether the partner could be trustworthy and give the organization some assurance that the

incidence of opportunism by the partner would be low. This was consistent with the goal that HealthTech Consortium had wanted for the project: *"Our overarching goal really was to promote collaborative innovative health IT solutions"* (CEO, HealthTech Consortium). Indeed, a number of the HealthPort partners fostered a positive collaborative reputation. For instance, the Business Development Manager of Content Provider A commented: *"And so we are working for a number of companies and it is very interesting for us as we believe in collaboration to be a component that adds value to the use of the health system"*. Similarly, the Project Consultant from ITConsult stated *"We want to be forefront in terms of a collaborative point of view. We want to make it well known that we are very keen on collaborating with other vendors in the market place"* (Project Consultant, ITConsult).

Trust is another important relational governance resource in collaborative networks: *"When you go into any collaborative project, the first thing you're going to have is trust"* (Business Development Manager, Content Provider, A). As mentioned earlier, structural mechanisms such as contracts can provide a form of deterrence-based trust, and reputation can lead to knowledge-based trust. Goodwill trust is an identification-based trust and thus is a powerful resource for sustaining inter-organizational relationships. There were two antecedents that facilitated the establishment of goodwill trust between the organizations in the HealthPort network. First, the partners shared a mutual goal to build a successful healthcare portal. As the CIO of Primary Health noted: *"Everyone gets together by a sense of common purpose and so it is driven by their ideas and goal in producing the thing that they believe in."* This joint empathy had the potential to serve as a basis for the development of goodwill trust because the partners could be confident that their partners would build the portal with co-operative rather than competitive intentions. A co-operative attitude would result *"through trust and relationships and understanding how their products can complement each other and helping each other"* (CEO, HealthTech Consortium).

Second, some of the organizations had established an emotional bond from previous collaborations, which provided a basis for these organizations to establish trust in the goodwill of each other. As the Programme Manager of HealthTech Consortium commented:

> *All of the participants had relationships with each other, either through being members of the Consortium or through relationships outside the Consortium ... There were levels of trust and friendship and camaraderie to work there than if we just tendered a whole bunch of people that have never worked* [together] *before. That helps.*

This bonding process had underpinned a reciprocation of trust whereby *"the parties had eventually put aside a lot of the competitive jealousy and actually sort of* [came] *to see there*

*might be a better more value in participating together and not trying to compete against each other"* (CEO, HealthTech Consortium). Furthermore, it could determine whether a participating partner would want to sustain a collaborative relationship because partners typically would not effectively act for each other if they had regarded the collaboration as a one-off event. The development of goodwill trust also provided the basis for the organizations *"to continue with the project while the contracts were being signed in the background"* (Project Consultant, ITConsult).

### 4.6.2 Governance Capability

Governance capability refers to the ability of collaborative network partners to effectively align the structural and relational governance mechanisms available to them to achieve a balance between co-operation and competition within the collaborative network. From a relational governance perspective, reputation and goodwill trust seemed to offer an important mechanism to allow the HealthPort partners to predict each other's co-operative behaviour. However, as the project progressed, the behaviour of one of the participating organizations, Systems Provider A, became a cause for concern among some of the other network members. Although co-operation at a technical level took place as expected, at a managerial level, it was *"more difficult because other agendas ... came into play"* (Project Consultant, ITConsult). Systems Provider A was responsible for building the healthcare portal interface but, reportedly:

> *They refused to let any of us see what the portal looked like until it was done. And I kept saying to them, this is a collaborative effort and to a large extent we do have some rights in actually seeing what the work in progress is so we can provide some input.* (Project Consultant, ITConsult)

This apparent unwillingness to engage in collaborative behaviour led to speculation that Systems Provider A *"had their own other private motive of wanting to participate"* (Health Sector Manager, SoftCom). This had a detrimental effect on the trust between Systems Provider A and other of the network members: *"There was trust developed among some of the participants, but there was one member who had distrust, which undermined the whole project"* (Business Development Manager, Content Provider A). As explained by the CEO of HealthTech Consortium: *"There was a tension ... that this organization* [Systems Provider A] *was going to go solo. You like to think that in collaboration, if the culture and relationship are going to work out well, the market strategy might change"*.

However, from the perspective of Systems Provider A, the portal project was not going well. The company had already made significant progress on a healthcare portal product before the network was formed but felt that, given their position in the New Zealand health IT industry,

they should participate in the HealthPort network. As the CEO of Systems Provider A explained, *"The idea was ultimately a technical proof of concept to demonstrate that the portal concept could work in an environment where you collaborate with other software components. We have no problem [with that]."* While the technical proof of concept was successful, further benefits arising from remaining in the network seemed increasingly unlikely to Systems Provider A: *"We were promised a major promotion so that we could get potential referrals out of this ... What we found was all the vendors' stuff was left out in the showcase. No marketing for us and nothing for us"* (CEO, Systems Provider A). Instead, Systems Provider A demonstrated its own healthcare portal product to potential users and decided to proceed with its commercialisation:

> *Before the project, we had a whole lot of modules built and we did not put everything in the HealthPort project. So then we showed it to the doctors and their view was good. So we decided to launch our version of the portal ... That officially ended our discussion between us and the network.* (CEO, Systems Provider A)

Ultimately, the HealthPort network had not managed to develop a governance capability that could enable them to deal effectively with the decision by Systems Provider A to essentially switch from co-operative to competitive behaviour. The network lacked sufficient rigidity to prevent this change in strategic direction by one of its members. Its relational governance mechanisms built around reputation and goodwill trust were insufficient to achieve this.

At the same time, its structural governance was also proving problematic. Despite HealthTech Consortium's attempt to devise a detailed contractual framework for the HealthPort network, there were problems interpreting the customised contractual agreements in relation to IP rights and the lack of formulation of a business model for commercialisation of any portal product constituted an incomplete contractual arrangement. Together, these factors resulted in ineffective management of the economic exchanges underlying the collaborative network. In particular, the unintended incomplete contractual arrangement meant that the network partners were working under a condition of uncertainty in relation to possible economic exchanges. In light of this, it was difficult to regulate the collaborative behaviours in such an uncertain environment so that all members would feel encouraged to participate in the project. With the delay in formulating the business model, some of the organizations began to have doubts about whether there would be a financial incentive system for continuing with the project. As a result, there was a tendency for organizations to limit the additional resources they allocated to the project so that deadlines in submitting project deliverables were often missed. In order for each party to *"put in this kind of effort and best people in the project, you need to have a commercial agreement in place"* (Project Consultant, ITConsult). Further, there seemed to be no basis for open communication around

the economic exchanges involved in the project. As the Project Consultant of ITConsult observed:

> *At the start of a collaborative project, you get everybody around the table and make sure everyone knows exactly what are you trying to achieve. If you do not do this kind of thing then you will damage some stage of the lifecycle of the project. The openness of communication is very important. You're open about the commercial initiatives.*

In hindsight, the network members expressed that a precise written agreement for protecting their IP should have been in place early, rather than relying solely on the idea of relational governance mechanisms such as trust. In particular, the CIO of Primary Health asserted that:

> *You have to put aside the warm fuzzy of what a great idea this is actually and nail the agreements of around what is going to happen whether it succeeds or fails right up front. Once you are going to talk about this: do not worry we are going to be fine and we trust each other. It is not a question of whether you do not trust people but the evidence says a significant number of these things end in tears.*

In the end, the selection and deployment of relational and structural governance mechanisms by the HealthPort network were ineffective at addressing the issues that had incited an imbalance of co-operation with competition. In the absence of a clear direction as to how the project could progress beyond the first phase, all of the participating organizations inferred that future collaboration was not cohesive. As described by the CIO of Primary Health:

> *I have seen several times, particularly in health, ultimately there comes a point where the parties have got some divergent views. And without some clear rules, where it has not been documented in the beginning and there is no way to sort it out, it simply collapsed, just like this one.*

## 4.7 Chapter Summary

Overall, the HealthPort had failed to develop technological capability and governance capability to balance the tension between co-operation and competition. Though the network had utilised Collab tool to operate an efficient asynchronous communication process to assimilate and disseminate technical information and documents associated with the healthcare portal proof of concept. In contrast, most non-technological information was poorly communicated using Collab. Without the technological capability to organize and co-ordinate communication in regards to non-technical issues such as proprietary ownership of the healthcare portal and the financial incentive system, communication asymmetries had developed between the network members. This in turn hindered the development of a shared

culture and commitment to the network necessary for establishing the high levels of connectedness among the partners needed to sustain collaboration. The lacked of governance capability to deploy structural governance mechanisms to formulae a business model for commercialisation of any portal product constituted an incomplete contractual arrangement. Consequently, this unintended incomplete contractual arrangement incited a condition of uncertainty in relation to possible economic exchanges that engendered a difficulty for the network to regulate non-collaborative behaviours. Thus, trust was undermined amongst the network members. In terms of relational capability, significant content and partner learning took place to leverage the various organizational resources available to the collaborative network to enfold a level of rigidity. However, the capability needed to adapt to one of its member's behavioural uncertainty as a result of a change in its strategic direction was lacking. As a result, the force of rigidity and flexibility became unbalanced.

# Chapter 5: MobiHealth

This chapter describes the findings and discusses the analysis of a second case study of collaborative healthcare product development. The first three sections present the background of the collaborative network involved in this product development and that of the participating organizations, before outlining the trajectory of the network. The remainder of the chapter presents and analyses the results from the case study. The analysis is organized around the conceptual framework outlined earlier in the thesis.

## 5.1 Network Background

The MobiHealth network was formed by three organizations in Singapore in 2009 to develop and commercialise a mobile patient health record (PHR) solution. PHRs provide patients with access to and control over their own health information and electronic medical records. Data may be patient-generated or uploaded from the information systems of healthcare providers, medical laboratories and pharmacies. Other functionality that is often mentioned in relation to PHRs includes remote appointment scheduling, prescription renewals, doctor communications, and access to patient-specific health information (Kharrazi et al., 2012). PHRs enable patients to better manage their health and to share their health information with approved healthcare providers.

The MobiHealth network's mobile PHR solution was intended to empower healthcare consumers by providing access to their PHRs from a central patient medical record database at anytime and anywhere via a mobile phone or other mobile device. There are two main drivers for developing this mobile PHR solution. First, accessing PHRs from various, non-integrated databases is costly and time consuming. The interoperable database system underlying the mobile PHR solution can reduce costs as it integrates the distributed PHRs into a unified database system. Second, a mobile PHR facilitates a faster communication channel as the patient and healthcare providers can easily access PHRs via patients' mobile phones without being bound by time or geography. Likewise, patients can receive up-dated information from their healthcare providers at anytime and anywhere.

With a mobile PHR, the patient can have a portable medical history that comprises his or her last visited physicians and medical details, such as a list of medication, allergies and laboratory results. In addition, the patient can input queries to his or her doctor for the next visit. Furthermore, any qualified doctors can conveniently access the main centralised PHR database during patient consultations or in emergencies from any location via a mobile device.

## 5.2 Participating Organizations

**MediSoft**

MediSoft is a software solution provider which has been operated for than 10 years in Singapore. The organization has operations in Singapore, Japan, Malaysia, Thailand, Taiwan, China, India and the United States. The organization's mission is to be the leader in the provision of IT component-based solutions and services for the life sciences and healthcare industry. It has successfully launched clinical software systems for hospitals and health ministries in the country. Its success is attributed to the organization's integrative database systems, which enable streamlining of Internet data collection, high-throughput data processing, and data visualisation. In view of this, MediSoft's role in the MobiHealth network was to develop the 'backend' interoperable database through which doctors could register patients and patients could effectively retrieve PHRs via mobile devices. Medisoft's motivation for participating in the MobiHealth collaborative network was both strategic, in furthering their connections in the health IT industry, and commercial, in seeking revenues from a successfully commercialised solution: *"It is a commercial decision. We see the strategic importance of this project, which can lead to more initiatives. And number two, we see potential revenues coming in – if it is not short term, at least it is mid-term to long term"* (CEO, MediSoft).

**MediSolutions**

MediSolutions is a provider of clinical software solutions which has been in operation for 5 years. The company's mission is to transform Singapore into a medical hub by enticing 90 per cent of the country's private medical practitioners to computerise their services using the company's web-based solutions. These consist of an open source web application and an in-house built web application using web services that enable doctors to computerise their clinics and to bring their services to the web at an affordable price. As such, the role for MediSolutions in the MobiHealth network is to build the 'frontend' of the mobile PHR, including applications needed to receive patient data, view PHRs, make medical appointments online, and obtain confirmation in real-time from anywhere. MediSolution's motivation for participating in the MobiHealth collaborative network was to increase the visibility of the company: *"With GlobalComm backing and working with MediSoft we have achieved awareness for the company. GlobalComm bring us more events; whenever they have events, they will showcase our solutions. It exposes us to more organizations"* (Director, MediSolutions). However, the company's Director also emphasised patient benefit, commenting: *"My first priority is that patients can benefit from the mobile PHR."*

**GlobalComm**

GlobalComm is a large telecommunications provider in Singapore. The organization has a total staff strength of about 20,000 and operations in more than 100 countries. It is a major investor in many of the world's submarine cable and satellite systems. Its global infrastructure fosters the provision of a range of services, including fixed, mobile, data, Internet, info-communications technology, satellite and pay TV. For the MobiHealth network, GlobalComm had three roles. First, it acted as a network manager in facilitating the collaboration since it was the sponsor of the network. Second, it provided the ICT infrastructure for the solution development, including the server for hosting the mobile PHR solution and the mobile network gateway. Lastly, it was responsible for devising a commercial business model and commercialising the mobile PHR solution: *"GlobalComm would be the one to fund the solution and sell the solution. We would be the one who makes the business work ... That is GlobalComm's ultimate goal. I want to develop it so that it can be profit making"* (Business Development Director, GlobalComm). GlobalComm's participation in the MobiHealth network was fundamentally based on its interest in supplying innovative ICT-based products and services for both healthcare providers and patients: *"What we are good at is to go to market. What we are good at is driving adoption ... We are working towards a more collaborative nature where we choose best-of-breed partners to work together"* (Business Development Director, GlobalComm).

## 5.3 Network Trajectory

In December 2008, GlobalComm initiated a competition that was intended to encourage potential participants to submit innovative ICT solutions that addressed the needs of business and industry. Successful participants would be awarded prize money and an opportunity to collaborate with GlobalComm in bringing the proposed solution to market. In March 2009, MediSoft and MediSolutions were announced as the winners for the competition. They had proposed a solution for the healthcare industry that utilised mobile devices to enable patients to retrieve their PHR at any time and from anywhere. As GlobalComm would only work with one entity in launching the proposed mobile PHR, the two companies formed a joint company.

The collaborative network was formed in July 2009, after all the partners had signed a non-negotiable contract agreement followed by a partnership agreement. The resulting collaboration entailed two main phases before commercialisation. The first phase, a Proof of Concept, was associated with the development and consolidation of a mobile PHR database. It took eight months for MediSoft and MediSolutions to develop the mobile PHR solution. The second phase involved rolling out the mobile PHR into the clinical environment with a test sample size of 200 live PHRs. The mobile PHR went through two environmental tests

and a production test to prepare it for commercialisation.  As at November 2010, the mobile PHR solution was considered by GlobalComm to be a *"success in terms of adoption, as now we have got 300-400 patients.  When it comes to user feedback, all of the users have positive feedback and most of the patients are willing to pay for it"* (Business Development Director, GlobalComm).

However, the CEO of MediSoft saw the future commercialisation of the mobile PHR somewhat differently, perceiving that *"most patients will be unlikely to pay ...* [to] *subscribe to the service. I can see some monies coming in but not much."*  With little revenue to share and believing that there was a limit to the value that it could continue to add to the mobile PHR project, MediSoft suspended its active participation in the joint project, leaving MediSolutions to continue to work with GlobalComm. However, the CEO of MediSoft signalled MediSoft's intention to participate in the mobile PHR project again at a later stage when the situation in the Singapore health environment had changed. Part of that changing environment was the pressure from the Singapore Ministry of Health to develop a clinical management system (CMS), a project led by GlobalComm and involving all three collaborating partners: *"We are moving to the CMS instead ... I will prefer to work with MediSolutions for the CMS project"* (CEO, MediSoft).

Although MediSoft (temporarily) suspended its activities in the mobile PHR project, the MobiHealth network had sustained its collaboration on the mobile PHR as far as it could, given the changing healthcare environment in Singapore, and the network members continued to collaborate on other projects. Indeed, the CEO of MediSoft was hopeful that a successful CMS would increase the potential revenues from the mobile PHR and provide an opportunity for MediSoft to once again make a value-added contribution by leveraging its contacts within the healthcare industry:

> *Imagine the number of patients going to these clinics* [using the CMS] *and if we can attach out mobile piece to these clinics then we would have immediate business.  We have to make sure that these clinics come together first.  Then the next phase is where the mobile PHR would come into it. In two years' time there would be some commercial success … At the end of the day all the partners have to add some value. We need to get the pharmaceutical companies and insurance companies to come in … This is where MediSoft can come in from that angle in two years' time.  We can bring in the pharmaceutical contacts and help to re-engineer the marketing strategy. MediSoft will be more interested in this aspect ... I mean that is our strength.* (CEO, MediSoft)

## 5.4 Technological Resources and Capability

### 5.4.1 Technological Resources

In terms of **ICT infrastructure** to facilitate communication, both synchronous and asynchronous communication channels were used to maintain an efficient flow of information to support the collaborative activities enabling the network partners to work together co-operatively. There was some use made of teleconferencing and document sharing services. For example, MediSoft and MediSolutions needed to exchange versions of data structures needed to build the mobile PHR database: *"We prepared a number of technical documents, for example a data dictionary, which the team had to share among each other"* (Director, MediSolutions). However, email was the primary form of asynchronous communication used in the network, particularly for the *"exchange of information at arm's length"* (CEO, MediSoft). For example, emails were used to inform other network members of changes made to the data dictionary: *"Any amendments or changes to the data dictionary will be emailed to all the parties"* (IT Consultant, MediSolutions).

Email was considered by one network member to offer the potential for clarity in communication compared with the perceived ambiguity of a telephone conversation: *"Email conversation is to state down what we need to deliver. It is like a black and white documentation. At the end of the day, you promise this and this, and just in case the other party is not delivering it, we can use that email to tell that you have already promised me"* (Director, MediSolutions). Nevertheless, other network participants found that email *"may lead to confusions or a war of words"* (CEO, MediSoft). The network partners would need to clarify such issues or problems that arose in relation to the development of the mobile PHR through synchronous interactions: *"Like when we wanted to work out something and sometimes through emails we had misunderstandings. So we had to meet up"* (IT Consultant, MediSolutions). In fact, the organizations took advantage of the small size of Singapore to leverage a weekly face-to-face meeting, as a synchronous communication process, to *"discuss about the strategy and what were we going to achieve with respect to the timeline"* (Director, MediSolutions).

Overall, all the organizations were equipped with an adequate level of **ICT competence** in using the ICT infrastructure, gained from the years of accumulated expertise in each organization's respective field. For instance, MediSoft had been involved with healthcare enterprise systems for a number of years, MediSolutions had 5 years local experience in clinical software implementation, and GlobalComm has been actively doing research in the medical sector. The level of ICT skills within the network enabled the users to be able to deploy ICT more effectively so as to engender an enhanced communication process for

efficient and effective information processing.  The provision of ICT training is typically determined by the level of a network's ICT competence.  In this case, there was no provision made for ICT training given the high level of ICT competence attributable to the respective organization's accumulated expertise.

The findings reflect that, as the designated network manager, GlobalComm possessed adequate **managerial ICT skills**.   In particular, GlobalComm established an open communication process within the collaborative network.   The partners were required to attend a weekly meeting: "*Every Tuesday, we would go to GlobalComm for a face-to-face meeting.  Sometimes the agenda was ad hoc but GlobalComm would take the lead to get some topics going and got everyone to contribut*e" (CEO, MediSoft). Furthermore, this open communication process enabled the partners to resolve any issues that arose during solution development, such as around relative contributions and responsibilities: "*There are definitely issues with regards to collaboration like this … where face to face discussions are important to clear up matter*s. *Communication is very important between partners and face to face discussions are the key*" (CEO, MediSoft).  The Director of MediSolutions confirmed the importance of face-to-face communication in resolving issues between the collaborating partners:  "*We did have some arguments along the way. We sort of reached a consensus through weekly meetings that we had, as well as through emails and telephone conversations. Face-to-face is easier to reach a consensus, basically having GlobalComm as a third party to mediate.*" In view of the above, it is evident that GlobalComm was effective at managing the communication process to keep the parties talking and communication flowing.

### 5.4.2 Technological Capability

The MobiHealth network needed to develop a network-wide technological capability that could provide the basis for communication, information processing and co-ordination of the network's collaborative activities.  What is interesting is the reliance placed on face-to-face, synchronous communication to gain a better understanding of what was needed to design and develop the mobile PHR, as well as to resolve issues or disagreements that arose. Electronic communication played a secondary role in document sharing and the notification of changes to the developing solution. As the IT Consultant from MediSolutions noted: *"We would use any communication tools for us to effectively monitor this project."*

Regular face-to-face meetings were also the means through which collaborative activities could be planned and co-ordinated by setting up priorities and checking progress against agreed deadlines: *"Face-to-face meetings were very important to us to understand where the solution had been built and which stage the solution was at" (*Director, MediSolutions). Maintaining timely progress on the development of the mobile PHR solution and the role of

regular face-to-face meetings to report and discuss the progress of development of the mobile PHR solution were also emphasised by other participants:

> *Most important is that all of us are committing to the project's timeline. Once a project's timeline is committed you have to work towards that ... Weekly meetings serve as a check point. You come to the weekly meeting to report on the status* [of the project]. (IT Consultant, MediSolutions)

## 5.5 Relational Resources and Capability

### 5.5.1 Relational Resources

Within the MobiHealth network, the selection of the collaborative partners was attributed to the complementary skills and expertise which each of them could contribute to developing a successful mobile PHR:

> *From the start we try to be very clear with the scope of work so that we can know what MediSoft and MediSolutions' individual expertise can bring onto the table ... They each bring their unique strengths into this project ... The key is that each partner must have a value to be put on the table.* (Business Development Director, GlobalComm)

In view of that, a high level of **partner complementarity** was cited among the network partners :

> *How we work together is very straightforward. We know that GlobalComm would provide the infrastructure ... such as a server and a Short Message System gateway ... and marketing strategy. We and MediSoft would focus on the technological aspects. We divide the solution into frontend and backend. We concentrate more on the frontend that is the user interface part and some part of the database. MediSoft concentrates on the backend, which is how the data can be managed and how doctors can register the patients.* (Director, MediSolutions)

Despite the potential for a substantial power differential between the two relatively small IT companies and the much larger GlobalComm, serious conflicts between the partners were avoided and cohesiveness generally remained high. From the start, GlobalComm, as the network leader, had wanted MediSoft and MediSolutions to form a new joint company, so that the collaboration was formally between only two parties. The intention was to smooth the progress of the network and reduce the occurrence of opportunistic behaviour through this more equitable distribution of power since *"both parties came in as partners. So it was not a joint venture, but was a partnership"* (Business Development Director, GlobalComm).

To an extent, the other two smaller organizations gained a further assurance from GlobalComm, that it would not terminate the collaborative network even though it had learnt much of the technological aspects from them: *"GlobalComm was a good partner to work as they stated upfront that they would not go into software development."* (Director, MediSolutions). These aspects contributed to a higher level of connectedness within the collaborative network.

Similarly, GlobalComm's insistence that MediSoft and MediSolutions form a joint company to develop the mobile PHR established a clear basis for a fair contribution of resources and distribution of rewards:

> *How do we split the revenues, how are we going to make sure we are contributing our resources fairly? ... That [joint] company would dictate how much man effort that you put in [and] how much you can get out from this whole thing. The revenue coming to this company will be split according to the cost of running of this company ... Once the costs are calculated then whatever is remaining will be shared as dividends among* [MediSoft and MediSolutions]. (Director, MediSolutions)

Overall, MobiHealth displayed an appropriate level of **network culture**. In particular, this culture was exemplified by a mission trait, involvement trait and adaptability trait. With regard to the former, it was evident that a shared mission created a functioning co-operative partnership between the three organizations: *"The goal would be actually to commercialise the service ... All the companies at the end of the day want to make sure it works and make a business out of it ... Everyone is in the same boat, achieving the same direction"* (Business Development Director, GlobalComm). Ultimately, the partners wanted to commercialise the mobile PHR and sell it as a solution to private healthcare providers and their patients. Given that, a strong mission trait endowed the partners with a defined direction and goal which, in turn, encouraged a collaborative environment in which the organizations were motivated to achieve this common purpose.

There was also a generally high level of involvement that was characterised by a sense of responsibility and psychological ownership towards the MobiHealth network by its members. To a certain extent, the shared economic goal underpinned the organizations' active participation in the network, which was exhibited, for example, through the partners' cohesive efforts to attend the meetings that were held weekly. The findings also reflect that these meetings had cultivated a shared responsibility in decision-making, which had enabled improved goal alignment: *"During the meeting, we discuss about the strategy and what are we going to achieve in respect to timeline"* (Director, MediSolutions). As noted earlier, GlobalComm stated upfront at the start of the collaboration that it would *"actually own ...*

*the portal's service, but we don't own the IP and technologies"* (Business Development Director, GlobalComm), This helped the other two partners to develop a sense of psychological ownership towards the network since their retained proprietary ownership of the IP and technologies would secure them a share of the economic rewards on commercialisation of the mobile PHR.

Despite the shared mission and high levels of involvement displayed by its members, the MobiHealth network exhibited a low level of consistency as a result of differing strategic orientations among its members. The CEO of MediSoft suggested that MediSolutions had a strategic direction and culture that was different from the other two organizations: *"The culture is different ... Some of the objectives are different from MediSoft and GlobalComm. They [MediSolutions] are trying to meet short term, whereas our objectives are long term."* The Director of MediSolutions framed the cultural inconsistency in similar terms:

> *MediSoft would measure the business benefits of the solution before it is built. For MediSolutions, if there is a potential I will build it. I do not think of the business aspect to it ... If you think too much before you do something others will take this up and do it on their own. We are a small company. We would rather be more adventurous.* (Director, MediSolutions)

This cultural inconsistency had practical consequences for the collaborative network. For example, it was reflected in conflicting approaches to co-ordinating and allocating resources. For the Director of MediSolutions, his company's participation in the collaboration also entailed a social objective involving patient benefit: *"I know there is a need a demand in that area* [mobile PHR] *and what the doctors and patients are looking for. So, I just need to convince MediSoft to see that there is a demand. He should put in his manpower first and then revenues will come later."* The consequences on resource allocation of the tension between a focus on the technological development and a commercial imperative were confirmed by the CEO of MediSoft:

> *The way they deploy resources is quite different from us. We have* [other] *projects, so resources are always occupied. But for them, this project is the key initiative, so they have a team which is more dedicated to this project. We do not wish to be too overly enthusiastic and commit too much resources as there is no immediate outcome. Even GlobalComm would work in the same manner. So that is the difference in culture between this partner with us and GlobalComm. We are based on commercial milestone stability to prepare our resources properly, but the partner has been too active ... They are so technology driven.* (CEO, MediSoft)

Similarly, the cultural differences initially led to another co-ordination problem whereby the two organizations had difficulty in agreeing on what type of application ought to be developed:

> *There were some tensions when we started. It took quite a while to discuss and basically to have a consensus of what kind of solution that we should build for the end users … Sometimes I would like to build a lot of applications and features but he* [CEO of MediSoft] *counter-balances me by telling me this may not be important … and we want to work on solutions which have* [financial] *benefits."* (Director, MediSolutions)

Overcoming this inherent cultural tension required a degree of compromise and adaptability. As the Director of MediSolutions continued: *"But there are times when I manage to convince him* [CEO of MediSoft] *that we do need these features. So it is like more towards trying to understand each other and reaching a middle point where both of us would agree … How we can compromise when we have certain hiccups."*

In fact, the findings reflect that the MobiHealth network demonstrated a strong adaptability trait in responding to uncertainty and changes in both the internal and external environment. With regard to the former, dealing with a large international company required some compromise on the part of MediSoft and MediSolutions: *"We see them* [GlobalComm] *as a big company, big giant. So when we deal with things sometimes we have got to bend a little, as they have their own corporate structures and protocols"* (CEO, MediSoft). This adaptability extended to driving the joint project when GlobalComm lost focus at one point, so that the collaboration could be continued:

> *For a period, in fact, GlobalComm could not decide where to go. But between MediSoft and MediSolutions, we continued to plough in our resources into the project as we saw the potential opportunities. At least we held the ropes for a while.* (CEO, MediSoft)

Changes in the external environment also required adaptability, a point recognised by the network members: *"There could be a changing landscape. For instance, if the Ministry of Health was going to pass certain patient privacy laws, when we roll* [out] *the mobile PHR we have to be careful. This is the issue that has to be constantly managed"* (Business Development Director, GlobalComm). In fact, as noted earlier, the landscape did change, with the Ministry of Health pushing the development of a CMS. As the CEO of MediSoft explained: *"Now GlobalComm is back, due to market forces, we can see the initiative is jumping forward again … Why GlobalComm came back very strongly is because there is*

*finally a role this mobile PHR can play in this coming* [CMS] *tender."* That adaptability also meant that MediSoft could take a break from the mobile PHR project without jeopardising the collaborative relationships between the three network members:

> *The business plan has changed as business is always changing. Initially the mobile PHR is not associated with the CMS. We would let GlobalComm run the CMS project first. Meanwhile, we would explore other opportunities elsewhere and if there are profits then we would come in to the project again.* (CEO, MediSoft)

In general, there was a high level of **attitudinal commitment** exhibited in the MobiHealth network: *"I think the commitment is good"* (Business Development Director, GlobalComm). This was predominantly attributable to the calculative commitment that had initially brought the three organizations together in collaborating on the development and commercialisation of a mobile PHR: *"All the parties are committed to the project's development"* (IT Consultant, MediSolutions). As discussed earlier, each partner had strategic reasons for participating in the network. For GlobalComm, a mobile PHR was a logical extension of their strategy in supplying innovative products and services that utilised their existing telecommunications network and consumer base: *"GlobalComm is more committed as he* [Business Development Director] *is in business development. He needs to bring in more revenues for GlobalComm"* (Director, MediSolutions). As noted earlier, Medisoft's motivation combined making connections in the health IT industry and deriving financial benefits from a successfully commercialised solution, while MediSolutions was also seeking to increase its visibility in the industry.

The findings reveal little evidence of the subsequent development of loyalty commitment among the members of the MobiHealth network. However, this did not seem to have a negative impact on the long term sustainability of the collaborative network. In particular, MediSoft did not appear to have developed a sufficiently strong emotional attachment to and psychological identification with the collaborative network so that it was prepared to continue committing resources after the mobile PHR solution had been developed. Nevertheless, calculative commitment was sufficient to ensure that MediSoft would continue to collaborate with its partners until such time as the financial benefits expected from the mobile PHR were more certain.

### 5.5.2 Relational Capability

The MobiHealth network evidenced all three forms of learning process in learning to collaborate. There were a number of examples of content learning from other partners that would act to reinforce the calculative commitment of the network members. For example, MediSoft internalised GlobalComm's skill and expertise as a well-established and successful

international company, potentially enhancing its own organizational performance: *"We learnt more from GlobalComm its marketing strategy and business development. This can help MediSoft in business"* (CEO, MediSoft). Similarly, the IT Consultant from MediSolutions acquired technological knowledge through his learning from MediSoft as a collaborative partner: *"For me, I have learnt the technologies from the technical aspect, learnt from MediSoft their database structure. They are very experienced in this area."* The findings of the case study suggest that learning from a collaborative partner could render a degree of openness, as these learning opportunities could only be delivered through co-operative interactions that were facilitated by communication and an open exchange of information. As the basis for forming the collaborative network was partnership, then such content learning did not result in a learning race. Instead, the learning intention exhibited by the network members was to seek means of enabling positive impacts on the collaborative relationship rather than internalising other organizations' technological competencies.

The MobiHealth network also showed evidence of partner-specific learning. Learning about a collaborative partner enabled the organizations to gather more information about the others' skills and capabilities. This, in turn, had encouraged the partners to have a high degree of inter-dependency, as it was through "*recognising each other's strength and, therefore, how we are going to collaborate so that the* [mobile PHR] *service can roll out more effectively*" (Business Development Director, GlobalComm). That is to say, an improved operational efficiency for the development of the mobile PHR would be possible if the initial partner selection was underpinned by the learning about one's collaborative partners. Learning more about each participating partner's characteristics in turn enabled a better mutual understanding that could smooth operational processes. As commented by the Director of MediSolutions: *"It is a matter of how we can understand each other and how we can work with each other. Basically it comes down to MediSolutions, MediSoft and GlobalComm, and how we three companies can work together."*

Partner-specific learning was also important in overcoming the difference in strategic direction between MediSoft and MediSolutions that had impacted on their utilisation of resources in the mobile PHR project. It was only when the two organizations had learnt more of each other over time that they were able to adapt to each other's norms and values: *"Now we know the partner [MediSolutions] deeper in terms of their strength and weakness. If people come together and do not re-adapt, then the partnership will be doomed"* (CEO, MediSoft). Thus, the cultural consistency trait was reinforced by the partners learning more of each other.

Partner-specific learning extended to the level of individuals. For example, the Director of MediSolutions recognised the importance of getting to know his counterpart, the CEO of

MediSoft: *"For a small enterprise, getting to know the boss is the most important thing. Because everything will go back to the boss .... GlobalComm is quite straightforward, they work as corporation. Even if* [Business Development Director] *is not there someone can take over and the whole thing can still move ahead. For an SME* [MediSoft], *it is different."* For the IT Consultant from MediSolutions, learning that timeframes for the technical staff in the other development company were different was an important step in learning to collaborate: *"Teamwork is important. We have to understand each other. For example, MediSoft programmers need more days* [to do something] *due to their other projects. We cannot press them."*

Finally, MobiHealth also developed a relational capability in managing the collaborative network more effectively through alliance management learning. This was emphasised by the Director of MediSolutions, who claimed: *"What we have gained is more towards managing this collaboration, because we know that at any point in time any of the partners are able fall out of this collaboration."* In particular, MediSolutions had learnt how to resolve conflicts and establish a closely-knitted collaborative relationship:

> *The first thing is you have to be more tolerant about the other partners. Meaning that when it comes to certain hiccups or milestones, then you have to pick up the phone to make some calls ... to discuss how we are going to move forward.* (Director, MediSolutions)

Learning from past collaborative experiences also provided the network partners with a greater aptitude for managing the collaborative relationship. The IT Consultant from MediSolutions suggested that prior collaborative experiences could enhance effective communication, which should engender a more efficient co-ordination of collaborative activities:

> *This is my first collaborative network. I think I learnt a lot about how to communicate with the collaborative parties. If you want to communicate with other parties whom at first you are not very familiar with ... and previously you do not have this experience in this communicating skill, then you will not know how to proceed with things.* (IT Consultant, MediSolutions)

The past successful collaborative experiences of GlobalComm boosted the other two organizations' confidence that GlobalComm would effectively direct and manage the collaboration so that they could achieve their shared goal. As highlighted by the Director of MediSolutions: *"GlobalComm has been marketing quite a number of products and they*

*know what to do for this project to be successful."*  The CEO of MediSoft shared the same sentiment:

> *Past experiences make a difference ...  With GlobalComm having a good wealth of resources, ranging from individuals to business networks with key stakeholders in the health industry, they can use these to make the project more successful.*

## 5.6 Governance Resources and Capability

### 5.6.1 Governance Resources

To establish the MobiHealth network, the three organizations adopted **structural governance mechanisms** in the form of a series of formal agreements between them. MediSoft and MediSolutions agreed to form a joint company, which subsequently signed a partnership agreement with GlobalComm. GlobalComm was responsible in drafting the agreement, which detailed the network's scope, goals and plans for achieving those goals, as well as the partners' respective responsibilities: *"We first have to sign a non-negotiable contract agreement followed by a partnership agreement ...  In these agreements we would state specifically who is supposed to do what"* (Business Development Director, GlobalComm).  Importantly, the contractual agreement detailed the ownership of the intellectual property (IP) rights of the mobile PHR.  GlobalComm particularly specified that it only owned the services offered by the mobile PHR while MediSoft and MediSolutions retained possession of the IP related to the PHR's technologies, since they were responsible for its development: *"IP are drafted clearly. That is something which we have to be careful about.  We are very clear of what we are doing at the backend, and MediSolutions is also very careful as they are doing the frontend"* (CEO, MediSoft). On the other hand, GlobalComm would be compensated for the provision of the necessary infrastructure and marketing strategies.  In this way, the contractual agreement enabled an efficient management of economic exchanges since the protection of each organization's proprietary assets was detailed and documented. Such a fair reward arrangement facilitated the organizations' collaboration by creating conditions of certainty, which in turn encouraged the organizations to behave consistently. Thus, the partnership agreement served as a form of deterrence-based trust in controlling the organizations' opportunistic behaviours.  As the Business Development Director from GlobalComm commented: *"In a way the trust is already built as we set the principle base* [in the agreements]*."*

The collaborating partners were clear about the business model for the mobile PHR; how revenues could be generated each time a patient accessed the mobile PHR and those revenues shared with healthcare providers, *"so they are happy to upload more information to the* [mobile PHR] *portal ... The business model must be very clear at the beginning. If not,*

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*the project will not progress"* (CEO, MediSoft). However, how the revenues would be shared among the three network members was not initially specified, the intention being to do so when the mobile PHR solution had been developed and was in a position to be commercially launched:

> *We have not worked out the agreement ... We have a black and white document that this project is within these three companies, but the revenues are not stated. The agreement will be ready before the launch* [of the mobile PHR]*, which would state how much revenue is shared after working out the cost.* (Director, MediSolutions)

Ultimately, this lack of specificity did not sufficiently enhance the rigidity of the MobiHealth network, so that MediSoft felt able to reduce their resource commitment to the mobile PHR project. As the CEO of MediSoft put it:

> *Governance does not have to be too formal ... All the parties must be happy working together, that is more important. Governance can come in later ... I have already told the partners that if there is no money to be made I am not going to carry on. They are a bit taken aback.* (CEO, MediSoft)

**Relational governance mechanisms** were an important resource for the MobiHealth network. Until their knowledge of each other grew, the partners had to rely on the reputation of an organization as a safeguard mechanism in allowing them to have a greater capacity in predicting that organization's behaviour with more confidence. This was particularly the case for MediSoft and MediSolutions in their dealings with GlobalComm: *"Trust needs to build up over time ... GlobalComm is a big company ... The kind of trust with GlobalComm is like only you know they are a stable company, publicly listed"* (Director, MediSolutions). On the other hand, as MediSoft and MediSolutions did not have any past knowledge of each other, they could not deploy reputation to validate prospective behaviour: *"Initially the trust between MediSoft and MediSolutions was not there. We did not know them very well ... It is a benefit if we know a partner beforehand"* (Director, MediSolutions)

In the MobiHealth network, goodwill trust was gradually built up as the network progressed and its members interacted with each other over time: *"Trust is not easy to be build up between big companies and small companies or between different companies. So what we do is to steadily mature this relationship with GlobalComm ... All these interactions help to mature relationships"* (CEO, MediSoft). Similarly, the Business Development Director from GlobalComm commented: *"Trust has to be built gradually ... Trust is built and earned."* Likewise, when asked how about the working relationship with the technical staff from MediSoft, the IT Consultant from MediSolutions said: *"Of course we have doubts at first*

*because we are new to each other. So far, working together for so long, I find that it should not be a problem to trust them. I believe trust is needed for team work."*

The cultivation of identification-based trust was not necessarily straightforward, as was evidenced in the development of the relationship between the CEO of MediSoft and the Director of MediSolutions. As the Director of MediSolutions explained:

> *We had heated arguments over the time and I did not know whether these heated arguments would lead to the growth of trust ... But I guess over time when we brought this solution to live, the trust grew as time went by.*

### 5.6.2 Governance Capability

As evident from the case study, the MobiHealth network developed a governance capability that engendered a balance of co-operation with competition. This was at least partially attributed to GlobalComm's competence in drafting the partnership agreements. Knowing the importance of a defined scope of work, GlobalComm had explicitly detailed the roles and responsibilities of itself and the perspective partners. As asserted by the Business Development Director of GlobalComm:

> *From the start we try to be very clear with the scope of work ... With that we would then have a very clear direction of, at the end of the day, what we are going to achieve. That is, to make a business out of it.*

GlobalComm built upon its historical collaborative experiences to adapt to the specific conditions of the MobiHealth collaboration. GlobalComm deployed its alliance management skills to flexibly shape the network's structure and organization to match its needs and operations:

> *I don't say that GlobalComm will adopt the same approach for every one of these collaborations. There are other projects in which we are involved ... In these consortiums different parties will have different scopes of work. Again, the whole dynamics is different. The trick to success for the collaboration is that everyone must be very clear what each other's scope of work is.* (Business Development Director, GlobalComm)

GlobalComm had also defined the perceived benefits in *"black and white"* (Director, MediSolutions) through the business model it developed for the mobile PHR. According to the CEO of MediSoft, *"The key thing is coming up with a generic business model to determine who would get a bigger outcome and it all depended on their contribution to the project."* In view of that, the partnership agreement entailed a perception of fairness that

played a significant role in safeguarding the participating organizations' interests against opportunistic behaviours: *"We can be very clear who does what. Because whoever does more will have a bigger revenue share. This is a basic principle, base engagement to work out the partnership"* (Business Development Director, GlobalComm).

The MobiHealth network combined these structural mechanisms with relational mechanisms to develop effective network governance that balanced rigidity with flexibility in aligning the interests of the partners and distributing the benefits of collaboration. Despite the potential for GlobalComm to dominate the relationship and exploit the technical knowledge of the other two organizations, GlobalComm's reputation and the goodwill trust that it engendered led to its partners having positive expectations of its behaviour, in turn encouraging their co-operative behaviour: *"We have adopted a an approach whereby we are not keen to own IP rights ... So, the SME is comfortable working with us as we complement with each other"* (Business Development Manager, GlobalComm).

One measure of the effectiveness of the governance capability developed by the MobiHealth network is that the partners decided to participate together in a new project. The development of an identification-based trust appears to have encouraged this decision: *"The trust has been building. That is why we are moving into another new project"* (Business Development Director, GlobalComm).

## 5.7 Chapter Summary

Overall, the MobiHealth network was able to develop specific capabilities to balance the three pairs of competing forces that it is suggested are necessary for sustaining a collaborative network. Technological capability had been built to leverage both synchronous and asynchronous flow of communication effectively in order to provide the basis for the co-ordination of collaborative activities. Setting up priorities and meeting target date allowed the collaborative activities to be well planned, which in turn enhanced the level of co-operation among the participating organizations. The development of relational capability balanced the competing force of rigidity and flexibility. The MobiHealth network underwent a network-based learning process that allowed the participating organizations to learn how to collaborate more effectively. Such relational-based learning capability enhanced the leveraging of the network's available relational resources to increase the connectedness of the collaborative relationship. On the other hand, governance capability played a role in reducing the level of competition within a collaborative network by limiting the gains from collaborative partners' opportunistic behaviours. The competency of MobiHealth network to detail specific partnership agreements served as an effective governance mode to regulate the collaborative relationship in combination with knowledge and identification based trust derived from GlobalComm's reputation and the ongoing interactions between the network

members. Thus, the MobiHealth network was able to develop effective network governance that deployed and combined both structural and relational governance mechanisms to balance the forces of co-operation and competition as well as rigidity and flexibility.

# Chapter 6: MediNet

This chapter describes the findings and discusses the analysis of the third case study, a collaborative network for healthcare service delivery. The first three sections present the background of the collaborative network and that of the participating organizations, before outlining the trajectory of the network. The remainder of the chapter presents and analyses the results from the case study. The analysis is organized around the conceptual framework outlined earlier in the thesis.

## 6.1 Network Background

The use of collaborative clinical networks to improve healthcare services by co-ordinating and delivering services across professional and organizational boundaries is becoming common in countries such as Australia and the United Kingdom (Cunningham et al., 2012; Goodwin, 2008). Such networks can operate at local, regional and national levels. As in these countries, a range of demand and supply pressures are facing the New Zealand public health system. To maximise the use of scarce specialist resources, share standards and guidelines, and co-ordinate patient care, specialised healthcare services are increasingly being consolidated across a number of regional centres linked by a clinical network that interact electronically (NHB, 2010).

MediNet is such a clinical network. It operates in a sub-specialty of a major field of medicine that manages non-routine, complex patient conditions. MediNet was established to achieve several goals: (1) to co-ordinate and ensure access to care and services for patients with a specific range of complex conditions, (2) to improve health outcomes for these patients, and (3) to maintain and support a network of specialists in this medical field to ensure continuity of service provision. Services related to this medical sub-speciality are provided through four regional specialist medical units within New Zealand, three in the North Island (Northern, Midland, Central) and one in the South Island (Southern). These four units form a hub-and-spoke model. They are based in tertiary hospitals that have the necessary medical and supporting surgical services, and act as a hub for referrals from the secondary hospitals in their regions. In addition, the Northern Medical Unit will receive referrals from the other regional units for specific conditions that require certain technical procedures that can only be performed in that unit.

Generally, the sub-specialists associated with MediNet work together with other clinical specialists and health professionals to manage high-risk and complex patient cases. This often involves contact with patients and their families who are facing stressful situations and potentially adverse outcomes. There are currently only five sub-specialists spread across the four units who have completed further training in the more complicated conditions and

procedures. Each unit has a specialised health professional who works closely with the sub-specialists. Sub-specialists and health professionals work collaboratively as they need mutual support from each other.

## 6.2 Participating Organizations

**Ministry of Health**

The Ministry of Health is the government department responsible for improving and promoting good health outcomes for all New Zealanders. It funds the public health system to ensure that healthcare consumers have access to affordable healthcare that is appropriate to their needs. The Ministry currently provides the funding for MediNet's management team and infrastructure. The Network Leader formally reports to the Ministry on a regular basis.

**District Health Boards**

District Health Boards (DHBs) are responsible for providing public healthcare services in a defined geographic area in New Zealand. Each of the four medical units in MediNet is housed in a DHB. Leadership and central administration of MediNet is provided through District Health Board A in the Northern healthcare region, which houses the Northern Medical Unit and receives funding for the network from the Ministry of Health. In addition, all 20 DHBs in New Zealand, as users of the medical services associated by MediNet, have an interest in the work and effectiveness of the collaborative network.

**Medical Units**

The four specialist medical units are each located in a DHB, one in each of the four healthcare regions in New Zealand. Each unit delivers medical services to patients from its own DHB and those of the DHBs in the region around it. As noted, Northern Medical Unit also receives referrals from the other units in certain specific cases. The medical specialists and associated health professionals in each unit are members of MediNet. The health professional in each unit acts as an administrator for that unit's participation in MediNet.

**MediNet management team**

The Network Leader is a medical specialist from the Northern Medical Unit. Much of the impetus for the development of MediNet came from this person and a second medical specialist in the Unit. Together with highly specialised services provided and the funding arrangement through District Health Board A, this positioned the Northern Medical Unit in a dominant, leadership role within MediNet. The Network Leader is supported by a Network Administrator, who handles network communication, organization and administration. In

addition, the Health Professional based in the Northern Unit plays a co-ordinating role with the other health professionals in the network.

**Content Provider A**

Content Provider A is an online health information provider that has operated in the health industry since 2004. Its mission is to enable healthcare customers to have a better understanding and using of New Zealand health services. To this end, it provides Web-based information in relation to the referral of secondary and tertiary healthcare services which are supported and provided by general practitioners, public/private medical specialists, public/private hospitals and DHBs. Its role in MediNet was to establish and support a website for MediNet, using the company's online content management system. Given Content Provider A's existing association and contract with District Health Board A, it was a logical decision to add the MediNet website to its provision of online health information services for the DHB.

## 6.3 Trajectory of the Collaborative Network

In 2007, this sub-specialty medical field was facing a major staffing crisis. Several specialists had left New Zealand for more attractive overseas opportunities, and replacing them was proving difficult. Very few potential specialists were interested in undergoing the training needed to work in this highly complex and psychologically draining field of medicine:

> *We had a situation, I think about four years ago, because we are a small country, we lost the only sub-specialist we had in the South Island. And the sub-specialist we had in Central was going to leave as well. We had a work-load staffing crisis where patients were basically not going to be able to get access to the care.* (Network Leader, MediNet)

Concerned about the critical shortage of specialists in this field and the risk that patients requiring necessary medical services would not have access to an adequate level of care and support, the two Medical Specialists at the Northern Medical Unit proposed the development of a clinical network to co-ordinate referrals and care in this sub-speciality across New Zealand, provide collegial support for the healthcare staff working in the four medical units, to enhance the training opportunities, and to maintain service provision and succession planning by attracting and supporting new trainees in the sub-speciality:

> *We decided to approach to the Ministry of Health about funding a network that would help to support people. What this meant was that even if a unit did not have as sub-specialist, the idea was we all connected in a network. There was easy access*

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*to a second opinion and support. It is a very emotional area and quite intense ... This area has a highest burnt-out rate of all the sub-specialties. It is very important that people do not work in this area in isolation. Even if they are physically isolated, the idea of this network is to make sure that they are not emotionally or collegially isolated, as much as possible.* (Network Leader, MediNet)

The Northern Medical Unit put forward a business case to the Ministry of Health in September 2008, which was accepted in June 2009:

*With the hospital manager, we came up with the business case ... We put down a whole lot of things that we would do ... We had a presentation to the Minister of Health. Once the Minister had approved our business case, we then said to our colleagues [in the other units] that we wanted to build the network.* (Medical Specialist, Northern Medical Unit)

A formal funding agreement between the Ministry of Health and District Health Board A provided the opportunity to establish MediNet and ensure its operation for a number of years. However, despite this, MediNet does not have a formal mandate to control the provision of the sub-specialty services in each medical unit. Instead, it relies on the mutually perceived benefits seen by the medical specialists in collaborating with each other:

*There is not an agreement between the four DHBs [hosting the four medical units], but the clinicians support each other, I guess, in a way. So, it is a classic clinician network, but we do not have that agreement among the DHBs.* (Network Leader, MediNet)

*The network was probably set up by obtaining collaboration from the doctors of the other centres ... There are not many sub-specialists in New Zealand, so the network gives you an opportunity to work with other people. The network provides a consistent referral of patients ... Certainly, at this stage in New Zealand, the network does not determine policy ... It has the potential to guide practice but, at the moment, you cannot force people to do something in a particular way.* (Medical Specialist, Northern Medical Unit)

There are two important functional aspects of MediNet. The first major function performed by the network is service improvement and standardisation: *"We see this very much as collaboration ... to try to improve the services. The idea of it is to actually provide the same service to the patients wherever they turn up"* (Network Leader, MediNet). Part of this relates to streamlining patient referral processes and developing guidelines that all the units agree to follow:

*We have been providing the units with a framework, guidelines and policies and an easy referral pattern. All of these are making the network work very well ... Each unit has its own operational procedures. We ask the other units to help us to write guidelines so we share them.* (Medical Specialist, Northern Medical Unit)

The second major functionality aspect is to provide clinical leadership and support for the medical specialists and health professionals from the four units. Partly this relates to the stressful nature of the sub-speciality and its small size in New Zealand, as several of the health professionals from the medical units commented:

*We need collegial support within a smaller team. ... You spend a lot of time counselling with distressed people. That can bring you down a little bit. Such support had not been formally addressed.* (Health Professional, Central Medical Unit)

*Everybody in the network is probably looking for that support from their colleagues. Because they are working in a very specialized area they want that support and they are able to offer that support in return.* (Health Professional, Northern Medical Unit)

It also relates to need to manage a scarce specialist resource by providing back-up between the units and developing an extended network of interested specialists. The former is a pragmatic response to the limited availability of relevant expertise: *"The other units get back-up for any clinical problem. If the leading person has gone away we can take over. If someone goes sick we can take over, so then they do not have to worry"* (Medical Specialist, Northern Medical Unit). The latter is also critical given the staffing crisis facing New Zealand in this sub-speciality:

*We want to develop a network of specialists, not doing what we are doing, but who generally have a bit of interest, to link at each one of the DHBs. These people are called the associate specialists. And ... we also have funding to bring one or two people from each DHB other than the medical units into one of the main centres for a week or a year. So we are slowly getting that organized and trying to get all those people in place.* (Network Leader, MediNet)

An important part of that initiative is the provision of training for such associated specialists and health professionals. In early 2010, MediNet organized its first Associate Specialist training. Subsequently, the provision of the training has been on a bi-annual basis: *"The network meetings have been highly successful. Usually the lecture theatre was filled with about 150 people"* (Medical Specialist, Northern Medical Unit).

These various network initiatives have additional benefits by, for instance, increasing the attractiveness of the field to new trainee medical specialists, or by providing a united voice on relevant issues to the sub-specialty:

> *One of the things of the network is about making sure we have good services that are well supported, but also to attract trainees. Because by role modelling a good service, we can get trainees interested in this area.* (Network Leader, MediNet)

> *We now get ask to provide opinions on national issues. And so now we are kind of seen as a legitimate body. If you want to know an answer to that, right, you go the network.* (Network Leader, MediNet)

Much of the work of the network has been supported by the development of a website to provide clinicians with access to contact and availability details for the service, and to facilitate information and knowledge sharing so that the clinical workflows could be more efficiently managed. The Northern Medical Unit produced a scoping document, which Content Provider A worked from to successfully develop the website in six months. The website has three areas. The first area provides public access where there is a link to each unit's web pages. Each unit's web page offers general information in relation to high-risk conditions associated with the sub-speciality, current information about services with support, and information about the specialised services offered by the Northern Medical Unit. The second area is for health professionals, where they can access guidelines, patient information leaflets and referrals forms, specialists' contact details, frequently asked questions to support the clinical work of the units, and updates on teaching opportunities provided by the network. Importantly, this part of the website serves as a mechanism for streamlining and standardising the referral process, as each unit has its individual referral pattern: *"The network provides a consistent referral of patients … so that the patients get the same kind of care in any of the regions"* (Medical Specialist, Northern Medical Unit). It also helps efficient dissemination of relevant information to the four units: *"The unit wants to have up-to-date information in regards to the new protocols. Things change all the time or quickly. What we did last year was no longer relevant. We need to know what are the new treatments and what are the new plans"* (Health Professional, Midland Medical Unit). The third area of the website is a private, secure section in which the medical specialists and health professionals from the four units can discuss patients' cases, share cases asynchronously with each other, and improve the quality of the services and support through combined audit and peer review.

## 6.4 Technological Resources and Capability

### 6.4.1 Technological Resources

From the outset, MediNet has been well supported by an **ICT infrastructure** that has engendered an effective communication process and a high level of co-operation between the network members. The work related support is facilitated through a balanced flow of synchronous and asynchronous communication, primarily by telephone and email. In particular, synchronous communication helps in accelerating the workflow: *"The communication is mostly by phones. But I would say we do email as well. Sometimes the nature of the job has to be reacted to quickly so we use phone calls to liaise"* (Health Professional, Northern Medical Unit). To an extent, less experienced medical specialists, when they encountered problems, utilised synchronous electronic meeting technologies to acquire and gather knowledge from an experienced medical specialist: *"We are using technologies for online consultations. For example, someone comes into Midland Medical Unit and they have a junior person there and they do not know what to do. We can join them over a web cam or use Skype"* (Medical Specialist, Northern Medical Unit).

Asynchronous communication via email tends to be used for less critical matters, for example: *"If it is just information about a protocol or a process email is OK because there is no urgency involved"* (Health Professional, Midland Medical Unit). Email is also used to facilitate collective decision making within in the network or for conflict resolution: *"If they want everybody's opinion then they would send a network wide email out asking for everybody's opinion"* (Network Administrator, MediNet). Similarly, the Medical Specialist from Northern Medical Unit commented:

> *We tend to use emails to resolve conflicts. If we have disagreements at the start or at the meetings we try to discuss it face to face. If it requires a bit of research or actions what we do is we say the action from the meeting is who and who will go and research the subject and we will email everybody. We will get responses and we will put our next steps and we will see what people said. And then the Network Leader tends to say this is the decision.*

As can be seen from the above quote, face-to-face communication was still found to be a crucial factor in reducing the occurrence of work-related conflict. It was also critical in building the trust that enabled other technology-mediated forms of communication to be relied upon:

> *Every six months, we get together face-to-face to have a business meeting. And this is absolutely key. You need to have a conference for the day and a business meeting, then you go out [for dinner]. And it works really well … Because we see each other*

*in every six months, we actually know each other and trust each other very well now. Then it means a lot of stuff can be done via email"* (Network Leader, MediNet).

*The fact that they have these study days is a big bonus ... [and] certainly has improved relationships a great deal. You get to know who the people are who you have talked through on the phone ... When you go to the study days you have little chats, you know, small talk. You have a feel of the person I suppose. You become part of their network as well, I guess. It does enhance the level of trust when you know who they are. Seeing them face-to-face is always a good thing.* (Health Professional, Midland Medical Unit)

Similarly, the Health Professional from Northern Medical Unit commented: *"The communication has to be fairly open and honest ... I'm very much fond of a face-to-face communication. If there is an issue or conflict arising I would rather sit down and sort it out with the person face-to-face."*

As noted earlier, the collaborative network had utilised the website as an administrative infrastructure to engender more efficient information processing, co-ordinate the provision of services, and support a national network of medical specialists, clinical associates and health professionals. Importantly, MediNet wanted to maintain the website as a knowledge management system that could assimilate and disseminate rich and resourceful web-based information about conditions, treatment and service provision to the various individuals involved in the network. The Network Leader explained the rationale as: *"The IT side of it is about supporting that clinical network. You have various people everywhere but you want them to feel that they have got a link ... So that comes to developing a website."* The Health Professional of Midland Medical Unit commented on how the website had provided significant support to the unit's medical specialists:

*Certainly we have lot more information about different conditions and how to treat them, and we know more of the protocols than we ever had before. I know our doctors refer to the website for information about what the current standard is. It is a great support for them.*

In terms of **ICT competence**, the formatting and uploading of information onto the website is responsible by two individuals. For the North Island, it is primarily the responsibility of the Network Administrator, although the health professional of each medical unit acts as an administrator for their units, with a higher level of access to the system: *"Within each of those centres there is a person who is involved in logging in and uploading content to the website"* (Website Manager, Content Provider A). Preparing and uploading information requires only minimal ICT skills: *"You only need very fairly basic IT skills"* (Network

Administrator, MediNet). However, despite the relatively low level of technical skill involved, the Website Manager suggested that *"the most important skill is that you need to know a holistic view of the service … You must collaborate or talk a lot with your team to see what information gets to put on to the website."*

Some ICT training was provided by the Website Manager to the Network Administrator and medical unit health professionals with a website administration role to show them how to upload information, edit the website, and set up hyperlinks to uploaded documents. According to the Network Administrator, the training was helpful: *"[The Website Manager] came in and sat with me and we did a bit of a run through. She showed me how to upload the documents and how the technical points behind it [worked], and the anchor points that we use for the website administration."* On-going support is also provided by the Website Manager: *"[If] they need anything, they can just email me or give me a call … If they have any big hiccups, I would just go and see them in person"* (Website Manager, Content Provider A).

The Website Manager also displayed the necessary **managerial ICT skills** needed to understand the MediNet's needs in relation to the website and to co-ordinate the activities involved in establishing and maintaining it: *"I set up the framework for how it was all set up. And I prompt them if I think things could be* [done] *better … Also, we would like them to take the ownership of the information, so I do a lot of follow-ups"* (Website Manager, Content Provider A). In particular, the website is monitored to entail a high quality of information provision in terms of accuracy and timeliness. The Website Manager instigated a checking process to make certain that the information being uploaded is accurate:

> *In our content management system we have a track of dates of every single site of when it was last checked. Each service has an approval process, so the person has to read through the contents and has to approve* [them] *… That gets sent to us and we would double check it again. Then we make it live.* (Website Manager, Content Provider)

With regard to the timeliness of information, the Website Manager checks that the website is updated on a regular basis, using a combination of Content Provider A's online content management system and email:

> *We would like them to update the information every four months, because we want to make sure that the information is accurate and up-to-date. We would send them an email to prompt them if we see they do not update, but generally they do update regularly … We have a system that will show us when the information has changed*

*and who has changed it. Every single change that happens on the system we will track.* (Website Manager, Content Provider)

While the online content management system facilities this process, it can also sometimes constrain the ability to change or customise aspects for MediNet's specific website in response to feedback from the network: *"We usually work a way to improve it ... [However] we are working within a content management system that has a fixed rule, fixed headings or fixed areas, so that you are always working within a constraint"* (Website Manager, Content Provider A).

### 6.4.2 Technological Capability

The findings suggest that MediNet have been able to synchronise the technological resources available to the network to support and facilitate effective co-operation between the collaborative partners. With the network and administration based in the Northern region, that medical unit played a major role in fostering an open communication process via both synchronous and asynchronous communication channels that, in turn, enabled the involved individuals to interact more actively and closely, enhancing co-operation. The open communication was acknowledged by other members of the network: "It is really the open communication that bridges our relationship" (Website Manager, Content Provider A). Similarly, the Health Professional of Central Medical Unit discussed how an open communication process helped to improve patient care:

> *I would say, generally speaking, the communication is open. Certainly, an open-ended sort of relationship encourages more on the sharing of information and communication. The more communication and information you have about you, the more effective the care for the patients would be.*

Formalising the network's communication processes and co-ordinating the combination of technological resources, such as the website, in order to streamline and manage the clinical workflow, was further evidence of MediNet's technological capability. As the Network Administrator explained:

> *Prior to there being a formal network, the communication between the units was very ad-hoc ... There was no established pathway for the referrals to come through and they did not have a set contact person for each unit ... [Also] with this network, we can send the reports to the co-ordinating health professional and she would make sure the information is being accessible.*

Within MediNet, technology-mediated communication was effectively complemented by face-to-face communication. For example, the involved individuals would leverage the bi-

annual business meetings to attain a better understanding of the network's operation and strategy, and to discuss any problems regarding operational processes or new ideas reflecting the future strategy for the network: *"At those meetings, basically we start with the role of the network, what do we do now?"* (Network Leader, MediNet). The involvement of the health professionals in the business meetings also enhanced co-operation with the medical specialists and co-ordination of clinical workflow: *"They are doing a lot of the work in terms of co-ordinating patients but also developing tools for our service ... We see this very much as collaboration across the edge* [boundaries] *to try to improve the services"* (Network Leader, MediNet).

Overall, MediNet was able to leverage its technological resources and capability to support communication and co-ordination, and to create an effective and supportive clinical network. As the Health Professional of Northern Medical Unit commented: *"The people who are working within the network are not many. We know each other relatively well given the distance we are apart ... I think we have a close-nested, warm and supportive network."*

## 6.5. Relational Resources and Capability

### 6.5.1 Relational Resources

The shaping of the network's partner selection process was postulated on how the contribution of each medical unit's resources could engender a more efficient service to the patients the four units served. The results show that this **partner complementarity** in resources engendered a high degree of inter-dependency and connectedness among the four units. Prior to the forming of MediNet, the Northern Medical Unit had a greater level on referrals from secondary hospitals relative to the other three units. To reduce the large number of referrals, the Northern Medical Unit proposed a hub-and-spoke model, inviting the three other regional units to serve as the network's hubs: *"We do not want every patient in New Zealand having to come to Auckland for care. So we look where we have expertise and approach those people about being the experts for their area. And essentially they were already doing that, but not in a formalized way"* (Network Leader, MediNet). On the other hand, the other three units required the access to the Northern Medical Unit's expertise and skills in supporting their clinical workflow. For instance, the three units could rely upon the more experienced medical specialists of the Northern Medical Unit to support their clinical diagnosis: *"The other units get back-up for any clinical problem. If they are in a difficult situation they can come to us. We have done many processes"* (Medical Specialist, Northern Medical Unit). In addition, if any of the three units faced a short-handed situation, for instance, if their medical specialist was away or sick, then the Northern Medical Unit could manage that unit's referrals: *"We can cover or support them whenever there is someone on*

*leave. Recently they have had people away in the Midland unit …and so all the referrals came to us"* (Network Administrator, MediNet).

However, the leadership role exercised by the Northern Medical Unit in proposing the network, the location of the funding and Network Administrator in that unit's DHB, and the advanced experience and expertise of its medical specialists, suggest that there is a relative power asymmetry between the Northern and the other three medical units in MediNet. To compensate for this, the Northern Medical Unit makes a concerted effort to involve the other three units to ensure that the ownership of the network is co-shared with them: *"We ask the other units to help us to write guidelines, so we share them. We ask them to help us with the leaflets … so they all have an ownership of it"* (Medical Specialist, Northern Medical Unit). This interviewee further explained that an equal distribution of partnership also encompassed rotating the location of the training meetings:

> *We are going to have a teaching session in the Southern region. Traditionally we had all of them in the Northern region. … Now we are taking a risk here. Southern is smaller … If the meeting is in the South Island, folks from Northern region may not want to travel … But we want each unit to feel they are part of everything.*

Shared ownership of and control over the network also involved demonstrating a "united front" to external stakeholders. For example, some of the smaller hospitals preferred to refer their patients to Northern instead of to their regional hub. In such cases, the Network Leader approached the hospital concerned directly:

> *The problem we had was that* [a hospital located in the South Island] *wanted to send every patient to us. They did not want to use the Southern Medical Unit … We had two visits down there … I had even taken the Southern and Midland teams to show them that we were a united front and that this was how we wanted it to be worked.* (Network Leader, MediNet)

MediNet developed a **network culture** that was based on three particular cultural traits: mission, involvement and consistency. The findings revealed that MediNet exhibited a strong mission trait that enabled the four units to have a shared understanding of the network's primary goal: *"Really our goal is to try to ensure that patients and families wherever they are in New Zealand can access to the same level of care and the same level of expertise in the country"* (Health Professional, Northern Medical Unit). Indeed, a number of the participants specifically referred to a "common goal", for example, *"I think we do have a common goal … We know our purpose"* (Health Professional, Midland Medical Unit). This included the Website Manager from Content Provider A, who was able to equate that

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organization's goal *"to get good quality information to patients and to the medical professions"* with that of the network: *"Everybody has the common goal. Everyone wants a better health outcome for the patients"* (Website Manager, Content Provider A). The mission trait provided the network partners with a sense of focus that enabled them to work collaboratively towards the shared vision: *"We are trying to achieve the same thing for the patients"* (Health Professional, Central Medical Unit). The mission trait also helped increase the connectedness of the collaborative relationship, which the Health Professional from the Central Medical Unit phrased as: *"Being willing to have common goals to determine what all of us want to achieve. To work collegially towards the same outcome"*.

Sharing a common goal or mission appeared to reinforce the high level of involvement that the members displayed towards the network: *"People have very much bought into what we are trying to do in terms of setting up the network, because it is for all of us. It is to benefit the patients and their families. This is really what we are here for"* (Health Professional, Northern Medical Unit). Partly, this was a factor of the individual people involved, as suggested by the Network Leader: *"The personalities and the willingness to be part of the network are the important issues affecting the network."* The Health Professional from the Midland Medical Unit similarly commented: *"The people are very dedicated and involved."* Involvement was also the result of the network's ability to include a wide range of participants and to cultivate a sense of shared ownership of the network. For example, the importance of the health professionals associated with the medical units was recognised and they were encouraged to take an active role in an effective delivery of the network's healthcare services. In particular, the network encouraged the health professionals to participate in the process of developing and uploading information onto the network's website:

> *The health professionals will provide some less technical details to the website ... We obviously get quite a say in the patient information leaflets, so we get to look at the drafts and make some suggestions and make some changes. ... We will all look at it and comment.* (Health Professional, Northern Medical Unit)

Further, the health professionals were key participants in the business meetings and training days, discussing clinical issues with the medical specialists: *"We are involved in the business meeting when we have our study days in the Northern region. The health professionals and the doctors would talk about issues or problems with the clinical processes"* (Health Professional, Midland Medical Unit).

The network culture and a closer partnership were facilitated through the consistency trait. This consistency arose from the involved individuals having shared norms, values and goal

around better patient outcomes. In light of these shared attributes, MediNet was able to create a strong sense of identity that facilitated the four medical units working well together. As described by the Network Administrator:

> *Now we are two years in we are more focused on our common goal. I think initially when we started, there were people who thought we were able to go here and some people wanted to go there. Now we are more focused on the same point, so the growth of the network is that we come together more as a team to function.*

In addition, consistency was facilitated by similar systems and processes in each medical unit, which enabled better co-ordination and integration of operational practices. A consistent and well-integrated network could limit the potential for conflict: *"There has not been any problem with the communication or conflicts around planning and management of care. We seem to work around with a similar framework … We carry out those activities quite similarly* (Health Professional, Central Medical Unit).

There was less evidence in the findings of a fourth cultural trait, adaptability, which would enable the network to flexibly respond to changing circumstance or environmental conditions. However, the Medical Specialist from the Northern Medical Unit suggested that MediNet needed to *"be adaptable to the changing situations"*. In particular, the network needed to be able to attract and maintain the involvement of medical specialists, while accommodating their interests and the risk of opportunistic behaviours:

> *As doctors become more experienced they tend to develop special interests or they want to do more by themselves. So what the network needs to do is to be adaptable to the changing situations. The network needs to keep those people very much involved in the loop and at the same time it needs to keep them to the principles of the network. Only then can the network grow.* (Medical Specialist, Northern Medical Unit)

The case study findings reflect that MediNet was characterised by a high level of **attitudinal commitment**, although this was more based on loyalty commitment than calculative commitment. There was a degree of calculative commitment in participating in the network because of the improved referral processes, knowledge sharing, and legitimacy that membership conferred, particularly for associated specialists without a formal qualification in the sub-specialty:

> *The other issue was that some of the people doing that [associate specialists] did not have a paper stating that they were medical specialists, and so they have not been taken seriously by people. By us coming in and saying, you are part of the*

*network, we give them a kind of legitimacy and people will take them seriously.*
(Medical Specialist, Northern Medical Unit)

However, loyalty commitment played the major role in inducing the network members to cultivate a closely-knitted, collaborative relationship. This loyalty commitment was reflected in individuals' emotional attachment to the network:

*I actually think the commitment is pretty good ... It is the kind of work that you need to feel supported. You do not want to feel you are the only person out there on your own. So I think that in itself engenders quite a buying in from the people who are involved in the network because they want a support network and they want to feel that they are not alone.* (Health Professional, Northern Medical Unit)

In addition, commitment to the network was, to an extent, a natural extension of the participants' commitment to attaining the common goal: *"The people involved are very highly committed ... There is quite a commitment to be able to provide good outcomes to people"* (Health Professional, Central Medical Unit).

### 6.5.2 Relational Capability

Based on the findings, MediNet developed a relational capability with significant collaborative network learning. Using this relational capability, the network was able to leverage its relational resources to bridge the connectedness between the collaborating partners. In terms of content learning, the collaboration that occurred within the network was an important mechanism for transferring formal knowledge about patient information, guidelines and referral processes between the three units. For example, the Health Professional from the Northern Medical Unit commented: *"I have learnt a lot from [the health professional from the Southern Medical Unit]. She has been working in this area for a long time. She has put together some resources that are fantastic for the patients."* In addition, the interaction between members of the network enabled the sharing of more tacit knowledge, as the same health professional related:

*I think there is a lot of learning from each other. For example, we are seeing a patient and it is an unusual situation. We will often liaise with each other just to bounce some ideas so that we can access their experiences. Besides learning how to get things done, we can learn from each other of how to deal with the stress, how to do counselling.* (Health Professional, Northern Medical Unit)

Such examples of content learning through acquiring and internalising knowledge reinforce the calculative commitment of members to belong to the network. Similarly, the Website Manager from Content Provider A was able to see the learning benefits associated with

network membership: *"This was really good learning ... There is no other website that is like it ... For us we learn about what our systems can do to meet those different needs."* Additionally, developing a capability for content learning could reinforce the adaptability trait of the collaborative network culture: *"We learn every day. We are working in a highly specialised area. You have to keep your mind very open to things because things may change"* (Health Professional, Central Medical Unit)

In the context of partner-specific learning, the interviewees emphasised learning more of the other network members' characteristics: *"The visits I had done enhanced my learning of the other people in the network"* (Network Leader, MediNet). Learning about a partner could also foster a mutual understanding that enabled the network to be more closely connected, in turn bringing about higher levels of integration in overcoming problems and helping to improve the clinical workflow. For example, the Health Professional from the Northern Medical Unit described: *"Over the couple years that the network has been working, and because we do know each other a lot better, we can anticipate each other. So you kind of know more instinctively what is going to work [and] how you can navigate through a certain situation."* Similarly, the Network Administrator commented: *"You get to know people and you learn how they work,"* while the Website Manager remarked: *"I have found that the more I know about them, the more work they can do by themselves ... In a way, I had learnt other people's working styles as well. You know more of the people involved – you have seen their behaviours."* As the involved individuals became more confident in predicting each other working behaviour, this would enhance loyalty commitment to the network: *"This can actually help to enhance trust. Just like with any relationship that you have developed the more contact you have the more you learn about someone"* (Health Professional, Central Medical Unit), and encourage more collectivist and goal-oriented behaviour. Thus, it was plausible that such partner-specific learning underpinned the mission cultural trait.

The findings suggest that MediNet developed some alliance management learning capability. As noted earlier, the individuals from the Northern Medical Unit initiated and managed several instances of an active learning environment that reinforced the involvement trait of the network culture and encouraged more co-operative behaviour among the network members. In particular, the Northern Medical Unit organized training sessions and asked the other units to participate in the presentations at these sessions. This was a deliberate strategy to ensure that responsibility for the facilitating and sharing of the knowledge in MediNet was spread among all four medical units: *"It shows that we are a network. It is about making them feel included"* (Network Leader, MediNet). The benefits of such a strategy were recognised by some of the other network participants. For example, the Health Professional from the Central Medical Unit noted that the regular network business meetings and training sessions helped to narrow the network's cultural distance: *"I think it is always good to have*

*collaboration to work effectively within a network and it would possibly break down any barriers. Meetings more often can be helpful."*

## 6.6 Governance Resources and Capability

### 6.6.1 Governance Resources

The findings reflect that MediNet deployed several **structural governance mechanisms** to regulate the operation of the collaborative network. The network had a formal funding agreement with the Ministry of Health via District Health Board A in the Northern healthcare region. The agreement contained clauses that specified what the network must perform in order to establish and provide a nationally co-ordinated service for the sub-specialty. Furthermore, the agreement included dates for the submission of regular reports to the Ministry of Health: *"We have an agreement with the District Health Board A and the Ministry of Health ... I have to do reports on a regularly weekly basis about we are doing"* (Network Leader, MediNet). The contractual agreement provided the network with a degree of control in aligning the behaviour of the four medical units as funding would be withdrawn if the network did not accomplish the specified service requirements. Thus, this structural governance mechanism provided a form of deterrence-based trust and encouraged the four units to act in the interests of the network so as to ensure there would be on-going funding for the network.

MediNet also had written terms of reference prepared by the Network Leader, that outlined the network's mission, functions, composition, reporting lines and rules governing network meetings. The minutes of the network meetings appeared to act as a structural governance mechanism in preserving a record of actions agreed to by the network members:

> *We have a meeting every so often of all the people in the network. We keep minutes of the meetings. We get them all to agree that it is the correct record of the meetings. So, we hope by doing that they have agreed to follow [an agreed guideline]. But I guess if they disagree and do something else we cannot stop them.* (Medical Specialist, Northern Medical Unit)

The collaborative network also effectively utilised hierarchical structural governance mechanisms to control behavioural consistency. Although MediNet could be characterised by all four medical units sharing ownership of the network, much of the direction and final decision making power was associated with the Network Leader, who had a strong leadership role in the network: "She drives the network" (Network Administrator, MediNet). The Network Leader, herself, reflected on the perceived benefit of strong network leadership:

*I think the learning process, which I think is useful, is to have a strong person [as leader]. I'm very bossy. But, having said that, you cannot just go in and lay down the law. Sometimes you need to give them enough rope to hang themselves so that they can see actually this is not going to work and there is a better alternative.*

The Network Leader was supported in the network structure by a Network Administrator, who acted as a central, co-ordinating "hub" for the network: *"We all liaise very much with the administrator. Because we are a very small unit, the administrator is really the key to our organization. The administrator is almost the hub"* (Health Professional, Northern Medical Unit. Her prior experience provided useful skills for the network's operation: *"I suppose being a customer service officer has given me skills to not make situations tenser but more for resolution or coming to an agreement"* (Network Administrator, MediNet).

In the interactions of the involved individuals from the four units, reputation acted as a **relational governance mechanism**. The Health Professional from the Midland Medical Unit described how having one's professional expertise respected facilitated collaborative interactions in the network: *"Having some respect for what you are talking about – that you have some knowledge of what it is going on. Recognizing that … you do know a little bit about things."* Reputation and professional expertise generated a form of knowledge-based trust: *"The trust level is very high. The doctors are very skilled and they appreciate each other's level of expertise … There is no barrier about status. Everyone's role is respected"* (Health Professional, Central Medical Unit). Similarly, the Medical Specialist from the Northern Medical Unit reflected: *"Trust can grow more as we know each other beforehand"*, while the Health Professional from the Central Medical Unit observed: *"The more visible you are, and the more present you are around people, all the more they can actually relate to who is at the other end and what they are about. This can actually help to enhance trust."*

To an extent, the findings suggest that within MediNet, knowledge-based trust was used in validating the credibility of partners sharing tacit knowledge with each other. For example, the Health Professional from the Northern Medical Unit commented: *"I would say trust is a big factor … In order to be honest and open with each other with certain stuff there is a need to have a certain level of trust and confidence with each other."* Repeated interactions provided individuals with a mutual understanding of each other's reliability in performing related collaborative activities together. Thus, reputation and knowledge-based trust regulated the collaborative relationship to be more closely-knitted:

*If you are asking for somebody else's opinion, you must be able to trust their judgement – particularly if they are in a different centre. The person who is*

*asking for the opinion must have trust in the people they are asking. Trust is very important.* (Network Administrator, MediNet)

Over time, as MediNet was established and operated successfully, a high level of goodwill trust developed. As mentioned earlier, it was the Northern Medical Unit that initiated the agreement with the Ministry of Health. Such structural governance only provides a degree of control over the network's goals and administrative responsibilities. Thus, the Northern Medical Unit had no absolute authority over the other three medical units. As the Network Leader noted: *"In terms of the other units, I have no governance over them. They will each have their own clinical director and their own governance."* In light of this, goodwill trust had to be grounded in the network as a relational governance mechanism for stabilising the collaborative relationship: *"We are dependent on goodwill ... What would happen if you have somebody who will not want to support us?"* (Medical Specialist, Northern Medical Unit). The development of goodwill trust reflected an identification-based trust that was grounded in the network participants' commitment to a shared goal and an emotional attachment that underpinned a collaborative relationship characterised by a high degree of mutual dependence and connectedness among the involved individuals: *"You can see there is lot of trust and goodwill. You know you want to help out your colleagues because you would want that help back from them"* (Health Professional, Northern Medical Unit).

### 6.6.2 Governance Capability

MediNet developed a capability for effective network governance that entailed a mix of structural and relational governance mechanisms and that ensured a balance between competitive and co-operative tensions. The formal funding agreement with the Ministry of Health and the terms of reference for the network stipulated the vision of the collaborative network and the scope of roles and responsibilities. These specified elements helped steer the involved individuals to embrace co-operative behaviours. The articulation of the network's objectives provided the participants' with a shared understanding of the network's direction, which in turn had a positive impact on the planning of network activities: *"We have some objectives to meet which we have promised the Ministry that we would achieve. Our goals have been set up and people know what they are. They are published"* (Health Professional, Northern Medical Unit).

Furthermore, the specification of each organization's role served as a management mechanism in facilitating an open and honest communication channel between the partners, and the exchange of accurate and reliable information among the four units. In turn, collaborative activities could be performed in an efficient and effective manner. The Network Leader explained:

*In terms of governance ... We are actually auditing the procedures and keeping track of them. Because we are all following the same guideline, it means you cannot have some people out there having a go at something that they should not be. You do not have people doing the wrong management. The network has ensured the care has been much standardized.*

It is important to note that the contractual mechanisms did not entail any issues in relation to economic exchanges: *"The network only has autonomy over information and referral related matters and writing guidelines. It does not have the ability to be a business unit"* (Medical Specialist, Northern Medical Unit).

Part of the development of a governance capability involved the network leveraging the knowledge acquired through the accumulated collaborative experiences in regulating the behaviour of its members. For example, the use of meeting minutes as a formal record of agreed actions was developed as an effective governance mechanism that had a positive impact on conflict resolution:

*There had been disagreements with an individual over a complex clinical management case. The network had a view and this individual had his view. Learning from the past experiences, this was how we dealt with him. At that moment, we referred to the minutes of the meeting and said, 'You had agreed.'* (Medical Specialist, Northern Medical Unit)

From the findings, it was clear that MediNet was also successful in building trust and collaborative norms that reinforced effective network governance and reduced misunderstandings and conflicts. As the Medical Specialist from the Northern Medical Unit observed: *"The network builds collaboration."* The network also relied on relational governance mechanisms such as goodwill trust to co-ordinate and perform the related activities: *"It is not like you have to push them to do their work. They are really good. They are engaged. We do not need the contract to push them"* (Website Manager, Content Provider A). In particular, goodwill trust built up the partners' emotional attachment to the network by fostering positive expectations about the collaborating partners' intentions or behaviours. For example, the bi-annual business and training meetings worked as an effective partner learning environment. This enhanced the perceived trustworthiness of other network partners as there was confidence that each would act in good faith. Thus, the rigidity level of the collaborative network was enhanced. The Health Professional from the Midland Medical Unit observed: *"You can contribute something to the meetings. They* [Northern Medical Unit] *do recognize what we have contributed and they actively encourage us to attend the meetings."*

At same time, the emotional attachment associated with goodwill trust ensured that the network retained a level of flexibility, particularly in responding to behavioural uncertainty. As the Health Professional from the Northern Medical Unit commented: *"The network can still continue, because we all find ourselves in the same situation and we are able to understand what each of us is going through."*

Despite the development of effective network governance, MediNet faced a number of potential governance-related issues or challenges going forward. The Medical Specialist from the Northern Medical Unit noted: *"One of the issues with the governance structure of the network is that there is a potential of conflict of interests. Because the Network Leader and I work here, but we have also been driving the network."* This influence of the Northern Medical Unit was felt by at least one of the other unit's members: *"The culture is very Northern based ... They are kind of big brother, shall we say"* (Health Professional, Midland Medical Unit). In addition, the lack of a formal government mandate for MediNet was a cause of concern for the Medical Specialist from the Northern Medical Unit. In particular, he perceived it as a potential threat to the on-going existence and development of the collaborative network:

> *When you set up a network which relies on collaboration at a clinical level, even though the government puts monies into it, it does not guarantee the survival of the network ... If the network wants to grow or become secure then at the moment we do not necessarily have a structure which allows us to do that ... It would be good to get something which gives us a bit more of security ... What I would like to see this year or next year is the network to be more recognized by the government.*

## 6.7 Chapter Summary

Overall, MediNet was able to develop specific capabilities to ensure its sustainability, at least in the medium term. The collaborative network had developed a network-based technological capability to combine ICT infrastructure and managerial ICT skills in enhancing the level of co-operation within the network. Particularly, MediNet was able to leverage its managerial ICT skills to facilitate interaction between those who managed the communication process (the Network Administrator and Website Manager) and the health professionals in the four medical units. Such an effective interaction acted as an important co-ordinating mechanism in the network's operation and activities. At the same time, MediNet successfully leveraged its strong relational resources of partner complementarity, network culture and attitudinal commitment to develop a relational capability, a network-based competency in learning to collaborate that limited misunderstandings and conflicts. Importantly, MediNet also developed a network governance capability by aligning appropriate structural and relational governance mechanisms

to reconcile the structural tension between rigidity and flexibility in the network. On the one hand, contractual and hierarchical governance approaches facilitated the co-ordination of collaborative activities, thus enhancing rigidity in the network. On the other hand, MediNet cultivated an identification-based trust that incorporated a shared vision and empathy for other network members and encouraged the involved individuals to develop co-operative behaviours. Such relational governance increased the flexibility in the collaborative network by exploiting past collaborative experiences to adapt to behavioural uncertainty. However, going forward, if MediNet grew significantly in size, the limits of its relational governance capability might be tested and a stronger, governmental mandate need to increase the structural governance of the network.

# Chapter 7: SurgiNet

This chapter describes the findings and discusses the analysis of the fourth case study, the second involving collaborative healthcare service delivery. The first three sections present the background of the collaborative network and that of the participating organizations, before outlining the trajectory of the network. The remainder of the chapter presents and analyses the results from the case study. The analysis is organized around the conceptual framework outlined earlier in the thesis.

## 7.1 Network Background

In recent years, New Zealand healthcare consumers have been facing lengthy and distressing delays for access to certain surgical services. In one particular surgical service, political pressure combined with a clinical working group's recommendations led to the development of a collaborative network, SurgiNet, as a mechanism for re-designing the existing service delivery system. As noted earlier, the use of clinical networks to improve healthcare services by co-ordinating and delivering services across professional and organizational boundaries is increasing in countries such as Australia, the United Kingdom and New Zealand.

SurgiNet was established as a national network as the publicly-funded surgical service concerned was delivered through five specialist centres each servicing a region of New Zealand. The network had a number of goals in reforming the surgical system to facilitate better delivery of this type of surgery and positive patient outcomes across New Zealand. These goals included increasing the number of operations performed, promoting greater equity of access to surgery, enhancing service quality, and ensuring that appropriate systems and processes were developed to support the network's goals. The network comprised participants from multiple health professions and organizations involved in delivering the particular surgical service. The involvement of multiple stakeholders was needed to understand what was happening, where there were issues, and how service delivery could be improved.

## 7.2 Participating Organizations

### Ministry of Health

The Ministry of Health is the government department responsible for improving and promoting good health outcomes for all New Zealanders. In particular, the Ministry oversees the administration and development of the New Zealand public health system in ensuring healthcare consumers have access to affordable healthcare that is appropriate to their needs. The Ministry had a clear interest in the success of the network as it was charged

with setting health targets and monitoring service delivery against those targets. In addition, SurgiNet would be a useful basis for evaluating the effectiveness of national clinical networks in achieving healthcare system change. The primary role of the Ministry in SurgiNet was to sponsor the network and be the government's representative on the network. It also provided the funding to support SurgiNet's clinical leader, network co-ordinator and infrastructure. The Ministry had two representatives on the network: the relevant Service Manager and Service Clinical Leader.

**District Health Boards**

District Health Boards (DHBs) are responsible for providing public healthcare services in a defined geographic area. Each DHB will plan, purchase and manage healthcare services for healthcare consumers in their area and ensure that those services have been effectively and efficiently delivered. Currently, there are 20 DHBs in New Zealand, divided into four main regions: Northern, Midland, Central and Southern. As users of the surgical services involved, all the DHBs had an interest in the work and effectiveness of SurgiNet. The DHB leadership group of CEOs had one of their number as their representative on SurgiNet. In addition, the various DHBs' nursing services were represented on the network by a Nursing Director from another of the DHBs.

**Surgical Centres**

The five specialist surgical centres are each located in a DHB, one in each region except for Southern, which has two centres given its geographical size. Each centre delivers surgical centres to patients from its own DHB and those of the DHBs in the region around it. Each surgical centre is headed by a Clinical Leader, who represented his or her centre in SurgiNet. As the deliverers of the surgical services under scrutiny, the centres and their clinical leaders had a direct interest in the operation and effectiveness of the collaborative network. The role of the clinical leaders in SurgiNet was to represent their centres in the network's discussions and decision making and to implement the proposals of the network within their centres.

**HealthNZ**

HealthNZ is a non-profit entity that funds health-related research, and plays an educational role in promoting healthy lifestyles. HealthNZ acted as an indirect representative of the general public, who are the ultimate consumers of the surgical services delivered by the five surgical centres. As a consumer advocate, the Medical Director of HealthNZ observed the formation and evolution of SurgiNet with interest.

**SurgiNet management team**

The Network Leader was a doctor from a related discipline to the surgical service. This gave him knowledge of that part of the public healthcare sector as well as credibility with the medical professionals in the network. It also meant that SurgiNet had a neutral and independent leader without vested interests in that type of surgery or in the surgical centres and their DHBs. The Ministry of Health funded the network leader to be released from his normal medical work so that he had the time and ability to lead and run the network. He was supported by a Ministry-funded Network Co-ordinator, who helped with the network communication, administration and project support. The network management team also had available the services of a Consultant with expertise in project management.

## 7.3 Trajectory of the Collaborative Network

SurgiNet was established in April 2009. One of its first tasks was to help reduce the backlog of patients waiting for an operation to an acceptable level. A small team, including the Network Leader, the Ministry of Health Service Clinical Leader and the Network Co-ordinator, worked with the surgical centres to review their waiting lists and help them identify and resolve issues that were creating a backlog in service delivery. To increase the level of operations performed nationally, the network implemented new targets for surgery and deployed a regular reporting cycle to monitor the performance of surgical centres in achieving the desired targets. Each surgical centre reported their progress against planned procedures and how many people were on waiting lists. Ministry of Health staff would compile a weekly report which summarised and graphed this information. These reports were edited by the Network Leader and then distributed to a range of stakeholders, including the CEOs of the DHBs that contained the five surgical centres.

SurgiNet also set up projects and working groups to examine particular issues in service delivery. For example, the network looked at workforce capacity and planning to ensure that the five surgical centres were able to perform the number of operations they needed to meet the demand for their services. The network also participated in the development and deployment of a scoring system to make effective decisions about which patients should receive surgery in accordance with their relative level of need and thus be treated in order of priority. Another project initiated by the network involved the potential development of a national database for the collection of standard data on patient assessment and surgery outcomes across the five surgical centres. This national data would help continuously improve the quality of surgical services.

By June 2011, SurgiNet had made significant progress towards achieving its defined goals. Nationally, the number of operations had increased, patients were receiving the appropriate

surgical procedures for their medical conditions, and surgery waiting lists had been significantly reduced. Equity of access to surgery had also improved across the country. Significantly, SurgiNet's perceived success encouraged the formation of a new, wider national network that involved many of the existing stakeholders together with the medical services responsible for referring patients for surgery. The new network had the potential to engender improvements across a wider scope of healthcare and provide improved services to a much larger group of patients.

## 7.4 Technological Resources and Capability

### 7.4.1 Technological Resources

SurgiNet utilised several **ICT infrastructure** resources to support and facilitate co-operation among the collaborative organizations. With only a few face-to-face meetings each year, email and telephone calls were important mechanisms for facilitating an efficient flow of communication and information among network members to co-ordinate and support collaborative activities. Interestingly, the Network Co-ordinator suggested that different synchronous and asynchronous communication channels seemed to work best for each approach seemed to be more effective for different groups of participants:

> *E-mails and phone calls. But just an aside on that, e-mails weren't that effective because surgeons don't do e-mails ... The Ministry of Health and DHBs are strongly e-mail underpinned organizations; everything relies on written words and documents. Whereas consultant medical staff typically use cell phones. And that's how referrals get discussed, cases reviewed.*

SurgiNet also developed a web portal as a different type of asynchronous communication channel in supporting the network's operational activities. The web portal was intended to share information and documents and to co-ordinate the workflow process:

> *It's a Ministry-supported website where you can create your sub-space, basically ... After that you can just go online and load documents and download documents. It's not a great system but it is quite functional, and it's perfectly suitable for what we need.* (Network Consultant, SurgiNet)

However, it seemed that the network members' level of **ICT competence** could influence their perceived ease of use of the web-based system. As described by Network Consultant:

> *The challenge is that people don't register for it and don't use it and you're not going to make them. If people don't like IT systems, then ... So that's the challenge of*

*switching to an online system and just sharing documents that way rather than e-mailing, because some won't use it now.*

This suggests that it was important for SurgiNet to provide network participants with relevant ICT skills and training, so as to enhance their understanding of the web-based system, and increase their acceptance of it and their readiness to use the system.

SurgiNet appeared to possess sufficient **managerial ICT skills** to maintain an open communication process with efficient sharing of information. Together, the SurgiNet management team were considered by the other network participants to be doing a good job of co-ordinating activities and facilitating effective communication. As the CEO representative on SurgiNet commented: *"The Network Leader is himself a very good communicator, and with him both meeting, going to each of the centres, working with [them], and emails and written material, that was the method"* (CEO, District Health Board A). Similarly, the Clinical Leader of the Southern Surgical Centre noted:

> *The Network Leader's been very, very good at communicating via e-mails and keeping everybody informed. The number of face-to-face meetings is only probably about two or three a year, but again the various issues or work streams that have been developed by the network have someone who has responsibility for carrying them through. But again, the Network Leader does a good job of co-ordinating all that.*

The Network Co-ordinator and later, the Network Consultant, effectively oversaw the communication process through which the network members had a good understanding of what was required of them and how they should act upon the various functional tasks:

> *I try to make sure that when meetings are organized the agenda obviously is there and that people are prepared, so that's more of the administrative tasks. There's a working group that's looking to establish the surgical data set development, database processes. So I work on that to help the doctors sort of progress that, make sure there's, sort of, actions defined. You know, dates set and that we actually have meetings.* (Network Consultant, SurgiNet)

### 7.4.2 Technological Capability

The findings suggest that SurgiNet had begun to develop the necessary technological capability to deploy, co-ordinate and combine various technological resources in supporting and maintaining network communication and co-ordination. Although the web portal developed for document sharing had not yet been fully utilised, the use of more traditional

channels of communication in combination with the managerial skills of the network's management team had enabled the network's communication to be managed effectively.

In particular, the Network Leader had exploited the routine weekly report to disseminate accurate and timely information to various stakeholders: *"The data is coming through, a constancy of data. Like, you don't want to be waiting three or six months for the next data; you really want to see what is happening week on week. That's an important point"* (Medical Director, HealthNZ). The wider dissemination of information to the constituents represented by the network members was also encouraged: *"There was an expectation about cascading out information. So, every time there was a teleconference or any discussions or face-to-face meetings, then I would make sure that information went through to my group, through to the [DHB] directors of nursing"* (Nursing Director, District Health Board B).

## 7.5 Relational Resources and Capability

### 7.5.1 Relational Resources

The selection of participants in the collaborative network was characterised by **partner complementarity**. SurgiNet was built upon a membership base representing a wide range of stakeholders from the surgery community, other health professional groups, DHB management, and government officials. In effect, there was a good partner fit as all of the stakeholders were from the public healthcare sector, shared similar systems and processes, and between them represented the major professional groups and sources of expertise and influence involved in delivery of this surgical service:

> *The clinical network was formed around the clinical leaders of surgery, the surgeons who ran their clinical units; chaired by a Network Leader, as a medical specialist, as a sort of well-informed neutral broker; myself, representing the Ministry services part; and a senior nurse. The [DHB] CEO, ... it was very appropriate to have him involved with the network ... Having that very strong link to very senior health management made it likely that the network was going to be more successful.* (Service Clinical Leader, Ministry of Health)

The similarities in the network members' management and operational styles enabled SurgiNet to operate with a generally equal distribution of power: *"There's no formal reporting structure. Everybody's equal in the leadership group"* (Network Consultant, SurgiNet). With members sharing control over the network, this reduced conflict between partners, which in turn enabled improved co-ordination and co-operation within the network. How the stakeholders shared control in the decision-making process was illustrated by one of the Clinical Leaders:

*We all feel that we should be doing better audits than we are doing. So we have been working together on setting different options ... We evaluated as the team a number of vendors. We came up with a preferred provider. We've hit some stumbling blocks in that regard, but these are being addressed. So there's been pretty uniform agreement from different units as to the overall vision and working together to try and achieve what would individually benefit us.* (Clinical Leader, Central Surgical Centre)

Further, the findings suggest that an equal distribution of power was significant in curbing the risk of opportunistic behaviour by network members. This was a change from more competitive historical relationships as the Network Co-ordinator explained:

*You didn't need to light a big match for things to flame up ... It was all about competing and contesting, challenging the capacity of other providers ... But they found themselves with a problem, and so it was a problem shared and a problem solved. We took an approach that we didn't want enemies in this business, so ... when that issue within a DHB was also one that was shared by a number of DHBs ... that was a problem that we then packaged up and represented to the Ministry.*

SurgiNet had established a strong **network culture** that was characterised by the four cultural traits: mission, consistency, involvement and adaptability. For example, SurgiNet had *"a very clear goal, which was improving the quality of surgical care and surgery services for patients"* (Service Clinical Leader, Ministry of Health). This was a goal that could be shared by all the network members as it reflected a desire to improve patient outcomes and achieve a more equitable access to surgery across the country. This sense of mission enabled the network participants to focus on working collaboratively towards the shared vision:

*I think it's very important to understand equity of care and quality of care issues that are in the various regions. You know that they have issues that you've actually never thought about and probably vice versa. And putting a collective head together to say, 'Well, how can we best manage that?' And that's why I think an important direction is happening in the network that we're getting more into planning and long-term strategy.* (Clinical Leader, Southern Surgical Centre)

Based on the empirical findings, both the involvement and consistency traits had facilitated a close collaborative relationship between the network members. In particular, the involvement trait meant that the five surgical centres and their DHBs developed a sense of responsibility towards achieving each centre's objectives:

*Because the Clinical Leaders of the five surgical centres have been really kind of held directly accountable for implementing the change within their district health boards, and because we have tied that with accountability documents, like the district annual plans ... and they've [DHBs] come back and negotiated with us.* (Service Manager, Ministry of Health)

In turn, the active participation of these stakeholders enhanced the network's operational capacity to meet its defined goals. According to the Network Consultant:

*The network had some success in addressing issues that were best handled nationally that had to do with their throughput and number of operations and wait lists and those kind of things, which by having a national co-ordination and actually involvement, rather than just directives from the Ministry, you know, sent down the line, but actual getting people to talk to each other, that seemed to kind of work quite well.*

On the other hand, the consistency trait enabled the network to have a high degree of cross-regional cultural convergence. It enabled the stakeholders to create a collective identity at a national level so that actions in reforming the surgical system could be co-ordinated more efficiently and effectively. For example, the consistency trait meant that the clinical leaders of the five surgical centres were examining how to facilitate better surgery in New Zealand based on agreed practices and decision-making principles:

*I guess what you call effective networking, and we've got a network established now. It's sort of like a collective leadership. These [surgical centre clinical leaders] are regional directors, you know. I think, they haven't done this before except in their own parish, but now they are coming together collectively, representing their region and actually thus coming together nationally.* (Medical Director, HealthNZ)

In the same vein, the Network Consultant commented on how the regional surgical centres would agree on the need for a national solution to a particular issue and collaborate in overcoming it:

*It's only when, you know, it's a common issue across all the regions, for example, and then everyone agrees that it's best done nationally – in terms of doing it once and getting the funding from the Ministry once, then we do it nationally, but it has to be there by consensus.*

The empirical findings also reflect that SurgiNet's culture exhibited a strong adaptability trait, characterised by the network's ability to contemplate a changing external environment and effectively translate such information into the internal system. To a significant extent,

this adaptability was facilitated by the Network Leader's ability to act as a boundary spanner between the clinical and political worlds. As the Network Consultant explained:

> *It does come back to the person you happen to have in that role and the Network Leader seems quite adept to understand how the Minister [of Health], the Ministry [of Health] operates and how the funding get set and how you sort of get involved in there. But at the same time, he's a clinician, so he can still represent clinicians as well, which is quite important. I don't think it would work if you had a Ministry representative leading the network. It just wouldn't work. It would have to be a clinician but it has to be also someone with a bit of a feel for, the political environment and, you know, the policy of funding and guidelines and those kinds of things. But he's quite adept at that.*

It was vital to ensure that the network always had a capacity to create adaptive changes even though defined goals had been achieved. Particularly, the network needed to understand and anticipate what types of surgical services that the patients would need in the futures:

> *I think that it has achieved many of its goals. There's still more work to do and I think the area that is probably the most pressing at the moment is around medium to long-term planning for surgical services in the future, capacity planning and making sure that prioritisation of patients is done well. Not just the development of the tools, which are the major focus, but also the use of the tools, because we're in a resource-constrained environment.* (Service Manager, Ministry of Health)

In general, there was a high level of **attitudinal commitment** exhibited by the members of the collaborative network: *"It was all pretty good, I'd have to say. It ranged from sort of willing participation to active and enthusiastic participation, but there was really no one who was unwilling or resistant in it"* (Service Clinical Leader, Ministry of Health). As suggested by the literature, elements of calculative commitment were observed as a precursor motivator in the network. The Minister of Health had taken a personal interest in the situation with this particular surgical service, and had provided a clear political mandate for service improvement. The government had also allocated NZ$ 50 million to be used by the five DHBs with surgical centres to improve the performance of the surgical system. When asked whether the network members were committed and involved, some of the interviewees elaborated on these "calculative aspects" of attitudinal commitment:

> *Needless to say, the commitment from the Ministry of Health and the District Health Boards etc, followed because when they've got the Minister of Health on the case on a sort of weekly basis saying, 'Are we getting progress?' So, those were very important. And there was additional money for this. There was significant money*

*made available to address the problem, most of which went into purchasing additional operations for patients.* (Service Clinical Leader, Ministry of Health)

*I mean the first thing was that we delivered some money to them. This 50 million was tagged on the basis of cases treated would trigger the release of the funds ... The increased revenues dealt with the marginal cost of doing the extra procedures ... There was not one surgeon that I was associated with, in the nearly 2 1/2 to 3 years that I was there, or doctors for that matter, that stood back and chose not to be engaged.* (Network Co-ordinator, SurgiNet)

However, loyalty-based commitment was also clearly evident in the network's relationships and operation. The findings reflect that many of the stakeholders had developed a strong attachment to and identification with the network:

*I'm seeing a real commitment from the members as well. They certainly all turn up ... It's so focused on, which is appropriate, clinical procedures, evidence around the procedures, when they should be done, who they should be done to, and then following the outcomes with all of that.* (Nursing Director, District Health Board B)

This commitment can also be seen in various stakeholders' willingness to put in significant effort to improve the delivery of surgery services and how this established a closer working relationship: *"[There was] a lot of personal engagement ... There was a lot of personal effort and investment made, and from that emerged respect and credibility and a willingness to participate in what the network was trying to do"* (Network Co-ordinator, SurgiNet). In another example of emotional attachment to the network, the Clinical Leader from the Central Surgical Centre commented that he would always make attempt to attend the network's meetings despite his busy timetable: *"I'm only really available on Thursdays ... Then, you know, the next network meeting is in the Southern region this coming Monday, so it's hard to attend that. Although, I was going to take leave, but I'll just go down to that meeting instead."* Similarly, the Network Leader *"would go and spend a whole weekend locked up in a motel and just review case after case after case, just to help out the various regional health groups which were subject to [surgery] backlog"* (Network Co-ordinator, SurgiNet).

The findings also illustrate that various network members had developed an identification with, and commitment to, others within SurgiNet:

*There was a bike ride the length of New Zealand to raise money for a research chair for HealthNZ and some of these guys showed up. The Network Leader did and a couple of the other regional Clinical Leaders. They rode the length of New Zealand*

*in their own time, at your own expense, and raised money for that Chair.* (Medical Director, HealthNZ)

When individual norms and values are deeply shared within a network, this facilitates the creation of a sense of collective identity among network members and forms the basis for a stakeholder's psychological identification with the network, which in turn leads to a co-operative and collaborative relationship:

> *My concept of a clinical network is that it is a group of individuals, clinicians, who come together because they have a shared purpose, goal, focus. They come together as equals, respect each other's contribution and they collaborate in order to achieve that shared goal. In that sense it's an utterly flat structure. We'll work together on achieving the goals. We've agreed on what they are. We'll action them and make it work.* (Service Clinical Leader, Ministry of Health)

### 7.5.2 Relational Capability

The empirical findings affirm that SurgiNet was able to develop a relational capability so that significant collaborative network learning occurred. The relational capability enabled and was reflected in the three types of learning processes: content learning, partner-specific learning and alliance management learning.

In effect, the content learning process enabled the network members to both learn from each other in how to overcome surgical related issues and to enhance their connectedness. With respect to the former, one Clinical Leader commented: *"So one advantage of the network and participation in the network is that if somebody's doing something well, we can learn from that and potentially share that amongst ourselves. And there's been a pretty good working, in that regard"* (Clinical Leader, Central Surgical Centre). With respect to the latter, another Clinical Leader reflected on how participation in the network created a better sense of mutual understanding: *"One of the learnings was to understand each other's problems, which were different depending on whether you live in the central region or southern region. We have different issues to the central region"* (Clinical Leader, Southern Surgical Centre). The DHB CEO representative in the network explained the significance of examining each other's problems:

> *I think that early work in solving those issues also gave a greater understanding and knowledge of what was happening in the various centres and what needed to be part of a network. So I think the good thing about dealing with an issue was certainly the key members of the network were gaining credibility and engagement by going and*

*working in each of the centres, but also hearing and feeling what the network from the grassroots up needed to do nationally.*

With respect to partner-specific learning, the findings reflect that a positive co-operation was engendered when partners learnt more of each other over time: *"As you meet, as we were meeting face-to-face, you know, you develop relationships and then that means when something happens and you want feedback or you want some support then accessing the network makes it much easier"* (Nursing Director, District Health Board B) In addition, cultural and operational compatibility could be encouraged when partners learnt more of each other, which played an important role in enabling the collaborative network members to manage consistency in relation to operating practices. In particular, the Clinical Leader from the Southern Surgical Centre explained that inter-partner cohesiveness was critical in overcoming surgical related issues:

> *Certainly you are able, or you do have the facility, to sit down round the table with your colleagues in a sort of semi-formal, informal fashion and to have an intelligent debate about issues that are important across the board. And, while we have local issues there is an issue of a global responsibility to New Zealand to continue to deliver these services in a timely fashion at an appropriate level of quality.*

Importantly, SurgiNet also developed alliance management learning in managing the collaborative network more effectively. Prior regional collaborative experiences formed a useful basis on which to learn how to co-operate and communicate with each other from a network perspective: *"There had always been long-standing clinical referral arrangements in place for some surgical services. So there are a lot of these regional clinical networks, or not networks, but regional clinical relationships in place where hospital A refers to hospital B, and they're regionally arranged"* (Network Co-ordinator, SurgiNet).

However, much of the credit for the SurgiNet members learning to effectively manage their network was given to the Network Leader, who was very influential in showing how to build consensus so that effective collaboration could be facilitated:

> *I think he [the Network Leader] had a few learning things. About the consensus thing and making sure that everybody's happy with what's been decided. It is quite important because if one person feels that it's sort of shoved through and they didn't have opportunity to really participate, then they won't support it, and that sort of defeats the whole purpose of having the network and one voice.* (Network Consultant, SurgiNet)

Similarly, other participants referred to the degree to which the network members relied on the Network Leader's managerial skills in steering them towards achieve the defined goals and encouraging them to adopt more collaborative behaviours:

> *Within any group there's always a little bit of storming, isn't there? And then they start to settle down. So we're talking about groups of very highly qualified, confident, successful surgeons. And to get them to all work together in a way - and really I have to say a lot of it's been to do with the Network Leader.  He has driven them and pushed them outside their comfort zone and not accepted poor behaviour.* (Nursing Director, District Health Board B)

> *I think I credit the way the network developed to its leadership by the Network Leader.  I think he did that very well. I think the culture of willing engagement and full participation of all health groups was created by him.  I observe that and I think that was very good.* (CEO, District Health Board A)

> *The first two face-to-face meetings of the network were very difficult because there were five surgeons, who never had a lot to do with each other, other than through professional networks, having to bare their souls in terms of the relative performance of their shop, in terms of intervention rates, access and capacity. But I have to say that, and I attribute this is entirely to the Network Leader's capacity to chair what was essentially a coalition of warring tribes, his capacity to get them focused on the main game. He did a tremendous job there. He needs a gong. And the subsequent meetings in year two and year three were far more collegial, far more 'Hey lads, we've got a position on this. We can't afford to have five variations of the truth. We've got to come up with one.'* (Network Co-ordinator, SurgiNet)

## 7.6 Governance Resources and Capability

### 7.6.1 Governance Resources

SurgiNet deployed a **structural governance mechanism** to regulate its operational workflow in the form of a contractual agreement between the network and the Ministry of Health. This acted as the terms of reference for the network:

> *What we did was we set up a terms of reference for the group ... [They] have clearly got a government instruction that says we need system change to improve surgery, so there was a very clear mandate ... And then we looked from that at the sort of accountability and reporting arrangements that were required.* (Service Manager, Ministry of Health)

The terms of reference articulated the network's scope and goals, which were derived from "*Quite a bottom-up approach ... The Service Clinical leader and the Network Leader and other doctors were involved in looking at the early network goals*" (Service Manager, Ministry of Health). The document also proposed various mechanisms for achieving these defined goals and responsibilities: "*The original terms of reference that the Ministry put together had a lot of expectations and far more process stuff around it*" (Network Co-ordinator, SurgiNet). For example, the Service Manager from the Ministry of Health noted: "*We set out ... meeting arrangements, quorums, rules for decision-making, group processes.*" The terms of reference also established a degree of hierarchy, in that the network would have a Network Leader, who was formally accountable to the Ministry: "*We were quite clear in what we expected that leader to do and that network to do*" (Service Manager, Ministry of Health). Arguably, a level of deterrence-based trust existed in the formal agreement with the Ministry of Health, as a failure to act in accordance with the clauses that were articulated in the agreement risked losing access to the additional government funding.

Another structural governance mechanism was the regular reporting of surgical centre performance against targets that the network implemented. Such reporting served as a communication mechanism whereby accurate and reliable information was exchanged between the network stakeholders, but also as a form of external monitoring and even peer pressure on the surgical centres. The ready availability of centre performance data against the agreed targets encouraged both surgical centres and their DHB management to focus on service improvement:

> *The Ministry was strongly involved in monitoring on a weekly basis the output and through-flow effect, and reporting to the Minister of Health on a weekly basis. That made a radical difference.* (Service Clinical Leader, Ministry of Health)

> *Every week, each of the five centres had to report their progress against planned procedures ... and everyone got to see everyone's.* (Network Co-ordinator, SurgiNet)

> *[This] surgery is probably the most micromanaged specialty within New Zealand ... And so the reporting, if you like, was a mechanism whereby to see trends in progress ... And that report goes to the hospital management of each DHB.* (Clinical Leader, Southern Surgical Centre)

**Relational governance mechanisms** also played a major role in governing the collaborative network. SurgiNet utilised reputation as a self-governance control mechanism to regulate the partners' behaviours. Most of the participants had little or no prior interactions with each other as this was their first collaboration. As a result, they needed to leverage reputation to

assess each other's competency and commitment in judging whether the various members could come together and collaborate to achieve the network's defined objectives. Mutual recognition of the network members' reputations enabled a form of knowledge-based trust that facilitated transparent information exchange within the network, and which in turn reduced the potential for conflict among the partners: *"As more and more trust was being built in the process, and trust in the data that was being presented, then you started to see agreements"* (Nursing Director, DHB). Accordingly, the stakeholders relied on the positive reputation of the Ministry of Health, a government agency, in establishing positive expectations about the performance and likely outcomes of the collaboration. Similarly, the close interest paid to the network by the Minister of Health helped to convince the stakeholders that changes to service delivery would be made. The Clinical Leader of Southern Surgical Centre explained:

> *It was established really by direct command by the Minister of Health. It's also given it a lot of legitimacy. And also, unlike a lot of these things that happen, you actually get some result for the effort that you put into it ... The actual formalisation of a network sort of gives it legitimacy, but allows things to happen because it's been set up particularly in this case by the Minister and so the Minister's been very responsive to the issues and the problems that have been raised and to the potential solutions suggested.*

From the outset, SurgiNet was characterised by a high level of goodwill between the stakeholders. The basis for the development of goodwill trust was attributed by one participant to the horizontal relationships inherent in a collaborative network and that each stakeholder had confidence that the others would not take advantage of the collaborative relationship: *"The network's based on considerable mutual respect, credibility and trust. And those attributes that don't fit comfortably, necessarily, in a hierarchical top-down bureaucratic organization"* (Network Co-ordinator, SurgiNet). The development of goodwill trust involved increasing identification with each other's shared values, so that norms of co-operation were internalised by the network participants and their working relationships evolved to be more integrated in managing the collaborative activities: *"I think a lot of networks relate to the trust and comfort of working together ... There was some positioning and understanding of, getting focused on what the core deliveries were of the network, and moving on"* (CEO, District Health Board A). To a further extent, SurgiNet utilised synchronous meetings to create an environment whereby partners were able to learn more about each other and develop goodwill trust: *"I think face-to-face meetings are really important because then you're sitting around with colleagues and getting to know each other a bit better, and the trust thing comes in."* (Medical Director, HealthNZ) As this was the first time that the stakeholders had come together to collaborate, it was vital for them to

develop a basis for a sustained collaborative relationship. In effect, goodwill trust enhanced the rigidity of the network by enabling the collaborative members to learn each other's expectations about the performance of the collaborative network.

This was evident to one participant in the development of collective decision-making around operational issues such as introducing a new surgical operational procedure:

> *So they moved quite quickly in a relatively short time to agree on criteria for that procedure. They agreed on criteria for access scoring. They agreed on criteria for clinical priority setting. So year two was a watershed year in terms of how collective decision-making really was demonstrated.* (Network Co-ordinator, SurgiNet)

### 7.6.2 Governance Capability

It was evident from the case study, that SurgiNet developed a strong governance capability in the form of effective network governance that both reduced the potential friction in interactions between network members and encouraged collaborative and value-creating behaviour by the members. This network governance was a combination of both structural and relational mechanisms. The detailed terms of reference developed by the Ministry of Health in conjunction with some of the key medical professionals involved stipulated the vision of the network. The articulation of the network's objectives in the agreement provided the involved individuals to have a shared understanding the network's direction, which balanced any competitiveness with co-operative behaviour and had a positive impact on the planning and execution of the collaborative activities.

The stipulation of additional funding and a mechanism for distributing it meant that the DHBs responsible for the various surgical centres did not have to compete with each other in order to receive the funding.

The utilisation of relational governance mechanisms further helped to control risk and distribute the benefits of collaboration. This was important as the delivery of surgery services was primarily the responsibility of the DHBs that managed the five surgical centres: *"There has been a lot of focus from the Ministry on service delivery so that's really at the DHB level rather than at the network level"* (Clinical Leader, Central Surgical Centre). As such, goodwill trust was an important mechanism for ensuring that the stakeholders acted in the best interests of the network in achieving the defined mutual goals. The Clinical Leader of the Southern Surgical Centre summarised how a balance of structural and relational governance mechanisms enabled the partners to co-operate in good faith and thus how an effective collaborative network could be sustained:

*Well, I think the network has a terms of reference and it has a structure and reporting structures. I think we're not big in terms of absolute numbers when you sit around the table. And we do know each other. While there is a structure, it's as much the relational trust that has been quite important. And it's been my experience over the years that no matter what structure you put in place, if people don't get on it's not going to work. And relational trust facilitates the whole process.*

## 7.7 Chapter Summary

Overall, the SurgiNet network was able to develop the three types of capability required to sustain the collaborative network. SurgiNet developed technological capability as a co-ordinating mechanism which combined the ICT infrastructure and managerial ICT skills effectively to enhance the level of co-operation within the network. For instance, managerial ICT skills such as organizing face-to-face or phone conversations and meetings were exploited in combination with ICT infrastructure (i.e. email and the web portal) to inform and update the participating partners of how the collaborative activities had been progressed. More importantly, the competency in leveraging ICT managerial skills allowed the participating partners to establish a close interaction among each other. This in turn allowed an open communication process that enabled an efficient information processing.

In terms of network rigidity, the SurgiNet network developed a network-based relational capability that allowed the participating organizations to learn how to collaborate more effectively. More significantly, the development of partner-specific learning capability enfolded more rigidity within the network. Learning about each other narrowed the gap between network members and deepened the partners' attitudinal commitment to the network, thus allowing more connectedness. At the same time, the network could embrace a degree of flexibility in responding to the changing needs of its stakeholders, not least in the eventual creation of a broader network encompassing the original network and a wider range of participants across the spectrum of healthcare related to the surgery services concerned.

Structural governance played a role in reducing the level of competition within the SurgiNet network by imposing hierarchical controls that facilitated the co-ordination of partners by specifying the responsibilities of each organization and clarifying decision-making procedures. In addition, SurgiNet developed relational governance in leveraging goodwill trust to establish collaborative behaviours. In effect, identification-based trust was established through the closer integration whereby the participating partners acted in the best interests of the network. Thus, the SurgiNet collaborative network developed an effective network governance capability by deploying and combining both structural and relational

governance mechanisms to balance the forces of co-operation and competition, as well as those of rigidity and flexibility.

# Chapter 8: Discussion

This chapter presents a cross-case analysis that discusses and compares the relevant findings from the four individual cases studied. The influence of each category of resources and capabilities is analysed across the four collaborative networks, before the insights about how collaborative networks are sustained that emerged from the analysis are discussed. In analysing the data from the four case studies, it was apparent that there was variation in the availability or development of particular resources and capabilities across the cases. To assist in the cross case analysis, for each case study, the availability of the various resources are assessed for their potential contribution to the sustainability of the collaborative network. Depending on the perceived level of adequacy within the collaborative network, the resources are rated as "High", "Moderate" or "Low". This was a subjective judgement made by the researcher in order to enable a comparison to be made across the cases. Similarly, the relative development and perceived importance of each type of capability in sustaining the collaborative network was evaluated and summarised. The justification for these assessments is provided in the subsequent discussion. A 'low' categorisation was used when a network was perceived to have an insufficient or inadequate level of a resource or capability so that a detrimental effect on the network's sustainability could be observed. In contrast, a 'high' categorisation reflected a perceived observable strength in a particular resource or capability. 'Moderate' was used when a resource or capability was perceived to be present and adequate rather than a particular strength of the network.

## 8.1 Technological Resources and Capability

Table 8.1 summarises the evaluation of the technological resources available to each collaborative network and the level of a technological capability developed in each case.

Table 8.1 Technological Resources and Capability across the Four Cases

|  | HealthPort Network | MobiHealth Network | MediNet Network | SurgiNet Network |
|---|---|---|---|---|
| Technological Resources |  |  |  |  |
| • *ICT Infrastructure* | High | Moderate | High | High |
| • *ICT Competence* | High | High | High | Low |
| • *Managerial ICT Skills* | Low | High | High | High |
| Technological Capability | Moderate | High | High | Moderate |

All four collaborative networks had available an ICT infrastructure that served as the technological foundation for the network (Thimm and Rasmussen, 2009), and that could be used as an inter-organizational information system to communicate and co-ordinate their collaborative activities. All four networks relied on email and telephone communication, while retaining an important role for face-to-face communication at varying levels of

regularity. For example, the SurgiNet and MediNet members met only several times a year, whereas the HealthPort network attempted to meet more regularly and geographic proximity meant that MobiHealth could utilize face-to-face communication for important co-ordinating activities. In addition, MediNet developed a network website, which it deployed as an administrative infrastructure to assimilate and disseminate web-based information about the referral process, medical conditions and treatments and types of service provision. Similarly, SurgiNet developed a web portal to support and co-ordinate its operations. HealthPort possessed an online collaboration tool, Collab, for communication, information sharing and document management.

Three of the collaborative networks were judged to possess sufficient ICT competence, in terms of ICT skills and training, to enable the network members to use their inter-organizational information systems. Within the HealthPort and MobiHealth networks, prior experience or familiarity with a tool meant that network members largely had the necessary competence to exploit the ICT infrastructure used within their networks, and that no provision for ICT training was needed. In the case of MediNet, the provision of ICT training allowed the network members to utilise the website to efficiently process and leverage information in supporting the network's operational activities. In contrast, members of SurgiNet were disinclined to make use of the network's recently developed web portal. In this case, ICT training may have enhanced the users' understanding of the web-based system, increasing their acceptance of it and their readiness to use it. Its lack prevented the collaborative network from making the most of its web-based system for efficient information processing.

With the important exception of HealthPort, the other three collaborative networks possessed a good level of managerial ICT skills to maintain an open communication process with efficient sharing of information. Importantly, these networks identified a focal leader who had the necessary know-how and skills to exploit both synchronous and asynchronous channels to keep the network's communication flowing (Chi and Holsapple, 2005), so that collaborative activities could be well co-ordinated and the collaborating partners could work together co-operatively. For instance, MobiHealth utilised emails to facilitate the sharing of information on solution development, while, at the instigation of GlobalComm, leveraging weekly face-to-face meetings to set priorities, check progress against agreed deadlines and resolve any conflicts that arose. On the other hand, as SurgiNet had only a few face-to-face meetings each year, email and telephone calls played an important role in co-ordinating and supporting collaborative activities. Its Network Leader and Co-ordinator ensured that updated information was efficiently dissimilated to everyone in the network. Similarly, the MediNet Network Administrator and Website Manager were responsible for overseeing the asynchronous flow of communication through the network's website. The distribution of

accurate and timely information helped to efficiently manage the clinical workflow and referral process, as well as enhancing the network's level of co-operation. MediNet leveraged face-to-face communication to resolve any issues or problems for uploading web-based information to the network's website.

In contrast, HealthPort initially failed to identify a focal leader who could manage and co-ordinate the network's communication process. Consequently, setting priorities and meeting project deadlines were poorly managed, hindering the effective co-ordination of collaborative activities. In particular, the capacity for Collab to facilitate communication beyond the sharing of technical information and documents associated with the healthcare portal proof of concept was not encouraged or managed. Better use of the online communication facilities provided by Collab may have enabled more effective and open communication between the senior representatives of the network partners. For example, important issues such as proprietary ownership of the emergent health portal and the project's financial incentive system were poorly communicated and an information asymmetry developed within the collaborative network, which affected the facilitation of co-operation between all the network members.

Looking across the four cases, three collaborative networks, MobiHealth, MediNet and SurgiNet, were able to combine and utilise their technological resources to develop a network-wide technological capability that could provide the basis for effective communication, information processing and co-ordination of collaborative activities. In the case of SurgiNet, the reluctance of many network members to use the network's web portal arguably limited the effectiveness of this part of the ICT infrastructure, but ultimately did not prevent effective co-ordination of the network. Significantly, these three networks had the necessary managerial ICT skills to combine and deploy their ICT infrastructure in a way that encouraged open communication and enhanced the level of co-operation among the network partners. Although HealthPort possessed adequate ICT infrastructure and competence, it lacked the managerial ICT skills to co-ordinate and leverage these other technological resources to ensure that a highly effective network-based technological capability developed. A more effective combination of synchronous and asynchronous communication channels may have helped to foster an open communication process and closer interaction between the network partners, increasing the likelihood of co-operative behaviour in the collaborative network.

## 8.2 Relational Resources and Capability

Table 8.2 summarises the evaluation of the relational resources available to each collaborative network and the level of a relational capability developed in each case.

Table 8.2 Relational Resources and Capability across the Four Cases

| | HealthPort Network | MobiHealth Network | MediNet Network | SurgiNet Network |
|---|---|---|---|---|
| **Relational Resources** | | | | |
| • *Partner Complementarity* | Moderate | High | High | High |
| • *Network Culture* | Moderate | Moderate | High | High |
| • *Attitudinal Commitment* | Low | High | High | High |
| **Relational Capability** | Low | Moderate | High | High |

One dimension of network partner complementarity is the inter-partner contribution of complementary resources and skills. In each of the four cases, resource complementarity was high. In the cases of HealthPort and MobiHealth, partner selection was intentionally based on the strategic fit of the set of resources and skills that each partner brought to the network. In the cases of MediNet and SurgiNet, the networks need the resources offered by all members in order to achieve their collective goal around more equitable patient access to healthcare. In addition, in MediNet, the Northern Medical Unit could only reduce its high number of referrals using the resources of the other three units, while they needed access to Northern's advanced expertise and experience. Such a mutual need creates a high degree of inter-dependency and connectedness between the collaborating organizations. In both MediNet and SurgiNet, complementarity was enhanced by the involvement of a wide range of stakeholders involved in healthcare service delivery. The members of these two networks also shared a high degree of organizational complementarity in the form of similar healthcare delivery systems and processes.

The main difference in the level of partner complementarity evaluated in each case was the presence of a power asymmetry and how that was addressed by the network. SurgiNet displayed an equal power relationship between the four surgical centres and, as noted, included representatives from across the range of healthcare stakeholders. In MobiHealth and MediNet there was a potential power asymmetry in which one member was larger in terms of size or influence. In the former case, GlobalComm insisted that the two smaller organizations formed a joint venture with which it could transact, and offered reassurances that it was not interested in owning the IP and technologies developed by the network. In the case of MediNet, the more influential Northern Medical Unit took explicit steps to ensure that the other units felt included and that ownership of the network was shared among all the members. In contrast, one of the organizations in the HealthPort network, Systems Provider A, occupied a dominant market position in New Zealand and used that to influence the co-ordination of collaborative activities within the network. This asymmetrical distribution of power lessened the level of connectedness among the collaborative partners, lessening the

network's cohesiveness and potentially increased the likelihood of partner conflicts (Sarkar et al., 2001).

The findings reflect that all four collaborative networks possessed a network culture comprising some combination of the four cultural traits: a sense of mission, involvement, consistency and adaptability. Both collaborative networks for healthcare service delivery, MediNet and SurgiNet, had a high level of network culture. Both networks had a shared goal of ensuring equity of access to particular healthcare services that provided a strong sense of mission for the network members. The mission trait provided the collaborating organizations with a sense of focus and clarity in working towards their mutual goals (Daniel and Mishra, 1995). Similarly, both MediNet and SurgiNet were characterised by a high level of involvement on the part of the network members. This involvement trait created a sense of ownership, responsibility, and commitment to achieving the goals of the respective collaborative networks (Daniel and Mishra, 1995). Drawn from specific parts of the New Zealand public healthcare sector, the members of each of these networks had relatively consistent norms, values and practices that strengthened their respective network cultures. This consistency was reinforced by the agreed processes that each network decided upon. For example, the consistent referral process in MediNet and the agreement on national priorities (rather than regional issues) in SurgiNet. There was less evidence of the adaptability trait in MediNet, although the network recognised the need to be adaptable to changing situations, such as those represented by future patient needs. SurgiNet similarly displayed this understanding of changing needs and services, and also exhibited a strong adaptability resource in the person of its boundary-spanning Network Leader who was adept in both clinical and political worlds.

Both the HealthPort and MobiHealth networks had a shared goal around development and commercialisation of healthcare products. In each network, this sense of mission acted (at least initially) as a common motivation for the network members to collaborate with each other. Both networks also had an initially high level of involvement from their members, characterised by a collective sense of ownership of the resultant healthcare product. This level of involvement would be challenged in both networks as the product development proceeded and particular network members began to question the likelihood of a commercialised product. In addition, both HealthPort and MobiHealth had low levels of network consistency, primarily the result of the different values, norms and practices across the participating organizations. For example, in MobiHealth, MediSoft emphasised business benefits of the emerging product while MediSolutions focused on its technological possibilities. These low levels of consistency did not contribute to the cohesiveness of these collaborative networks. For instance, the HealthPort network was not able to integrate one

particular organization's values and beliefs into the network culture, contributing to that particular organization's low level of conformity to the network's collective behaviour and desired practices. In contrast, some of the other network members were prepared to adapt their initial understandings of the product development project to nurture the collaborative relationship. MobiHealth network displayed a strong adaptability trait, with which the network was able to respond to uncertainties and changes in the external environment (Daniel and Mishra, 1995). Particularly, MobiHealth was able to adapt to a temporary change in focus by GlobalComm's behaviour and to flexibly adjust its collaborative arrangements when another partner, MediSoft, de-emphasised its participation in the original project.

The findings from the four case studies suggest that increasing attitudinal commitment is an important basis for sustaining a stable collaborative relationship (Lunnan and Haugland, 2008). The MediNet and SurgiNet cases reflect the literature on the development of attitudinal commitment, whereby collaborating organizations are initially motivated more by calculative commitment, but subsequently develop loyalty commitment that creates a state of emotional attachment and psychological identification within the network (Gilliland and Bello, 2002). As collaboration proceeded, the members of each network developed a strong sense of belonging to the network and loyalty to the other members that provided a strong moral obligation to sustain and continue the collaborative relationships (Robson et al., 2006). In contrast, loyalty commitment did not appear to prevail to such an extent in the MobiHealth and HealthPort networks. In the latter case, any initial loyalty commitment to the network was eroded by the behaviour of one of the network members and calculative commitment was insufficient to sustain the network given the declining likelihood of being able to secure economic benefits going forward. However, in the case of MobiHealth, calculative commitment based on future economic gains seemed to be sufficient to ensure that MediSoft continued in the network despite suspending its participation in the ongoing product development.

The various relational resources discussed above serve as relational capital that can be used by a network to learn to collaborate and thus develop a network wide capability for effective relationship management. Looking across the four cases, three of the collaborative networks, MobiHealth, MediNet and SurgiNet, were evaluated as having developed a moderate or high level of relational capability characterised by content learning, partner-specific learning and alliance management learning. Content learning is expected to strengthen calculative commitment as organizations in a network acquire knowledge and skills they previously lacked (Cullen et al., 2000). While this can be seen in these three networks, the findings from MobiHealth and SurgiNet in particular suggest that content learning does not

necessarily bring about a learning race, but can be exploited by the network members to maximise the network's collaborative aim. In these cases, the participating organizations established content learning to acquire and internalise knowledge, skill and competencies from the partnership to better develop a healthcare product or deliver a healthcare service. In other words, where content learning in strategic alliances frequently drives competitive advantage, content learning in collaborative networks can produce collaborative advantage.

Partner-specific learning can reinforce the effects of partner selection, network culture and loyalty commitment in bridging the connectedness of collaborative relationships. For instance, in the case of MobiHealth, the mutual learning about collaborative partners enabled the three organizations to enhance their inter-dependency and overcome initial differences in strategic direction. Learning about a collaborative partner can also allow a better understanding and sharing of each other's values and practices, that in turn strengthens the development of a network culture and commitment. Indeed, the findings from the MediNet case illustrate how learning more about the partners and their characteristics fostered a mutual understanding that brought about higher levels of cultural integration and support for each other.

Alliance management learning reinforces the connectedness of the inter-organizational relationships that comprise a collaborative network through the acquisition and utilisation of alliance management skills in effectively managing the collaborative network (Kale and Singh, 2007; Nielsen et al., 2008). For instance, in the MobiHealth network, GlobalComm possessed a capacity for successful relationship management acquired through past collaborative experiences that boosted the confidence of its partners, MediSoft and MediSolutions, that it could effectively direct and manage the collaborative process to develop and ultimately commercialise the mobile PHR (Anand and Khanna, 2000; Sampson, 2005). Alliance management learning supports a network's capacity to respond to changes experienced in the collaborative environment (Das and Teng, 2000a), as was also observed in the MobiHealth network. Likewise, the MediNet network learnt to deploy periodic face-to-face training sessions in order to create an active learning environment and foster a shared ownership of the network. Development of a network and relationship management capability meant that MediNet's members learnt how to co-operate and collaborate with each other to efficiently achieve their shared goal. In the SurgiNet network, past regional collaborative experiences formed a useful basis on which the partners could learn to co-operate and communicate with each other from a national network perspective. In a collaborative network, joint learning can lead to a negotiated consensus (Agranoff, 2006).

In contrast to the other three cases, the HealthPort network was evaluated as developing only a low level of relational capability. While prior collaborative experiences, including between

some of the network members, should have provided a strong basis for network management, the network was unable to develop the know-how and alliance management skills to respond to one of its member's behavioural uncertainty as a result of a change in its strategic direction. Similarly, the positive impressions of some organizations obtained by partner-specific learning encouraged collaborative behaviour within parts of the network. In time, however, learning about the actions of a particular network member had a detrimental effect on loyalty commitment and goodwill trust within the network. The network's relational capital and capability for relationship management was unable to prevent or adapt to one partner's decision to pursue commercialising its own healthcare portal product.

## 8.3 Governance Resources and Capability

Table 8.3 summarises the evaluation of the governance resources available to each collaborative network and the level of a governance capability developed in each case.

Table 8.3 Governance Resources and Capability across the Four Cases

|  | HealthPort Network | MobiHealth Network | MediNet Network | SurgiNet Network |
|---|---|---|---|---|
| Governance Resources | | | | |
| • *Structural Governance Mechanisms* | Low | High | Moderate | High |
| • *Relational Governance Mechanisms* | Moderate | Moderate | High | High |
| Governance Capability | Low | High | High | High |

Each of the four collaborative networks studied utilised a combination of structural and relational governance mechanisms to attempt to regulate the participating organizations' behaviours. In all four cases, some form of contractual or formal written agreement existed to structure the collaborative venture. Both healthcare service delivery collaborative networks had formal terms of reference that outlined the network's scope and objectives, the roles and responsibilities of each member, and the co-ordination of operational activities between the network members. Written terms of reference act as a vehicle for articulating the shared goals of the network members and providing an agreed basis for regulating member interactions. The two networks also had formal funding agreements with the Ministry of Health, which contributed financial resources while the other stakeholders bestowed physical and human resources. These funding agreements provided a degree of deterrence-based trust, in that the financial sustainability of the networks required achievement of the agreed objectives and outcomes. However, while SurgiNet had a formal mandate from government for its establishment and operation, MediNet had less government recognition, which was seen as a potential threat to the sustainability of the network. In addition, the terms of reference for MediNet and SurgiNet established a degree of hierarchy in the position of a

Network Leader who could (if necessary) wield final decision-making power. In both cases, the Network Leader was also accountable to the Ministry of Health and responsible for regular reporting on their network's operations.

The two healthcare product development collaborative networks differed from the healthcare service delivery collaborative networks in that the IP was both contributed and generated in the collaborations. Where such property-based resources are the primary resources to be contributed to a collaborative network, contractual agreements are preferred (Das and Teng, 2000b). As such, contracts serve as a safeguarding mechanism as each collaborating partner's IP and other legal properties can be protected by the written specification of promises and obligations. In the case of MobiHealth, contractual agreements were used to structure the collaborative relationships. MediSoft and MediSolutions formed a joint company, which the signed a partnership agreement with GlobalComm, which specified the partners' respective roles and responsibilities. The contractual agreements specified that MediSoft and MediSolutions would own the IP arising from the development of the mobile PHR, while GlobalComm would own the services provided by the mobile PHR and would be compensated for the provision of the necessary infrastructures and marketing strategies. Such a fair reward arrangement facilitated the three organizations working together under conditions of certainty that, in turn, helped sustain their behavioural consistency.

In contrast, the organizations in the HealthPort network were participating in a non-equity collaborative venture, so that the written specification protecting their property-based resources needed to be precisely articulated. The network had a project scope document that detailed the roles, responsibilities and accountabilities of each participating organization. This strengthened the efficient co-ordination of the network's technical activities by clearly articulating a division of labour for the healthcare portal project. The document also specified particular roles and responsibilities in relation to project management and governance. The contractual framework that was established for the network was intended to include a business model for the eventual commercial exploitation of the healthcare portal product. However, the delay of this business model to a future stage of the collaboration meant that the contractual agreements did not properly specify the ownership and protection of each organization's IP rights. This oversight meant that the network was unable to prevent the subsequent opportunistic behaviour by one of its members.

In terms of relational governance mechanisms, the four networks were able to leverage reputation as a means for generating knowledge-based trust. For example, many of the organizations in the HealthPort network had established reputations in the New Zealand healthcare industry. Awareness of an organization's reputation for collaborative behaviour would act as a relational norm in justifying whether that organization could be trusted and

giving prospective network partners some assurance that the likelihood of opportunistic behaviour by that organization would be low. In the case of MobiHealth, MediSoft and MediSolutions did not have any past knowledge of each other and could not deploy reputation to validate prospective behaviour. Instead, they had to depend on GlobalComm's established reputation as a stable organization that had the ability to direct the collaboration to achieve the shared goal. The MediNet network utilised reputation and professional respect to produce a knowledge-based trust that could facilitate the network members' collaborative interactions and validate the credibility of sharing tacit knowledge with each other. Similarly, most of the participants from the SurgiNet network had little or no prior interactions with each other, as this was their first collaboration. Reputation was needed as a relational governance mechanism to understand and predict other partners' behaviour with more confidence (Ireland et al., 2002) and facilitate the transparent exchange of performance related information on each surgical centre.

Goodwill trust is potentially a more powerful relational governance mechanism than reputation as it is associated with an identification-based trust. Goodwill trust develops as a network's members interact with each other with increasing frequency or over an extended period of time, and the collaborating partners internalise each other's preferences and norms of co-operation (Shapiro et al., 1992). For most of its existence, the HealthPort network evidenced a degree of goodwill trust arising from a generally shared sense of common purpose in generating benefits for New Zealand healthcare consumers and in some cases established emotional bonds with prior collaborators. Importantly, this goodwill trust meant that the network members were prepared to continue collaboration on the healthcare portal while contractual arrangements such as the business model remained unfinished. However, later in HealthPort's network trajectory, the perceived opportunistic behaviour by one of the organizations undermined the level of goodwill trust within the network. In the case of MobiHealth, goodwill trust only gradually grew over time as the partners interacted with each other in developing the mobile PHR and developed an increasingly identification-based trust. In MediNet and SurgiNet, goodwill trust was the result of the high degree of mutual dependence and connectedness among the network members, as well as the horizontal relationships inherent or developed in the networks that encouraged a sense of shared ownership and identification with each other.

A network-wide governance capability involves developing effective network governance through the deployment and use of an appropriate mix and balance of structural and relational governance mechanisms (Kale and Singh, 2009; Poppo and Zenger, 2002; Todeva and Knoke, 2005). For example, in the case of MobiHealth the formal contractual arrangements did not act to undermine the accumulation of goodwill trust among the network members (Gulati et al., 2012), and the two types of governance mechanisms complemented each other in a highly effective way by aligning the interests of the partners and distributing the benefits of the collaboration. The identification-based trust that resulted encouraged and enabled the three

partners to collaborate on a new project going forward. In MediNet, strong relational governance mechanisms, in particular developed through the network's bi-annual meetings, reduced the potential for misunderstandings and conflicts, and compensated for the relatively less effective structural governance mechanisms (Reuer and Arino, 2007). In this sense, the network operated primarily through mutual goodwill and co-operation at a clinical level rather than through enforcement of structural control by the Network Leader or the Ministry of Health. A sustained collaborative network develops the capability to both enforce formal contracts and agreements while building trust and collaborative norms (Alexander et al., 2003; Lui and Ngo, 2004; Poppo and Zenger, 2002). This was observed in the case of SurgiNet, where each surgical centre co-operated in regularly reporting their performance data to the Ministry of Health. This was only made possible because of, on the one hand, the formal agreement with the Ministry and the written terms of reference agreed to by all the network members, and on the other hand, the goodwill trust developed among the network participants over time and as the network began achieving defined results. In contrast to these three cases, the HealthPort collaborative network was unable to develop a sufficiently effective capability for sustained network governance, particularly when confronted by post-formation dynamics, changing levels of commitment and trust, and shifting motives in among the network participants (Gulati et al., 2012; Winkler, 2006). Effective network governance includes a competence in drafting agreements and contracts so that rights and obligations are clearly stipulated (Chen and Chen, 2003; Kale and Singh, 2009; Reuer and Arino, 2007). In the end, any deterrence arising from the HealthPort network's structural governance mechanisms was ineffective, and the level of identification-based trust developed within the network was insufficient to sustain the collaboration and hold the network together when one member switched from co-operative to competitive behaviour.

## 8.4 Network Sustainability

The findings from across the four case studies support the proposition that to sustain a collaborative network three pairs of competing forces need to be balanced. These three pairs of forces reflect three tensions that threaten the sustainability of a collaborative relationship (Das and Teng, 2000a). First, a behavioural tension exists between the expected co-operative behaviour of network members and the tendency for opportunistic behaviour on the part of potential competitors. Second, a structural tension exists in the level of rigidity that connects the network members together and the flexibility of the collaborative arrangement to adapt and respond to internal changes or changes in the external environment. Third, a psychological tension exists between short-term and long-term orientations either by the network or on the part of different network members.

The status of the four collaborative networks at the time of study can be described and explained in terms of these three tensions (Table 8.4). Three of the collaborative networks, MobiHealth, MediNet and SurgiNet, continued to sustain their collaborations at the time of the study. In MobiHealth, the original product development project remained ongoing and the network partners commenced collaboration on another project. In MediNet, the network members successfully implemented a standardised referral process and established an effective support structure for the medical specialists and health professionals involved in providing the particular healthcare service at a national level. In SurgiNet, the collaborative network was considered to be sufficiently successful to form the basis for a new, expanded network that increased participation across a wider spectrum of healthcare providers. In all three cases, the networks could be characterised by a balance between co-operation and competition, rigidity and flexibility, and short-term and long-term orientation. In contrast, in the case of HealthPort, all three tensions became unbalanced, leading to the dissolution of the network after the initial proof of concept phase.

Table 8.4 Cross-Case Comparison of Network Sustainability

| Competing Forces | HealthPort | MobiHealth | MediNet | SurgiNet |
|---|---|---|---|---|
| Co-operation vs Competition | Unbalanced | Balanced | Balanced | Balanced |
| Rigidity vs Flexibility | Unbalanced | Balanced | Balanced | Balanced |
| Short-term vs Long-term Orientation | Unbalanced | Balanced | Balanced | Balanced |
| **Network Status** | *Not Sustained* | *Sustained* | *Sustained* | *Sustained* |

This thesis explores how the resources and capabilities of a collaborative network contribute to it being sustained. Since the definition of a sustained network used in this study is one where all three pairs of competing forces identified by Das and Teng (2000a) are balanced, how the resources and capabilities of a collaborative network influence the balance between these three tensions needs to be addressed. The next part of this chapter attempts to do this across the four collaborative networks studied.

### 8.4.1 HealthPort

In the case of HealthPort, all three network capabilities played a role in determining the inability of the collaborative network to be sustained. Figure 8.1 illustrates the proposed influence of each network capability on the balance of each of the three pairs of competing forces. The arrows indicate the path of influence and the text accompanying the arrows indicates the major factors or reasons through which the capabilities were influential.

Competition eventually dominated co-operation in the HealthPort collaborative network. The level of co-operation between particular members of the network became undermined by a

communication asymmetry that developed from the inability of the collaborative network to fully combine and deploy its technological resources. Further, a low level of relational capability allowed one organization to change its interests in participating in the network and exploit a power asymmetry to pursue its own goal in developing a proprietary healthcare portal, potentially in competition with that of the network. The loss of goodwill trust once this organization's divergent intentions became clear also undermined the level of co-operation in the network.
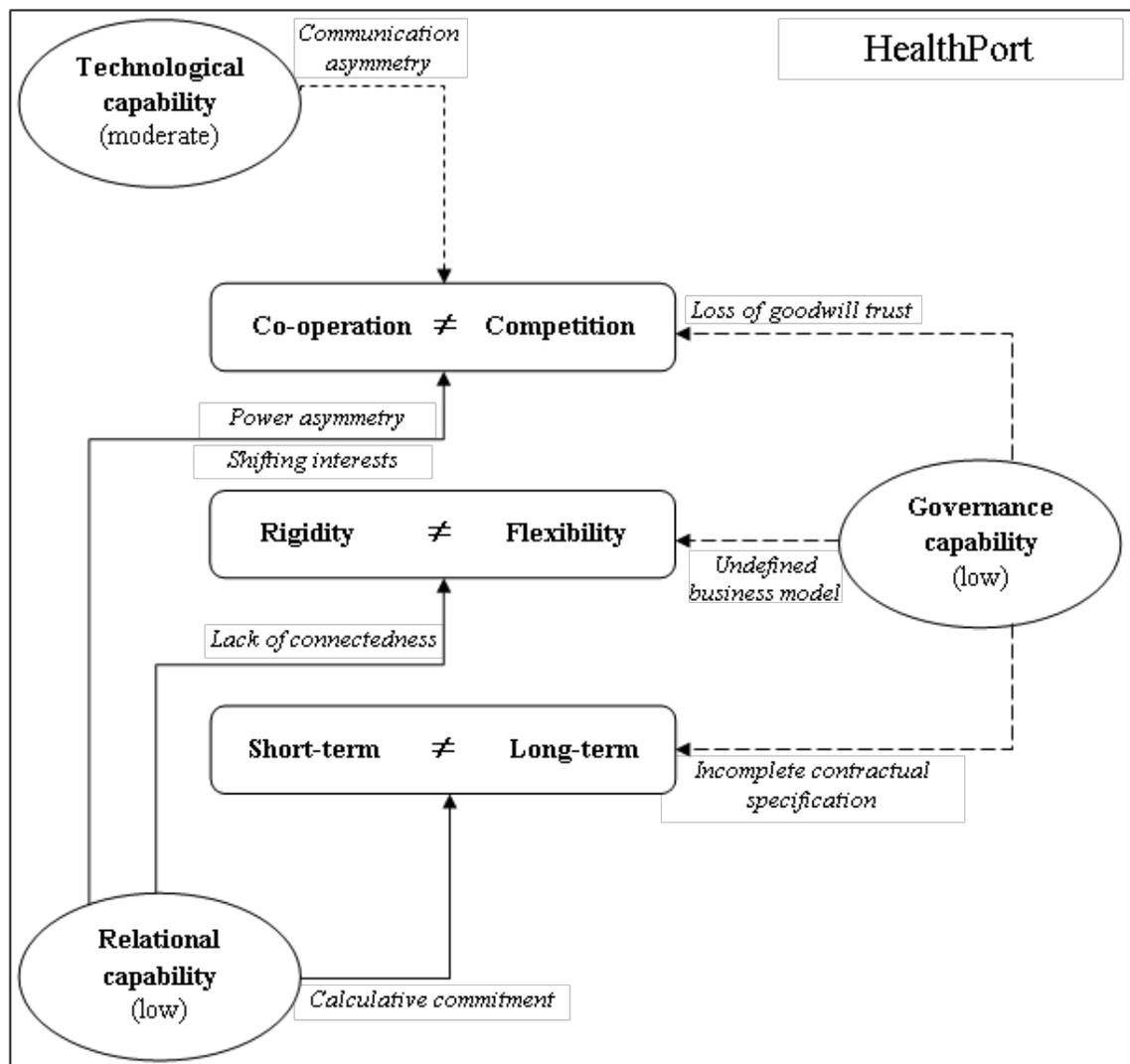


Figure 8.1: Network Capabilities Influencing the Three Internal Tensions in HealthPort

The individual course of action taken by this particular organization was facilitated by a relative imbalance between rigidity and flexibility in the network. A lack of connectedness between the network partners meant that there was more flexibility than rigidity in the HealthPort network. In particular, the network was not able to utilise its partner-specific and alliance management learning to reinforce the network's culture and bring about higher levels of integration and cohesion between the participating organizations. In terms of governance, the delays in defining a business model for commercialisation of the intended

healthcare portal further reduced the rigidity of the network and provided the necessary flexibility for opportunistic behaviour by one of its members.

Finally, the network failed to develop a strong relational capability that could sustain a longer term orientation when confronted with one organization's short-term focus and calculative commitment to maximising its economic gains. Similarly, the governance capability developed by HealthPort was insufficient to prevent the disestablishment of the network. In particular, the incomplete contractual specifications in establishing HealthPort were inconsistent with a long-term orientation for the network.

### 8.4.2 MobiHealth

The MobiHealth collaborative network developed sufficiently effective network capabilities to sustain the network in the face of the various changes it experienced and challenges it confronted. Figure 8.2 illustrates the proposed influence of each network capability on the balance of each of the three pairs of competing forces.

MobiHealth developed a technological capability characterised by an effective deployment of technological resources to facilitate open communication and co-ordinate the partners and their collaborative activities. The open communication encouraged co-operation on the part of the potential competitors comprising the network. In terms of relational capability, the complementary resources provided by each network partner encouraged their co-operation in developing an effective mobile PHR solution. Finally, the use of detailed partnership agreements to regulate the collaborative relationship between MediSoft and MediSolutions, and between them and GlobalComm, encouraged co-operative behaviour and reduced the potential for competition.

The MobiHealth network successfully developed a capability for effective network governance that balanced rigidity with flexibility. In particular, GlobalComm was able to adapt its alliance management learning to the specific conditions of the MobiHealth collaboration, and flexibly shape the network's structure and organization to match its needs and operations. In this way, GlobalComm's prior experience in managing collaborative relationships was an important element in the network's governance capability. At the same time, the strong co-ordination associated with MobiHealth's effective technological capability contributed the rigidity necessary to hold the network together in its development of a mobile PHR. The network's culture included a strong adaptability trait that provided sufficient flexibility for MobiHealth to adjust to various internal and external changes, including a shift in the Singapore healthcare environment and the decision for one network member to temporarily suspend its contribution to the mobile PHR when commercialisation was delayed.
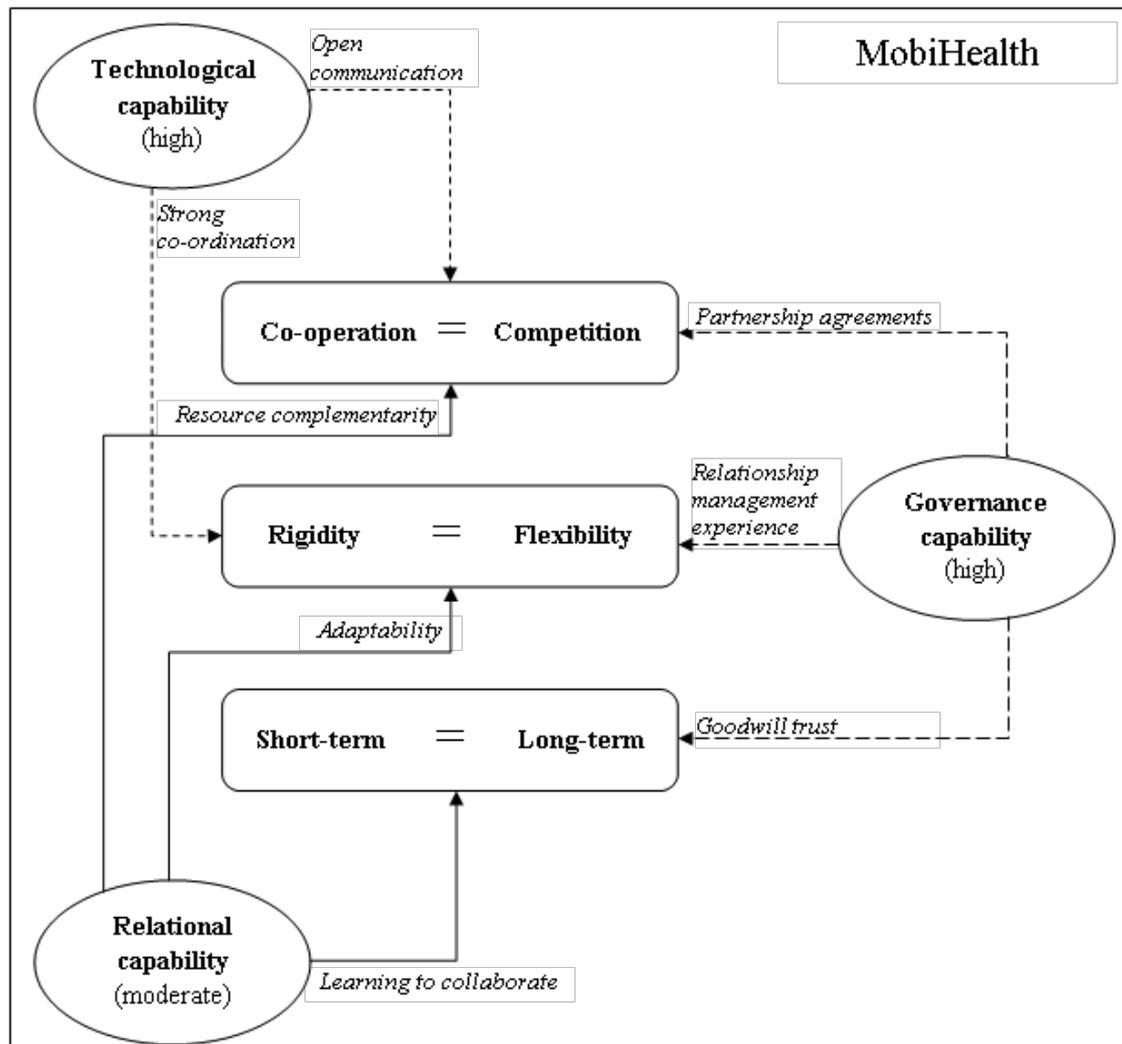
Figure 8.2: Network Capabilities Influencing the Three Internal Tensions in MobiHealth

This latter challenge to the network could have produced a more short-term orientation, but the partner-specific learning that all three network members had undergone meant that they were prepared to accept this suspension by one member and continue to collaborate on a new project in the longer term. This was assisted by the goodwill trust that developed among the network participants as they collaborated over time and which contributed to the longer term orientation of the network.

### 8.4.3 MediNet

The MediNet collaborative network developed very effective technological, relational and governance capabilities, which enabled the network to be sustained. Figure 8.3 illustrates the proposed influence of each network capability on the balance of each of the three pairs of competing forces needed for network sustainability.
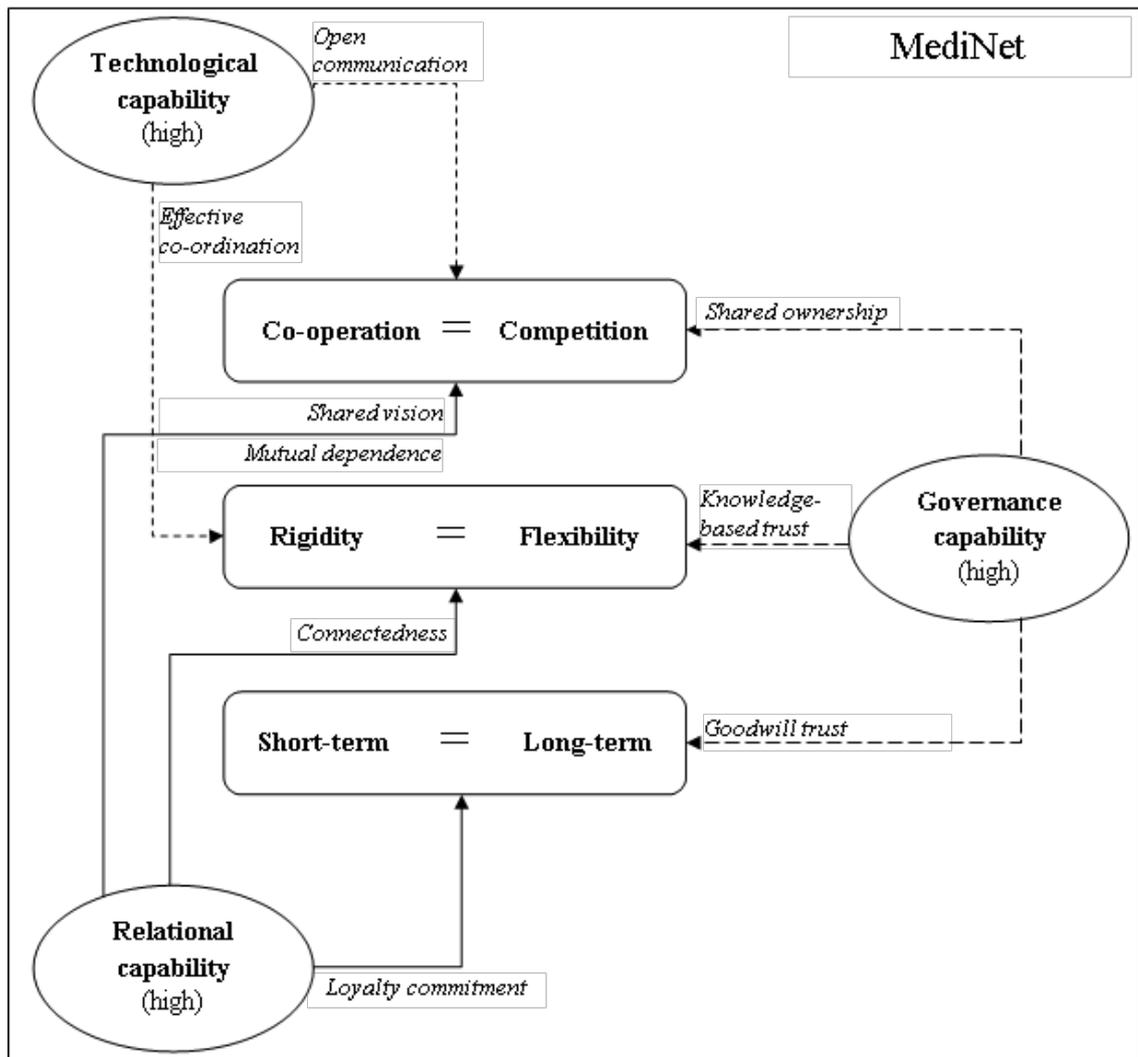
Figure 8.3: Network Capabilities Influencing the Three Internal Tensions in MediNet

MediNet successfully utilised a mix of synchronous and asynchronous communication channels to facilitate open communication and collective decision-making, and to encourage co-operation among its members. The existence of a shared vision for improved patient outcomes, and the mutual dependence of each network member on each other, minimised conflicts and encouraged co-operative behaviour in pursuit of their common goal, despite the separate interests, autonomy and independence of each medical unit (D'Amour et al., 2008). The inclusiveness and sense of shared ownership of the network and its work promoted by MediNet's network leadership team also encouraged co-operation rather than competition among the participants.

The network's website was utilised as an effective administrative infrastructure to disseminate information and guidelines, co-ordinate network processes and healthcare services, and support a national network of medical specialists, clinical associates and health professionals. This strong co-ordination maintained the inter-dependence of the network members and thus the rigidity of the network. The rigidity of MediNet was also influenced

by the high level of relational capital possessed by the network. In particular, resource complementarity, consistency in systems and processes, and shared norms and values increased the connectedness between the network partners. As the network developed, partner-specific learning fostered a mutual understanding that also enabled the network to be more closely connected. Similarly, mutual respect for each other's professional expertise encouraged a knowledge-based trust that enabled the network to function effectively as a collective entity, while allowing sufficient flexibility to adapt to any behavioural uncertainty that might arise.

MediNet's members' loyalty to the network ensured that they were committed to its on-going existence as a long-term support structure for the provision of their healthcare service. The empathy and goodwill that developed among the collaborating network members engendered an identification-based trust that supported a long-term orientation in sustaining the network. A possible concern is whether this relational governance capability would be sufficient to maintain the network if it expanded in size or its membership changed. A more balanced governance capability that included further structural governance mechanisms, such as a government mandate, might improve the likelihood of MediNet's long-term sustainability.

### 8.4.4 SurgiNet

The SurgiNet collaborative network developed effective network capabilities that sustained it while it pursued its goal of improving the equity of access to its particular healthcare service across New Zealand. Figure 8.4 illustrates the proposed influence of each network capability on the balance of each of the three pairs of competing forces needed for network sustainability.

SurgiNet was able to deploy a range of technological resources for communication and co-ordination within the network. Although the opportunities represented by its proposed web portal were not yet fully realised, the network's technological capability was sufficiently effective to support co-operation, particularly through the skills and efforts of the network's management team. Indeed, network leadership was an important aspect of SurgiNet's governance, with the Network Leader playing a major role in establishing consensus and facilitating collective decision-making and co-operative action in the network. This was reinforced by the regular reporting and sharing of surgical centre performance against agreed targets which also encouraged co-operation among the network members. Co-operation was further facilitated by network members sharing a vision of and commitment to equity of access to healthcare.
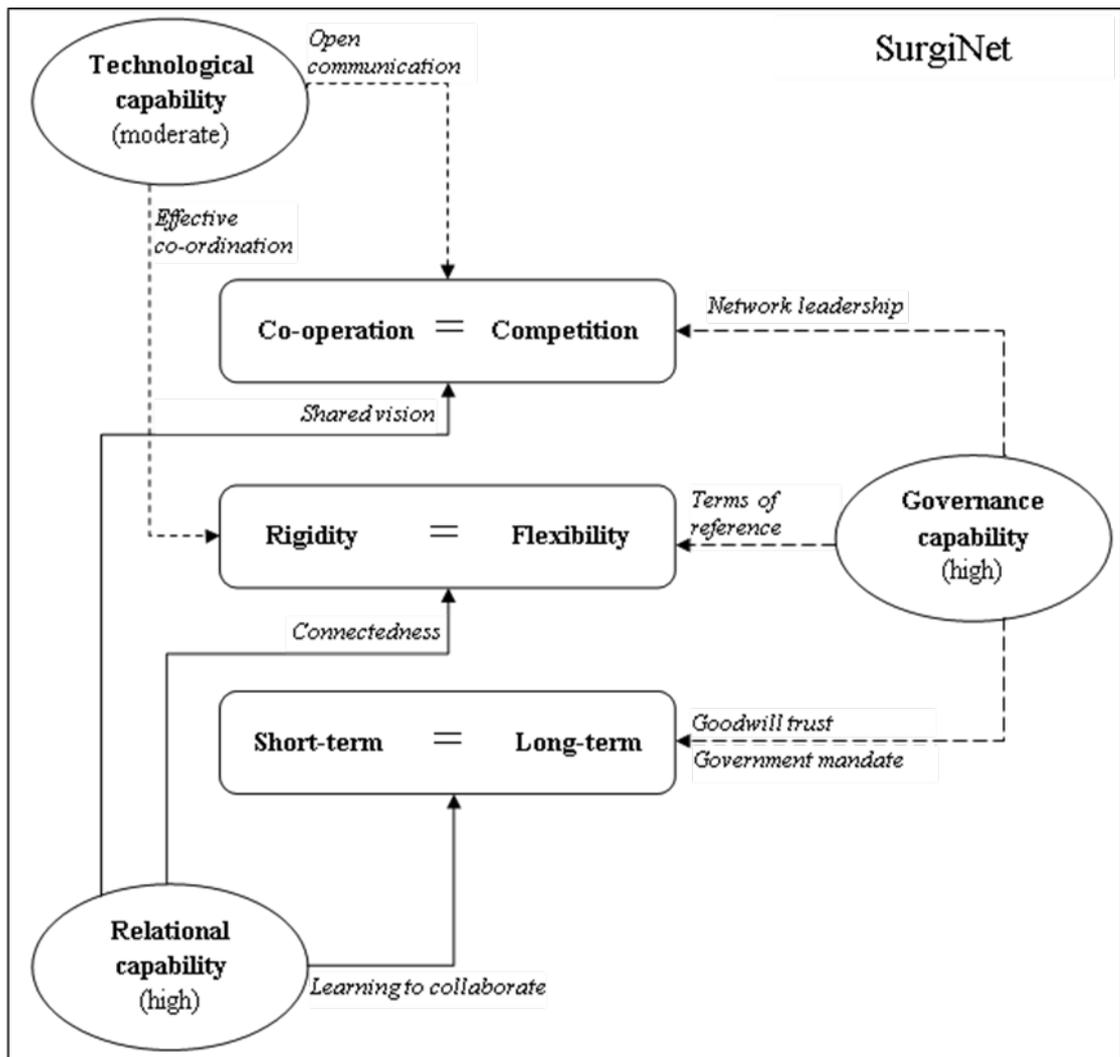
Figure 8.4: Network Capabilities Influencing the Three Internal Tensions in SurgiNet

The utilisation of available technological resources to effectively co-ordinate SurgiNet's collaborative activities provided a degree of rigidity to the network. A high level of connectedness across SurgiNet was reinforced by the cultural and operational compatibility of the network members, and by their acceptance of the network's terms of reference. The latter outlined the goals and objectives of the network, which provided a shared focus and purpose for collaborating. Together with the terms of reference, the negotiated agreements among the network members (such as the consideration of national rather than regional issues) helped to balance network rigidity with the flexibility to adapt to changing priorities.

The perceived need to expand the network to a broader section of the healthcare spectrum was such a change and helped to provide a longer term orientation to the network. This was facilitated by the goodwill trust that developed between the network members and the network's collective capability in learning to collaborate. The presence of a formal government mandate also helped to provide a degree of security to the network and its members, discouraging short-term orientations.

## 8.5 Chapter Summary

The within-case and cross-case analyses conducted on the four case studies were informed by the conceptual framework developed in this study. This framework proposed particular resources and capabilities that would enable a collaborative network to be sustained while it pursued its collective goal. The evidence from the four case studies confirms the general validity of the conceptual framework. Each of the proposed resources and capabilities could be observed in the operation and management of the four collaborative networks and, once the framework had been adjusted after the first case study was analysed, no new types of resources or capabilities emerged from the analyses. That is, the conceptual framework provided sufficient theoretical concepts with which to articulate an empirically-grounded understanding and explanation of how collaborative networks are sustained (or not). The intention was not to be able to predict the outcome of a collaborative network, but to explore how a collaborative network might be sustained in terms of the resources available to it and the capabilities it was able to develop to sustain itself.

# Chapter 9: Conclusion

## 9.1 Conceptualising Sustained Collaborative Networks

The aim of this thesis was to understand how inter-organizational collaborative networks are sustained. While there is a body of research on the rationale and motives for, and benefits of, forming collaborative networks, the post-formation implementation and management of such networks is relatively less explored. Thus, the research conducted in this thesis was focused on exploring how collaborative networks become viable inter-organizational entities and sustain themselves in the pursuit of their collective objectives.

This thesis used an approach drawn from the resource-based view of the firm and dynamic capabilities view to empirically investigate the types of resources and capabilities that are needed to sustain a collaborative network. Resources are assets possessed by the participating organizations that can be accrued to the collaborative network in order to support network sustainability, while capabilities are developed by the network and represent the network's capacity to deploy these bundles of resources. Based on an extensive literature review of strategic inter-organizational relationships, an initial conceptual framework was developed that proposed a set of technological and organizational resources that appeared relevant to sustaining a collaborative network. This framework was further refined after the preliminary analysis of an initial case study. The technological resources focused on the use of ICT to support communication within the network and to co-ordinate collaborative activities. Organizational resources were re-labelled as relational resources, as they were considered necessary to increase the connectedness of the collaborative relationships. A third group of resources, governance resources, were added to the framework in order to account for the stabilisation and regulation of the inter-organizational relationships in the collaborative network.

These three types of resources were considered as necessary but not sufficient to sustain a collaborative relationship. As such, a collaborative network needs to further develop specific network-level capabilities in leveraging each group of resources, to select, co-ordinate and combine the necessary technological, relational and governance resources. A network-wide technological capability involves selecting, combining and synchronising the network's ICT resources in order to effectively co-ordinate collaboration. A relational capability entails a learning process that provides a sound basis for the network members to learn how to collaborate and manage their inter-organizational relationships. Finally, a governance capability entails a capacity to develop effective network governance. The three types of resources and capabilities and their respective functions are summarised in Table 9.1.

Table 9.1 Resources and Capabilities for a Sustained Collaborative Network – Overview

| Resources | | Capabilities | |
|---|---|---|---|
| *Type* | *Function* | *Type* | *Function* |
| Technological Resources | Support communication and co-ordination in the collaborative network | Technological Capability | Effectively co-ordinating collaboration |
| Relational Resources | Increase the connectedness of the collaborative network | Relational Capability | Learning to collaborate |
| Governance Resources | Regulate the collaborative relationship | Governance Capability | Developing effective network governance |

The thesis further proposed that the resources and capabilities discussed above sustain a collaborative network by helping to resolve three internal tensions that threaten the network's stability and on-going viability. Das and Teng (2000a) present these tensions as three pairs of competing forces that require balancing in order for a network to be sustained: co-operation versus competition, rigidity versus flexibility, and a short-term versus a long-term orientation. Figure 9.1 depicts and summarises this overall conceptualisation of a sustained collaborative network.
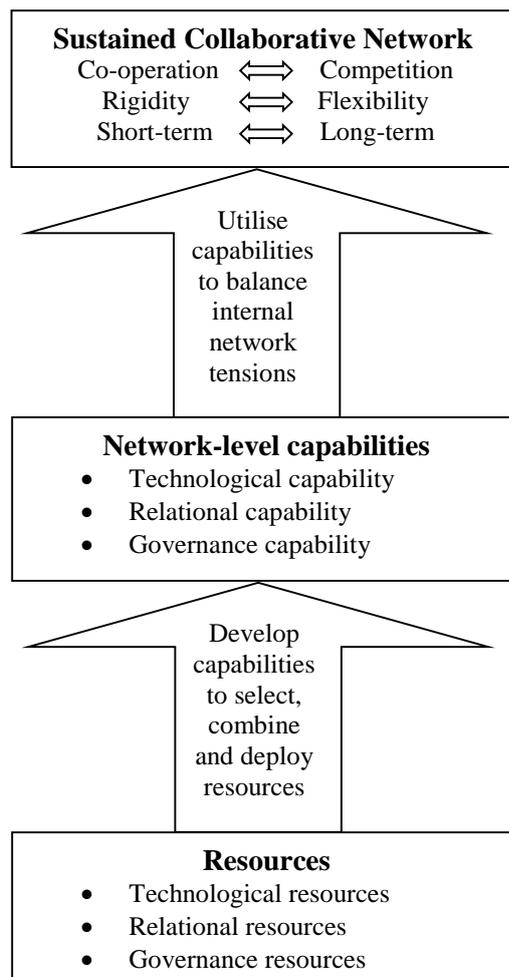


Figure 9.1: Conceptualisation of a Sustained Collaborative Network

## 9.2 Exploring Collaborative Network Sustainability

The thesis used a multiple case study design, with both within-case and cross-case analysis, to answer the research question: *How are network-level resources and capabilities utilised to sustain inter-organizational collaborative networks?* In doing so, the thesis explored the usefulness and validity of the conceptualisation of a sustained collaborative network outlined above, and of the conceptual framework of resources and capabilities needed for collaborative network sustainability that was developed and refined in the study. Four collaborative networks from a healthcare context were studied – two involving healthcare product development and two supporting healthcare service delivery. One collaborative network was not sustained, and the other three were considered to be sustained. The combination of network purpose and network status allowed the four case studies to be used for both theoretical and literal replications. The theoretical replications changed either the collaborative network status (sustained or not sustained) or the purpose of the collaborative network (product development or service delivery), enabling the usefulness of the conceptual framework to be examined across contrasting cases. The literal replication was used to confirm the validity of the framework across similar cases.

Both within-case and cross-case analyses were conducted using the empirical data obtained in the four case studies. The within-case analysis used the conceptual framework developed in the study to inform and organize the analysis of the particular resources and capabilities that appeared to influence whether the collaborative network was sustained or not. The cross-case analysis was conducted to compare the relevant empirical findings that emerged from the individual case studies so that more contextually novel insights could be provided in answering the research question (Eisenhardt, 1989).

As noted in Chapter 8, the evidence from the four case studies (involving three replications) confirms the general validity of the conceptual framework of resources and capabilities needed for collaborative network sustainability. After the initial refinement of the framework, no new types of resources or capabilities emerged from the analyses. The conceptual framework was able to provide an empirically-grounded explanation of the sustainability of collaborative networks in healthcare across varying network purposes and statuses. Table 9.2 summarises the resources and capabilities proposed in the conceptual framework, together with their dimensions and properties for which there was empirical evidence in the case study analyses. In general, the various resources possessed by a collaborative network were necessary but not sufficient for it to be sustained. A network's capacity to leverage the resources available to it by developing appropriate network-level capabilities in selecting, combining and deploying those resources appeared to be more critical in influencing the sustainability of a collaborative network.

Table 9.2 Resources and Capabilities for a Sustained Collaborative Network – Findings

| Resource/capability | Properties and dimensions | Findings from the case studies |
|---|---|---|
| **Technological Resources –** *Supporting communication and co-ordination* | | |
| ICT Infrastructure | ➢ Telephony, email, website<br>➢ Collaborative software and systems<br>➢ [Complemented with face-to-face meetings] | ICT infrastructure was necessary but not sufficient. It played a role in facilitating effective communication and co-ordination of network activities, but did not replace the importance of face-to-face meetings. |
| ICT Competence | ➢ ICT skills<br>➢ ICT training | Existing ICT skills of network participants were usually adequate to utilise the ICT infrastructure, often limiting the need for and importance of ICT training. |
| Managerial ICT Skills | ➢ Understanding needs<br>➢ Co-ordinating activities using ICT<br>➢ Project management and leadership | There was a critical need for leadership in providing the necessary know-how and skills to manage the ICT infrastructure and maintain network communication and co-ordination. |
| **Technological Capability –** *Effectively co-ordinating collaboration* | | |
| | ➢ Formal and informal processes for combining and co-ordinating technological resources<br>➢ Learning by doing and from experience | A range of processes, not all of which were ICT-based, were used to co-ordinate collaboration. Open communication was critical in maintaining and enhancing co-operation among the network partners. |
| **Relational Resources** – *Increasing connectedness* | | |
| Partner Complementarity | ➢ Complementary resources<br>➢ Compatible systems and processes<br>➢ Relative power | Resource and organizational complementarity facilitated inter-dependency and connectedness between the collaborating organizations. Asymmetrical power distribution could result in conflict or opportunistic behaviours if not actively managed. |
| Network Culture | ➢ Involvement<br>➢ Consistency<br>➢ Adaptability<br>➢ Sense of mission | A strong sense of mission, high level of involvement, and consistent norms, values and practices, were cultural traits that strengthened network culture. Adaptability was an important trait for responding to uncertainty and change. |
| Attitudinal Commitment | ➢ Calculative commitment<br>➢ Loyalty commitment | Initial calculative commitment needed to be supplemented by development of loyalty commitment to sustain stable collaborative relationships. |
| **Relational Capability** – *Learning to collaborate* | | |
| | ➢ Content learning<br>➢ Partner-specific learning<br>➢ Alliance management learning | A network-level capability for effective relationship management involved learning to collaborate. Content learning reinforced calculative commitment – it did not necessarily result in a learning race, but could be exploited to maximise the network's collaborative aim. Partner-specific learning reinforced the effects of partner selection, network culture and loyalty commitment in bridging the connectedness of collaborative relationships. Alliance management learning provided a basis for network partners to collaboratively learn to effectively manage the network. |

| Governance Resources – *Regulating the relationship* | | |
|---|---|---|
| Structural Governance Mechanisms | ➢ Contractual and formal written agreements<br>➢ Hierarchical structures and procedures | The presence (or absence) of structural governance mechanisms were important in limiting (or enabling) opportunistic behaviour by network members. |
| Relational Governance Mechanisms | ➢ Reputation<br>➢ Goodwill trust | Knowledge-based trust and the development of identification-based trust were critical for effectively governing a collaborative network. |
| Governance Capability – *Developing effective network governance* | | |
| | ➢ Aligning appropriate governance mechanisms with network needs and operations<br>➢ Balancing structural and relational governance forms<br>➢ Negotiating, implementing and enforcing contracts and written agreements<br>➢ Building trust and collaborative decision-making norms | Effective network governance involved the use of an appropriate mix and balance of structural and relational governance mechanisms – deploying and enforcing formal agreements while building the trust and collaborative norms needed to respond to changes in the collaborative environment or relationships. In sustained collaborative networks, the two types of governance mechanisms complemented each other. |

Generally, high levels of technological, relational and governance capabilities were associated with the sustained collaborative networks, while the network that failed to sustain itself was judged to have generally less effective capabilities in these three areas. Importantly, however, no one capability could be identified as solely responsible for a network's sustainability. All three capabilities seemed to be influential (although to varying degrees across the four cases), and often complementary or mutually reinforcing, so that separating out their perceived effects became a matter of analytical judgement.

## 9.3 Evaluating the Research

This PhD study adopts the concept of trustworthiness (Lincoln and Guba, 1985) to ensure the validity and reliability of the data collected. Trustworthiness offers four evaluative criteria for qualitative, post-positivist research that correspond to, but are different from, the established evaluative criteria for positivist research. The four criteria are: (1) credibility (instead of internal reliability); (2) transferability (instead of external validity or generalisability); (3) dependability (instead of reliability); and (4) confirmability (instead of objectivity) (Shenton, 2004).

**Credibility** refers to whether the research findings are congruent with reality (Merriam, 1998). A range of strategies can be used to establish credibility in qualitative research. One of the most important is *triangulation* in the research data collection. Credibility can be enhanced through triangulation by using different methods, different informants and different sites (Shenton, 2004). In this PhD study, two data collection methods were combined to provide corroborating

evidence (Creswell and Miller, 2000): semi-structured interviews and documentation review. The interviews provided a relatively structured method of accessing the research participants' views and interpretations of actions and events by asking participants direct questions related to the purpose of the study. The review of available documentation was used to corroborate the data gathered from the interviews, provide more detailed background of the participating organizations, and to verify any specific details that the participants supplied. This study also used triangulation of data sources by interviewing a range of participants in each case study. This allowed individual views and experiences to be compared with others and a comprehensive description and understanding of the case study to be developed from the multiple participant contributions (Shenton, 2004). The different sites of the four case studies offered a third form of triangulation, reducing the potential influence of site-specific features on the research findings and enhancing credibility when similar findings were observed across different sites (Shenton, 2004). Semi-structured interviews and documentation review are both *well-established research methods* in qualitative investigation, which further increases the credibility of this research (Shenton, 2004).

Another means of establishing credibility is for the researcher to have *debriefing sessions* with peers or supervisors (Creswell and Miller, 2000; Shenton, 2004). In this research, after each interview in the first case study, the researcher and her supervisor met together to discuss the information covered in the interview, and to revise and improve the interview guide where necessary. Subsequently for the other three case studies, the researcher and supervisor met to discuss the research process and findings, and to check whether any new concepts had emerged from the interviews. Furthermore, these frequent debriefing sessions with her supervisor helped the researcher to check whether she had been biased in her data collection and findings. The supervisor also helped to increase the PhD study's credibility by checking the categories developed out of the researcher's data analysis. In addition, this PhD study applied *negative case analysis* (Lincoln and Guba, 1985) as a means to establish credibility. Purposive sampling was used to select four healthcare collaborative networks: one was not sustained and the other three were sustained. Credibility was enhanced as both supportive and contradictory findings were addressed within the data collection.

**Transferability** refers to the ability of other researchers using similar methods in another time or place, or practitioners, to assess whether the research findings can be transferred to other research contexts or subjects, or to compare the results and conclusions with those from other studies. Transferability is achieved through the provision of adequate contextual information on the research participants and the boundaries of the case study, and detailed descriptions of the phenomena studied in the research (Lincoln and Guba, 1985; Shenton, 2004). Chapters 4-7 of this thesis provide background information for each of the four collaborative networks, details of the participating organizations, and a description of the network's trajectory. Each case study

chapter also provides a detailed description and analysis of the resources and capabilities observed in the maintenance and management of the particular collaborative network.

**Dependability** refers to the consistency of the research findings (Merriam, 1998). One way to address dependability is to report in detail the research processes used in order to provide a basis for other researchers to evaluate whether proper research practices have been followed and to understand and assess the extent to which the research is repeatable, even if not necessarily with the same findings (Shenton, 2004). Chapter 3 provides a thorough description of the research design used in this PhD study and its implementation, including details of the data collection and analysis. Eisenhardt's (1989) case study research design approach was followed to guide the conduct of the research. The study's research design (1) outlined how the research was going to be conducted; (2) described how the case studies were selected; (3) discussed the data collection instruments and the protocols used in the study; (4) explained what the researcher did in the field; and (5) discussed how the data was analysed.

**Confirmabilty** refers to the "qualitative investigator's comparable concern to objectivity" (Shenton, 2004, p. 72), and relates to the extent to which the research findings are grounded in the experiences and perceptions of the research participants, rather than biases or preferences of the researcher (Lincoln and Guba, 1985; Shenton, 2004). To address the confirmability criterion in this PhD study, the researcher used *triangulation* to support her analysis and interpretation of the data. In addition, the extensive use of *participant quotes* in reporting the research findings demonstrates the authenticity of the research and enables the reader to better assess the basis of the researcher's interpretations. Finally, the researcher introduced a degree of *reflexivity* by discussing the methodology adopted in the study (Chapter 3), including the beliefs and assumptions that influenced the choice of research approach and the methods used (Shenton, 2004).

## 9.4 Theoretical Contributions

This thesis makes several theoretical contributions. First, this thesis makes a contribution to the literature on inter-organizational networks by synthesising prior work on resources and capabilities associated with competitive advantage that may be extended to the management of inter-organizational collaborative networks. Collaborative networks are an under-researched area in the existing literature of network studies (Cao and Zhang, 2011). Collaborative networks emphasise the collective interactions among the individual organizations in a network so as to result in a joint value creation, often leading the participating organizations to engage in a more enduring and co-operative partnership. The resources and capabilities proposed as relevant to sustaining a collaborative network were based on a systematic review of the relevant RBV literature on the classification of resources and on prior theoretical development of the concept of dynamic capabilities.

By exploring the different types of resources and capabilities necessary for sustained collaborative networks and how they potentially contribute to network sustainability, this study answers the call for further empirical research that differentiates between resources and their different characteristics (Kraaijenbrink et al., 2010). It offers a typology of three types of resources that are needed to sustain a collaborative network: technological, relational and governance. Similarly, while prior research has studied the development of distinctive capabilities in various areas, this thesis proposes a typology of three specific capabilities that may contribute to the sustainability of a collaborative network. It suggests that technological, relational and governance capabilities are crucial for the selection, co-ordination and deployment of the technological, relational and governance resources used to stabilise, manage and sustain a collaborative network over time. This categorisation of resource and capabilities is a novel contribution to the literature on collaborative networks (see Table 9.1).

Second, this thesis makes a contribution to the literature on collaborative networks in relation to the unit of analysis. While the literature on inter-organizational networks is generally focused at the organizational level of analysis, this thesis is focused on the whole network. In particular, it is concerned with how the organizations in a collaborative network collectively assemble the resources and build the capabilities needed to utilise those resources to sustain their collaboration. Empirical research that examines inter-organizational networks at a 'whole' network level of analysis is an under-emphasised area (Provan et al., 2007). The case studies suggest that when participating organizations are collaborating at a whole network level, they tend to work towards a mutual goal across the network as a whole. As such, capabilities are developed that enable the collaborative network to enhance the deployment of the resources to facilitate co-operation, build closely knitted inter-organizational relationships, and regulate the collaborative arrangement. In contrast, focusing on inter-organizational networks at an organizational level typically involves the analysis of how organizations are exploiting their participation in the network for their individual goals.

A third major contribution of this study builds on the first in developing a conceptual framework of the resources and capabilities needed to sustain a collaborative network. This framework incorporates a conceptualisation of network sustainability that utilises the internal tensions framework of Das and Teng (2000a) to propose that a three pairs of competing forces need to be in balance to provide a basis for sustaining a collaborative network (see Figure 9.1). The framework also incorporates the three categories of resources and capabilities discussed above, and outlines their various properties and dimensions (see Table 9.2). Articulating these properties and dimensions contributes to a better understanding of the resources and capabilities needed to sustain a collaborative network. For example, the conceptual framework proposes describing network culture using four cultural traits (Denison and Mishra, 1995). The empirical findings provide details of how the different cultural traits can play a role in enabling a

collaborative network to be sustained. Similarly, in considering attitudinal commitment, the framework differentiates between calculative commitment and loyalty commitment (Gilliland and Bello, 2002), and the research findings illustrate how these two dimensions of commitment operate in different collaborative networks. The conceptualisation of a network-level relational capability as a learning process, incorporating content, partner-specific, and alliance management learning (Das and Kumar, 2007) offers a way of addressing how a collaborative network draws on its relational capital to learn to collaborate.

The conceptual framework can be used by researchers to analyse the operation and management of collaborative networks. In particular, researchers can leverage the constructs of the framework and its suggested operationalisation to inform their research. Using the framework facilitates a holistic and comprehensive analysis of this complex and multi-dimensional phenomenon. The four case studies illustrate the conceptual framework's utility for analysing and explaining the resources and capabilities that underpin collaborative network sustainability. A strength of the conceptual framework is its empirical refinement and validation, which enhances the credibility of the proposed resources and capabilities involved in collaborative network sustainability (see Table 9.2). In particular, the framework and the research presented in this thesis highlights the importance of capabilities as a higher level or resource necessary for network management and stabilisation, and confirms the usefulness of this theoretical distinction between resources and capabilities (Araya et al., 2007).

As a fourth contribution, the four case studies function as useful exemplars of how collaborative networks are sustained (and not sustained) in the healthcare context. They address the lack of empirical studies in this context of research (Chong and Doolin, 2011; Turrini et al., 2010). In particular, the four case studies cover the use of collaborative networks for healthcare product development and for healthcare service delivery. Collaboration is an important characteristic of both healthcare product innovation and the clinical networks spanning organizational and professional boundaries that are becoming an increasingly common model of healthcare service delivery. This thesis thus helps to develop a better understanding of how such networks are sustained in this important industry. Despite the divergent focus of healthcare product development and healthcare service delivery, the findings from the thesis suggest that both types of collaborative healthcare networks are considerably convergent in the resources and capabilities needed to sustain them. One observable difference between the two types of network was the degree to which structural governance mechanisms, particularly contractual agreements, were utilised in the healthcare product development networks to deal with the higher level of property-based resources involved. In contrast, the healthcare service delivery networks placed a higher reliance on relational governance mechanisms, perhaps reflecting their collective membership of a public healthcare system and shared objective in improving patient

outcomes. However, in both types of networks, structural and relational governance played complementary roles in regulating the collaborative relationships.

## 9.5 Contributions to Practice

Beyond its theoretical contributions, this thesis also makes a number of contributions to practice. First, the conceptual framework provides a comprehensive list of resources and capabilities for sustained collaborative networks that can be used in the evaluation of a collaborative network's sustainability. Such an evaluation could be conducted when establishing a new network, managing an existing network, or assessing the risk associated with a particular network. It can also be used to structure and inform a retrospective review of a non-sustained network. From a practice perspective, the leaders, managers and members of a collaborative network need to understand the role that the various resources and capabilities play in sustaining their network. While the dynamic capabilities needed to sustain a collaborative network are developed over time, it is conceivable that the appropriate resources utilised in sustaining a network could be assembled at the network's formation. The conceptual framework provides the basis for determining what those needed resources might be for a particular network.

Second, the thesis highlights that collaboration is more than an outcome of inter-organizational networks. It is a dynamic process that needs on-going and continuous management to ensure that the collaborative relationships are sustained. This has practical implications for all those involved in collaborative networks. As mentioned above, the conceptual framework developed in the thesis can be used to manage aspects of the issues and changes in a collaborative network as they arise, particularly if one or more of the three competing forces suggested by Das and Teng (2000a) become unbalanced and need re-aligning. The findings of the thesis also have important implications for healthcare policy, emphasising the need for government to invest resources and attention in the on-going monitoring and management of clinical networks as a mechanism for healthcare service improvement, and in encouraging and supporting collaborative product development in healthcare technologies.

Third, the findings of the four case studies emphasise the importance of a collaborative network building the necessary capabilities to effectively mobilise the resources available for sustaining the network. For example, the case studies illustrate the importance of developing a technological capability to effectively manage and facilitate an open communication process using both asynchronous and synchronous channels and to effectively co-ordinate collaborative activities. Managerial ICT skills appear to be an important technological resource in this capability. Similarly, the research findings point to the importance of an effective relational capability for leveraging the various relational resources available to a collaborative network. Such a capability may involve compensating for any inadequacy or imbalance in those resources. For example, the research findings suggest that the existence of a power asymmetry

in terms of partner complementarity can be addressed by taking steps by encouraging shared ownership of the collaborative network or introducing formal arrangements that limit the potential effects of such an asymmetry. The findings also suggest that it is crucial for a collaborative network to develop a governance capability that balances both structural and relational governance mechanisms. In particular, this involves developing detailed terms of reference that provide the network members with a shared understanding of the network's goals, the way collaborative activities will be co-ordinated and managed, and any perceived reward sharing scheme, as well as selecting and constructing effective contractual agreements that align network members' interests, discourage opportunistic behaviours, and distribute the benefits of collaboration.

## 9.6 Limitations and Further Research

As in any research, this thesis is not without its limitations. First, although an extensive literature review was conducted to identify particular technological, relational and governance resources and capabilities that seemed important in sustaining a collaborative network, it is unlikely that the conceptual framework developed in the study has captured all the factors that influence sustained collaboration. Further research is needed to examine other types of resources and capabilities beyond those studied in this thesis. For instance, the technological resources that underpin collaborative networks are continuously evolving. Possible resources for sustaining a collaborative network may entail the deployment of Web 2.0 technologies to improve the communication process, since contemporary organizations are embedded in a social networking environment (Andriole, 2010), or the development of a dynamic collaboration capability through an enactment of boundary spanning initiatives like aligning goals and metrics (Allred et al., 2011).

Second, collaborative network sustainability is a complex and multidimensional phenomenon. The conceptual framework and case study analysis conducted in this thesis represent a preliminary step towards understanding such a concept. For example, an attempt was made to explore the influence of the various resources and capabilities on balancing the three pairs of competing forces in sustained network suggested by Das and Teng (2000a). However, the research has not established a direct relationship between each capability and these internal network tensions. Future research could usefully be directed at theorising the relationships between the three capabilities and the three pairs of forces. Another stream of future research could focus on extending the concept of resource complementarity to the need for complementarity of the three capabilities described in this thesis. As illustrated in the cross-case analysis presented in this thesis, the effects of the three network capabilities on the sustainability of the four collaborative networks were multiple and often interrelated. How the three capabilities complement and interact with each other is a question that needs further research.

Third, the empirical findings of this thesis are not generalisable in a statistical sense (Yin, 2003). Instead, the multiple case study approach used contributes to the theoretical conceptualisation and development of an interesting phenomenon (Cavana et al., 2000, Eisenhardt, 1989; Strauss and Corbin, 1998; Yin, 2003) – namely, how inter-organizational collaborative networks are sustained. As such, future research is needed to test the findings and propositions outlined in this thesis. Large-scale quantitative surveys could be used to produce statistically generalisable results from hypotheses based upon the conceptual framework developed in this thesis.

Fourth, the four collaborative networks studied were all from the healthcare industry. Further research is needed to establish the relevance and applicability of this study's findings to other industries or sectors. Future studies can examine the similarities and differences between what is needed to sustain a collaborative network in healthcare and other contexts, such as the financial sector or high technology industries, which are also considered to be highly collaborative contexts (Frost & Sullivan, 2007). The detailed data and descriptions generated in the four case studies should assist other researchers in assessing how applicable the findings are to other contexts (D'Amour et al., 2008).

Fifth, network sustainability is an inherently future-oriented concept and implies the importance of temporality in analysing collaborative networks. The case study research conducted for this thesis was largely cross-sectional or retrospective, although the second case study included a longitudinal aspect to the fieldwork. Further research involving longitudinal studies of collaborative networks would provide valuable insights to help extend the understanding of this complex phenomenon. In particular, the question of how an organization successfully exits from a sustained collaborative network deserves further attention.

# References

Agranoff, R. (2006) 'Inside collaborative networks: Ten lessons for public managers', *Public Administration Review*, vol. 66, no. S1, pp. 56-65.

Ahuja, G. (2000a) 'The duality of collaboration: Inducements and opportunities in the formation of inter-firm linkages', *Strategic Management Journal*, vol. 21, no. 3, pp. 317-343.

Ahuja, G. (2000b) 'Collaboration networks, structural holes, and innovation: A longitudinal study', *Administrative Science Quarterly*', vol. 45, no. 3, pp. 425-455.

Alexander, J.A., Weiner, B.J., Metzger, M.E., Shortell, S.M., Bazzoli, G.J., Hasnain-Wynia, R., Sofaer, S., & Conrad, D. (2003) 'Sustainability of collaborative capacity in community health partnerships', *Medical Care Research and Review*, vol. 60, no. 4, pp. 130S-160S.

Al-Ahmad, W., Al-Fagih, K., Khanfar, K., Alsamara, K., Abuleil, S., & Abu-Salem, H. (2009) 'A taxonomy of an IT project failure: Root causes', *International Management Review,* vol. 5, no. 1, pp. 93-106.

Allen, N.J., & Meyer, J.P. (1996) 'Affective, continuance, and normative commitment to the organization: An examination of construct validity', *Journal of Vocational Behaviour*, vol. 49, no. 3, pp. 252-276.

Alt, R. and Reitbauer, S. (2005) 'Towards an integrated architecture and assessment model for financial sourcing', *Proceedings of the 2nd International Workshop on Enterprise*, Applications and Services in the Finance Industry, Regensburg, pp. 67-74.

Ambrosini, V., & Bowman, C. (2009) 'What are dynamic capabilities and are they a useful construct in strategic management?', *International Journal of Management Reviews*, vol. 11, no. 1, pp. 29-49.

Amit, R., & Schoemaker, P.J.H. (1993) 'Strategic assets and organizational rent', *Strategic Management Journal*, vol. 14, no. 1, pp. 32-46.

Anand, B.N., & Khanna, T. (2000) 'Do firms learn to create value? The case of alliances', *Strategic Management Journal*, vol. 21, no. 3, pp. 295-315.

Anderson, J.C., & Narus, J.A. (1990) 'A model of distributor firm and manufacturer', *Journal of Marketing*, vol. 54, no. 1, pp. 42-58.

Araya, S., Chaparro, J., Orero, A., & Jogler, H. (2007) 'An integrative view of IS/IT and organizational resources and capabilities', *Issues in Informing Science and Information Technology,* vol. 4, no. 2, pp. 629-639.

Argyres, N., & Mayer, K.J. (2007) 'Contract design as a firm capability: An integration of learning and transaction cost perspectives', *Academy of Management Review*, vol. 32, no. 4, pp. 1060-1077.

Arya, B., & Lin, Z. (2007) 'Understanding collaboration outcomes from an extended resource-based view perspective: The roles of organizational characteristics, partner attributes, and network structures', *Journal of Management*, vol. 33, no. 5, pp. 697-723.

Bafoutsou, G., & Mentzas, G. (2002) 'Review and functional classification of collaborative systems', *International Journal of Information Management*, vol. 22, no. 4, pp. 281-305.

Bailey, C.A. (2007) *A Guide to Qualitative Field Research* (2nd edition). Thousand Oaks, CA: Sage.

Bajwa, D., Lewis, L., Pervan, G., Lai, V., Munvolk, B., & Schwabe, G. (2007) 'Organizational assimilation of collaborative information technologies: Global comparisons', in R.H. Sprague (Ed.), *Proceedings of the 40th Hawaii International Conference on System Sciences*, pp. 41-51. Los Alamitos, CA: IEEE Computer Society.

Barney, J.B. (1991) 'Firm resources and sustained competitive advantage', *Journal of Management*, vol. 17, no. 1, pp. 99-120.

Barney, J.B. (2001) 'Is the resource-based "view" a useful perspective for strategic management research? Yes', *Academy of Management Review,* vol. 26, no. 1, pp. 41-56.

Barreto, I. (2010) 'Dynamic capabilities: A review of past research and an agenda for the future', *Journal of Management*, vol. 36, no.1, pp. 256-280.

Barua, A., Konana, P., & Whinston, A. (2004) 'An empirical investigation of net-enabled business value', *MIS Quarterly*, vol. 28, no. 4, pp. 585-620.

Bateman, T.S., & Strasser, S. (1984) 'A longitudinal analysis of the antecedents of organizational commitment', *Academy of Management Journal*, vol. 27, no. 1, pp. 95-112.

Benbasat, I., Goldstein, D.K., & Mead, M. (1987) 'The case research strategy in studies of information systems', *MIS Quarterly*, vol. 11, no. 3, pp. 369-386.

Berg, B.L. (2007) *Qualitative Research for the Social Sciences* (6th edition). Boston: Pearson.

Bergenholtz, C., & Goduscheit, R.C. (2011) 'An examination of a reciprocal relationship between network governance and network structure', *International Journal of Strategic Business Alliances*, vol. 2, no. 3, pp. 171-188.

Bessagnet, M., Schlenker, L., & Aiken, R. (2005) 'Using e-collaboration to improve management education: Three scenarios', *Journal of Information Systems and Technology Management*, vol. 2, no. 1, pp. 81-94.

Betts, M., Robinson, G., Blake, N., Burton, C., & Godden, D. (2011) *Global Construction 2020: A Global Forecast for the Construction Industry Over the Next Decade to 2020*. London: Price Waterhouse Coopers.

Beugelsdijk, S., Koen, C., & Noorderhaven, N. (2009) 'A dyadic approach to the impact of differences in organizational culture on relationship performance', *Industrial Marketing Management*, vol. 38, no. 3, pp. 312-323.

Bharadwaj, A.S. (2000) 'A resource-based perspective on information technology capability and firm performance: An empirical investigation', *MIS Quarterly*, vol. 24, no. 1, pp. 169-196.

Bharadwaj, A.S., Sambamurthy, V., & Zmud, R.W. (1999) 'IT capabilities: Theoretical perspectives and empirical operationalization', in P. De & J.I. DeGross (Eds), *Proceedings of the Twentieth International Conference on Information Systems*, pp. 378-385. Atlanta, GA: Association of Information Systems.

Bhatt, G.D., & Grover, V. (2005) 'Types of information technology capabilities and their role in competitive advantage: An empirical study', *Journal of Management Information Systems*, vol. 22, no. 2, pp. 253-277.

Bititci, U., Mrtinez, V., Albores, P., & Parung, J. (2004) 'Creating and managing value in collaborative networks', *International Journal of Physical Distribution and Logistics Management*, vol. 34, no. 3/4, pp. 251-268.

Brown, S.L., & Eisenhardt, K.M. (1997) 'The art of continuous change: Linking complexity theory and time-paced evolution in relentlessly shifting organizations', *Administrative Science Quarterly*, vol. 42, no. 1, pp. 1-34.

Bryson, J.M., Crosby, B.C., & Stone, M.M. (2006) 'The design and implementation of cross-sector collaboration: Propositions from the literature', *Public Administration Review*, vol. 66, Issue Supplement, pp.44-55.

Burt, R.S. (1992) *Structural Holes: The Social Structure of Competition*. Cambridge, MA: Harvard University Press.

Butler, T., & Murphy, C. (2008) 'An exploratory study on IS capabilities and assets in a small-to-medium software enterprise', *Journal of Information Technology*, vol. 23, no. 4, pp. 330-344.

Cao, M., & Zhang, Q. (2011) 'Supply chain collaboration: Impact on collaborative advantage and firm performance', *Journal of Operations Management*, vol. 29, no. 3, pp. 163–180.

Capaldo, A. (2007) 'Network structure and innovation: The leveraging of a dual network as a distinctive relational capability', *Strategic Management Journal*, vol. 28, no. 6, pp. 585-608.

Carmeli, A., & Tishler, A. (2004) 'Resources, capabilities, and the performance of industrial firms: A multivariate analysis', *Managerial and Decision Economics*, vol. 25, no. 6/7, pp. 299-315.

Carpenter, M.A., Li, M.X., & Jiang, H. (2012) 'Social network research in organizational contexts: A systematic review of methodological issues and choices', *Journal of Management*, vol. 38, no. 4, pp. 1328-1361.

Casson, M. (1997) *Information and Organization: A New Perspective on the Theory of the Firm*. Oxford: Oxford University Press.

Casson, M., & Cox, H. (1997) 'An economic model of inter-firm networks', in Ebers, M. (Ed.), *The Formation of Inter-organizational Networks*, Oxford University Press, Oxford, pp. 174-196.

Cavana, R.Y., Delahaye, B.L., & Sekaran, U. (2001) *Applied Business Research: Qualitative and Quantitative Methods*. Brisbane: Wiley.

Chen, H., & Chen, T.J. (2003) 'Governance structure in strategic alliances: Transaction cost versus resource-based perspective', *Journal of World Business*, vol. 38, no. 1, pp. 1-14.

Chen, T.Y., Liu, H.H., & Hsieh, W.H. (2009) 'The influence of partner characteristics and relationship capital on the performance of international strategic alliances', *Journal of Relationship Marketing*, vol. 8, no. 3, pp. 231-52.

Cheng, E.W.L., Love, P.E.D., Standing, C., & Gharavi, H. (2006) 'Intention to e-collaborate: Propagation of research propositions', *Industrial Management and Data Systems*, vol. 106, no. 1, pp. 139-152.

Chi, L., & Holsapple, C.W. (2005) 'Understanding computer-mediated inter-organizational collaboration: A model and framework', *Journal of Knowledge Management*, vol. 9, no. 1, pp. 53-75.

Chi, T. (1994) 'Trading in strategic resources: Necessary conditions, transaction cost problems, and choice of exchange structure', *Strategic Management Journal*, vol. 15, no. 4, pp. 271-290.

Child, J. (2003) 'Organizational learning', in D.O. Faulkner & A. Campbell (Eds), *The Oxford Handbook of Strategy*, pp. 443-471. Oxford: Oxford University Press.

Chong, J.L.L., & Doolin, B. (2011) 'Building sustainable collaborative networks: A healthcare information portal case study', in *Proceedings of the 17th Annual Americas Conference on Information Systems (AMCIS)*, Paper 386.

Chou, D.C., & Chou, A.Y. (2002) 'Healthcare information portal: A web technology for the healthcare community', *Technology in Society*, vol. 24, no. 3, pp. 317–330.

Collis, D. (1994) 'Research note: How valuable are organizational capabilities?', *Strategic Management Journal*, vol. 15, no. S1, pp.143-152.

Cox, H., & Mowatt, S. (2004) 'Consumer-driven innovation networks and e-business management systems', *Qualitative Market Research,* vol. 7, no.1, pp. 9-19.

Cox, H., Mowatt, S., & Prevezar, M. (2003) 'New product development and product supply within a network setting: The chilled ready-meal industry in the UK', *Industry and Innovation,* vol. 10, no.2, pp. 197-217.

Creswell, J.W. (2007) *Qualitative Inquiry and Research Design: Choosing among Five Approaches* (2nd edition). Thousand Oaks, CA: Sage.

Creswell, J.W., & Miller, D.L. (2000) 'Determining validity in qualitative inquiry', *Theory into Practice*, vol. 39, no. 3, pp. 124-130

Cullen, J.B., Johnson, J.L., & Sakano, T. (2000) 'Success through commitment and trust: The soft side of strategic alliance management', *Journal of World Business*, vol. 5, no. 3, pp. 223-240.

Cunningham, F.C., Ranmuthugala, G., Plumb, J., Georgiou, A., Westbrook, J.I., & Braithwaite, J. (2012) 'Health professional networks as a vector for improving healthcare quality and safety: A systematic review', *British Medical Journal Quality and Safety*, vol. 21, pp, 239-249.

D'Amour, D., Goulet, L., Labadie, J.F., Martin-Rodriguez, L.S., & Pineault R. (2008) 'A model and typology of collaboration between professionals in healthcare organizations', *BMC Health Services Research*, vol. 8, pp. 188-202.

Daft, R.L., & Lengel, R.H. (1986) 'Organizational information requirements, media richness and structural design', *Management Science*, vol. 32, no. 5, pp. 554-571.

Danziger, J.N., Jennings, J.S., & Park, C.P. (1999) *Assessing the Value of Information and Communication Technology (ICT) Training*. Center for Research on Information Technology and Organizations, University of California.

Darke, P., Shanks, G., & Broadbent, M. (1998) 'Successfully completing case study research: Combining rigour, relevance and pragmatism', *Information Systems Journal*, vol. 8, no. 4, pp. 273-289.

Das, T.K., & Kumar, R. (2007) 'Learning dynamics in the alliance development process', *Management Decision*, vol. 45, no. 4, pp. 684-707.

Das, T.K., & Kumar, R. (2009) 'Inter-partner harmony in strategic alliances: Managing commitment and forbearance', *International Journal of Strategic Business Alliances*, vol. 1, no. 1, pp. 24-52.

Das, T.K., & Teng, B.S. (1997) 'Sustaining strategic alliances: Options and guidelines', *Journal of General Management*, vol. 22, no. 4, pp. 49–64.

Das, T.K., & Teng, B.S. (2000a) 'Instabilities of strategic alliances: An internal tensions perspective', *Organization Science*, vol. 11, no. 1, pp. 77-101.

Das, T.K., & Teng, B.S. (2000b) 'A resource-based theory of strategic alliances', *Journal of Management*, vol. 26, no. 1, pp. 31-61.

Das, T.K., & Teng, B.S. (2001) 'Trust, control, and risk in strategic alliances: An integrated framework', *Organization Studies*, vol. 22, no. 2, pp. 251-283.

Das, T.K., & Teng, B.S. (2002) 'The dynamics of alliance conditions in the alliance development process', *Journal of Management Studies*, vol. 39, no. 5, pp. 725-746.

Davey, S.M., Brennan, M., Meenan, B.J., & McAdam, R. (2011) 'Innovation in the medical device sector: An open business model approach for high-tech small firms', *Technology Analysis and Strategic Management*, vol. 23, no. 8, pp. 807-824.

David, R.J., & Han, S.K. (2004) 'A systematic assessment of the empirical support for transaction cost economics', *Strategic Management Journal*, vol. 25, no. 1, pp. 39-58.

Davis, F.D. (1989) 'Perceived usefulness, perceived ease of use, and user acceptance of information technology', *MIS Quarterly*, vol. 13, no. 3, pp. 319-339.

Dekker, H.C. (2004) 'Control of inter-organizational relationships: Evidence on appropriation concerns and co-ordination requirements', *Accounting, Organizations and Society*, vol. 29, no. 1, pp. 27-49.

de Man, A.-P. (2005) 'Alliance capability: A comparison of the alliance strength of European and American companies', *European Management Journal*, vol. 23, no. 3, pp. 315-323.

de Man, A.-P. & Duysters, G. (2005) 'Collaboration and innovation: A review of the effects of mergers, acquisitions and alliances on innovation', *Technovation*, vol. 25, no. 12, pp. 1377-1387.

Denison, D.R., & Mishra, A.K. (1995) 'Toward a theory of organizational culture and effectiveness', *Organization Science*, vol. 6, no. 2, pp. 204-223.

Denzin, N.K., & Lincoln, Y.S. (Eds) (2005) *Handbook of Qualitative Research*. Thousand Oaks, CA: Sage.

Dewett, T., & Jones, G. (2001) 'The role of information technology in the organization: A review, model, and assessment', *Journal of Management*, vol. 27, no. 3, pp. 313-346.

Di Benedetto, C.A., & Song, X.M. (2003) 'The relationship between strategic type and firm capabilities in Chinese firms', *International Marketing Review,* vol. 20, no. 5, pp. 514-533.

Doz, Y.L. (1996) 'The evolution of co-operation in strategic alliances: Initial conditions or learning processes?', *Strategic Management Journal*, vol. 17, Summer Issue, pp. 55-83.

Doz, Y.L., & Hamel, G. (1998) *Alliance Advantage: The Art of Creating Value Through Partnering*. Boston: Harvard Business School Press.

Duisters, D., Duysters, G., & de Man, A.-P. (2011) 'The partner selection process: Steps, effectiveness, governance', *International Journal of Strategic Business Alliances*, vol. 2, no.1/2, pp. 7-25.

Dyer, J.H., & Singh, H. (1998) 'The relational view: Co-operative strategy and sources of inter-organizational competitive advantage', *Academy of Management Review*, vol. 23, no. 4, pp. 660-679.

Dyer, J.H., Kale, P., & Singh, H. (2001) 'How to make strategic alliances work', *Sloan Management Review*, vol. 42, no. 4, pp. 37-43.

Ebers, M. (Ed.) (1997) *The Formation of Inter-Organizational Networks*. Oxford: Oxford University Press.

Eisenhardt, K. (1989) 'Building theories from case study research', *Academy of Management Review*, vol. 14, no. 4, pp. 532-550.

Eisenhardt, K., & Martin, J.A. (2000) 'Dynamic capabilities: What are they?', *Strategic Management Journal*, vol. 21, no. 10/15, pp. 1105-1121.

Elmuti, D., & Kathawala, Y. (2001) 'An overview of strategic alliance', *Management Decision*, vol. 39, no. 3, pp. 205-217.

Emden, Z., Yaprak, A., & Cavusgil, S.T. (2005) 'Learning from experience in international alliance: Antecedents and firm performance implications', *Journal of Business Research*, vol. 58, no. 7, pp. 883-892.

Epstein, R.M., Fiscella, K., Lesser, C.S., & Stange, K.C. (2010) 'Why the nation needs a policy push on patient-centred health care'*, Health Affairs*, vol. 29, no. 8, pp. 1489-1495.

Evans, P., & Wurster, T. (1999) 'Getting real about virtual commerce', *Harvard Business Review*, vol. 77, no. 6, pp. 83-94.

Faems, D., Janssens, M., Madhok, A., & Looy, B.A. (2008) 'Toward an integrative perspective on alliance governance: Connecting contract design, trust dynamics, and contract application', *Academy of Management Journal*, vol. 51, no. 6, pp. 1053-1078.

Feeny, D.F., & Willcocks, L.P. (1998) 'Core IS capabilities for exploiting information technology', *Sloan Management Review*, vol. 39, no. 3, pp. 9-21.

Fink, L. (2007) 'Co-ordination, learning, and innovation: The organizational roles of e-collaboration and their impacts', *International Journal of e-Collaboration*, vol. 3, no. 3, pp. 53-70.

Fischer, F. (1993) 'Reconstructing policy analysis: A post-positivist perspective', *Policy Sciences*, vol. 25, no. 3, pp. 333-339.

Flick, U. (2002) *An Introduction to Qualitative Research* (2nd edition). London: Sage.

Frost & Sullivan. (2007) *Meetings Around the World: The Impact of Collaboration on Business Performance*. Palo Alto, CA: Frost & Sullivan.

Galbraith, J. (1974) 'Organizational design: An information processing view', *Interfaces*, vol. 4, no. 3, pp. 28-34.

Gauld, R. (2006) 'Public sector information system project failures: Lessons from a New Zealand hospital organization', *Government Information Quarterly*, vol. 24, no. 1, pp. 102-114.

Geib, M., Kolbe, L.M., & Brenner, W. (2006) 'CRM collaboration in financial services networks: A multicase analysis', *Journal of Enterprise Information Management*, vol. 18, no.6, pp. 591-607.

Gilliland, D.I., & Bello, D.C. (2002) 'Two sides of attitudinal commitment: The effect of calculative and loyalty commitment on enforcement mechanisms in distribution channels', *Journal of the Academy of Marketing Science*, vol. 30., no. 1, pp. 24-43.

Gnyawali, D., & Madhavan, R. (2001) 'Co-operative networks and competitive dynamics: A structural embeddedness perspective', *Academy of Management Review*, vol. 26, no. 3, pp. 431-445.

Goldberg, L., Lide, B., Lowry, S., Massett, H. A., O'Connell, T., Preece, J., Shneiderman, B., … (2011) 'Usability and accessibility in consumer health informatics: Current trends and future challenges', *American Journal of Preventive Medicine*, vol. 40, no. 5 (Suppl. 2), pp. S187-S197.

Goodwin, N. (2008) 'Are networks the answer to achieving integrated care?', *Journal of Health Services Research and Policy*, vol. 13, pp.58-60.

Grabher, G., & Powell, W.W. (Eds.) (2004) 'Introduction', *Networks*, Vol. 1, pp. xi–xxxi, Cheltenham, Elgar, UK.

Grandori, A., & Soda, G. (1995) 'Inter-firm networks: Antecedents, mechanisms and forms', *Organization Studies*, vol. 16, no.2,  pp. 183-214.

Granovetter, M.S. (1973) 'The strength of weak ties', *American Journal of Sociology*, vol. 78, no.6, pp. 1360-1380.

Granovetter, M.S. (1985) 'Economic action and social structure: The problem of embeddedness', vol. 91, no.3, pp. 53-81.

Grant, R. (1991) 'The resource-based theory of competitive advantage', *California Management Review*, vol. 33, no. 3, pp. 114-135.

Grant, R. (1996) 'Prospering in dynamically-competitive environments: Organizational capacity as knowledge integration', *Organization Science*, vol. 7, no. 4, pp. 375-387.

Gray, B. (1985) 'Conditions facilitating inter-organizational collaboration', *Human Relations*, vol. 38, no. 10, pp. 911-936.

Grewal, R., & Slotegraaf, R.J. (2007) 'Embeddedness of organizational capabilities', *Decision Sciences*, vol. 38, no. 3, pp. 451-488.

Griffith, D.A., & Harvey, M.G. (2001) 'A resource perspective of global dynamic capabilities', *Journal of International Business Studies*, vol. 32, no. 3, pp. 597-606.

Guba, E.G. (1990) 'The alternative paradigm dialog', in E.G. Guba (Ed.), *The Paradigm Dialog*, pp. 17-27. London: Sage.

Guest, G., Bunce, A., & Johnson, L. (2006) 'How many interviews are enough? An experiment with data saturation and variability', *Field Methods*, vol. 18, no. 1, pp. 59-82.

Gulati, R. (1998) 'Alliances and networks', *Strategic Management Journal*, vol. 19, no. 4, pp. 293-317.

Gulati, R. (1999) 'Network location and learning: The influence of network resources and firm capabilities on alliance formation', *Strategic Management Journal*, vol. 20, no.5. pp. 397-420.

Gulati, R., & Gargiulo, M. (1999) 'Where do inter-organizational networks come from?', *American Journal of Sociology*, vol. 104, no. 5, pp. 1439-1493.

Gulati, R., & Singh, H. (1998) 'The architecture of co-operation: Managing co-ordination costs and appropriation concerns in strategic alliances', *Administrative Science Quarterly*, vol. 43, no. 4, pp. 781-814.

Gulati, R., Nohria., N., & Zaheer, A. (2000) 'Strategic networks', *Strategic Management Journal*, vol. 21, no. 3, pp. 203-215.

Gulati, R., Wohlgezogen, F., & Zhelyazkov, P. (2012) 'The two facets of collaboration: Co-operation and co-ordination in strategic alliances', *Academy of Management Annals*, vol. 6, no. 1, pp. 531-583.

Hamel, G., & Prahalad, C.K. (1989) 'Strategic intent', *Harvard Business Review*, vol. 67, no. 3, pp. 63-78.

Harvey, M.G., & Griffith, D.A. (2002) 'Developing effective inter-cultural relationships', *Thunderbird International Business Review*, vol. 44, no. 4, pp. 455-476.

Häyrinen, K., Saranto, K., Nykänen P. (2008) 'Definition, structure, content, use and impacts of electronic health records: A review of the research literature', *International Journal of Medical Informatics*, vol. 77, no. 5, pp. 291-304.

Helfat C. (1997) 'Know-how and asset complementarity and dynamic capability accumulation: The case of R&D', *Strategic Management Journal*, vol. 18, no. 5, pp. 339–360.

Hemphill, T.A., & Vonortas, N.S. (2003) 'Strategic research partnerships: A managerial perspective', *Technology Analysis and Strategic Management*, vol. 15, no. 2, pp. 255-271.

Himmelman, A.T. (1996) 'On the theory and practice of transformational collaboration: From social service to social justice', in C. Huxham (Ed), *Creating Collaborative Advantage*, pp. 19-43. London, Sage.

Hoang, H., & Antoncic, B. (2003) 'Network-based research in entrepreneurship: A critical review', *Journal of Business Venturing*, vol.18, no.2, pp. 495-527.

Hoffmann, W. (2007) 'Strategies for managing a portfolio of alliances', *Strategic Management Journal*, vol. 28, no. 8, pp. 827-856.

Hoffman, W.H., & Schlosser, R. (2001) 'Success factors of strategic alliances in small and medium-sized enterprises – An empirical survey', Long *Range Planning*, vol. 34, no. 3, pp. 357-381.

Holm, D.B., Eriksson, K., & Johanson, J. (1999) 'Creating value through mutual commitment to business networking relationships', *Strategic Management Journal*, vol. 20, no. 5, pp. 67-486.

Howarth, C., Gillin, M., & Bailey, J. (2000) *Strategic Alliances: Resources-Sharing Strategies for Smart Companies*. Melbourne: Pitman Publishing.

Huxham, C. (1993) 'Pursuing collaborative advantage', *Journal of the Operational Research Society*, vol. 44, no. 6, pp. 599-611.

Huxham, C. (Ed.) (1996) *Creating Collaborative Advantage*. London, Sage.

Huxham, C., & Macdonald, D. (1992) 'Introducing collaborative advantage: Achieving inter-organizational effectiveness through meta-strategy', *Management Decision*, vol. 30, no. 3, pp. 50-56.

Huxham, C., Vangen, S., & Eden, C. (1994) 'Collaborative capability and collaborative maturity', *Management Research News*, vol. 17, no. 7/8/9, pp. 28-29.

Ireland, R.D., Hitt, M.A., & Vaidyanath, D. (2002) 'Alliance management as a source of competitive advantage', *Journal of Management*, vol. 28, no. 3, pp. 413-446.

Johanson, Jan and Lars-Gunnar Mattsson (1987) 'Interorganizational relations in industrial systems: A network approach compared with the transaction-cost approach,' *International Studies of Management & Organization,* vol. 17, no. 1, pp. 34-48.

Johnson, B., & Onwuegbuzie, A. (2004) 'Mixed methods research: A research paradigm whose time has come', *Educational Researcher*, vol. 33, no 7, pp. 14-26.

Judge, W.Q., & Ryman, J.A. (2001) 'The shared leadership challenge in strategic alliances: Lessons from the U.S. healthcare industry', *Academy of Management Executive*, vol. 15, no. 2, pp. 71-79.

Kale, P., & Singh, H. (2007) 'Building firm capabilities through learning: The role of the alliance learning process in alliance capability and firm-level alliance success', *Strategic Management Journal*, vol. 28, no. 10, pp. 981-1000.

Kale, P., & Singh, H. (2009) 'Managing strategic alliances: What do we know now, and where do we go from here?', *Academy of Management Perspectives*, vol. 23, no. 3, pp. 45-62.

Kale, P., Singh, H., & Bell, J. (2009) 'Relating well: Building capabilities for sustaining alliance networks', in P.R. Kleindorfer & Y. Wind (Eds) *The Network Challenge: Strategy, Profit, and Risk in an Interlinked World*, pp.353-364. Upper Saddle River, New Jersey: Wharton School Publishing.

Kale, P., Singh, H., & Perlmutter, H. (2000) 'Learning and protection of proprietary assets in strategic alliances: Building relational capital', *Strategic Management Journal*, vol. 21, no. 3, pp. 217-237.

Kanter, R.M. (1994) 'Collaborative advantage: The art of alliances', *Harvard Business Review*, vol. 72, no. 4, pp. 96-108.

Kelly, M.J., Schaan, J.L., & Joncas, H. (2002) 'Managing alliance relationships: Key challenges in the early stages of collaboration', *R&D Management*, vol. 32, no. 1, pp. 11-22.

Kharrazi, H., Chisholm, R., Vannasdale, D., & Thompson, B. (2012) 'Mobile personal health records: An evaluation of features and functionality', *International Journal of Medical Information*, vol. 81, no. 9, pp. 579-593.

Kilo, C.M. (1999) 'Improving care through collaboration', *Pediatrics*, vol. 103, no. 1, pp. 384-393.

Kogut, B. (1988) 'Joint ventures: Theoretical and empirical perspectives', *Strategic Management Journal*, vol. 9, no. 4, pp. 319-332.

Koufteros, X., Vonderembse, M., & Jayaram, J. (2005) 'Internal and external integration for product development: The contingency effects of uncertainty, equivocality, and platform strategy', *Decision Sciences*, vol. 36, no. 1, pp. 97-133.

Kraaijenbrink, J., Spender, J.C., & Groen, A.J. (2010) 'The resource-based view: A review and assessment of its critiques', *Journal of Management*, vol. 36, no. 1, pp. 349-372.

Kumar, R., & Andersen, P. H. (2000) 'Interfirm diversity and the management of meaning in international strategic alliances', *International Business Review*, vol. 9, no.2, pp. 237–252.

Kumar, K., & van Dissel, H.G. (1996) 'Sustainable collaboration: Managing conflict and cooperation in inter-organizational systems', *MIS Quarterly*, vol. 20, no. 3, pp. 279–300.

Lado, A.A., Boyd, N.G., & Hanln, S.C. (1997) 'Competition, co-operation, and the search for economic rents: A syncretic model', *Academy Management Review*, vol. 2, no .1, pp. 110-141.

Lander, M.C., Purvis, R.L., McCray, G.E., & Leigh, W. (2004) 'Trust-building mechanisms utilized in outsourced IS development projects: A case study', *Information and Management*, vol. 41, no. 4, pp. 509-528.

Lasker, R.D., Weiss, E.S., & Miller R. (2001) 'Partnership synergy: A practical framework for studying and strengthening the collaborative advantage', *The Millbank Quarterly*, vol. 79, no. 2, pp. 179-205.

Lavie, D. (2006) 'The competitive advantage of inter-connected firms: An extension of the resource-based view', *Academy of Management Review*, vol. 31, no. 3, pp. 638-658.

Lee, H., & Kelley, D. (2008) 'Building dynamic capabilities for innovation: An exploratory study of key management practices', *R&D Management*, vol. 38, no. 2, pp. 155-168.

Legler, R., & Reischl, T. (2003) 'The relationship of key factors in the process of collaboration', *Journal of Applied Behaviour Science*, vol. 39, no. 1, pp. 53-72.

Leiblein, M.J. (2003) 'The choice of organizational governance form and performance: Predictions from transaction cost, resource-based, and real option theories', *Journal of Management*, vol. 29, no. 6, pp. 937-961.

Lewis, J.M., Baeza, J.I., & Alexander, D. (2008) 'Partnerships in primary care in Australia: Network structure, dynamics and sustainability', *Social Science and Medicine*, vol. 67, no. 2, pp. 280-91.

Li, E.Y., Chen, J.S., & Huang, Y.H. (2006) 'A framework for investigating the impact of IT capability and organizational capability on firm performance in the late industrialising context', *International Journal Technology Management*, vol. 36, no. 1/2/3, pp. 209-229.

Lincoln, Y.S., & Guba, E.G. (1985) *Naturalistic Inquiry*. Beverly Hills, CA: Sage.

Ljungquist, U. (2008) 'Specification of core competence and associated components: A proposed model and a case illustration', *European Business Review*, vol. 20, no. 1, pp. 73-90.

Ludwick, D.A., & Doucette, J. (2009) 'Adopting electronic medical records in primary care: Lessons learned from health information systems implementation experience in seven countries', *International Journal of Medical Informatics*, vol. 78, no. 1, pp. 22-31.

Lui, S.S., & Ngo, H. (2004) 'The role of trust and contractual safeguards on cooperation in non-equity alliances', *Journal of Management*, vol. 30, no. 4, pp. 471-485.

Lunnan, R., & Haugland, S.A. (2008) 'Predicting and measuring alliance performance: A multidimensional analysis', *Strategic Management Journal*, vol. 29, no.5, pp. 545-556.

Mahdizadeh, H., Biemans, H. & Mulder, M. (2008) 'Determining factors of the use of e-learning environments by university teachers', *Computers and Education*, vol. 51, no. 1, pp. 142-54.

Majumdar, S.K. (2000) 'Sluggish giants, sticky cultures, and dynamic capability transformation', *Journal of Business Venturing*, vol. 15, no. 1, pp. 59-78.

Makadok, R. (2001) 'Towards a synthesis of the resource-based and dynamic-capability views of rent creation', *Strategic Management Journal*, vol. 22, no. 5, pp. 387-401.

Mata, F., Furest, W., & Barney, J. (1995) 'Information technology and sustained competitive advantage: A resource-based analysis', *MIS Quarterly*, vol. 19, no. 4, pp. 487-505.

Mayer, K.J. & Argyres, N.S. (2004) 'Learning to contract: Evidence from the personal computer industry', *Organization Science*, vol. 15, no. 4, pp. 394-410.

Mayer, K.J., & Salomon, R.M. (2006) 'Capabilities, contractual hazards, and governance: Integrating resource-based and transaction cost perspectives', *Academy of Management Journal*, vol. 49, no. 5, pp. 942-959.

McIvor, R. (2008) 'How the transaction cost and resource-based theories of the firm inform outsourcing evaluation', *Journal of Operations Management*, vol. 27, no. 1, pp. 45-63.

Melville, N., Kraemer, K., & Gurbaxani, V. (2004) 'Information technology and organizational performance: An integrative model of IT business value', *MIS Quarterly*, vol. 28, no. 2, pp. 283-322.

Mentzas, G., Apostolou, D., Young, R., & Abecker, A. (2001) 'Knowledge networking: A holistic solution for leveraging corporate knowledge', *Journal of Knowledge Management*, vol. 5, no. 1, pp. 94-106.

Merriam, S.B. (1998) *Qualitative Research and Case Study Applications in Education*. San Francisco: Jossey-Bass.

Midwinter, T., & Sheppard, P.J. (2000) 'eCollaboration – "The drive for simplicity"', *BT Technology Journal*, vol. 18, no. 2, pp. 107-115.

Mitsuhashi, H., & Greve, H. R. (2009) 'A matching theory of alliance formation and organizational success: Complementarity and compatibility', *Academy of Management Journal*, vol. 52, no. 5, pp. 975-995

Mohr, A.T., & Puck, J. (2010) 'Control and trust as organising principles for international joint ventures', *International Journal of Strategic Business Alliances*, vol. 1, no. 4, pp. 319-336.

Mohr, J., & Spekman, R. (1994) 'Characteristics of partnership success: Partnership attributes, communication behavior, and conflict resolution techniques', *Strategic Management Journal*, vol. 15, no. 2, pp. 135-152.

Moller, K., & Svahn, S. (2003) 'Managing strategic nets: A capability perspective', *Marketing Theory*, vol. 3, no. 2, pp. 209-234.

Mouttham, A., Kuziemsky, C., Langayan, D., Peyton, L., & Pereir, J. (2012) 'Interoperable support for collaborative, mobile, and accessible health care', *Information Systems Frontiers*, vol. 14, no. 1, pp. 73-85.

Munkvold, B.E. (2005) 'Experiences from global e-collaboration: Contextual influences on technology adoption and use', *IEEE Transactions on Professional Communication*, vol. 48, no. 1, pp. 78-86.

Muthusamy, S.K., & White, M.A. (2005) 'Learning and knowledge transfer in strategic alliances: A social exchange view', *Organization Studies*, vol. 26, no. 3, pp. 415-441.

National Health Board (NHB) (2010) *Trends in Service Design and New Models of Care: A Review*. Wellington: Ministry of Health. Available at: http://www.nationalhealthboard.govt.nz/sites/all/files/trends-service-design-new-models-care-jul2010.pdf.

Nelson, R.R., & Winter, S.G. (1982) *An Evolutionary Theory of Economic Change*. Cambridge, Mass.: Belknap Press.

Nielsen, B.B. (2004) 'The role of trust in collaborative relationships: A multi-dimensional approach', *Management*, vol. 7, no. 3, pp. 239-256.

Nielsen, B.B. (2005) 'The role of knowledge embeddedness in the creation of synergies in strategic alliances', *Journal of Business Research*, vol. 58, no. 9, pp. 1194-1204.

Nielsen, B.B (2007) 'Determining international strategic alliance performance: A multinational approach', *International Business Review*, vol. 16, no. 3, pp. 337-361.

Nielsen, J.S., Boer, H., & Gertsen, F. (2008) 'The influence of learning in collaborative improvement', *International Journal Technology Management*, vol. 42, no. 1, pp. 107-126.

Nolan, T., Brizland, R., & Macaulay, L. (2007) 'Individual trust and development of online business communities', *Information Technology & People*, vol. 20, no. 1, pp. 53-71.

Nonaka, I. (1994) 'A dynamic theory of organizational knowledge creation', *Organization Science*, vol. 5, no. 1, pp. 14-37.

Nooteboom, B. (1996) 'Trust, opportunism and governance: A process and control model', *Organization Studies*, vol. 17, no. 6, pp. 985-1010.

O'Reilly, C. (1989) 'Corporations, culture, and commitment: Motivation and social control in organizations', *California Management Review*, vol. 31, no. 4, pp. 9-25.

Orlikowski, W.J., & Baroudi, J.J. (1991) 'Studying information technology in organizations: Research approaches and assumptions', *Information Systems Research*, vol. 2, no. 1, pp. 1-28.

Osborn, R.N., & Baughn, C.C. (1990) 'Forms of inter-organizational governance for multinational alliances', *Academy of Management Journal*, vol. 33, no. 3, pp. 503-519.

Ouwens, M., Wollersheim, H., Hermens, R., Hulscher, M., & Grol, R. (2005) 'Integrated care programmes for chronically ill patients: A review of health policy and planning', *International Journal for Quality in Health Care*, vol. 17, no. 2, pp. 141 - 146.

Pare, G., Sicotte, C., Jaana, M., & Girouard, D. (2008) 'Prioritizing the risk factors influencing the success of clinical information system projects: A Delphi study in Canada', *Methods of Information in Medicine*, vol. 47, no. 3, pp. 251-259.

Pateli, A. (2009) 'Decision making on governance of strategic technology alliances', *Management Decision*, vol. 47, no. 2, pp. 246-270.

Pateli, A.G., & Giaglis, G.M. (2007) 'Governance contingencies for strategic technology alliances: A case in wireless business', *International Journal Technology Management*, vol. 40, no. 4, pp. 310-328.

Pavlovich, K., & Akoorie, M. (2003) *Strategic Alliances and Collaborative Partnerships: A Case Book*. Palmerston North, NZ: Dunmore Press.

Penrose, E.T. (1959) *The Theory of the Growth of the Firm.* New York: Wiley.

Perri 6, Goodwin, N., Peck, E., & Freeman, T. (2006) *Managing Networks of Twenty-first Century Organizations*. Basingstoke, UK: Palgrave/Macmillan.

Pessoa, A. (2008) 'Public-private partnerships in developing countries: Are infrastructures responding to the new ODA strategy?', *Journal of International Development*, vol. 20, no. 3, pp. 311-25.

Peteraf, M.A. (1993) 'The cornerstones of competitive advantage: A resource-based view', *Strategic Management Journal*, vol. 14, no. 3, pp. 179-191.

Petroni, A. (1998) 'The analysis of dynamic capabilities in a competence-oriented organization', *Technovation*, vol. 18, no. 3, pp. 179-189.

Pham, L.T., & Jordan, E. (2007) 'Information technology capability, the effects on organisational performance', in *Proceedings of the 13th Asia Pacific Management Conference*, pp. 261-269.

Phillips, N., Lawrence, T.B., & Hardy, C. (2000) 'Inter-organizational collaboration and the dynamics of institutional fields', *Journal of Management Studies*, vol. 37, no. 1, pp. 23-43.

Pirnejad, H., Roland, B., & Berg, M. (2008) 'Building an inter-organizational communication network and challenges for preserving interoperability', *International Journal of Medical Informatics*, vol. 77, no. 12, pp. 818-827.

Pittaway, L., Robertson, M., Munir, K., Denyer, D., & Neely, A. (2004) 'Networking and innovation: A systematic review of the evidence', *International Journal of Management Reviews*, vol. 5/6, no. 3&4, pp. 137-168.

Plochg, T., Delnoij, D.M.J., Hogenworst, W.V.G., van Dijk, P., Belleman, S., & Klazinga, N.S. (2006) 'Local health systems in the 21st century: Who cares? – An exploratory study on health system governance in Amsterdam', *European Journal of Public Health*, vol. 16, no. 5, pp. 559-564.

Plsek, P.E., & Wilson T. (2001) 'Complexity science: complexity, leadership and management in healthcare organizations', *British Medical Journal*, vol. 23, no. 8, pp. 707-725.

Podolny, J.M., & Page, K.L. (1998) 'Network forms of organization', *Annual Review of Sociology*, vol. 24, pp. 57-76.

Poppo, L., & Zenger, T. (2002) 'Do formal contracts and relational governance function as substitutes or complements', *Strategic Management Journal*, vol. 23, no. 8, pp. 707-725.

Porter, L.W., Steers, R.M., Mowday, R.I., & Boulian P.V. (1974) 'Organizational commitment, job satisfaction and turnover among psychiatric technicians', *Journal of Applied Psychology,* vol. 59, no. 5, pp. 603-609.

Powell, W.W. (1990) 'Neither market nor hierarchy: Network forms of organization', in L.L. Cummings & B.M. Staw (Eds), *Research in Organizational Behavior Vol. 12*, pp. 295-336. Greenwich, CT: JAI Press.

Powell, W.W., Koput, K.W., & Smith-Doerr, L. (1996) 'Inter-organizational collaboration and the locus of innovation: Networks of learning in biotechnology', *Administrative Science Quarterly*, vol. 41, no. 1, pp. 116-146.

Priem, R.L., & Butler, J.E. (2001) 'Is the resource-based view a useful perspective for strategic management research?', *Academy of Management Review*, vol. 26, no. 1, pp. 22-40.

Provan, K.G., & Milward, H.B. (2001) 'Do networks really work? A framework for evaluating public-sector organizational networks', *Public Administration Review*, vol. 61, no. 4, pp. 414-423.

Provan, K.G., Fish, A., & Sydow, J. (2007) 'Inter-organizational networks at the network level: Review of the empirical literature on whole networks', *Journal of Management*, vol. 33, no. 3, pp. 479-516.

Provan, K.G., Nakama, L., Veazie, M.A., Teufel-Shone, N.I., & Huddleston, C. (2003) 'Building community capacity around chronic disease services through a collaborative network', *Health Education and Behavior*, vol. 30, no. 6, pp. 646-662.

Pullen, A.J.J., Weerd-Nederhof, P.C., Groen, A.J., and Fisscher, O.A.M. (2012) 'Open innovation in practice: Goal complementarity and closed NPD networks to explain differences

in innovation performance for SMEs in the medical devices sector', *Journal of Product Innovation Management*, vol. 29, no.6, pp. 917-934.

Puranam, P., & Vanneste, B.S. (2009) 'Trust and governance: Untangling a tangled web', *Academy of Management Review*, vol. 34, no. 1, pp. 11-31.

Racine, D.P. (2006) 'Reliable effectiveness: A theory on sustaining and replicating worthwhile innovations', *Administration and Policy in Mental Health Services Research*, vol. 38, no. 3, pp. 356-387.

Ratnasingham, A. (1998) 'Trust in web-based electronic commerce security', *Information Management and Computer Security*, vol. 6, no. 4, pp. 166-162.

Reuer, J.J., & Arino, A. (2007) 'Strategic alliance contracts: Dimensions and determinants of contractual complexity', *Strategic Management Journal*, vol. 28, no. 3, pp. 313-330.

Reuer, J., & Zollo, M. (2000) 'Managing governance adaptations in strategic alliances', *European Management Journal,* vol. 18, no. 2, pp. 162-172.

Ring, P.S., & Van de Ven, A. (1994) 'Developmental processes of co-operative inter-organizational relationships', *Academy of Management Review,* vol. 19, no. 1, pp. 90-118.

Ritchie, J., & Lewis, J. (2003) *Qualitative Research Practice: A Guide for Social Science Students and Researchers*. London: Sage.

Ritter, T., & Gemünden, H.G. (2003) Network competence: Its impact on innovation success and its antecedents', *Journal of Business Research*, vol. 56, no. 9, pp. 745-755.

Ritter, T., & Gemünden, H.G. (2004) 'The impact of a company's business strategy on its technological competence, network competence and innovation success', *Journal of Business Research*, vol. 57, no. 5, pp. 548-556.

Robson, M.J., Skarmeas, D., & Apyropoulou, S. (2006) 'Behavioural attributes and performance in international strategic alliances: Review and future directions', *International Marketing Review*, vol. 23, no. 6, pp. 585-609.

Ross, J.W., Beath, C.M., & Goodhue, D.L. (1996) 'Develop long-term competitiveness through IT assets', *Sloan Management Review*, vol. 38, no. 1, pp. 31-42.

Rothaermel, F., & Boeker, W. (2008) 'Old technology meets new technology: Complementarities, similarities, and alliance formation', *Strategic Management Journal*, vol. 29, no. 1, pp. 47-77.

Royer, S., & Simons, R. (2009) 'Evolution of co-operation and dynamics of expectations-Implications for strategic alliances', *International Journal of Strategic Business Alliances*, vol. 1, no. 1, pp. 73-88.

Rowlands, B. (2003) 'Employing interpretive research to build theory of information systems', *Australasian Journal of information Systems*, vol. 10, no. 2, pp. 3-22.

Rycroft, R.W. (2007) 'Does cooperation absorb complexity? Innovation networks and the speed and spread of complex technological innovation', *Technological Forecasting and Social Change*, vol. 74, no. 5, pp. 565-578.

Safran, C. (2003) 'The collaborative edge: Patient empowerment for vulnerable populations', *International Journal of Medical Informatics*, vol. 69, no. 2/3, pp. 185-190.

Sako, M. (2006) 'Does trust improve business performance?', in R.M. Kramer (Ed), *Organizational Trust*: *A Reader*, pp. 267-292. Oxford: Oxford University Press.

Sampson, R.C. (2005) 'Experience effects and collaborative returns in R&D alliances', *Strategic Management Journal*, vol. 26, pp. 1009-1031.

Sarkar, M.B., Echambadi, R., Cavusgil, S.T., & Aulakl, P.S. (2001) 'The influence of complementarity, compatibility, and relationship capital on alliance performance', *Journal of the Academy of Marketing Science*, vol. 29, no. 4, pp. 358-373.

Scheirer, M. A. (2005). 'Is sustainability possible? A review and commentary on empirical studies of program sustainability', *American Journal of Evaluation*, vol. 26, no. 3, pp. 320–347.

Schreiner, M., Kale, P., & Corsten, D. (2009) 'What reality is alliance management capability and how does it impact alliance outcomes and success', *Strategic Management Journal*, vol. 30, no. 13, pp. 1395-1419.

Schreyogg, G., & Klisch-Eberl, M. (2007) 'How dynamic can organizational capabilities be? Towards a dual-process model of capability dynamization', *Strategic Management Journal*, vol. 28, no. 9, pp. 913-933.

Schweitzer, J., & Gudergan, S.P. (2011) 'Contractual complexity, governance and organisational form in alliances', *International Journal of Strategic Business Alliances*, vol. 2, no. 1/2, pp. 26-40.

Shachaf, P. (2008) 'Cultural diversity and information and communication technology impacts on global virtual teams: An exploratory study', *Information and Management*, vol. 45, no. 2, pp. 131-142.

Shah, R.H., & Swaminathan, V. (2008) 'Factors influencing partner selection in strategic alliances: The moderating role of alliance context', *Strategic Management Journal*, vol. 29, no.5, pp. 471-494.

Shapiro, D.L., Sheppard, B.H., & Cheraskin, L. (1992) 'Business on a handshake', *Negotiation Journal*, vol. 8, no. 4, pp. 365–377.

Shenton, A.K. (2004) 'Strategies for ensuring trustworthiness in qualitative research projects', *Education for Information*, vol. 22, no. 2, pp. 63-75.

Sicotte, C., Pare, G., Moreault, M.P., & Paccioni A. (2006) 'A risk assessment of two inter-organizational clinical information systems', *Journal of the American Medical Informatics Association*, vol. 13, no. 5, pp. 557-566.

Silverman, D. (2000) *Doing Qualitative Research: A Comprehensive Guide*. London: Sage.

Sirmon, D.G., Hitt, M.A., & Ireland, R.D. (2007) 'Managing firm resources in dynamic environments to create value: Looking inside the black box', *Academy of Management Review*, vol. 32, no. 1, pp. 273-292.

Spekman, R.E., Isabella, L., Macavoy, T., & Forbes, T. (1996) 'Creating strategic alliances that endure', *Long-Range Planning*, vol. 29, no. 3, pp. 346-357.

Stake, R.E. (1995) 'Qualitative case studies', in N.K Denzin & Y.S. Lincoln (Eds), *Handbook of Qualitative Research* (3rd edition), pp. 443-466. Thousand Oaks, CA: Sage.

Stieglitz, N., & Heine, K. (2007) 'Innovations and the role of complementarities in a strategic theory of the firm', *Strategic Management Journal*, vol. 28, no. 1, pp. 1-15.

Strauss, A. & Corbin, J. (1998) *Basics of Qualitative Research: Techniques and Procedures for Developing Grounded Theory*. London: Sage.

Sydow, J., & Windeler, A. (1998) 'Organizing and evaluating interfirm networks: A structurationist perspective on network processes', *Organization Science*, vol. 9, no. 3, pp. 265-284.

Taylor, S. (2005) 'An operations perspective on strategic alliance success factors: An exploratory study of alliance managers in the software industry', *International Journal of Operations and Production Management*, vol. 25, no. 5, pp. 469-490.

Teece, D.J. (1986) 'Profiting from technological innovation: implications for integration, collaboration, licensing and public policy', *Research Policy*, vol. 15, no. 6, pp. 285-305.

Teece, D.J. (2007) 'Explicating dynamic capabilities: The nature and microfoundations of (sustainable) enterprise performance', *Strategic Management Journal*, vol. 28, no. 13, pp. 1319-1350.

Teece, D.J., Pisano, G., & Shuen, A. (1997) 'Dynamic capabilities and strategic management', *Strategic Management Journal*, vol. 18, no. 7, pp. 509-533.

Teo, T.S.H., & Ranganathan, C. (2003) 'Leveraging IT resources and capabilities at the housing and development board', *Journal of Strategic Information Systems*, vol. 12, no. 3, pp. 229-249.

Thimm, H., & Rasmussen, K.B. (2009) 'An information support service for moderators of SME company networks'*, Management Research News*, vol. 32, no. 9, pp. 846-857.

Thomas, J.B., & Trevino, L.K. (1993) 'Information processing in strategic alliance building: A multiple-case approach', *Journal of Management Studies*, vol. 30, no. 5, pp. 779-814.

Tippins, M.J., & Sohi, R.S. (2003) 'IT competency and firm performance: Is organizational learning a missing link', *Strategic Management Journal*, vol. 24, no. 8, pp. 745-761.

Todeva, E., & Knoke, D. (2005) 'Strategic alliances and models of collaboration', *Journal of Management Decision*, vol.43, no.1, pp.123-148.

Tolich, M., & Davidson, C. (1999) *Starting Fieldwork: An Introduction to Qualitative Research in New Zealand*. Auckland: Oxford University Press.

Turrini, A., Cristofoli, D., Frosini, F., & Nasi, G. (2010) 'Networking literature about determinants of network effectiveness', *Public Administration*, vol. 8, no. 2, pp. 528-550.

Tushman, M.L., & Nadler, D.A. (1978) 'Information processing as an integrating concept in organizational design', *Academy of Management Review*, vol. 3, no. 3, pp. 613-624.

Uzzi B. (1997) 'Social structure and competition in interfirm networks: The paradox of embeddedness', *Administrative Science Quarterly* , vol. 42. Pp. 35-67.

Vangen, S., & Huxham, C. (2003) 'Nurturing collaborative relations: Building trust in inter-organizational collaboration', *Journal of Applied Behavioral Science*, vol. 39, no. 1, pp. 5-31.

Varadarajan, P.R., & Cunningham, M.H. (1995) 'Strategic alliances: A synthesis of conceptual foundations', *Journal of the Academy of Marketing Science*, vol. 23, no. 4, pp. 282-296.

Vatanasombut, B., Igbaria, M., Stylianou, A.C., & Rodgers, W. (2008) 'Information systems continuance intention of web-based applications customers: The case of online banking', *Information and Management*, vol. 5, no. 7, pp. 410-428.

Venkatesh, V., & Davis, F.D. (2000) 'A theoretical extension of the technology acceptance model: Four longitudinal field studies', *Management Science*, vol. 46, no. 2, pp. 186-204.

Wade, M.W., & Hulland, J. (2004) 'The resource-based view and information systems research: Review, extension, and suggestions for future research', *MIS Quarterly*, vol. 28, no. 1, pp. 107-142.

Walter, J., Lechner, C., & Kellermanns, F.W. (2007) 'Knowledge transfer between and within alliance partners: Private versus collective benefits of social capital', *Journal of Business Research*, vol. 60, no. 7, pp. 698-710.

Weiss, E.S., Anderson, R.M., & Lasker, R.D. (2002) 'Making the most of collaboration: Exploring the relationship between partnership synergy and partnership functioning', *Health Education and Behavior*, vol. 29, no. 6, pp. 683-698.

Wernerfelt, B. (1984) 'A resource-based view of the firm', *Strategic Management Journal*, vol. 5, no. 2, pp. 171-180.

Williamson, O.E. (1985) *The Economic Institutions of Capitalism*. New York: Free Press.

Williamson, O.E. (1991) 'Comparative economic organization: The analysis of discrete structural alternatives', *Administrative Science Quarterly*, vol. 36, no. 2, pp. 269-296.

Winkler, I. (2006) 'Network governance between individual and collective goals: Qualitative evidence from six networks', *Journal of Leadership and Organizational Studies*, vol. 12, no. 3, pp. 119-134.

World Health Organization (2012) *World Health Statistics 2012*. Geneva: WHO Press. Available at: http://www.who.int/gho/publications/world_health_statistics/2012/en/.

Wu, F., & Cavusgil, T. (2006) 'Organizational learning, commitment and joint value creation in inter-firm relationships', *Journal of Business Research*, vol. 59, no. 1, pp. 81-89.

Yazici, H.J. (2002) 'The role of communication in organizational change: An empirical investigation', *Information and Management*, vol. 39, no. 1, pp. 539-552.

Yin, R. (2003) *Case Study Research: Design and Methods* (3rd edition). Beverly Hills, CA: Sage.

Zaheer, A., & Bell, G. (2005) 'Benefiting from network position: Firm capabilities, structural holes, and performance', *Strategic Management Journal*, vol. 26, no. 9, pp. 809-825.

Zaheer, A., Gözübüyük, R., & Milanov, H. (2010) 'It's the connections: The network perspective in interorganizational research', *Academy of Management Perspectives*, vol. 24, no. 1, pp. 62-77.

Zahra, S., Sapienza, H., & Davidsson, P. (2006) 'Entrepreneurship and dynamic capabilities: A review, model and research agenda', *Journal of Management Studies*, vol. 43, no. 4, pp. 917-955.

Zikmund, W.G. (2003) *Business Research Methods* (7th edition). Ohio: South-Western.

Zineldin, M. (1998) 'Towards an ecological collaborative relationship management', *European Journal of Marketing*, vol. 32, no. 11, pp. 1138-1164.

Zollo, W., & Winter, S.G. (2002) 'Deliberate learning and the evolution of dynamic capabilities', *Organization Science*, vol. 13, no. 3, pp. 339-351.

# Appendix A

**INTERVIEW QUESTIONS**

1. Can you please describe the nature, scope and history of the collaborative network?
2. What was your involvement in the collaborative network?
3. What was your organization's role in the collaborative network?
4. What was your organization's motivation for participating in the collaborative network?

5. To what extent were the benefits your organization hoped to achieve realised?

6. What challenges did your organization face in participating in this collaborative project?

7. To what extent was the collaborative network successful?

8. How would you characterise the collaboration that took place in the collaborative network?

9. What resources and mechanisms, including information and communication technologies, did the various parties use to work together? (e.g. to communicate and share information, to cooperate and collaborate)

10. Were the resources available for these purposes adequate?

    ➢ Was there any training provided?

    ➢ Does this project require any IT skills?

11. How would you describe the 'culture' of the collaboration that occurred in the collaborative network?

12. Do you think the members of the collaborative network were able to work together to achieve the project's goals and objectives?

13. To what extent do you think the various parties involved shared the same values and understanding of the goals and objectives for the collaborative network?

14. How would you describe the level of commitment to the collaborative network shown by the various parties involved?

15. How would you describe the level of trust between the various parties involved in the collaborative network?

16. How open was the communication between the various parties involved in the collaborative network?

17. Were members of the collaborative network able to reach agreement on critical issues or resolve conflicts? How was that achieved?

18. How was governance of the project established and performed in practice? (e.g. formal agreements, contractual arrangements, project leadership, business models)

19. To what extent did learning take place by and between the various parties within the collaborative network? (e.g. learning about the content of the project, learning about partners, learning about managing the collaboration)

20. Do you think that your organization's (or other parties') past collaboration experiences played an important part in managing the collaboration?

21. How were the costs and revenues shared between the parties?

22. In your opinion, what was the most important issue affecting collaboration in the collaborative network?

# Appendix B

# Participant
# Information Sheet

**AUT**
**U N I V E R S I T Y**
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

**Date Information Sheet Produced:**     **23 July 2010**

**Project Title:** **Sustainability in ICT-Enabled Collaborative Networks**

**An Invitation**

My name is Josephine Chong and I am a postgraduate student at AUT University. I am currently undertaking research for a Doctor of Philosophy thesis.

I am conducting a series of interviews in order to obtain a current and detailed understanding of how organizations sustain their collaborative networks. By sustainability I mean an organization's capability to maintain an ongoing collaborative inter-organizational relationship. This is an important aspect to research as while many organizations are forming collaborative networks in order to improve their performance, and we understand the motives and benefits for participating in collaborative networks, the area of sustaining collaborative networks is less well explored.

I invite you to participate in my research. You have been selected as someone who could provide a helpful perspective on the sustainability of a collaborative network. Your experiences, views and comments on this topic would be a valuable source of information for my research.

Participation is voluntary and you are under no obligation to be interviewed. If you agree to be interviewed I will ask you to sign a consent form that, together with this information sheet, outlines your role in the project and how I will respect your rights as a research participant. I will not ask for personal information or for commercially sensitive information. You are free to not answer a question and may withdraw from the interview at any time.

**What is the purpose of this research?**

The purpose of this research is to better understand how organizations can sustain their collaborative networks. Data collected in the study will be used as part of a thesis for the Doctor of Philosophy degree from AUT University. Findings from this research may also be presented in academic conference and journal papers.

**How was I chosen for this invitation?**

I have identified your organization as one that participates in a collaborative network with other organizations.  Your organization has provided a list of people, from which we are hoping to establish participants in the study. As a manager or employee overseeing or involved in these collaborative activities, you are someone who can provide a helpful perspective on the sustainability of your organization's collaborative network.

**What will happen in this research?**

I would like to interview you for about an hour at a location and time convenient to you. The interview will be conducted by me, under the guidance of my supervisor, Professor Bill Doolin from AUT University. I would like to audiotape the interview so that I have an accurate record of the interview, but this would only be done with your consent. A transcript of the interview will be prepared by me, and will only be read by me and my supervisor.

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**What are the discomforts and risks and how will these discomforts and risks be alleviated?**

I do not anticipate any discomfort or risk arising from your participation in this study. Your responses will be used for academic purposes only. No data will be provided to a third party. I will not ask for personal information or for commercially sensitive information. You are free to not answer any question and may withdraw from an interview at any time. Your name and that of your organisation will not be identified in the thesis or any subsequent publication.

**What are the benefits?**

The outcome of the research may be a better understanding of how organizations can sustain their collaborative networks. The findings may be of interest to you or your organisation. In addition, it may provide an important contribution to academic knowledge in this area.

**How will my privacy be protected?**

The findings from this research will form part of my Doctor of Philosophy thesis, and may also be presented in academic conference and journal papers. In all cases, the findings will be aggregated so that your comments will not be linked to you personally. Your name or your organisation's name will not be used. If I quote your comments directly, the quote will only be attributed to a pseudonym or generic position title and not to you personally. At the conclusion of the research, consent forms and data from the study will be stored in my supervisor's office at AUT University for six years, before being destroyed.

**What are the costs of participating in this research?**

The only anticipated cost to you is approximately one hour of your time to participate in an interview.

**How do I agree to participate in this research?**

I would appreciate it if you could consider this invitation and inform me your decision (contact details are provided below) when you have had a chance to read this information sheet. If you do agree to participate in an interview, I will ask you to read and sign the consent form to indicate your informed consent at the time of the interview.

**Will I receive feedback on the results of this research?**

If you are interested, I will send you a summary of the research findings upon request.

**What do I do if I have concerns about this research?**

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Professor Bill Doolin, *bill.doolin@aut.ac.nz*, (09) 921 9999 extn. 5807.

Concerns regarding the conduct of the research should be notified to the Executive Secretary, AUTEC, Madeline Banda, *madeline.banda@aut.ac.nz* , 921 9999 ext 8044.

**Whom do I contact for further information about this research?**

*Researcher Contact Details:*

Josephine Chong
AUT University Business School
Tel: 021 632898
E-Mail: jochong@aut.ac.nz

*Project Supervisor Contact Details:*

Professor Bill Doolin
AUT University Business School
Private Bag 92006
Auckland
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E-Mail: bill.doolin@aut.ac.nz

*Approved by the Auckland University of Technology Ethics Committee on 6 July 2009, AUTEC Reference number 09/133.*

This version was last edited on 3 December 2007

# Consent Form

**AUT** UNIVERSITY
TE WĀNANGA ARONUI O TAMAKI MAKAU RAU

*Project title:* Sustainability in ICT-Enabled Collaborative Networks

*Project Supervisor:* Dr Bill Doolin, Professor of Technology and Organisation

*Researcher:* Josephine Chong, PhD student

○ I have read and understood the information provided about this research project in the Information Sheet dated 23 July 2010.

○ I have had an opportunity to ask questions and to have them answered.

○ I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.

○ I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.

○ If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.

○ I agree to take part in this research.

○ I wish to receive a copy of the report from the research (please tick one): Yes○   No○

Participant's signature: .........................................................................................................................

Participant's name: .........................................................................................................................

Participant's Contact Details (if appropriate):

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Date:

**Approved by the Auckland University of Technology Ethics Committee on 6 July 2009, AUTEC Reference number 09/133.**

*Note: The Participant should retain a copy of this form.*

This version was last edited on 3 December 2007