Rapid Alignment of Resources and Capabilities in Time-bound Networks: The Case of Construction Projects in Dubai-UAE

by

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Author's Declaration

I hereby declare that I am the sole author of this thesis. This is a true copy of the thesis, including any required final revisions, as accepted by my examiners.

I understand that my thesis may be made electronically available to the public.

Abstract

Researchers studying the alignment of business resources usually focus on business cases that inherently have a going-concern interaction built on long-term relationships at the firm level (e.g., Barney, 1991) dyadic level (e.g., Eisenhardt & Martin, 2000) or the broader network level (e.g., Dyer, 1996). Resource alignment is usually flexible in terms of the timeline for identifying and aligning resources and resource engagement. While contractual limitations can be applied to resource alignment, resource engagement holds a notion of persistent value adding relationship. However, there are multitudes of contexts where relationships are bounded by the limited life of a project and by the way where resources must be rapidly aligned and managed. Examples exist in sectors as diverse as construction, filmmaking, and oil exploration.

The study examined theories and empirical studies of resource alignment ranging from resource-based views (e.g., Wernerfelt, 1984) to more complex network views of social organizational interactions (e.g., Gulati et al., 2000). The majority of these literatures treat the development of business relationships and the acquisition of resources as a phenomenon that occurs over an extended period. Time-bound transactions challenge these theoretical perspectives built around the longevity of inter-organizational relations. Thus, the key strategic management problem this research addresses is how resources and capabilities can be rapidly aligned and managed in a time-bound network to achieve sustainable competitive advantages (SCA) at the network level.

The fieldwork was conducted on more than 20 construction projects in the United Arab Emirates. Using secondary source data, I mapped the projects' networks and interviewed 45 industry experts about the resources and capabilities their firms bring to the network, and how quickly they can be aligned to achieve the objectives of the project. The interviews were conducted over 11 months between 2011 and 2012 and amounted to more than 20 hours of audio and hundreds of notes including network sketches. I also investigated the transfer of resources and capabilities that may help network members to increase their competitive advantage when bidding on future projects. The benefits of long-term relationships are evident in any business; however, firms in the project-based construction industry often cannot reap those benefits. This study built upon theories of network-based resource alignment in the extreme situation of time-bound projects.

The two-phase qualitative research approach relied on intensive interviews with key decision makers. Template analysis was used as the primary method of data analysis. This research's primary finding is that there is no evidence of the concept of sustainable competitive advantage at the network level, while it is evident at the firm level. Other findings confirm that the events of full replication and non-replication of networks after project completion do not exist nor do decision makers favour them. While these findings imply the lack of attention to the benefits of contributing to a network, the more apparent scenario is replication of parts of a network, which is a result of two factors: 1) capabilities developed at firm level, which in return develop resources, and other capabilities, 2) movement of resources across network entities.

The results shed light on decision-making techniques for efficient management of resources in time-bound business transactions such as construction and other projects. However, they may also generalize to dynamic business situations such as the entry of a firm into a new market or the entrepreneurial start-up of a new company in which resources must also be quickly aligned.

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1 INTRODUCTION

1.1 Research question

Researchers studying the development and alignment of business resources concentrate on situations that have the potential to build on, and benefit from, long-term relationships at the firm level (e.g., Barney, 1991) dyadic level (e.g., Eisenhardt & Martin, 2000) or the broader network level (e.g., Dyer, 1996). In such conditions, resources aligned at the firm or network level to gain sustainable competitive advantage usually have the advantage of time flexibility in terms of: 1) the timeline for identifying and aligning resources; and 2) resource engagement. While contractual limitations may be applied to resource engagement, the spirit of association has a notion of persistent relationship that favours continuous value addition.

This research examines existing theories and studies of resource alignment ranging from resource-based views (e.g., Wernerfelt, 1984) to the more complex networks of social organizational interactions (e.g., Gulati et al., 2000). The majority of the literature discusses the development of business relationships that target the acquisition of resources over an extended period. In contrast, this research looks at a context where relationships are bounded by the limited life of a project and by the way in which resources must be rapidly aligned and managed such as in the construction industry. Thus, the key problems investigated by this research are how resources are:

- *rapidly aligned in a time-bound network, and*
- *managed in a time-bound network to achieve sustainable competitive advantages at the network level.*

The first research question can be addressed in the context of the common strategic make-or-buy decision process. If we were to reduce the whole network into one entity that compresses all activities into a “one-stop-shop” firm, we would be looking at a

scenario equivalent to Robinson Crusoe building his own house on a tropical island with all the resources and capabilities possessed by one source. This research was conducted in the real world of business rather than on a tropical island; hence, project developers and all downstream entities exercise their options to make or buy through a vertically integrated network. This research adopts Loasby's (1998) view that a firm is a specialized system of limited internal resources and competences that is embedded in and relies on a network of external resources and competences. Chang (2006) integrated the resource-based view (RBV) with transaction cost economics (TCE) to study the strategic decision of subcontracting in construction. Based on the TCE perspective, he highlighted that a firm decides to deal with a subcontractor after a long trial period to reach a state of settlement, which is not a common feature of a time-bound construction project. With the fundamental objective of maximizing the net benefits of production costs and transaction costs, Chang assumed that the efficiency of subcontracted construction firms is at the same level due to the equal availability of technology. This results in tight competition in a cyclical workload that encourages subcontracting. This is in line with the social network structures addressed in this research.

The second research question addresses sustainable competitiveness at the network level. The purpose of this identification is to justify the replication of benefits gained from one project through continuous business interaction after project completion. As will become apparent in this dissertation, none of the studied projects showed a full replication of its organizational network on new construction projects. Therefore, empirical evidence from this study will provide a theoretical and practical understanding of the alignment of resources and capabilities in the specific business environment of time-bound networks. Analysis of in-depth interviews with industry experts reveals the importance of monitoring and managing key resources, and capabilities. Successful management of these resources and capabilities contributes to partial replication of networks with the objective of successfully delivering construction projects within budgets.

Early perspectives on firm assets by Penrose (1959) and more recently Teece (1984) suggest that unique competitive advantages are driven by internal strategies that require

acquisition and development of resources to achieve ongoing advantages. The resource-based view defines contributors to sustainable competitiveness of a firm as resources that are valuable, rare, inimitable, and difficult to substitute (Wernerfelt, 1984; Barney, 1991).

Beyond specific tangible assets, the dynamic capabilities view provides an explanation of the possibility of developing resources through interdependency on external factors. For example, Eisenhardt and Martin (2000) refer to the managerial ability of forming alliances as a dynamic capability. Zollo and Winter (2002) attribute organizational learning to dynamic capabilities, and, recently Chen and Lee (2008:78) found that "external linkages, previous experience, repeated practice, experience, codification and the integration power of managers play key roles in developing dynamic competitive capabilities". The commonality in the dynamic capabilities view is that time presents an essential factor in building such capabilities, and that capabilities create competitive advantages that help to accumulate value over time. However, business transactions that are time-bound, such as construction projects, challenge the theoretical perspectives built around the longevity of inter-organizational relations.

1.2 Theoretical justification

Based on the assumption that a firm belongs to an economic exchange system of resources, the focus on a firm's relationship with its external actors has been explored since the middle of the 20th century. Several pioneering researchers have provided a solid foundation to the study of networks. Among them are the theory of firm growth by Penrose (1959) and the economic perspectives of Alchaian and Demsetz (1972) on specialization and cooperation, and the inter-organizational views of Van de Ven (1976). Porter's (1980) strategic management approach to the role of industries in a firm's creation of value also paved the way to understanding networks. These studies agree that resource interactions aim at sustainable advantages driven by strategies based on alliances, knowledge transfer, or other long-term associations.

In their introduction to industrial networks, Axelsson and Easton (1992) cite the fundamental role of long-term and stable organizational relationships in International Marketing and Purchasing (IMP) research. With the recognition of the interdependency of organizational resources at the firm and network levels, many researchers have focused on capabilities that link to external resources. In order to adapt to dynamic business challenges, firms need to devise strategies that enhance availability or accessibility to external resources that are important to an organization's survival. According to Van de Ven and Walker (1984) such interactions need coordination that leads to less consideration of the organizational objectives of other firms. Therefore, the resource dependence view within organization theory (Ulrich & Barney, 1984) describes organizations as vulnerable to competition if they allow other organizations to control vital resources. Research has addressed the balance between dependence on external resources and the risk of losing control. Inter-organizational relationships represent a trade-off between access to resources and independence. Daft (2004:140) suggests that firms "maintain their autonomy" through strategies that include acquiring equity in suppliers, or even developing long-term joint ventures to secure resources. During a period when competition became fiercer and internationalization increased, the collaborative network perspective replaced the resource-dependence view to align resources, and meet customer demands through alliances (Daft, 2004).

Most of the theoretical work cited in this introduction addresses firm and network resource alignments that have long-term objectives of sustainability built into their modes of operation. This is suitable for such industries as manufacturing, hospitality, and consumer services. However, some business transactions possess very rigid conditions of execution, especially with respect to the periods of resource engagement. Example sectors that fit into this category are the construction and film industries. A primary feature of these industries is the time-bound nature of resource alignment. Interactions must take place swiftly, resources must be aligned rapidly, and activities or competencies that are integral to competitive advantage may be subcontracted to other members of the network. Therefore, limitations apply to the time allowed for aligning resources, followed by a definite period of engagement. This rigid environment creates complexities that

compel each member of the network to focus on completing the project without regard to long-term sustainable competitive advantages that may be created by a more flexible interaction. Subsequently, members of a time-bound network are faced with short-term objectives that are governed by the life of the project.

This research studied the alignment and combination of resources at the firm and network levels. The study was developed with a unique focus on evaluating the characteristics that determine the positioning of resources with respect to the firm; i.e., internally or externally. Preliminary work was dedicated to understanding firm-level resources and network-based capabilities. This was followed by a literature review to explore the resources that contribute to a firm's, or to a network's, competitiveness.

Extant literature focuses on resource alignment and on the application of sustainable competitiveness to organizational interactions that are oriented towards manufacturers or service providers (e.g., Anand & Khanna, 2000; Dyer, 1996; Isobe et al., 2000; Ritter et al., 2003; Waluszewski & Johanson, 2007). While this is a fair characterization of industrial sectors such as steel manufacturing (e.g., Gadde & Hakinsson, 2008) or hospitality (e.g., Robaina & Rodriguez, 2007; Salgado, 2003) several sectors have received less attention with regard to the understanding of sustainable competitive advantage. The construction sector, for instance, involves a wide array of business transactions among networked companies that have very limited choices in terms of resource selection, duration of engagement, and modes of interaction.

This research enhances understanding of the alignment of resources that contribute to sustainable competitive advantages as capabilities attributed to internal processes of the firm or competencies that build on the firm's presence within a network. A project-based transaction (PBT) is a business transaction that is capital-intensive, time-bound, and involves non-routine tasks offering customized outputs through a consortium of specialized firms. While PBT may be generalized to a wide array of industries, this research uses the construction sector as a domain of application through an industry level case study approach.

This study characterizes the strategic choices of PBT owners when aligning resources to prioritize the building of sustainable competitive advantages. The unit of analysis is a network comprising the main project developer, contractor, consultants, architects, subcontractors, and suppliers. For instance, a property developer investing in a new project will form a consortium that will grow into a network aligning various resources to execute the project within a certain period. The main objective of this research is to evaluate the linkage of resources to identify the potential for a sustainable competitive advantage of the network after the completion of the project.

Although the study alternates between the firm and the network, the research is set within networks. Among the principles adopted in this research are those of Gulati et al. (2000) on the importance of strategic networks in linking a firm's performance to the network to which it belongs. These principles are described in Chapter 2. However, while this view is applicable to long-term relationships, it falls short of defining the parameters of short-term commitments such as those of the construction industry where objectives set by decision makers are limited to the life of the project.

The research aims at positively contributing to the strategic management literature and to participants in time-bound networks. The research integrates early literature on firm-level competence (e.g., Teece et al., 2002) that contributes to the formation of networks (e.g., Alchain & Demsetz, 1972) aiming for sustainable competitiveness in the newly demonstrated dimension of time-bounded networks. The literature has addressed competitive advantages for both goods and service providers; however, several business sectors in the category of service providers seem to possess features that are worth exploring when it comes to the strategic management of their value chains. In this research the terms "resource combining", "resource coupling", "resource alignment", and "resource matching" are used interchangeably to describe the processes of creating flows and links among organizational resources.

This study investigates resource alignment in a project-based industry, rather than the industries typically studied that have continuous or open-ended production processes.

Although the research findings apply to resource alignment in a wide array of transactions, a novel contribution to the academic literature provides a ground to explore resource alignment in project-based transactions. Project-based transactions possess the following features:

- Time-bound: A project-based transaction has an announced completion date after which all interconnectivities will terminate. This is because contractual obligations end as soon as the objectives are met.
- Non-routine sequential tasks: The construction activities are usually a complex coordination of sequential tasks.
- Capital-intensive: In this research, PBT is viewed as capital-intensive in terms of the value of the product, such as a commercial tower.
- Customized output: The end product of a PBT possesses a unique design and specifications that meet certain needs of the project owner.

Transactions conducted in traditional manufacturing industries assume business continuity with clients and suppliers for durations that exceed the conclusion of interim dealings. For instance, a first-tier supplier of aluminum frames to an automaker will invest in equipment designed according to certain specifications; therefore, in addition to the network's natural drive to maintain the dyadic customer-supplier links, the manufacturer will strive to manage transaction costs by sustaining its long-term competitiveness within the network. Similarly, service providers such as banks aim for long-term business associations with the same clients, thus enhancing their profitability. Such long-term advantage is not necessarily available for a time-bound PBT.

A construction project is a capital intensive PBT that involves sequential activities starting from the time of laying the tower foundations. A specialized firm demobilizes from the construction site as soon as its role is completed to allow another firm to start its activity. Other firms have overlapping tasks that also run in parallel. Dubois and Gadde (2002) view this transfer of roles as a source of complexity in the construction industry. This complexity is magnified by the need for a dynamic alignment of resources and

capabilities. In their study of time-compression diseconomies, Pacheco-de-Almeida and Zemsky (2007) combine strategic management with microeconomic modeling to assess firm-level resource development. Beginning with the premise that it takes time to develop firm resources, they show that diminishing returns to effort result in a time-cost trade-off. This concept adds another challenge to PBT owners. The natural drive of project dynamics to align resources in relatively shorter periods leads to financial burdens.

Practitioners in the construction industry have been criticized for leading the sector into operational inefficiency and sub-optimization at the macro level (Cox & Thompson, 1997; Gann, 1996). This is due to focusing on short-term business objectives. The main effect has been felt in the industry's delayed improvement in technical innovation. Dubois and Gadde (2002) agree with this opinion because the loosely coupled system at industry level causes innovation to suffer. However, they argue that this loose coupling provides the ground to support the tight coupling at the project level. Dubois and Gadde (2002) therefore conclude that the coupling dynamics at the project and industry levels are a convenient match for the inherent complexity in the construction sector. According to this perspective, the project level resembles short-term resource engagement, while the industry level corresponds to longer-term interaction that exceeds a single project.

Dubois and Gadde (2002) evaluated the patterns of system couplings in the construction sector. They describe a construction project as a "specific temporary network" that operates within a "more permanent network" (Dubois & Gadde, 2002: 624). This laid the foundation for this research study in that managing the resources for a time-bound temporary PBT may carry a different strategy from a longer-term objective that would hold for a more permanent business strategy. In terms of resource coupling, Dubois and Gadde found that construction projects follow tight couplings within the framework of individual projects but follow loose couplings in a permanent network or on a global level of the industry. This view is based on the idea that a construction project is a single point in time with neither a collective specific history, nor a clear future beyond the transaction. This is the primary point of departure in this research where historical

interactions and future potential links form the foundation for strategic management of resources for firms seeking sustainable competitive advantages.

Beach et al. (2005) propose a more specific approach to resource alignments with a long-term objective in the construction industry. They studied the development of partnership in the construction industry to evaluate the elements of successful collaboration in strategic long-term partnerships. They report three key elements: commitment from management, organizational processes demonstrated in communication, and tools such as innovation approach and team integrations. In such approaches that are similar to network strategies, the motivation of competitive advantage is to strengthen the barriers of entry given the long-term duration. In this research, the objective is to sustain the relationship beyond the life of the project. However, it is assumed that the barriers of entry fall upon the conclusion of each project; and will then require formulating and entering into new contractual links.

1.3 Practical justification

During the initial stages of this research, the United Arab Emirates was preparing to open the world's tallest skyscraper. Burj Khalifah contains a signature hotel, residential units and office units. The building, which is more than 800 meters high, is a record-breaking achievement for structural engineers and material scientists. Another impressive achievement is the coordination of resources offered by 160 firms from 100 countries working on a single construction site over five years. The UAE is home to many other iconic structures that required the synchronization of resources and activities for temporary networks that are established, developed, and then terminated throughout the limited life of a construction project. According to Emporis, a public provider of building information (http://emporis.com) in 2012 the city of Dubai had constructed more than 1,800 buildings in the last 30 years. These buildings employed various international firms that utilized the latest construction methods and best practices, resulting in the tallest skyline in the region containing the two tallest hotels in the world. The present research

uses the economically vibrant UAE as a live laboratory to study aligning resources in time-bound construction projects.

In addition to its contribution to theory, this research has practical implications for management practices and policies. This research focuses on the construction industry, which will provide an abundant source of information to understand resource alignment, in what Winch (1987) calls one of the most complex transactions. A construction consortium usually creates a competitive advantage by building a unique proposition that will raise the entry barriers. The duration of a consortium extends to the completion date of the project, at that time the competitive advantages of a network are terminated. However, building sustainable competitiveness during the life of the project may establish the momentum for successful future bids. This study evaluates the scenarios that lead to understanding the strategies behind the long-term matching and alignment of internal and external resources.

The unique features of a PBT challenge existing knowledge about resource alignment on the academic and practical fronts. However, given the complex and interdependent flow of resources, lessons learned from studying resource alignment for a time-bound network provide access to extreme business conditions that may benefit more relaxed transactions. For example, entrepreneurs may also benefit from these guidelines when engaging in new ventures that require a thorough assessment of the required resources. Areas that are worth analyzing include the outsourcing of resource alignment. This may have other implications for knowledge sharing to be governed by contractual dealings.

Project management tools used in a typical PBT usually include standard policies, procedures, software tools, and management guidelines. One of the benefits sought in this research is the possibility of introducing new strategic perspectives that could drive decision making at a higher level, which is expected to cascade down the system and manifest in these practices.

1.4 Research methods

I conducted preliminary analysis of observations and secondary data compiled during the initial stages of this study. This preliminary analysis, along with the study of relevant extant literature (Chapter 2) led to the development of four propositions regarding the rapid alignment of resources and capabilities in time-bound networks. Evaluation of the research propositions required working within a specific philosophical background in consideration of the qualitative nature of the research data and the wide range of information sources from various network members. As this research study will reveal, a construction network plays a dual role of cause and effect based on a variety of factors, including social and organizational practices. Chapter 3 presents a description of the research proposition and the details of the research setting.

This research consists of a multi-case study based on a qualitative two-stage approach. As described in Chapter 4, forty-five industry experts from different firms were interviewed through an open-ended interview protocol to compile data on twenty construction projects in the UAE. Chapter 6 reports the analysis of the data using Template Analysis (TA): a technique that is frequently used in health studies and sociology (e.g., King, 2004).

1.5 Summary

This chapter established the scope of this research in terms of the research questions, field of application, philosophical setting, and methodology. The remainder of this thesis will seek to answer the research questions regarding how construction projects align their resources. The inquiry then evolves into a rigorous analysis of the interactions between network members to manage the rapid alignment of resources and capabilities in favor of executing construction projects with the aim of sustaining competitive advantages.

2 LITERATURE REVIEW

This chapter presents an overview of literature streams that pertain to the research questions. Key terms and concepts in this section include firm-based resources, sustainable competitive advantage, firm-specific competencies, and industrial networks.

According to Van de Ven (1976) organizational theory considers the flow of resources among organizations as a process of creating relationships. These relationships may take the form of simple business transactions such as trading in specific goods, or may be structured into a more concrete alliance such as partnerships. In any case, the outcome of resource interaction is the fulfillment of predetermined business objectives. Such relationships would ideally be created with the notion of longevity. For example, in the case of a one-time trading transaction, the seller would set a target of customer satisfaction to ensure that the buyer will establish a longer-term relationship. At the other extreme, a joint venture alliance would start with the intention to support the prosperity of the relationship as long as it produces competitiveness and profitability. By studying the overlap between transaction cost and organizational theory, Gadde and Hakansson (2008) adopted the IMP approach to highlight the association between a firm's management of its business relationships and its use and control of resources. A firm forms dyadic links with certain members of the supply chain through the strategic decision to make or buy resources. This association then evolves through organizational relationships that may extend beyond the direct interaction to form a network.

Uncertainty and interdependence are among the factors that brand the construction sector as a complex industry. Gidaldo (1996) attributed this to the complexity of linking and orchestrating the workflow of resources. Such resources extend beyond the dyadic relationship to include an array of interdependences that work together to execute a specific project. With this in mind, this research explored previous literature on creating sustainable competitive advantage through resource management from two dimensions:

- *Firm level* perspective reviews resource-based literature that focuses on the dynamics of resource alignment at the level of a unit firm, with a distinction between internal and external resources.
- *Network level* perspective targets the notion of resource management in networks, with a special focus on external resource alignment.

Researchers in strategic management (e.g., Penrose, 1959; Barney, 1986), and marketing (e.g., Alderson, 1965), assumed that the heterogeneity of resources were a reason for differentiating firms in terms of their levels of success. Strategy researchers elaborated this assumption into the source of competitive advantage for one firm (e.g., Barney, 1991) or a network of integrated firms (e.g., Ritter et al., 2003). However, not all resources are locked into the firm boundaries; and in many cases the firm does not even readily possess access to resources. Therefore, controlling internal resources or aligning resources with external environments plays an important role in the competitiveness of a firm or even the industry to which the firm belongs, as demonstrated by Dyer's (1996) assessment of the auto industry. On a wider scale, the importance of resource differentiation and management plays a role in cross-country firm competitiveness (e.g., Yang et al., 2009).

2.1 Literature background

Several researchers from different disciplines have defined the concept of competitive advantage. Baumol et al. (1982) consider a firm's competition to be its existing and potential competition. The consideration of potential competition provides a definition by default that extends beyond instantaneous competitive advantage to be bound by future market dynamics. Because of the potential for new sources of competition to arise in the future, the concept of sustainable competitive advantage was introduced to the literature. The field of strategic management is rich with research on sustainable competitive advantage (e.g., Rumelt 1984; Porter 1985; Barney 1991). According to Barney and Hoskisson (1989) sustainable competitive advantage is the ability to create value that has

not been created by existing or potential competition. A firm can gain sustainable competitive advantage by developing or acquiring a unique resource.

A perspective based on strategic management principles may be attributed to the value chain model first described by Porter (1980). In this perspective, the competitive forces approach considers value creation as the objective of a business transaction. Since then, Porter's approach has identified the role of industry in determining a firm's success (e.g., Passemard & Kleiner, 2000). Woiceshyn and Falkenberg (2008) assessed value creation by elaborating on the alignment of resources with business strategies as described in the value-shop model applied to firms that offer customized outputs such as in their demonstration of the petroleum exploration case. Their framework is based on the understanding that knowledge-based firms would acquire external technical resources when internal resources prove insufficient. The acquisition of resources follows the value shop model, which for a knowledge-based firm takes into account aligning resources with the types of technical problems the firm faces, along with an evaluation of economic feasibility (Stabell & Fjeldstad, 1998). The motive for resource enhancement is to create competitive advantage through external alignments to complement internal shortfalls and to add value to the supply chain.

Alchian and Demsetz (1972) presented an economic perspective. They suggested that productivity enhancement might be achieved through "cooperative specialization" that results in "demanding economic organizations which facilitate cooperation" (Alchian & Demsetz, 1972: 777). Economic organization refers to economic methods of measuring productivity. This early demonstration of the benefits of organized coupling of resources evolved through the perspectives of modern economies under inter-firm specializations of the value chain where firms develop limited business links that eventually form a complex network of interactions (Dyer, 1996). Firms can become competitive by developing an integrated production network that demonstrates a high degree of inter-firm specialization. Dyer reached this conclusion by evaluating performance differences between the Japanese and American auto industry supply networks, based on inter-firm specialization of assets such as site, physical and human capital.

Summary 1: Identifying the source of sustainable competitive advantages extends firm-specific advantages to the network level. However, sustainable competitive advantages reside in developing unique resources either internally or through external alignments to ensure a firm's survival.

2.2 Resources

Literature on managing firm resources has been presented within the context of competitive advantage (Seggie & Griffith, 2007) business relations (Gadde & Hakansson, 2007) and value creation (Woiceshyn & Falkenberg, 2008).

Studies of how firms develop or acquire resources have been based on many characterizations of coupling modes; however, there is consensus that industrial activities are linked through different levels and intensities of interdependence (Glassman, 1973; Orton & Weick, 1990; Weick 1976). Coupling of resources may occur in various directions of a transaction, as described by Duboi and Gadde (2000) among individuals, units, organizations or even between environments, ideas, intentions, and actions. The main objective in such a matching is to create synergies among resources.

Daft (1983) categorizes resources into assets, capabilities, organizational, processes, firm attributes, information, and knowledge. Later, Barney (1991) grouped firm resources under physical capital, human capital, and organizational capital. In a more explicit classification, Teece et al. (1997) stress that resources are inimitable firm-specific assets. With relatively similar terminologies, Hunt (2001) specifies seven firm resources: financial, physical, legal, human capital, organizational capital, and information capital. In all cases, the firm controls these resources with an orientation towards an efficient running of the business.

2.3 Resource-based view (RBV)

Wernerfelt (1984) introduced the RBV concept in his paper, which then diffused to become a seminal concept in business scholarship and practice. Barney (1991) adapted

the model to construct a framework for a firm's sustainable competitive advantage. He argued that a firm resource might be a source of sustainable competitive advantage if it possesses four characteristics:

- Valuable resources improve a firm's implementation of strategies that enhance efficiency by exploiting opportunities or mitigating risks.
- Rareness of a resource contributes to a firm's competitive advantage by not being possessed by many other firms. Hirshleifer (1980) used an economical dimension to define the threshold for rareness as a potential for competitiveness by having the number of firms with specific valuable resources to be less than the number of firms needed to operate in an environment of perfect competition.
- Imperfectly imitable resources as defined by Lipman and Rumelt (1982) are resources that cannot be obtained by a firm that does not have them. Barney (1991) identifies three sources of imperfect imitable resources:
  - The first source is "historical conditions", which seem to be widely acknowledged as a reason for competitiveness by strategists, (e.g., Stinchcombe, 1965) and economists (e.g., Arthur et al., 1987) who agree that the historical path followed by a firm to reach a certain stage affects the firm's performance at that stage. Examples listed by Barney (1991) for the importance of historical conditions include physical capital resources obtained when a firm chooses an advantageous location in which to set up. Another example of a human capital resource is a firm employing scientists with unique knowledge that enhances the firm's R&D ability.
  - A second source of imperfectly imitable resources is "causal ambiguity", which Barney (1991) explains as the difficulty of understanding or identifying the link between a firm's resources and its actual competitive advantages. This creates ambiguity and difficulty in establishing or duplicating the advantages by competing firms.

- The third source of imperfectly imitable resources is the ‘social complexity’, which will restrict any imitation by competition. This applies to human capital resources, which possess unique interpersonal relations and management cultures that will provide ways for exploiting other resources and synergies within the firm.

- Lack of a substitute for a firm resource is another source of sustained competitive advantage. To demonstrate the importance of this feature, Barney (1991) gives the example of a firm’s management team that is valuable, rare, and imperfectly imitable yet can be substituted by another team that will also adopt efficient strategies.

Supporters of strategic management criticize the RBV as having difficulty gauging the firm-specific factors that result in high performance and possibly create a competitive advantage (Dyer, 1996). RBV does not consider the time factor. While firm-based resources, especially those that are in some way tangible, are viewed as instantaneous in nature, capabilities are also among such resources. Capabilities could have associations with the time factor. While a resource may be acquired, the capability of it will require time to be developed. Although a seasoned manager can identify and exploit resources, the actual unique capability may be fully identified only after a certain period. Another aspect attributed to the RBV perspective is its rigidity in applying it to dynamic environment of a project-based transaction.

***Summary 2*:** The resource-based view is a reasonable starting point for understanding the basic requirements of establishing a sustainable competitive advantage. However, dynamic market conditions need enhanced resources and capabilities beyond firm-bound resources. This will require a firm to extend its reach through external resource alignments to compensate for internal shortfalls.

2.4 Dynamic capabilities perspective

A further enhancement of the RBV is the dynamic capability perspective. The term *dynamic capability* was first defined by Teece et al. (1997: 516) as a "firm's ability to integrate, build and reconfigure internal and external competencies to address rapidly changing environments". The core focus in this definition is managerial and organizational processes, which Helfat (1997) described as means to open new strategic alternatives for a firm.

Eisenhardt and Martin (2000) elaborated on dynamic capabilities. They specified examples of processes characterized as dynamic capabilities including business alliances, resource allocation and knowledge transfer. Eisenhardt and Martin (2000) present the dynamic capabilities perspective as an enhancement of the resource-based view with a focus on long-term competitive advantage, especially in dynamic markets. They view organizational capabilities as common across firms; these capabilities may be labelled as "best practices" that evolve over time through learning. According to Eisenhardt and Martin (2000) the specific sets of organizational strategies that are addressed in the dynamic capabilities perspective include formation of alliances and decision-making strategies that reconfigure resources into value creation. They concluded that dynamic capabilities are not the source of sustainable competitive advantage; it is rather the timing and effective use of these capabilities to configure resources ahead of competition.

Several other studies have enriched our understanding of dynamic capability, including that of Zollo and Winter (2002) who identified organizational learning as a source of dynamic capability. Over time, this capability may lead to what Adner and Helfat (2003) refer to as "dynamic managerial capability", which encompasses management's capacity to align a firm's resources. Teece et al. (2002) highlighted this capability as a mechanism to sense business opportunities.

Helfat et al. (2007: 29) later fine-tuned the definition of dynamic capability as "the capacity of an organization to purposefully create, extend, or modify its resource base".

The broad term “resource base” includes not only tangible and intangible assets, but also dynamic capabilities as part of the resource structure. Based on this definition, and through their attempt to measure the performance of dynamic capabilities, Helfat et al. (2007) build upon the concept of evolutionary fitness that describes the extent that a dynamic capability enables a firm to operate by configuring its resource base. The key in linking dynamic capabilities to evolutionary fitness is the dependence of evolutionary fitness on external environment factors that will enable a firm to survive and grow in the market.

Evolutionary fitness presents a pretext to link a firm’s resources with external entities through the four influencing factors on the evolutionary fitness of a dynamic capability “quality, cost, market demand, and competition” (Helfat et al., 2007: 52). Competition entails cooperation with other firms through alliances that will increase evolutionary fitness. At the same time, a greater competitive environment with similar dynamic capabilities will decrease the evolutionary fitness of a firm. Helfat et al. (2007) conclude that dynamic capabilities will not lead to competitive advantages unless the following prerequisites are met:

- Heterogeneity of the cost and quality of a dynamic capability.
- Demand for the application of the dynamic capability.
- Rareness of the dynamic capability.

While these prerequisites share similar themes as attributed to the resource-based view (i.e., valuable, rare, imitable, un-substitutable) Helfat et al. (2007) attribute the sustainability of competitive advantage to the external environment. In a dynamic environment, needs might change, which renders imitation barriers insignificant as capabilities will no longer be required. A key dynamic capability identified by Helfat et al. (2007) is relational capability, which has the potential to provide competitive advantages that provide long-term success through external growth mechanisms, including alliance and acquisition capabilities.

2.5 Network competence

Ritter et al. (2003: 745) defined "network competence" as "a company-specific ability to handle, use and exploit interorganizational relationships", which provides competitive advantage. The scope of competence in this definition encompasses owned qualifications and knowledge as well as the skills required to manage the associated resources. The network competence model involves the elements described in Figure 2.1 as adapted from Ritter et al. (2003).

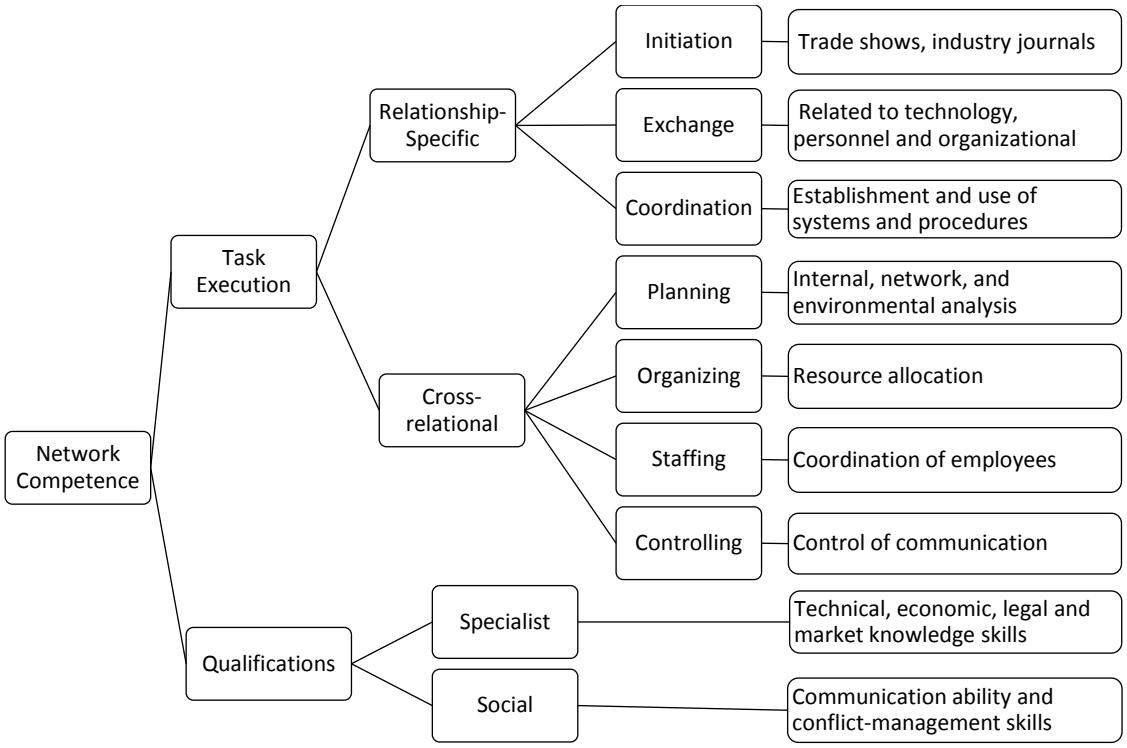


Figure 2.1: Parameters of network competence

Ritter et al. (2003) presented network competence as a means to develop unique competitive advantages exemplified in enhanced innovativeness in technology-based firms. However, this ability to manage networks has become a resource that can lead to competitive advantages.

Another perspective that complements the resource-based view and dynamic capabilities perspective is the relational view described by Dyer and Singh (1998). By considering the unit of analysis to be the dyad or network of firms, they designed a framework for managing a network that led to inter-organizational competitive advantages. The four sources of potential competitiveness include the use of relation-specific assets, knowledge-sharing routines, complementary resources and capabilities, and effective governance mechanisms. Researchers describe these characteristics as alliance capabilities that can be a critical resource for a competitive strategic position (e.g., Anand & Khanna, 2000; Kale et al., 2000).

Summary 3: The dynamic capability perspective is important in shifting upstream from firm-level resources to link with external resources. Dynamic capabilities are in principle an integral part of a firm's set of resources and capabilities. A key dynamic capability is network competence, which is the ability to manage resource alignment through external alliances within networks to achieve long-term competitiveness.

2.6 Networks (Organizational Sociology)

The concept of networks dates back to Penrose's (1959) theory of firm growth. The picture of exchange of heterogeneous resources emerged as an interactive process that later developed into interactions of interdependencies between human and physical resources. Alchian and Demsetz (1972) later exemplified a network as the cooperation between firms and across markets through interactions among a lumberman, a lumber mill and a cabinetmaker.

Van De Ven (1976) described the inter-organizational relationships among firms as a social action system that facilitates the achievement of goals that would be difficult to achieve had the firms acted independently. The formation of inter-organizational relationships would be driven by the need to enhance internal or external resources. Van De Ven (1976) supports the idea that gauging the strength of inter-organizational relationship may be achieved by identifying the intensity and direction of resource flow

between units. Intensity of resource flow also refers to the frequency of interaction. Van De Ven (1976) used this framework to study how inter-organizational relationships develop and eventually die. His assumptions and hypotheses propose that the strength of inter-organizational relationships is a function of resource dependence on external support, awareness of external resources and internal consensus on the objectives of the relationship. In this context, resource alignment becomes more complex as the number of interacting units increases.

This later evolved into the network perspective, which is also viewed from an organizational sociology perspective (e.g., Galaskiewicz & Zaheer, 1999). A sociological approach to inter-organizational networks is described in Gulati and Gargiulo's (1999) study of organizational alliances. They explained that organizational alliances are formed to complement firm-specific resources and capabilities in the context of developing the social structure of the network. They elaborated on this concept by describing the formation of a network as an evolving social structure based on a longitudinally dynamic system that links resources. Their model portrayed the social structure as a "macro phenomenon" emerging from micro firm-level decisions seeking to gain access to resources.

The main connection between resource-based view (RBV) and industrial networks comes from the network resources referred to by Gulati (1999) as a similar understanding of the social capital view. Therefore, the RBV perspective may be a source for the creation of inimitable resources within the network. With this capability, a firm's network allows a firm to gain access to key resources that are not possessed internally. Gulati et al. (2000) suggest that the network structure that a firm belongs to is a key resource that may be a crucial source of competitive advantage; accordingly, they label such structures 'strategic networks'.

In their study, Gulati et al. (2000) stress that a more elaborate assessment of a firm's performance and profitability may be achieved when evaluating the strategic network that the firm is a part. They use a set of five sources of differential returns of a firm to

illustrate the importance of strategic networks; or what they refer to as a "relational model" rather than an "atomistic model". The following list summarizes the five key points:

- ***Industry structure***: This is described through the intensity and concentration of relationships across the network. Womack et al. (1990) demonstrated through a very extensive international research the importance of a closely-knit supply network to improve the auto industry. Later, Dyer (1996) discussed the potential impact of improved competitiveness due to inter-organizational collaborations. According to Gulati et al. (2000) competitiveness has an impact on a firm's behaviour and will eventually reflect the industry's profitability.
- ***Intra-industry structure***: According to Gulati et al. (2000) the similarities among firms in terms of products, services, technology, or other features drive such firms to become members of strategic groups. This could raise the entry barriers for other firms to penetrate the group; hence improving the competitive advantage of network members.
- ***Inimitable firm resources and capabilities***: This source of differential return refers to the firm-based value-generating resources and capabilities that provide sustainable competitive advantages by extending access to resources beyond firm boundaries. A network contributing to sustainable competitiveness of a firm has the following features that may be attributed to resources or capabilities:
  - The structural pattern of relational ties may be a source of competitiveness. While the most significant impact is on dyadic relations, Gulati and Gargiulo (1999) demonstrate that advantages might be felt at the second level of connectivity, such as second-tier suppliers.
  - The idiosyncratic nature of a firm's membership of a network provides an inimitable resource. This may be demonstrated by the difficulty international firms face when entering new territories. The joint venture partnerships North American companies established with Chinese firms to enter China illustrate

the importance of allying with a local partner to access valuable resources and capabilities.

- If interconnection modalities are considered in terms of their strength and nature, the structure of nodal links can be identified as either "collaborative" or "opportunistic". The examples provided by Womack et al. (1990) demonstrate that the success of the Japanese auto industry is partly due to collaborative links among members of the network between automakers and their suppliers.

- ***Contracting and coordinating costs***: Gulati et al. (2000) stressed the important implications of the social network perspective in assessing relationships within a network structure. A key advantage in this setting is the potential positive impact gained through building trust and confidence among network members. This reduces the possibility of opportunistic behaviors that affect transaction costs. In other words, a firm that seeks a continued existence within a network or even an industry will be sensitive to the basic dyadic alliances to ensure a positive reputation. The enhanced trust will support the alliance mainly by allowing the flow of information across the organizations that will support the sought-after business objectives.

- ***Network dynamics and economic returns***: Gulati et al. (2000) suggest two consequences of internal and external drivers of network dynamics. This description is made from the perspective of inter-firm tie formation or destruction, which has an impact beyond the dyadic link into second-tier suppliers. First, the lock-in and lockout effect is viewed as a constraint against the formation of other network ties, which may affect a firm's performance. The second consequence is the learning races that will determine the motive behind being a member of a network in terms of acquiring new knowledge.

Network Sustainability

Gulati (1999) has discussed network sustainability in the context of resource alignment through networks or alliances, suggesting that alliances and networks enhance the value-

creation of firms by providing valuable resources. Zheng et al. (2013: 1208) have elaborated on Gulati's study by defining network resources as "those resources that are owned by their alliance partners but which potentially can be accessed by the focal firm, as well as the valuable routines and arrangements embedded in the ties between the external parties." This view by Zheng et al. (2013) presented network resources as a source of competitive advantage especially in relation to the innovation performance and technological capabilities of firms within a network.

Network resources have created competition among networks rather than just among firms. Firms participating in networks share resources and exchange relationships, thereby creating knowledge acquisition (Inkpen & Tsang 2005). Several researchers have studied the enhancement of a firm's performance through shared network resources in fields such as biotechnology (e.g. Powell et al. 1996) and telecommunication (e.g. Sampson 2007).

2.7 Industrial Marketing and Purchasing (IMP)

Based on inter-organizational theory, sociology and anthropology, the industrial marketing and purchasing (IMP) setting describes resource interfaces through empirical cases (Waluszewski & Johanson, 2008). Scholars from this research field stress the importance of long-term relationships that form within structured networks (e.g., Axelsson & Easton, 1992; Hakansson & Snehota, 1995). Axelsson and Easton (1992: xiv) label such interactive relationships as industrial networks that describe connections between "large numbers of entities" involved in the "economic process, which converts resources to finished goods, and services for consumption by end users whether they be individuals or organizations". In other words, the resources used by a firm have interfaces to other resources that affect the larger network of interactions.

By comparing the two extremes of an open exchange market against the static market structure of the Soviet era when resource interfaces were neglected, Hallen and Johanson (2004) elaborate on the impact and extent of resource interfaces on business efficiency.

The two critical factors that contribute to this interaction are the time factor and the economic landscape. Waluszewski and Johanson (2008) proposed that even when external resource interactions take place, this will require time before the internal organization builds a level of awareness that creates an efficient interaction with external resources. This aspect of development over time applies to both sides of the interaction. Another crucial factor in building effective external resource networks is to operate in an economic landscape that allows and even nourishes resource interfaces across organizational borders. In the construction industry, this might imply the challenges that might surface due to a landscape that includes families, multinationals or even governments. An efficient interactive structure would be more apparent in an environment that is governed by heterogeneous ownership structure, decentralized management, and a technologically competent workforce.

In other research that illustrates the IMP approach, Rijt and Santema (2005) refer to firm-addressable resources based on the definition by Sanchez Heen and Thomas (1996). These are resources the firm can access externally without being owned or controlled. This definition differentiates these resources from internal firm-specific resources. Rijt and Santema (2005) refer to the four criteria that provide firm competitiveness (value, rareness, inimitability and non-substitutability) with specific attention to value of the firm-addressable resources. They use the operation of European airports to evaluate this model in the context of a very complex business set-up. On the one hand, similarities between this example and the research target example (i.e., the construction industry) are that both are service oriented, and both involve various external players that may be formed into a consortium. On the other hand, airport management is a longer-term relationship within the network as opposed to the time-bound construction project.

Summary 4: Sustainable competitiveness expands beyond a firm's resources and capabilities to include features that are attributed to the network and even to the industry in which the network operates. Current literature on strategic management applicable to resource management and firms as well as network capabilities are critical to evaluating sustainable competitive advantages in project-based settings. Being a member of a

network structure is a fundamental feature of a firm wishing to enhance existing resources by gaining access to new resources. However, the time factor is a crucial element when evaluating the efficiency of interaction with external resources, which extends from the initial identification stage throughout the interaction stage. Another important aspect is the receptiveness of the external environment to supporting resource interactions.

2.8 Practical perspectives

Much of the research on the construction industry is reported in industry-specific journals, especially those addressing the practical disciplines of project management (e.g., Winch, 1987) and supply chain management (e.g., Wickramatillake et al., 2007). While these disciplines integrate resource alignment with the objectives of managing a project or the supply chain, they are based on theoretical foundations that are relevant to this research.

Project management

Since the medium of application of this research involves project-based transactions, it is logical to explore the view of the practical field of project management. A project-based transaction is most probably viewed by industry professionals from the perspective of project management practices that usually provides the standard charter for managing the sequence of activities governed by managing project resources. Resource management takes its definition under the discipline of construction management as described by Clough and Sears (1979). They suggest that the execution of a construction project with economic and time efficiency is based on the management of available resources.

The domain of a contractor directly involved with the physical construction is usually directly affected by the availability of resources. Seasonal shortages, labour disputes, and equipment breakdowns are among a host of uncertainties that challenge the availability of resources (Clough & Sears, 1979). According to Clough and Sears, these uncertainties can be addressed by systematic scheduling and planning of resources to supply and support

project operations to meet time and cost objectives. Nowadays, advancements in computer software provide tools that allow project managers to monitor progress and provide alternative solutions to leveling human and physical assets along with material deliveries and outsourced subcontractors to meet deadlines. Nevertheless, uncertainties relating to construction projects continue to exist due to consistent pressure from project owners to meet budgets and timelines that are even more stringent.

Winch (1987) explored traditional project management practices with a focus on coalition as a means of reducing costs. He found that the group of entities contributing to the execution of a project usually focuses on the economic gains highlighted under return on their investment rather than aligning resources for a longer-term objective. From a project management perspective, Winch (1987) defines the sources of complexity he traces to inherent uncertainties surrounding a construction project. The main impact of uncertainties in the time-bound construction industry is the inefficient allocation of resources due to possible opportunistic behaviours of some members of the coalition whereby members may lean towards satisfying their immediate interests rather than the overall project's interests. This defensive behaviour, which is historically dominant in the construction sector, is driven by market-based relationships (Beach et al., 2005). To understand the importance of coalition formation, Winch (1987) compares a construction project to a typical production system. What he terms 'task uncertainty' highlights that a high level of uncertainty is generated by the inefficient learning curve. This results in a very limited transfer of knowledge from one project to another. The level of project complexity is strongly correlated with the level of uncertainty that is also related to the size of the project. Further elaboration by Winch (1987) stresses that as coalition members start responding to uncertainties transaction costs increase due to the opportunistic behaviour of the members; as a consequence, the project owner may experience additional costs.

Based on this perspective, Winch (1987) suggests that the linkage system among coalition members is governed by the structure of contract management where project managers liaise between network members to reduce uncertainties.

Supply chain management

In an attempt to measure the performance of a supply chain in the construction industry, Wickramatillake et al. (2007) presented a case study for the expansion of London's Heathrow Airport. The basis of the study was that integration of the supply chain is a success factor aimed at achieving competitive advantage. This is magnified in time-bound projects such as large-scale industrial projects. Wickramatillake et al. (2007) summarized reasons for project complexity as being due to delays caused by underestimation of the workload as well as variations that come along as the project progresses, which requires close interaction with contractors and their second-tier products, or service providers that constitute the supply chain. While Wickramatillake et al. (2007) assert the difficulty of gauging the progress of the supply chain, especially in the area of subcontracted activities, the study is in line with the main theme of this research that organizational collaboration and linkage between resource providers is crucial to the project's good performance.

Through a more theoretical approach, Davis (2008) explores the intersection between supply chain management and social capital through relationship marketing in the construction industry. In this approach, key upstream stakeholders would interact to configure and allocate resources downstream to create value for clients. The relationship marketing approach to building long-term competitive advantage presents a relatively novel approach to the complexity of construction projects that are proportional to the size of the project. Davis (2008) demonstrates a perspective on the importance of forming long-term relationships by developing social capital that is founded on commitment and trust.

Summary 6: Although the project management perspective offers limited insight into the characteristics of resource alignment needed to gain competitive advantage, it offers a mechanism to link resources whereby opportunistic behaviour is reduced through a unified contract management system. Supply chain management principles also affirm the importance of structured management of inter-firm links to achieve sustainable

competitiveness. Both concepts are in line with the network notion that stresses the importance of social capital driven by enhanced trust among network members.

2.9 Role of internationalization

The topic of internationalization is an important complement to this research study. The reason is that the study is conducted in the city of Dubai, in the United Arab Emirates (UAE) which relies on the technical contribution of international firms, especially in the construction industry. Given that, the coordination among local and international firms is paramount to the formation of efficient business networks.

A general assessment of the literature on firm internationalization seems to highlight the importance of a firm's resources in determining its ability to internationalize. The disciplines of business literature have produced extensive research on the modes and characteristics of internationalization of firms. Most of the research focuses on growth through internationalization from the firm's perspective. Foundations of these research tracks may have been inspired by Penrose's (1959) theory of firm growth. Hymer (1976) refers to a firm's resources as a critical factor that should be used to penetrate foreign markets. Many researchers follow by focusing on a firm's resources (e.g., Buckley & Casson, 1998; Dunning, 1988; Seev, 1976) to describe the evolving and dynamic area of internationalization. The resource-based view and dynamic capabilities were also explicitly attributed to internationalization strategies (Peng, 2001). Barney et al. (2001) highlighted that tacit knowledge developed by a firm through international experience is a competitive capability that is difficult to imitate. When studies on internationalization started focusing on international production into emerging economies or from emerging economies (e.g., Yamakawa et al., 2008) the perspective of industrial network revealed its important role. Johanson and Mattson (1988) link the strength of an international network to the strength of a company's domestic relationships. Liu and Brookfield (2005) refer to "convoy migration" as a result of the internationalization of other members of a network. Ke et al. (2007) studied the internationalization of Chinese and Japanese firms

to conclude that foreign entries are influenced by industry and resource-based considerations formed by local and international institutional frameworks.

Seggie and Griffith (2008) employ the resource-advantage (R-A) theory to support their argument that internationalization of service-based firms may be enhanced by aligning resources with the globalized domestic market. Standardization of the resource-matching process builds a competitive advantage for the international market. Although Seggie and Griffith (2008) highlight the important role of resource alignment on internationalization, their perspective is more focused on the usually less attended topic of increasing client diversity served domestically. The main proposition they advance is that the alignment of firm resources with the domestic segment's customer needs leads to enhanced performance at the domestic level and in the international market.

Seymour (1987) explored the research crossroads between foreign direct investment, Dunning's eclectic paradigm (Dunning, 1988) and construction management. In the Middle East, construction surged in the 1970s and 1980s due to the high financial reserves from oil revenue. Seymour (1987) observed a trend at that time pertaining to the influx of construction companies into the Middle East from less developed countries such as South Korea and India. The need for little technical expertise in these projects allowed such companies to offer a high input of construction labour at competitive rates. That created what Seymour (1987: 84) refers to as "international contracting".

Javernick-Will (2009) used institutional theory to describe organizational learning in international construction companies. He defined organizational learning as a firm's ability to acquire external knowledge that is applied to its core business. Scott (2001:48) categorized an international firm's business elements into "regulative, normative and cultural-cognitive elements that, together with associated activities and resources, provide stability and meaning to social life". These categories include:

- Regulative: laws and regulations, design standards, and government approval.
- Normative: practices, social norms, local preferences, logistics, relationships, resources, and operational standards.

- Cultural-cognitive: cause and effect relations that rely on individual decisions.

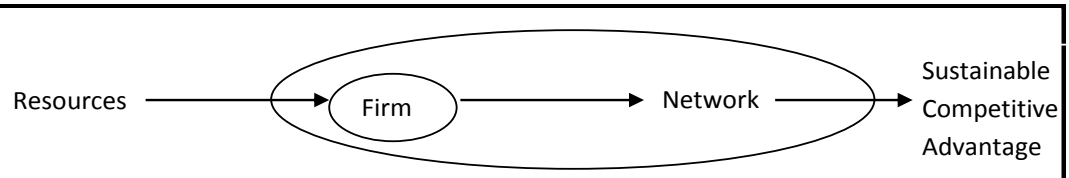
Javernick-Will (2009) explained that many internationalization process studies follow the tradition of Johanson and Vahlne (1977) where learning about the local market takes place through costly reiterative experiential knowledge. The time factor in this process contributes to the slow progression of strengthening the position in a foreign market. Various studies reported by scholars (Lorenzen & Ahnke, 2002; Petersen & Pedersen, 2002; Zaheer & Mosakowski, 1997) have found that a firm's ability to recognize and grow its knowledge depends on the absorptive capacity or prior knowledge and experience of the project team or firm. Therefore, the international feature of firms allows them to enhance their knowledge, which contributes to firm-level sustainable competitive advantage.

Summary 7: Firm internationalization has been presented in the academic literature to describe the advantages of entry strategies with the internationalizing firm being the unit of analysis. However, limited attention has been paid to the implications of internationalization on network performance.

2.10 Literature review summary

Based on the literature reviewed in this section, it is evident that scholars have presented two levels of sustainable competitive advantage. The first level is firm-based competitiveness that may be attributed either to tangible sets of resources or intangible capabilities that should possess value-adding characteristics that are unique, inimitable and non-substitutable. The second level is the macro network dimension that takes into account the nature of links among firms as well as the overall industry dynamics with significant attention to social capital fundamentals. While this outlook serves well as a general interpretation of the basic requirements for sustainable competitiveness in a typical business setup, it falls short of addressing the complexities associated with applications that fit within the category of time-bound networks.

Table 2.1: Theories overview



D: Assets, capabilities, organisational, processes, firm attributes, information, and knowledge **R**: Daft (1983)	**T**: Resource Based View **D**: a resource may be a source of sustainable competitive advantage if it holds four characteristics **R**: Barney & Clark (2007)	**T**: Network Strategy **D**: Organisational sociology and social capital. **R**: Gulati et al. (2000), Scherer & Ross (1990)	**T**: Sustainable Competitive Advantage **D**: May be achieved if four characteristics are held at the firm level: value, rareness, imperfect immitability, and unsubstitubility **R**: Barney (1991) **D:** Sustainable competitiveness is attributed to resources and capabilities within the firm, the network, and the industry **R:** Gulati et al. (2000)
D: Physical capital, human capital, and organisational capital **R**: Barney (1991)	**T**: Dynamic Capabilities View **D**: Firm's ability to integrate, build, and reconfigure internal and external competencies to address changing environments **R**: Teece et al. (1997), Helfat et al. (2007)	**T**: Strategic Networks **D**: A firm's performance may be understood by examining the network the firm is part of. **R**: Gulati et al, (2000)	
D: Financial, physical, legal, human capital, organisational capital, and information capital **R**: Hunt (2001)	**T**: Interorganizational Relationship **D**: The simplest format of dyadic relationship that forms the intial step towards a network **R**: Van De Ven (1976)	**T**: Economic organisation **D**:Internal firm affairs for managing resources **R**: Alchain and Demsetz (1972)	
	T: Network Competence **D:** A firm specific capability to manage interorganizational relationships **R**: Ritter et al. (2003)		
T: Theory or research discipline **D**: Description **R**: References			

In other words, the reviewed literature has failed to describe the challenges that face individual firms as part of a temporary network where resources are aligned to cater to a certain project with limited long-term potential for continuous interactions. Subsequently, these challenges cascade across the supply chain and affect the competitiveness of the specific network, and the industry itself. Table 2.1 summarizes the main theories discussed in this section along with a schematic depiction of the expansion from a firm-level view to the network level.

2.11 Theoretical positioning of research

In order to answer the research questions, the application of this research is done in the context of an internationally based construction industry that provides a unique position to evaluate the features of sustainable competitive advantages in transactions that possess extreme cases pertaining to time, finance, and sequence of activities. While sustainable competitive advantage has been studied in the context of the construction industry, this research explores the crossroads between firm-level advantages as presented by the resource-based view (Barney, 1991; Wernerfelt, 1984) and the dynamic capabilities view (Eisenhardt & Martin, 2000; Helfat et al., 2007). The dynamic capabilities view serves as a key for alignment with external resources and social networks (Gulatti et al., 2000) that link firms in a single time-bound network. In principle, the resource-based view establishes the firm's advantages, while the relational dynamic capabilities will allow a firm to align its resources with the external environment to become part of the greater network. Figure 2.2 presents the intersection points among the research disciplines that will be used in connection with PBT within an international setup.

Given the significance of network notions in this study, a sociological approach is the most attractive when addressing social networks. However, to address a broader perspective, including firm-based advantages and resource allocations, the industrial organizational approach was employed. In general, this research evaluated the characteristics of a project-based transaction through the discipline of strategic management, a field that explores the reasons for business success. The approach of the

Industrial Marketing and Purchasing (IMP) group stresses the value of relationships when aligning resources and capabilities.

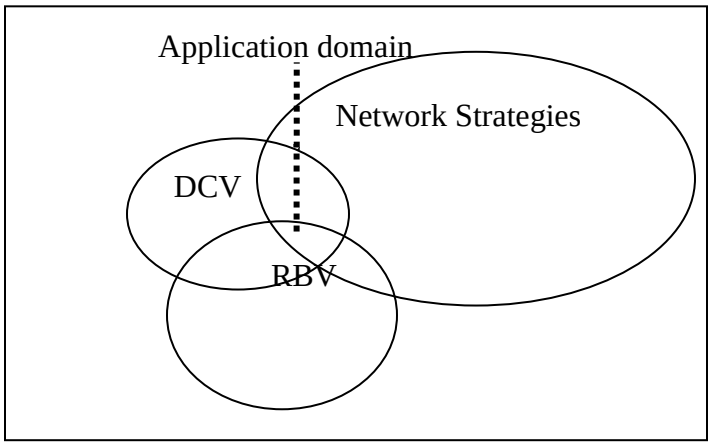


Figure 2.2: Target research intersection

Current knowledge applies sustainable competitive advantage on relationships that involve a life cycle that could be definite to certain members of the network. However, in a time-bound PBT the primary nodes of a network all follow a life cycle that is bound by the life of the project and governed by the planned execution program. The literature does not seem to explore this relationship, which creates a shortcoming in current knowledge.

3 PROPOSITIONS AND FIELD SETTING

3.1 Philosophical setting

This research takes a novel approach to evaluating the alignment of resources in the construction industry. However, it has proven difficult to identify a philosophical setting for the research approach. The difficulty lies in the temptation to follow the lead of positivists who use various well-developed research tools. However, the combination of several research parameters, applied in this study to construction networks, narrows the options of research methodologies to qualitative case-based techniques. This is described in Chapter 4. In principle, this research adopts the critical realist approach that Easton (2010:121) argues is well positioned to address "clearly bounded, but complex, phenomena such as inter-organizational relationships or networks".

As the research uses a less common perspective, it is necessary to review the assumptions of this approach in order to understand its advantages. Fleetwood (2004) classifies the meta-theories adopted by scientific researchers into three mutually exclusive types: positivism, postmodernism, and critical realism (CR). Positivists view the world as a rational closed system where event regularities of cause-effect relations can be empirically monitored. Postmodernists consider the world to be socially constructed by humankind. Finally, critical realists such as Fleetwood (2004) argue that the world's existence is based on an open system, regardless of the knowledge one may have developed about it.

Bhaskar (2002) claims that incompleteness in a philosophy that is adopted by a researcher or practitioner in a certain area leads to inconsistencies between theory and empirical evidence. Smith (2006) attributes these theory-practice inconsistencies to the limitations of human knowledge. These differences encourage further research. Among the pioneers of critical realism was Bhaskar (1998) who applied it to social sciences.

Using an ontological approach, Bhaskar (1998: 13) asked: "what the world must be like to generate a particular phenomenon", rather than asking how we can know something. To answer these realists' questions, Fleetwood et al. (2004) consider one of the techniques of critical realism to be creating scenarios of models then selecting one aspect for further analysis.

3.2 Features of critical realism

Sayer's (1992) representation of CR is one example of how CR can provide a philosophical justification for its use. Along the same lines, Easton (2010) suggests comprehensive guidelines for applying critical realism to case studies. Table 3.1 presents an overview of the elements of critical realism as prescribed by Easton (2010). It also shows the application of critical realism to the construction industry through examples extracted from the research interviews. Table 3.1 is based on three key critical realist assumptions that Sayer (1992: 5) makes about ontology:

- "The world exists independently of our knowledge of it."
- "There is necessity in the world; objects -whether natural or social- necessarily have particular powers or ways of acting and particular susceptibilities."
- "The world is differentiated and stratified, consisting not only of events, but objects, including structures, which have powers and liabilities capable of generating events. These structures may be present even where, as in the social world and much of the natural world, they do not generate regular patterns of events."

Structure of causal explanation is the feature that compiles all components listed in Table 3.1 to address the cause of events to happen. For example, a contractor (entity) has a networking capability through its management (structures) and has the ability to establish business relations through personal contacts (causal powers) to link with other entities; it also has the challenge of fierce market competition (liabilities).

Table 3.1: Features of critical realism

Feature	**Description (Easton, 2010)**	**Relevance to a construction project**
Objects / Entities	These are the theoretical building blocks that comprise entities such as organizations, people or relationships. This feature is equivalent to the measurable variables in quantitative analysis. Objects of critical realism may cover a wide range, including social or material, complex or simple, structured or unstructured.	Firms that participate in the same construction project experience interaction of resources that are possessed by these entities. These relationships form events that also have sequential interactions.
Causal powers and liabilities	Objects have causal powers and liabilities. An object has the power to cause events to occur. A liability could be the susceptibility to the action of other entities. Easton (2010: 120) describes the advantage of this view by focusing on three key questions: "What are the entities that define our research field, what are their relationships and what are their powers and liabilities?"	A firm has the power to impact its resources and the way they are aligned with other network resources. Similarly, resources owned by a firm have the power to affect the firm.
Events	Events or outcomes are the subject of investigation. This includes the external and visible behaviours of the entities. According to Easton (2010) critical realists assume that the non-occurrence of an event requires an explanation and could provide valuable inputs into the research study. Events result from activating powers of entities, or when liabilities are obstructed (Bhaskar, 1975; Sayer, 2000).	Resource interactions that do not lead to long-term benefits after project completion is a key subject of this research.
Structure of Entities	Causal effects call for the evaluation of the overall structure that involves the entities. This leads to considering the linked entities such as other organizations, or sub-entities such as people or departments.	Firms in a project form a network of structured relationships that serve the same project. Departments and people within each firm also constitute other structured relationships.

Table 3.1: *continued*

Feature	**Description (Easton, 2010)**	**Relevance to a construction project**
Emergence	The essence of critical realism is to study entities as a connected part of a system as opposed to studying them in isolation. Therefore, the analysis should be done at various levels of aggregation. One cannot understand the global picture by studying individual entities in isolation from their connections.	Members of a construction project form a network of interconnections between resources among them and among sub-entities within the firms. The properties of each entity are not only understood through working with the individual firms in isolation. Emergence must always involve some element of connectedness that reveals the synergistic impact of the network as a whole.
Relations	Events should be explained by a combination of necessary and contingent relations that connect entities. Entities are defined according to their necessary relationships with events that are usually varied. Contingent relations are not necessary but may exist.	An example of necessary relationship is the one between a firm and the physical resources it owns in the form of a production system. One cannot exist without the other. However, the model of one of the types of equipment does not affect the physical resource and forms a contingent relation only.
Mechanism	Mechanisms are the various ways entities interact through causal powers and liabilities to create certain events.	The relationship between a firm and a supplier may be extended beyond the life of a project or terminated at the end of the project.

The causal power may lead to winning a new project; alternatively, the liability may result in a lost opportunity. While this simplistic view provides a logical framework for explaining events, it is far from close to real-world situations due to the complexity of interactions. According to Easton (2010: 123) critical realists "argue that there should always be competing explanations since different interpretations of the data are necessary to ensure that the best current interpretation is made". This is the approach adopted during all interviews conducted with industry experts from many firms serving different

projects. The personal experience of respondents coupled with the various possible scenarios of interactions within the same network makes various explanations possible for alignment of resources and capabilities.

3.3 Proposition development

The critical realist approach served as a philosophical framework to develop the research proposition and to analyze the information gathered from the interviews. This section presents the path taken to develop the research proposition based on observations made from time-bound networks. An example is used to demonstrate the setting followed by a listing of the four research propositions.

3.3.1 Observations

As seen from literature described in Chapter 2, researchers have concentrated on the enhancement of a firm's performance through shared network resources. My focus in this research on the alignment of resources in the construction industry brings a new perspective by studying a network's potential to sustain its competitiveness for participation in future projects. The following example is a general derivation to create an abstract model from the time-bound networks experienced in the construction industry in the United Arab Emirates. A property investment firm decides to develop a new tower and appoints an architecture firm to transfer the idea to the concept design stage. After approving the design, the property investment firm outsources the project management to a specialized firm, which appoints an engineering consultancy firm, and a main contractor. The newly formed consortium of project management, consultant, and contractor provides the main resources required for the project. This consortium then becomes the primary network structure that aligns more resources and capabilities to drive all subsequent network members to execute the project according to the agreed design, budget, and timelines.

The structured network includes many other firms that interact with the project consortium such as subcontractors and suppliers with different levels of interactions and

at various stages of the time-bound project network. Viewing the network as a whole reveals a systematically coupled interwoven structure. This structured interdependency and coupling of resources is the main reason a time-bound network can achieve its objectives. However, if such a structured system presents a successful relationship that serves the project, could the same structure be replicated to cater to another similar project once the current project is completed? If this ideal scenario took place, one would expect a replication of the network for a new project to be a reason for minimizing the time required to align resources. Many of the procedural requirements of tendering and due diligence would be eliminated and the competitive advantage of the network would be sustained to realize more gains on new projects.

Preliminary data analysis presented later in this section reveals that there seems to be a negligible level of re-creating the same successful network. This is not a surprising finding as it is in line with various studies conducted on the construction industry as previously described in the literature review. Opportunistic behaviours of network members described by Beach et al. (2005) weaken the trust required to sustain network gains. In parallel, the strengthening of interactive relationships in industrial markets is not only limited to negotiating prices and transferring products and services but requires developing relationships over time as described by the IMP view (Hakansson & Snehota, 1995). This is not possible in time-bound networks experienced in the construction industry.

If sustainable competitiveness is not realized at the network level, then a time-bound network and the industry associated with it may be destined to remain dormant in terms of the network's inability to create more value. According to Barney & Hoskisson (1989) sustainable competitive advantage is the ability to create value that has not been created by existing or potential competition. Hence, the lack of value creation may hinder the progressive development of the industry.

While sustainable competitive advantage has been studied in the context of the construction industry, this research explores the crossroads among different perspectives.

These perspectives include firm-level advantages as presented by the resource-based view (Barney, 1991; Wernerfelt, 1984) the dynamic capabilities view (Eisenhardt & Martin, 2000; Helfat et al., 2007) as a key for alignment with external resources and social networks (Gulati et al., 2000) that link firms serving the same time-bound network in the context of a project-based transaction. In principle, the resource-based view establishes the firm's advantages, while the relational dynamic capabilities will allow a firm to align its resources with the external environment to become part of the greater network.

Dubois and Gadde (2002) followed a similar approach by suggesting that the loosely coupled system at industry level causes innovation to suffer. However, they argue that the loose coupling system at industry level provides the ground to support the tight coupling at project level.

3.3.2 Propositions

Silverman and Marvasti (2008: 134) state that "in many qualitative research studies, there is no specific hypothesis at the outset". In this study, the research proposition is built on the Industrial Marketing and Purchasing (IMP) views primarily developed by European scholars during the 1980s. Johanson and Mattsson (1988) viewed networks as a bundle of relationships. To understand the basis of proposition development for this research, it is advisable to start with a general overview of the relationship-based IMP view of networks.

In their description of the network as a structure, Axelsson and Easton (1992) explain that interdependencies among firms pose limitations on the actions of individual firms, which results in creating a structure. On the other hand, lack of interdependence produces unstructured and random forms. Reducing uncertainty is one of the drivers of forming structured relationships within a project network.

Major relationships of a firm with other members of a network have been found to be connected in a way that affects indirectly linked relationships (Blankenburg & Johanson,

1990). Hakanson and Snehota (1995: 14) pictured a firm as "an entity that in order to build up its own capabilities and strength and to offer the required performance in a certain relationship has to strive to connect all the other relationships". Therefore, a dyadic interaction is not only dependent on the two firms involved, but also on the other interactions in the broader network.

As described in the literature review (Chapter 2) the primary focus of various research disciplines has been on resource interactions among firms that consider long-term relationships.

Hakansson and Snehota (1995: 2) describe business interaction between firms as dependent on historic and future links. They state that the interactions are "episodes in a relationship, in which a lot of things happen besides haggling over price and transferring products and money". This relationship view concentrates on relationships over time between companies in industrial markets, as opposed to typical buyer-seller exchange transactions. From a structural characteristic point of view of industrial markets, continuity, complexity, symmetry, and informality seem to favour the long-term stability of business relations where companies appear to be linked based on longevity of relationships.

Proposition 1: ***Firms participating in a time-bound network align and manage resources to serve the target project without considering a possible sustainable competitive advantage at the network level that extends beyond project completion.***

Sustainability in this context carries the notion of longevity to serve a firm's interests in becoming a member of a new network. This is reflected in a firm's behaviour in focusing on addressing the immediate needs of the project without giving regard to designing strategies and developing capabilities that enhance a firm's chances to build on the benefits gained from the existing network. This proposition does not necessarily indicate that members of a time-bound network have only short-term plans. Actually, it stresses the idea that these firms do not capitalize on the advantages of aligning resources and

capabilities that have the potential to leverage sustainable competitive advantage after project completion.

The literature described in Chapter 2 demonstrates how the resource-based view (Wernerfelt, 1995) supports the idea that firm-owned resources allow a company to differentiate its offerings. Such resources are categorized into tangible and intangible resources. The dynamic capabilities view (Helfat, 1997) then elaborated on intangible resources and classified them as capabilities that are built on learning, evolving, and developing new capabilities that link to resources outside the firm's boundaries.

Hakinson and Snehota (1995) used the IMP approach to conclude that industrial business relationships have the components of adaptation, cooperation and conflict, social interaction and routinization. They describe these characteristics of interaction processes as components that develop over time based on experience and potential for continuity. This causes the relationships to evolve in terms of their content, strength and nature, and this becomes the source of change in the firm and *the* overall network.

Proposition 2: ***Tangible resources determine the initial structure of the network but intangible resources and capabilities define the network evolution pattern.***

A resource that is scarce to a firm becomes an important element, and the firm exhibits a greater desire to gain control over it. On the other hand, if there is a surplus of the resource, the firm will have less interest in gaining control over it. Easton and Lundgren (Axelsson & Easton, 1992: 135) state that networks are "living structures" that are continuously exchanging activities and resources. Therefore, networks are continuously changing and never reach a state of equilibrium. The authors describe changes in industrial networks as means for network members to adapt to changes caused by other actors.

Hakanson (in Axelsson & Easton, 1992) describes the structure of networks in the technical connection between resources, which can be reflected in the analogy of the process of developing a road system in a modern country. Initially, people used paths that

were shaped by nature based on terrain geography. Progressive development helped evolve the roads from a primitive system into a developed road structure that is safe and convenient to use. Intercompany relationships are built according to the same pattern, whereby the sequential exchange of activities and resources will run easily and in specific directions. Structuring is a continuous process and changes over time. This means that even if specific resource interactions are stable during a certain period of time they tend to change in strength, direction and intensity over a longer period.

Hakansson and Snehota (1995) state that from a change point of view, a firm's capabilities depend partly on the amount of resources it controls and on the movement pattern of these capabilities. Therefore, the faster the movement of resources and capabilities, the greater the change and development in the firm's sustainable competitiveness.

A recent study by Zen et al. (2009) compares the property-based resources with the knowledge-based resources of a firm. Property-based resources are an alternative definition of tangible assets based on the resource-based view, and knowledge-based resources are equivalent to intangible assets such as know-how, management and learning capabilities. Makijah (2003) suggested that knowledge-based resources lead to sustainable competitiveness. Knowledge-based resources may be enhanced through the movement of capabilities within the network. This contributes to the improvement of a firm's capabilities if acquired with the intention to serve beyond the life of the project.

Axelsson and Easton (1992) state that heterogeneous resources create synergies when combined and their joint performance increases through experiential learning and adaptation. Therefore, the time factor associated with learning and adaptation is crucial to realizing the synergistic effect of combining resources. In addition, when resources are heterogeneous and various combinations of resources are possible, change and improvement of new combinations of resources will induce further changes in the network.

Based on the above description, it is evident that movement of resources and capabilities within a network has a reciprocal relationship with change in the network. Firms adapt to network changes through movement of resources and capabilities. Similarly, the network structure changes because of the movement of resources and capabilities.

Proposition 3: ***The movement of resources and capabilities among members of the network is a source of developing firm-level sustainable competitiveness but has little effect on network-level sustainable competitiveness.***

Hakansson and Snehota (1995) believe that the network approach is more apparent and effective in a world with increasing business exchange between countries. They suggest that international companies evolve partly through acquisitions and partly by establishing new units in different countries. Such activities induce the movement of resources and capabilities to fill the gaps, especially on the technical and knowledge fronts. Zen et al. (2009) state that local companies in less developed economies are increasingly forming international joint ventures to gain access to advanced organizational capabilities from foreign firms.

International firms of a time-bound network are more active in considering high-level strategies for achieving sustainable competitive advantage compared to local firms.

Proposition 4***: Foreign firms are more active than local (UAE) firms in devising and implementing strategies for aligning resources in time-bound networks with the aim of gaining sustainable competitiveness beyond the life of one project.***

To understand the applied field of research, the following sections describe the economic conditions of the United Arab Emirates. This is followed by an overview of resources applied to the construction industry and a preliminary analysis of a construction project.

3.4 Target geography

The study used the construction projects in the city of Dubai. Dubai is one of seven developing emirates in the Gulf Cooperation Council (GCC) country of the United Arab Emirates. There were two reasons for the choice of Dubai for this research. The first reason is that the growth pattern witnessed since the 1990sin the United Arab Emirates makes the country in general and Dubai city specifically a unique example of fast-track construction projects. The country's economic stability allows the developers to complete their projects on schedule. Although the economic turbulence that slowed the global economy in 2008 has disrupted many of these projects, within three years the UAE market recovered, thanks to government support. The second reason for choosing Dubai is that I have been working in the city since 2003. During this period, I have gained useful knowledge about the market and about ways to identify sources of information especially for secondary research data. My social network in the country has been beneficial for this research.

The construction industry in the economically active city of Dubai has the following characteristics:

- **Young economy**: The United Arab Emirates (UAE) is only 40 years old. This is also the age of its modern urban development. Minimal construction activity took place prior to the formation of the UAE in 1973. Since then, the country has become a vibrant economic and architectural center. The last 20 years have witnessed significant economic activity with a determination by the government to rank Dubai among cities such as New York, Toronto, Singapore, Paris, and London. The rapid execution of this vision with strict timelines for project completion in order to start a new project forced members of the construction industry to seek short-term gains rather than longer-term benefits.
- **Statutory requirements**: Given the fast track of the construction industry's development, the regulatory system that supports technical requirements still has inefficiencies that require improvements. The entry of international firms has

complicated the situation by trying to mould regulations to accommodate different backgrounds. For example, many developers specify project requirements based on the background of the main consulting firm that may be based in another country.

- **Import oriented**: Perhaps the most significant contributor to construction industry complexity is the dependence on imported resources for projects. International firms have found the UAE to be a fertile ground to apply their expertise. While this provides a desirable diversity of technology and skills, it has created a challenge in terms of interaction among different resources that may create inefficiencies.

3.5 Economic indicators of Dubai

Over the past thirty years, the United Arab Emirates has witnessed a diversified economic growth, as seen in its construction activity, services sectors, and manufacturing base. The UAE government strove to create a sustainable business climate by increasing production capacity and creating jobs. The government has driven this growth by devising, implementing, and enforcing laws and regulations that encouraged openness to international markets through international trade agreements with economic blocs from Europe, North America, and Asia. More than 30 free trade zones with preferential treatment to international investors have encouraged many international firms to use the United Arab Emirates as a hub serving other countries in the Middle East region. The Emirate of Dubai pioneered several economic initiatives that have made it among the region's most thriving cities.

To understand the strong economic position of Dubai in 2011, which is when the data for this research were collected, it is worthwhile to compare the indicators in Table 3.2 with figures from neighboring cities in the GCC.

Table 3.2: Dubai economic indicators in 2011

GDP	USD 53.8 billion
Annual Economic Growth	18%
Oil Production	240,000 bpd
Trade Balance	USD 3.1 billion
Annual non-oil GDP Growth	43%
Population	1.65 million
Annual Population Growth	11.1%
Investment Rating	AA2 (Moody's)
FDI	USD 13 billion

(GCC Real Estate Overview, 2011)

Among its neighboring cities, Dubai is the most integrated in the global economy. For two decades, government policies have been targeted at diversifying sources of income away from oil revenues. This is because Dubai's oil and gas production is dwarfed by that of other Gulf cities. While Dubai's production of oil was at 240,000 barrels per day (bpd) in 2011, Qatar and Abu Dhabi produced five and ten times as much, respectively. On the other extreme of GCC oil economy, Saudi Arabia produced 9.2 million barrels per day, which is 38 times the production of Dubai.

While Dubai seems to be at a disadvantage among GCC cities in terms of its share of the oil business, the government's drive towards detachment from oil revenues has been supported by policies that are favourable for attracting foreign direct investment (FDI). With an area of 4,000 km^2 and a population of 1.65 million, the city attracted about USD 13 billion in FDI. Abu Dhabi, which occupies a larger area with more significant resources, especially agricultural and oil-based resources, attracted almost the same volume of FDI funds. Qatar's share of FDI was even less at USD1.1 billion. Generally, Dubai's FDI is targeted at sectors such as real estate, tourism, and financial services with annual non-oil GDP growth of 43%. The same indicators for Abu Dhabi, Qatar, and Saudi Arabia are 20.2%, 22.2%, and 4.8%, respectively.

One of the main sectors that has flourished is the construction sector, due to increasing demand from the real estate industry. The growing economy resulted in an 11.1% annual population growth. Added to this is tourism, which recorded around 9 million visitors in

2011. Apart from the demand for infrastructure development such as roads, airports, and other transport facilities, the city needed more hotels, office space, retail outlets, and residences.

The growth prospects continue to be visible, especially in the escalating demand for more infrastructure projects to accommodate the urban expansion. Dubai, like its neighboring cities, is investing in world-class expansions of airports, seaports, and road networks. Business firms that chose to be part of this growth path were compelled to align their resources at a pace that was faster than that of other markets. With both local and international firms investing in Dubai, the difficulty of aligning resources was even more apparent as decision makers questioned the sustainability of their business decisions in terms of long-term gains after project completion.

3.6 General sector description

Information gathered from secondary data and interview respondents present a typical construction project as a sequence of activities that may be broken down to three stages (Figure 3.1).

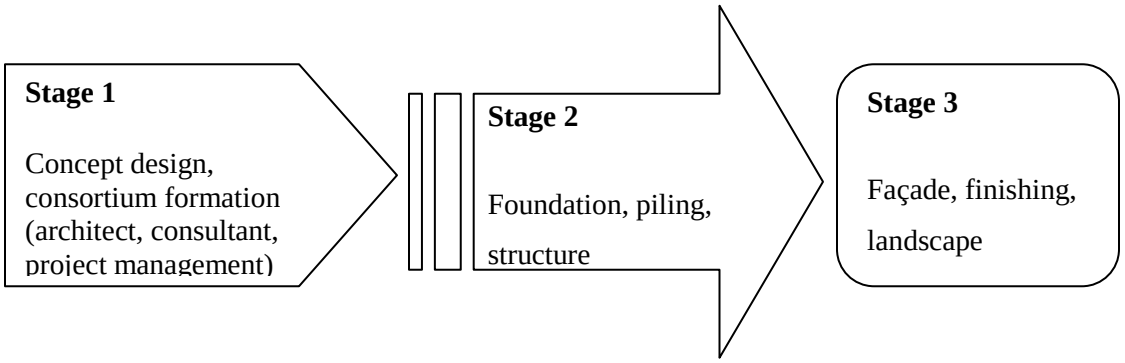


Figure 3.1: Construction sequence

A construction project involves firms that specialize in certain areas of the project by contributing their resources as part of a business transaction. The following labelling of network members (Table 3.3) will be used throughout the research to identify each member of the transaction according to its specialty.

Table 3.3: Network entities

Member	Description
Owner/Developer	This is the ultimate client that conceives the main idea, which is then evolved by other members of the network to become a final product. The owner will eventually either use or sell the final product.
Consultant/Architect	Uses technical knowledge and experience to become the point of reference for confirming compliance of all designs and construction practices.
Project Management	The project management firm manages all coordination activities and ensures budgets are maintained.
Contractor	The main contractor serves as the driver of the materialization of all architectural drawings and technical specifications into a final tangible product.
Subcontractor	Complements the activities of the main contractor with specialized technical competencies.
Suppliers	Provides materials to contractor and subcontractors.

The nodal links between the entities of a construction project are shown in Figure 3.2. When Figure 3.2 is analyzed as per the components of relationships described by Ritter et al. (2004) one can see the similarities between this structure and the "macro-composition" that define a network identity. According to Ritter et al. (2004) such a network comprises intra-links and interactions between firms, including business and non-business units. While the unit of analysis in this research does not extend beyond the consortium's downstream links, the involved units do actually interact with non-business units such as government agencies as part of the regulatory procedures.

The main project developer is the ultimate client in the construction network described in this study. The primary step that the client takes is to identify the first set of contributors to the project that will eventually form the project consortium. This will be labelled as

"primary resource alignment" activity. This formation of resources will then drive the 'secondary resource alignment' stage that will be linked to Tier 1 and Tier 2 suppliers and subcontractors, who form the third level network.

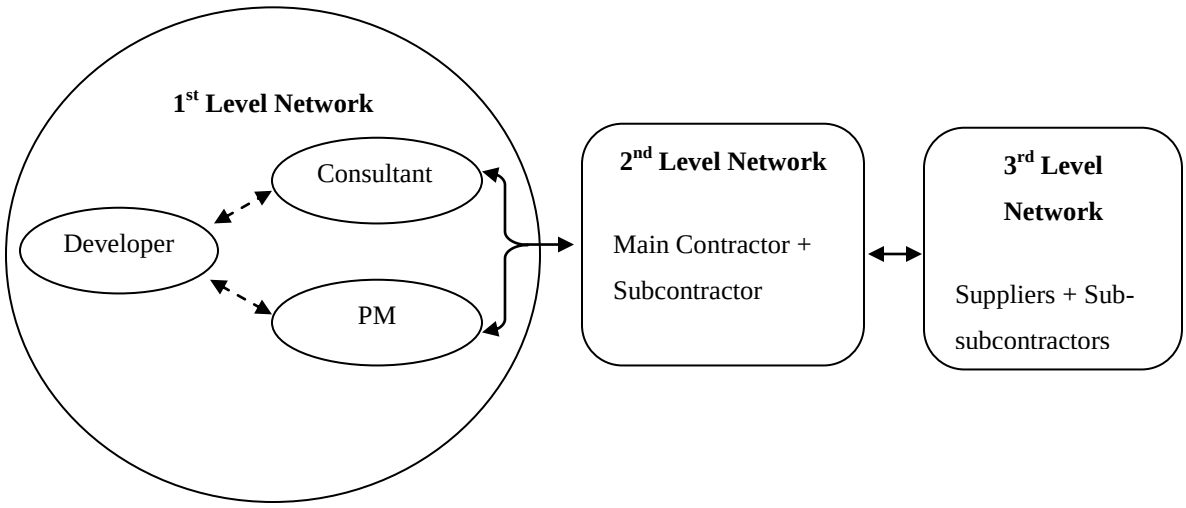


Figure 3.2: Individual network macro-view

3.7 Preliminary assessment

A review of the construction sector structure was initially conducted to visualize the relationship dynamics among interacting firms. Table 3.4 summarizes data gathered from a set of projects that were under construction in 2009. Fifty unique projects were selected from an electronic database generated and maintained by the UAE based consultancy firm Ventures Middle East LLC. I purchased the database that covered all construction projects in Dubai with a list of all companies contributing to each project. The projects were filtered to narrow down the list to those targeting completion dates between 2009 and 2012, with a value range between USD50 million and USD300 million per project. For simplicity, while firms that are more specialized also contribute to a project network, the preliminary analysis described in this section only considered few firms for each network. The basis of this selection was to arrive at a general idea of the patterns of interaction among the major firms with a cumulative contribution of approximately 65%

of the project value. Besides the project owner, consultant, and project management firm (Tier 1) I included in this analysis the main contractor, electromechanical subcontractor, and façade subcontractor (Tier 2) in addition to ready-mix supplier (Tier 3). According to the estimated values listed in the database, these firm types constitute around 65% to 70% of the total project value. Table 3.4 summarizes the number of firms selected from each type.

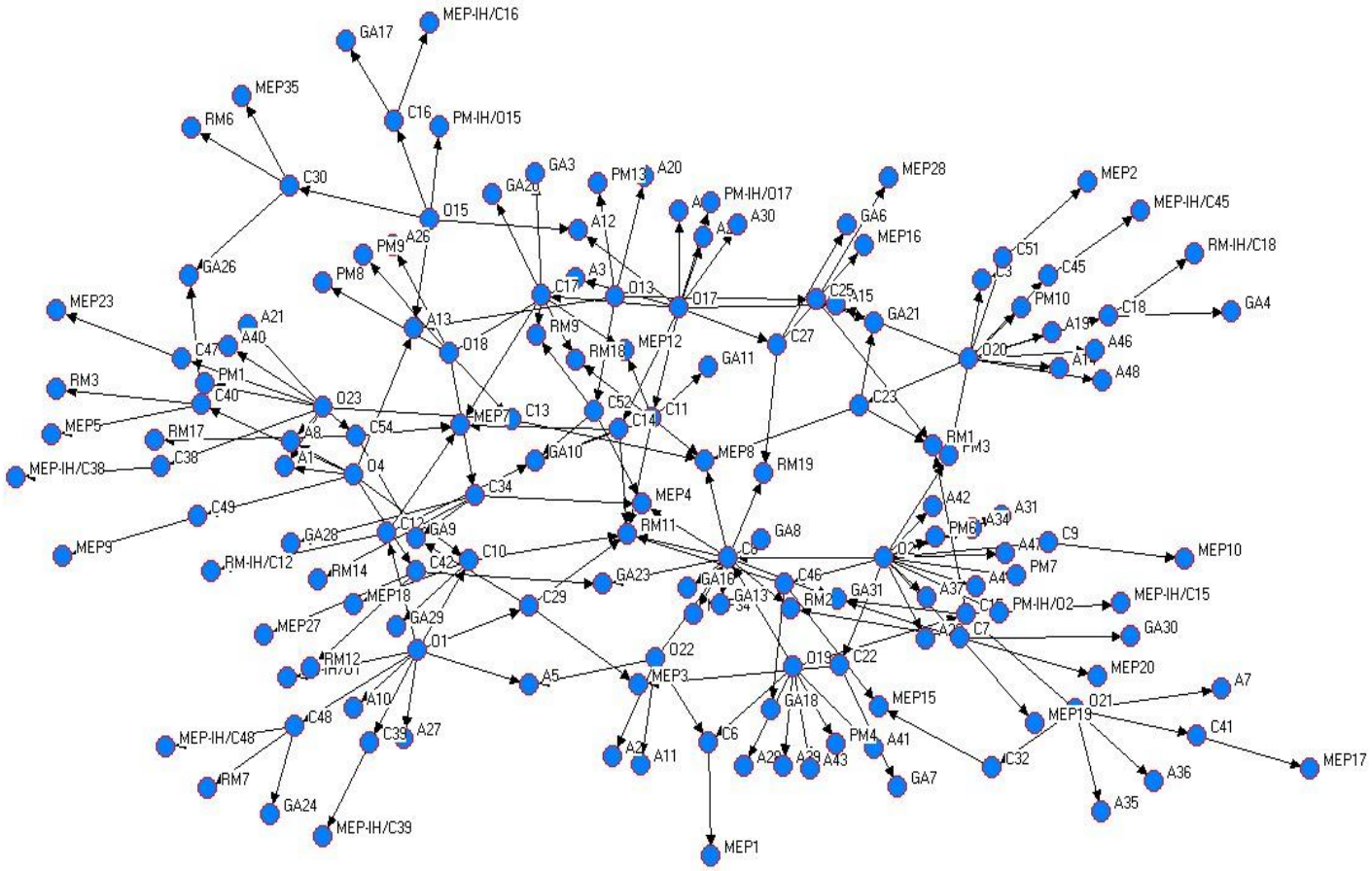
Table 3.4: Preliminary data for 50 projects

Firm type	**Count**
Clients (owners)	12
Main contractor	35
Consultant	36
Project management firms	13
MEP contractor	27
Building façade (supply and erection)	21
Ready-mix suppliers	18

Appendix I lists the coded firms participating in each of the 50 projects. UCINET (Borgatti et al., 2002) was used to visualize the interaction among the companies contributing to the selected projects. Figure 3.3 depicts the output from UCINET. This representation is limited to demonstrating links without further reference to many important aspects attributed to resource interaction. The directional link merely shows the flow of order as in a buyer-seller transaction.

It is evident from Figure 3.3 that the level of interaction among members of the construction sector does not follow a consistent pattern. The following observations are made:

- A project owner may use the same consultant, contractor or project owner on several projects. On other occasions, there seems to be no redundancy.



***Legend**: O: Owner, A: Consultant/Architect, PM: Project Manager, C: Contractor, GA: Aluminum/Glass subcontractor, MEP: Electrical subcontractor, RM: Ready Mix supplier*

Figure 3.3: Network of selected nodes forming 50 construction projects

- Example: O1 appointed A10 twice and A5 twice as consultants on four projects. On the other hand, O17 appointed six different consultants on six projects.

- A project owner may use in-house technical capabilities on certain projects and outsource the same capability on others.
  - Example: O2 outsources project management to PM7 on three projects and provides in-house management on two other projects of the same magnitude.
- A contractor occasionally appoints parts of the same mix of subcontractor and supplier, although all three parties are independent.
  - Example: C7 assigns on two separate projects GA30 for installation of the building façade and RM2 for supplying ready-mix concrete.

These limited observations provide few indications about the flow and interaction of resources in such networks, which were further analyzed through the two-phased case study analysis of this research.

3.8 Preliminary case overview

During the initial stages of this research study, I observed a case that demonstrated the practical importance of the research questions. An investment firm had formed a network of local and international firms to build a horse race course that includes the main track, stadium and an adjacent five-star hotel. The completion date for the project was scheduled for March 2010, which coincided with the World Championship Horse Race. Project value was estimated at 800 million (USD).

The network included the firms listed in Table 3.5 with the relevant contribution to primary resources as defined by Daft (1983):

Table 3.5: Preliminary case

Firm	**Resource Contribution**
Investor/Client	Financial, Relational, Legal
Local and International (JV) Contractor	Physical, Relational, Human
Project Management (and client representative)	Organizational, Information
Consultant/ Architect	Information
Subcontractors & Suppliers	Physical

Being associated with the local government, the client had a unique attractiveness that persuaded all members of the network to seek sustainable competitive advantage with the hope of obtaining similar contracts in the future. However, all implemented strategies by the network players faced a major challenge when the client terminated the engagement of the main contractor due to commercial disputes.

In this case, the main contractor exemplified the bearer of the key capability of linking resources to achieve the project objectives. Apart from the failure caused to the potential long-term relationships, the immediate complexity was demonstrated in the disjoint resource alignment that risked project continuity. However, the client was successful in restructuring the responsibilities of network players to re-align resources as per their existing capabilities. Eventually the project came back on track and met the target completion date. The uniqueness of this restructuring was that the main contractor was never replaced. In fact, the remaining tasks of the main construction were distributed among various new subcontractors, who offered the consortium closer control on all aspects of the project.

The relevance of this case to the research may be summarized in the following questions, which are in line with the research question:

- Is sustainable competitive advantage attributed to the individual firm or the network?

- What are the resources or capabilities a firm needs to contribute to the sustainable competitive advantage of either the firm or the network?
- Do network leaders take into consideration the in-house supplier network capabilities with which the main contractor is associated?

A preliminary assessment of this and similar cases sheds light on factors that play an indirect role in the decision-making process when considering alignment of resources. Some of these general factors include:

- The magnitude of activities in which a firm is engaged can restrict it from participating in other projects due to limited capacity.
- The complexities witnessed on a certain project reduce confidence among members of a network, who then seek other resource alignments on subsequent projects.
- A client could be avoiding the establishment of stronger resource links among other members of a consortium to avoid the potential for joint opportunistic behaviour that will affect the project results.

All of these initial observations and questions formed the basis of the research analysis that is described in the following chapters.

4 METHODOLOGY

Fleetwood (2004) refers to organizations and social structures as 'socially real'. Fleetwood (2004: 29) defines something as real "if it has an effect or makes a difference". As described in Chapter 3, this is similar to the causal effect that is key to critical realism. Among the various modes of reality is the socially real mode, which is dependent on human activity. The research methodology was designed around this understanding by investigating the experiences and perceptions of industry practitioners to address the research question. This chapter provides a comprehensive overview of the research design and implementation method.

4.1 Qualitative approach

This research describes and explains the trends witnessed when aligning resources in time-bound networks. Qualitative analysis is adopted as a means of developing this research. According to Strauss and Corbin (1990) when research findings are achieved through methodologies that do not rely on statistical procedures, then qualitative research is used. The mechanism employed for data collection is based on a case-study approach and information is processed according to template analysis techniques.

Qualitative research has its roots in sociology. When qualitative research started losing its position to quantitative methodologists in the 1960s, Glaser and Strauss emerged as strong supporters of qualitative research through their examination of dying in hospitals (Glaser & Strauss, 1967). At that time, quantitative researchers were critical of qualitative research as "impressionistic, anecdotal, unsystematic, and biased" (Charmaz, 2006: 12). The only advantage researchers saw in qualitative research was that it served as a prerequisite to organizing quantitative research, such as using interviews to develop surveys that are more effective.

Proponents of grounded theory viewed quantitative researchers as refiners of exciting theory without constructing new theory (Charmaz, 2006). Grounded theory is based on guidelines "for collecting and analyzing qualitative data to construct theories grounded in the data themselves" (Charmaz, 2006: 2). Therefore, the grounded theory approach starts with the basic understanding that no theory exists to explain the behaviour being analyzed.

As described in Chapter 2, several theories apply to managing resources and capabilities. Hence, this research cannot claim that no theory exists; therefore, grounded theory may not be adopted as a methodology. However, the interviewing techniques used by grounded theory were adopted as described in Section 4.5.2. The flexibility of grounded theory interviewing techniques provides a mechanism for following leads that emerge during interaction.

The research study adopted a two-stage approach based on qualitative research. Figure 4.1 summarizes the approach.

4.2 Case study

A description of a case study is provided by Schramm (1971) who observed a case study that attempts to justify why decisions are implemented, how they are implemented, and with what results. One of the aspects this study is concerned with is the patterns or reasons for the behavior of network members when making decisions about resource alignment. The similarity between this study and those in the clinical social sciences is that the human factor plays a significant role in shaping patterns of relationships among network members. This goes back to the decision-making drivers that influence the interaction of resources. The research provides a better understanding of the contributors to such trends. This will later explain what potential variation may be needed to enhance the performance of these networks.

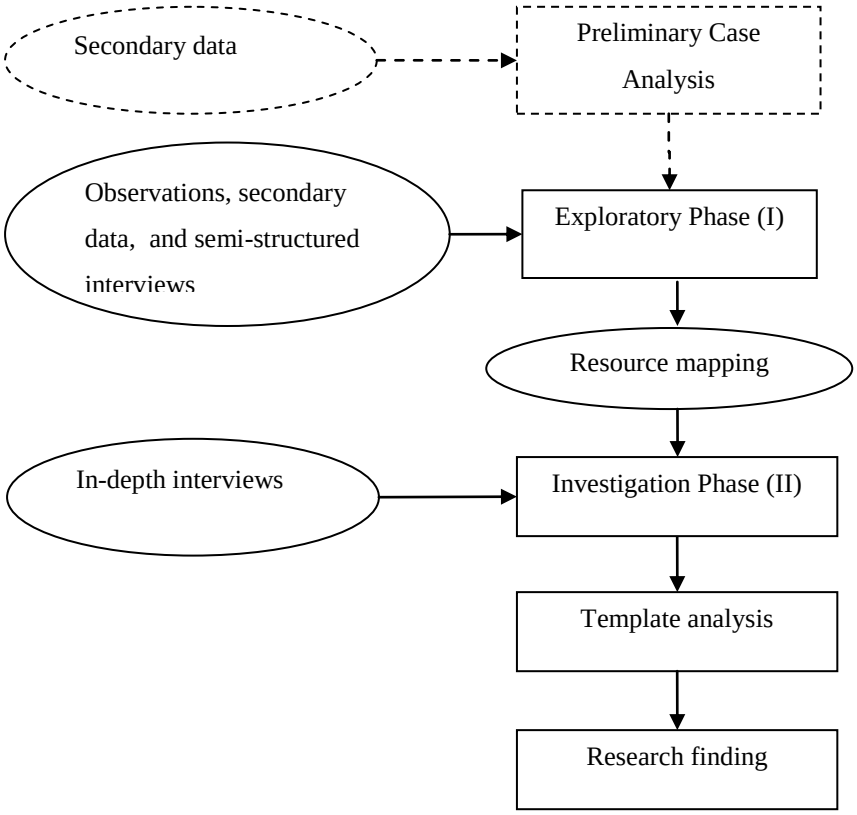


Figure 4.1: Two-stage qualitative analysis

A similar justification is presented by Yin's (2009) description of case studies as a means of explaining the "why" or "how" of social, political or organizational phenomena. According to Yin's (2009) distinction based on type of research question, extent of control over events and degree of focus on historical events, the method of choice for this research is a survey-based case study. Since the research question is 'how' resources are aligned in time-bound networks, the following observation could be made based on the conditions presented by Yin (2009):

- The "how" questions lean more towards the use of case studies, experiments or histories.

- Control cannot be gained over the target investigation.
- Case studies are favorable when dealing with contemporary events but when the behaviours "cannot be manipulated". Experiments, in contrast, have the advantage of manipulating behaviours and are applied mainly to social studies.

Easton (2010) refers to case studies as intensive research that uses interviews, ethnography, and qualitative analysis where testing is by corroboration by using causal groups that produce causal explanation. An ideal evaluation of a case study requires all units of analysis to belong to the same group under study. The research at hand would allow such an ideal scenario only if the interviews were conducted at the time a construction project was successfully completed. The biggest obstacle in achieving this objective is the inability to interview individuals who contributed to the project in the same instance during the project's lifetime. Given the sequential mode of execution of construction projects, there is no single time during any point of the project where all members of the network exist at the same time. Furthermore, at the time of project completion, all individuals would be relocated to other sites; perhaps in other countries, which would make it difficult to locate them for interviews.

To overcome this challenge, the interviews in Phase 1 were conducted with 35 individuals spread over 20 projects. The cross-sectional evaluation of firms across several projects provided a wider spectrum over the various stages of a project's life, and a diverse exposure to different interactions among network members.

4.3 Classification of resources and capabilities

This section provides an overview of various classifications of the resources and capabilities that are used for data collection in the interview setting. The literature provides several classifications of resources (e.g., Barney, 1991; Hunt, 2001; Teece et al., 1997) that differ mainly in terms of grouping. To define resources in this research, I adopted the classification from Daft's (1983) categorization of resources into assets,

capabilities, organizational, processes, firm attributes, information and knowledge. Including capabilities in this classification is essential to building the network approach.

Another resource that became apparent after conducting the initial interviews is a firm's brand name that Wernerfelt (1984) referred to as an intangible resource. Enz (2008) referred to the hospitality industry to suggest that brand equity under general organizational resources is a resource that if combined with other resources creates sustainable competitive advantage. Zhang and Su (2008) studied the 'Made in China' brand based on resource-based theory and labelled it as a source of competitive advantage. Arnett et al. (2010) also identified brand equity as a valuable source of competitive advantage. Brand name is just one element contributing to brand equity or brand value. Since there is no actual evaluation of brand equity for the companies involved in this research, the positive reputation of a brand name as perceived by research respondents is used as a reference for qualitatively determining brand equity of a firm.

Firms do not usually own all needed resources and may rely on resources controlled by other firms (Axelsson & Easton, 1992; Hakansson & Snehota, 1995). In parallel, products and services of a firm become resources for others. Therefore, according to Hakansson and Snehota (1995) the resource perspective of business relationships is important. Resources are usually identified with tangible elements that are not freely supplied. That has led to an emphasis on resource availability and control. They suggest that better access to and control over resources offers an advantage. Hakansson and Snehota (1995) provide the example of the wealth of oil companies in relation to their control of oil fields and the wealth of the forest industry in relation to the control of forests.

Hakansson and Snehota (1995) offer a close look at resources and suggest that the relative concept of defining resources is problematic. Considering an element as a resource depends on its use, whether it is tangible or intangible. A useful element becomes a resource and the value of the resource is defined by its potential use. Resources, according to Hakansson and Snehota (1995: 135) have a provision side and a

use side, where provision "determines the features of resource elements that can, but need not be, of use". Resource value depends on the use of their features "and thus on the relationship between the provider and the user".

Alderson (1965) supports the view that heterogeneity of resources is a reason for differentiating firms in terms of their levels of success. Along the same lines, Hakansson and Snehota (1995: 135) suggest that as long as resources are regarded as heterogeneous, their value depends on the resource ties in business relationships that "tend to be relatively broad in content and stable over time".

In addition to the description provided above on resources, capabilities were extensively described in the literature review (Chapter 2). Table 4.1 summarizes the resources and capabilities referred to in this research.

4.4 Research data

4.4.1 Unit of analysis

Features of this research are similar to network studies where the units of analysis are organizations and relationships, which according to Easton's (2010) are complex in structure compared to other types of studies such as consumer markets. Easton also noticed that a case study of one or few firms or networks might provide rich qualitative data for case-based research. According to Yin (2009) the unit of analysis in case-based research, like all research methodologies, depends on the research question. The main source of data in this research is interviews with key personnel in the projects. Twenty large construction projects at varying levels of development were examined to enable a timely follow-up on project progress.

One source of confusion in case studies is the distinction between the unit of data collection and the unit of analysis. Yin (2009) attributed this problem to data collection, which is a potential source of distortion of the unit of analysis. To avoid this confusion, secondary data and cross-referencing among interviewees were used in the present study.

Table 4.1: Classification of resources and capabilities

	Resources & Capabilities	Description	Reference
Resources	**Financial**	Monetary resources from which a firm can draw funds.	Hunt, 2001; Enz, 2008
	Human capital	Skills, background and training of staff, and the way they are organized. Including recruitment and building career paths.	Barney, 1991; Hunt, 2001; Enz, 2008
	Physical	Land, buildings, equipment and access to raw materials. Physical assets are the resources people usually observe before all the others.	Barney, 1991; Hunt, 2001); Enz, 2008
	Legal	Experience in contractual and legal requirements.	Hunt, 2001
	Know-how	Operational know-how exemplified in patents, advanced industrial systems. Unique designs and material selection may also constitute know-how.	Daft, 1983; Teece et al., 1997; Hunt, 2001
	Systems & Procedures	Administrative, quality assurance, efficient documentation and implementation of procedures.	Daft, 1983; Hunt, 2001
	Information technology	Use of computer software and other information technology to manage operations internally and externally.	Daft, 1983; Hunt, 2001
	Brand name	Brand equity, image and reputation.	Enz, 2008
Capabilities	**Organizational learning**	Firm's ability to acquire externally possessed knowledge that is important to operations.	Enz, 2008; Javernick-Will, 2009
	Social capital	An intangible resource that is built on social structures comprising personal relationships and trust.	Putnam, 1995; Hakansson & Snehota, 1995
	Managerial capabilities	Also defined as marketing capability; a firm's ability to integrate cumulative knowledge and skills to effectively react to competitive market needs.	Helfat et al., 2007; Griffith et al., 2010
	Alliance management	Knowledge of forming and managing alliances to acquire new resources and capabilities.	Helfat et al., 2007
	Network competence/ Strategic Networks	Firm's ability to handle, use and exploit inter-organizational relationships	Van De Ven, 1976; Gulati et al., 2000; Ritter et al., 2003

In this study, the source of data collection was employees of the firms. The unit of analysis was the firm and the network where the firm is an integral member. The network comprised three tiers that cascaded downward, beginning with the main developer (or project owner). The primary network comprised the consortium of decision-making firms appointed by the project owner, while the secondary network consisted of the main contractor, subcontractors, and immediate resource providers to the primary network. Finally, the tertiary network included all other resource providers who supported the primary and secondary networks, including suppliers and sub-subcontractors.

The alignment of resources was evaluated across all three network levels to identify all options of creating a more sustainable network that is anticipated to be capable of maintaining the earned benefits beyond the life of the initial project.

4.4.2 Target case studies

The projects selected for this research fulfill the project-based transaction (PBT) criteria described in Chapter 1. The following features were taken into consideration:

- The projects allowed for direct face-to-face interaction with all interviewees.
- The projects were at various levels of completion, allowing for a wider spectrum for evaluation.
- Project values exceeded 100 million (USD). The limitation on projects' minimum value filtered out many construction firms unable to cater to such projects, thus making the scope of the study more manageable. Another factor that resulted in discounting smaller project values is the inconsistency in the network structure of smaller projects. For example, the secondary data gathered at the initial stages of this research showed that the developer of a small shopping plaza hired only one company to perform all project activities, including designing, procuring, building, and commissioning the building services. The value of that project was around 30 million (USD).

4.4.3 Sample size

Gubrium and Holstein (1998) warned researchers about the difficulty of seeking respondents for an interview when not being able to find candidates who are willing to talk. One of the major challenges this research faced was the level of response from managers contacted in Phase 1. The success rate was around 53%, as shown in Table 4.2.

Table 4.2: Phase 1 response rate

Individuals called requesting an interview	75
Individuals accepted to have interviews	40
Respondents approval rate	53%

Thirty-five interviews were included in Phase 1 analyses. These interviews took place after 75 candidates were invited to participate in the study. Thirty-five candidates declined to participate in the study for a variety of reasons. Some of the reasons that were expressed or implied include:

- Concerns over revealing information that might be exposed to competition. Although the candidates were assured information would remain anonymous, some were still skeptical about the outcome.
- Lack of awareness in the region about academic research and its value in enhancing knowledge.
- Managers working on projects reaching handover stage did not have time for an interview.

Out of the 40 candidates who accepted to participate in the study, five respondents were excluded from the analysis and records were not maintained. Three of these interviews were discontinued when the respondents were called during the interview to attend to their daily business. The other two disqualified interviews were not registered when I felt the information provided by the respondents lacked depth and knowledge about the industry.

Welch et al. (2011) recently reviewed articles published in four major international business journals and found that case studies are the most popular qualitative research strategy. Welch et al. (2011) found that 32% of multiple case studies had the number of cases clearly stated. Eisenhardt (1989) recommended a maximum of 10 cases for multiple case studies. Many cases were found where the number of observations was not sufficient for statistical analysis. This resulted in a bias toward multiple case studies. This form of case study was called a multiple-case study.

The present research used a large sample size in order to encompass a wide spectrum of construction projects. According to Lillis and Mundy (2005) who termed their management account research a 'limited-depth cross-sectional field study' to differentiate it from a conventional case study, using a large sample sacrifices depth for breadth. To avoid sacrificing depth in the present study, I used a more in-depth approach to devise the second phase of interviews with ten executive-level managers from different construction firms.

4.4.4 Data collection

Data collection and sample selection followed a longitudinal approach built on integrating from multiple sources of evidence. Phase 1 data collection began by interviewing managers with various levels of contributions to the firm to which they belonged. These were face-to-face interviews. In all interviews, the researcher started by establishing an appropriate rapport and clearly explained that all information would be kept anonymous at all times.

One of the features of case research is that it allows the researcher to filter and unscramble complex information and relations through an iterative process of data gathering from each case being studied (Verschuren, 2003). I used semi-structured interviews conducted as informal conversations in relaxed ambiances. Interview questions were based on the protocol shown in Appendices II and III. After sharing the information about the project gathered from secondary sources, I explained the main

theme behind the research and demonstrated the terminologies used. This stage was critical as it allowed the respondent to align his/her thinking process with the research guidelines.

Many respondents provided valuable flowcharts describing network links or flow of information. Meyer (1991: 218-236) found visual data valuable "in efforts to move beyond mechanical and biological models of organizations to view them as systems for creating meaning". In such cases respondents claim responsibility for their inputs by making freehand sketches.

Approximately 22 hours of audio recording was compiled in addition to hundreds of sheets with sketches and notes. I also reviewed other sources of data that were made available on site without permission to copy. These documents included:

- Project monthly reports including manning histograms, material delivery schedule and project program
- Minutes of meetings with different network parties
- Policies and procedures
- ISO quality management system manuals
- Contracts and schedule commercial terms and conditions
- Pre-qualification documents
- Commercial and technical submissions and comparison tables

4.5 Interviews structure

The two-phase interview structure offered two benefits. First, creating two levels of information sources strengthens the trustworthiness of the research (trustworthiness is described in greater detail in Chapter 6). Second, the two phases allowed for the evaluation of a longitudinal cross section of the unit of analysis.

The questions listed in the interview protocol of Phase 1 (Appendix II) and Phase 2 (Appendix III) were designed around the research propositions described in Chapter 3. Although the open-ended interview structure motivated the respondents to share information, I was always cautious to keep the dialogue as per planned interview protocol in order to ensure that the research propositions were sufficiently addressed. Table 4.3 summarizes the correspondence of research questions to the research propositions.

Table 4.3: References to interview question

Phase 1	**Subject**	**Proposition/Description**
Q1-Q2	General questions	Project network setting
Q3	Allocation of resources and capabilities	P2
Q4	Movement of resources & capabilities	P3
Q5	Sustainable competitive advantages	P1 & P4
Phase 2		
Q1-Q2	Research introduction and overview	Present Phase 1 preliminary findings
Q3	Allocation of resources and capabilities	P2
Q4	Sustainable competitive advantages	P1 & P4
Q5	Movement of resources & capabilities	P3
Q6	Interaction beyond project completion	P1 & P3

4.5.1 Phase 1: Semi-structured interviews

The initial stage of data gathering consisted of observations, secondary data banks and semi-structured interviews. An observation, according to Crabtree and Miller (1999) is time-intensive and demanding. Observations were recorded in the form of mapping relationships among resources and by creating checklists that are attributed to the resource interconnectivity to gauge directions, intensity and duration. Observations refer to undocumented information in social networks and media outlets.

Secondary data were used to compile preliminary information about the targeted organizations. Project names and locations including names of contributing companies were compiled from the public database in the main library of the Chamber of Commerce and Industry in Dubai-UAE. Secondary data served as a preparatory stage that supported building the interview schedules with an initial mapping of resources prior to meetings.

This information was the main source of contact details for the recruitment of interview candidates.

After compiling basic information about the target project, I established contact with members of middle management from the primary network (i.e., developer, contractor and consultant) according to the telephone script shown in Appendix IV. Middle managers included heads of departments for supply chain/procurement, project management, and finance. A follow-up note was then sent by e-mail to candidates who agreed to take the interview explaining further details (Appendix IV). All respondents received a feedback email thanking them for participating in the study and confirming the possibility of sending them an executive summary upon concluding the research (Appendix IV).

Gubrium and Holstein (1998) compared qualitative interviews to survey interviews. Apart from the similarity in terms of researchers asking questions and respondents answering, the epistemology of qualitative interviews "tends to be more constructionist than positivist" (Gubrium & Holstein, 1998: 83). Therefore, the primary objective of qualitative interviewing is to derive interpretations from respondents' input. Semi-structured interviews were conducted with the identified individuals to determine firm-specific resources and capabilities that are required for the successful completion of the subject projects as perceived by decision makers.

Interviews were all conducted in the English language. However, the level of English varied due to the various nationalities interviewed. Research terminologies were not always understood; and, in such instances, further explanation was required.

Phase 1 interviews targeted the following general information:

- What are the internal resources and capabilities that contribute to the firm's role in the project network?
- What are the firm's parameters of network competence?

Evaluation of firm's capabilities was conducted using the CPX framework introduced by Duhan et al. (2005). The CPX framework is based on organizational capabilities defined as competences, processes, and externalities that enable a firm to respond to a dynamic competitive market. Table 4.4 depicts the CPX framework.

Table 4.4: CPX framework

Capability: identifier and summary of essential characteristics	
Competence	Key skills, technologies, knowledge at the heart of this capability
Process	How competencies are deployed, organized, coordinated and embodied in business process
External	How this capability connects with customers and/or suppliers
Evaluation: • How does this capability differentiate from competitors? • How does this capability give competitive advantage?	

Phase 1 interviews focused on the relationships between resources aligned throughout the life of 20 different projects, with a total of 35 respondents listed in Appendix V with their corresponding codes.

Since the main theme of this research is the study of resources and capabilities within networks, I used Table 4.3 as a starting point to create a priori codebook shown in Appendix VI. The priori code structure uses two capital letters to identify the type of resource (R) or capability (C) followed by one lowercase letter to provide further description. For example, RHl stands for the workforce strength of the employed skilled laborers (l) which contributes to the human capital (H) resources (R) possessed by the firm. The interview transcripts and sketches were manually scanned by words and sentences, which were grouped into coded categories. I marked each corresponding code on all compiled transcripts.

Phase 1 was initiated by conducting four interviews with four individuals from different firms serving the same project. A total of 10 days elapsed from the time the recruitment process commenced until the interviews were completed. One of the main outcomes from the initial four interviews was the formation of emergent codes. Questions from the first round of interviews were listed in a table with the corresponding answers from the first

four respondents. As the interviews progressed, I developed the table by inserting the different types of responses and assigning a unique code for each new type of response. The table eventually evolved into the final list of emergent codes shown in Appendix VII. The code style chosen for the emergent codes uses three capital letters; the first two letters correspond to the main question, and the following letter is linked to the unique response. For example, PIP, PIS, and PIN are emergent codes assigned to three different responses to the question about a respondent's level of previous interaction (PI) with a certain firm in the network.

The three code types are defined as follows:

- PIP: Applies to respondents who have dealt with the target firm previously.
- PIS: Applies to respondents who have interacted with the firm while employed with a different company.
- PIN: Applies in cases where no previous interaction can be identified.

Preliminary information gathered on the subject projects along with interview results from Phase 1 were used to map network connections. Samples of project networks are displayed in Appendix VIII. These charts were used to understand the network development stages from the initial stages of mobilization to project completion. Data analysis was developed based on the relational links between network firms and the level of interaction between their resources and capabilities.

4.5.2 Phase 2: Intensive interviews

Shareholders, managing directors or their immediate deputies were interviewed in Phase 2. The intensive interviews gathered in-depth understanding of the strategies and management styles employed by key decision makers.

The resource and capabilities codes developed in Phase 1 guided the interview in Phase 2. The aim was to elicit the resources and network-based capabilities that contribute to the success of the project, taking into consideration the inter-organizational interaction of

resources and capabilities aligned with the project. The in-depth interviews gauged the significance of these interactions for the long run after completion of the project. Secondary data compiled on the history of resource and capability interactions was also presented during the interview to expand on the investigation and to create hypothetical links that allowed the interview to explore various interaction scenarios.

The same interview approach from Phase 1 was used for the intensive interviews. However, questions were more focused as a better understanding of interactions had been formulated (Appendix III). Just as grounded theory relies on the social content of interviewees, this research relied on the experience and judgment of interviewees. Some of the guidelines proposed by Charmaz (2006) include:

- "Go beneath the surface of the described experience."
- "Stop to explore a statement or topic."
- "Keep the participant on the subject."
- "Restate the participant point to check for accuracy."

The in-depth interviews conducted in Phase 2 followed the phenomenographic interview style recently described by Lamb et al. (2011: 54). Phenomenographic interviews extract respondents' meaning by capturing "the variation in how respondents understand aspects of their realities". In such interviews, the questions are initially designed to guide the conversation topics but also to allow for a two-way dialogue to encourage respondents to provide information from their experience beyond the current project. The primary intention of the phenomenographic approach is to ask the respondent regularly to provide examples. This was particularly important in the present research in order to confirm that the respondents had understood the question, especially in view of the new terminology introduced to them in the course of the interviews.

To increase the validity of the results, additional data collection methods were used to supplement the interviews (Eisenhardt, 1989) with secondary data that were either available publicly or provided by the respondents. Permission was granted by the

respondents to view on-site information, such as pre-qualification documents or internal project checklists. For example, respondents ECT1 (main contractor) and ECO (consultant) granted access to their file room to view and study prequalification of recent projects they had completed with a documentation on decision-making criteria, including firm capacity, price, payment terms, previous track record and three years of audited financial reports of the main contractor and subcontractors. Phase 2 interviews involved 10 executive-level personnel from 10 organizations as described in the following chapter.

Charts and tables from Phase 1 were shown to the Phase 2 respondents. Some of the immediate reactions to this information were hindsight reflections on how resources and capabilities flow. Several of the respondents were impressed by the visual mapping of a construction network in terms of resource flow. Respondent EPD from property developer Devco described the information as follows:

> *[Mapping] is a nice way to see the real components that are behind a project. We usually focus on one resource, which is the money, and tend to ignore the real components that, if managed from a perspective of sustainability, I'm sure we can generate more profits in the long run.*

Respondent EPD presented the following analogy:

> *[A construction project] is like any team sport match. Team coach enters the match according to certain rules and limitations but has a specific strategy according to the opponent's characteristics. Depending on the game the coach will change the strategy to achieve results. On a new project, a company enters a network according to the project guidelines, as project parameters start deviating from budgets and program all network members start adjusting their resources to fit the new project flow hoping they achieve the original targets.*

Phase 2 consisted of open-ended interviews with 10 executive managers from 10 different firms, listed in Table 4.5. These respondents brought years of experience in the construction industry in addition to long-term involvement in UAE business environment. All 10 respondents had risen to positions of leadership in their

organizations after at least 15 years in the UAE's construction industry, making them eyewitnesses to the construction boom.

Table 4.5: Phase 2 respondents

Firm Code	Firm Type	Respondent Code	Respondent	Firm Details
Devco	Property Developer	**EPD**	Board Director	− 100% owned by local shareholders − 300 employees
Consco	Consultant	**ECO**	Vice President - Operations	− 60% owned by local shareholders and 40% by European firm − 120 employees
Mangco	Project Management	**EPM**	Executive Director	− Currently 100% owned by local shareholders − 80 employees − Established in the late 90s by a European company that owned 40% until 2008
Arco	Architect	**EAR**	Board Director	− 52% owned by local shareholders. Balance owned by North American firm − 50 employees
Contco1	Main contractor	**ECT1**	General Manager	− 52% owned by local shareholders. Balance owned by international investors − 4,000 employees (85% labour force)
Contco 2	Main Contractor 2	**ECT2**	Managing Director	− 60% owned by local shareholders. Balance owned by international investors − 3,000 employees − Established in the early 1990s by a European company that owned substantial shares until 2000
Subco 1	Interiors Contractor	**ESC1**	Shareholder (Executive Director)	− 80% owned by local shareholders. Balance owned by international investors − 2,000 employees
Subco 2	MEP	**ESC2**	Managing Director	− 100% owned by local shareholders. − 500 employees
Suplo 1	Concrete supplier	**ESU1**	Chief Financial Controller	− 100% owned by local shareholders. − 75 employees
Suplo 2	Light supplier	**ESU2**	Sole Owner	− 100% foreign company − 25 employees

4.6 Data interpretation and analysis

This research consisted of two levels of case analysis to provide the broadest possible scope of investigation. At the first level, each case was analyzed independently. Eisenhardt (1989) suggests that analyzing each case as a standalone reveals independent patterns before the results across cases are generalized. As seen in Appendix VIII, each network showed a different pattern of nodal interactions, giving every case a distinctive resource flow. At the second level, cross-case analysis was used to compare and contrast the cases.

According to Vega (2008) one of the basic tools for analysis and inference in a case study is the discourse analysis technique, through which textual information is classified into categories and a systematic procedure is used to study the content. This process, which has already been used by several researchers (e.g., Mayntz, Holm & Hübner, 1975; Wolfe, 1991) consists of conceptualization, categorization and the use of inferences to draw conclusions.

The template analysis (TA) technique is based on tools similar to discourse analysis. Qualitative data that was gathered through both interview stages required a rigorous analysis procedure, which is shown in the TA technique. Template analysis seems to have emerged from the USA during the 1990s and has shown similarities to the grounded theory approach (King, 2004). Waring et al. (2008) observed that TA later gained credibility in Europe through the work of King (e.g., King, 2004) in fields related to health and sociology.

The TA technique is most evident in ethnography (Crabtree & Miller, 1999). While TA is not well established in Business and Management research, some recent publications during the past decade have emerged, such as the work of Yanamandram et al. (2006) on switching barriers in services, Lapointe et al. (2007) on information systems in the context of organization science, and Matheus (2009) on inter-organizational innovation.

In TA, the researcher "defines a template or codes and applies these to the data before proceeding to the connecting and corroborating/legitimating phases of the analysis process" (Crabtree and Miller, 1999: 165). Connecting is the linking of various segments within the data to identify patterns. Corroborating/legitimating then becomes the stage of interpretive validity, which includes confirming the credibility and trustworthiness of the process.

The following analysis procedure was followed according to guidelines from Glaser and Strauss (1967) and Strauss and Corbin (1990):

- Created a code manual/coding scheme. This was based on the results extracted from the first five interviews conducted under Phase 1 for assigning and tracking movement of resources and capabilities.
- Sorted segments to get all similar text in one place. This was done by sorting all gathered interview notes, documents and transcripts.
- Coded the text to assign each segment to appropriate categories.
- Read the code segments and analyzed data connections.

According to Gubrium and Holstein (1998: 46) coding is the "pivotal first analytic step that moves the researcher from description toward conceptualization of that description". Coding requires the researcher to attend closely to the data. Waring et al. (2008:54) suggested that one could be challenged by TA bearing "little difference from the use of software packages such as NVivo for analysis of data and in fact the software might allow a more comprehensive approach". They argued that: "immersion in the data is an essential part of the interpretive process and use of technology can often act as a substantial barrier". This was taken into consideration and I did not use any software for applying the TA technique.

Textual data was explored to identify key concepts, relationships, and key issues based on the literature review, theoretical propositions, and research questions. A priori code (Appendix VI) was established based on previous scholarly literature. After creating a priori code, emergent codes were developed based on the feedback gathered from respondents with

reference to the theoretical propositions and corresponding research questions. Appendix VII lists the codes that emerged over the course of data collection. The priori codes and emergent codes became the basis of data analysis.

The TA technique reduced the qualitative information gathered from the interviews and all other sources mentioned earlier into categories based on the points addressing the propositions being studied according to the priori and emergent codes. As more information was gathered through the interviews, patterns started formulating and cross-referencing was used to draw preliminary conclusions along with understanding causal paths that were incorporated into the data analysis.

Information gathered from Phase 2 was used to further elaborate on the maps generated from Phase 1. This provided a visual tool that aided in displaying template-sorted text (Crabtree & Miller, 1999; Mason, 1996). Shapes and sizes of categories indicated the type of resource. Lines intensity and direction represented the flow of resources as shown in the following chapter.

Chapter 5 describes the core of this research study, presenting the results compiled from both interview phases and evaluating the results using template analysis.

5 FINDINGS

The main research question is the extent to which relationships continue after a project has been completed. The network structure built throughout the progressive cycle of a construction project involves connections with reciprocal causal effects on actions by network entities. The business and social relations that constitute the network structure involve causal powers and liabilities, which may cluster into causal configurations that, according to Fleetwood (2004) can produce properties that would not exist in isolation. During a construction project, a firm has the power to affect its resources and the way they are aligned with other network resources. For example, if a main contractor's decision to recruit a site engineer working with the downstream subcontractor will involve a causal power, then this will enhance the human capital resources possessed by the main contractor. On the other hand, the subcontractor is liable to losing a valuable resource that will have an impact on the firm's competitiveness when bidding for a new project. Fleetwood (2004: 46) explains that power possessed by an entity is held "whether or not it is exercised or actualized and, therefore, endures irrespective of any outcome it generates".

Using the guidelines prescribed in Chapter 3 and the information gathered on network structure, three outcomes are identified as potential results of the mechanisms that govern a construction network structure. The sequence of interactions that takes place between and within firms of a network may result in one of these three events:

- **Event 1**: The network is fully replicated on a new project with the same network members. The preliminary findings showed that this event does not occur under any circumstances due to causal sequences that will become clear in the following analysis.
- **Event 2**: The network is partially replicated, with new entrants replacing exiting members.
- **Event 3**: The network is fully terminated, with no continuity of interaction on new projects as a result of the concluded network links.

The interviews in Phase 1 investigated the actual alignment of resources and capabilities within networks and used feedback from project–level experts to study assessment of the three events mentioned above. In order to consider various levels of a network, Phase 2 interviews aimed at using these events as the main driver for dialogue with executive managers from various construction industry specialties.

As will be seen in this chapter, I combined information on each interview question from all respondents into a single generic network, referred to as the 'master network'. Almost all respondents agreed that all networks might be represented by a typical set of nodal links between firms where the project owner is the initial source of the resource flow, which cascades down the network. The uniqueness of each network as demonstrated in Appendix VIII is attributed to the variations that are introduced to resolve particular commercial, legal, or technical issues.

5.1 Description of respondents and network interactions

5.1.1 Management experience

This section begins by describing the background of interview respondents (unit of data collection) before the analysis of the gathered information is discussed. The feedback on respondents is provided in terms of the respondents' experience in the industry and their position with respect to the network. Respondents working in the same industry for more than 10 years constituted 92% of the total sample; this includes respondents serving for more than 10 years in the same company (27%) competing companies (19%) a similar company in another country (19%) or another member of the network (27%). These numbers give the researcher a level of comfort in the depth of gathered information considering the wealth of knowledge acquired in the course of more than 10 years of field experience. Table 5.1 summarizes the experience gathered by respondents according to the tier they belong to within the network.

Table 5.1: Management experience

	Tier 1	Tier 2	Tier 3
Competition in the same country	4%	15%	0%
Similar business in another country	4%	15%	0%
The current company was a **client** to my previous employer and moved after working together on an earlier project.	4%	8%	4%
The current company was a supplier to my previous employer and moved after working together on an earlier project.	8%	0%	4%
Respondent grew with the company through experience gathered from various projects. Either first job, or has been with the company for over 10 years	0%	8%	18%
Joined the company from a different industry	0%	8%	0%

Further analysis of the distribution of respondents reveals that a majority (60%) of managers working in Tier 1 belonged to the same trade within the construction industry throughout most of their career. The rest of the managers (40%) moved up the network from Tier 2 firms. For example, respondents RCO3 and RPM2 were resident engineers with the main contractor before transferring to the consultant firm CO3 and project management firm PM2, respectively. This movement of human capital provides clues to the movement of resources, which will be a point of elaboration in Section 5.3.1. Most of the Tier 3 respondents (70%) seem to have grown with the company. The majority of Tier 3 respondents advanced their careers through their sales and marketing skills that fit the requirements of trading in building materials.

The following subsection will focus on the relationships between members of the network in order to aid in understanding the types of nodal links between firms.

5.1.2 Networks formed through nodal interactions

The links between firms in various networks were evaluated to identify the relationship types. Among the codes that emerged throughout the interviews are the dyadic nodal

links or interaction modes (IM) described in Table 5.2 with the corresponding emergent code.

Table 5.2: Nodal links

Nodal Link Type	Description	Emergent Code
Project based contract	The most common construction contract that covers the duration of a project in addition to a 1-year liability period. This detailed document covers all responsibilities of both parties especially any associated penalties for not meeting targets. The project owner will always have a project-based contract with the main contractor.	IMB
Nominated contract	Specified and nominated by project owner but the project-based contract is placed with the main contractor.	IMS
Coordination link	No contractual agreement is involved, but regular coordination and sharing of technical information is required. May have occasional instruction from client or consultant, which is followed by documented instruction from contracting party.	IMC
Instruction link	Receive instruction from the party but without contractual agreement.	IMI
Project specific procurement	Procurement of building material specific to the project.	IMP
Bulk procurement	Procurement of building material in bulk applied to many projects.	IMM

Definitions of domestic and nominated subcontractors emerged from the description provided by respondents such in the statement made by respondent SC2 of network NAD.

> *Domestic subcontractors, on the other hand, are directly under the main contractor; they are awarded a contract by the main contractor*…. [Nominated subcontractors are] *those directly employed by the client and are asked to engage in a contract with the main construction company*.

The nodal links between network firms were identified based on feedback from respondents and information gathered from project records (e.g., contracts and tender evaluation documents). In many cases, the consultant or project manager possessed a list

describing all network members' status in the project as domestic or nominated, and subcontractor or supplier. The dyadic interaction among network firms can be broken down into the transactional modes described in Figure 5.1.

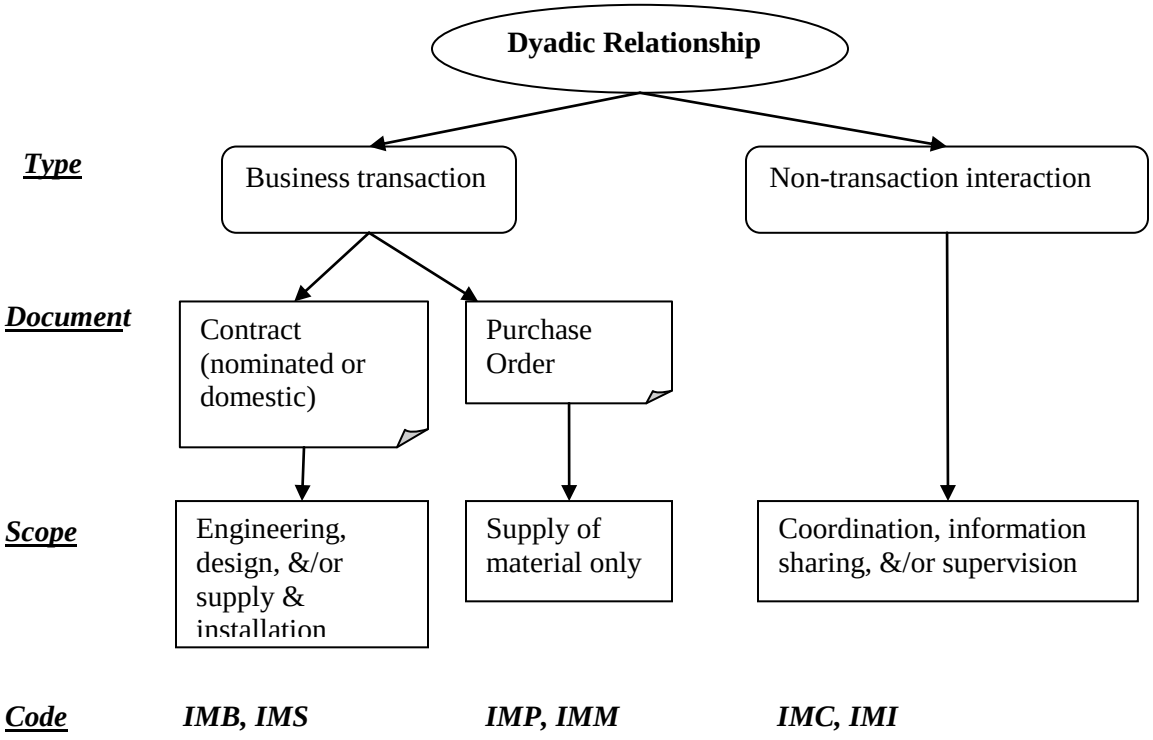


Figure 5.1: Transaction mode

On the one hand, a contract under nomination (IMS) is a documented business transaction between the main contractor and a subcontractor selected by the developer. On the other hand, a non-transaction interaction can take place between the architect and the subcontractor where they have daily coordination without contractual obligations (IMC).

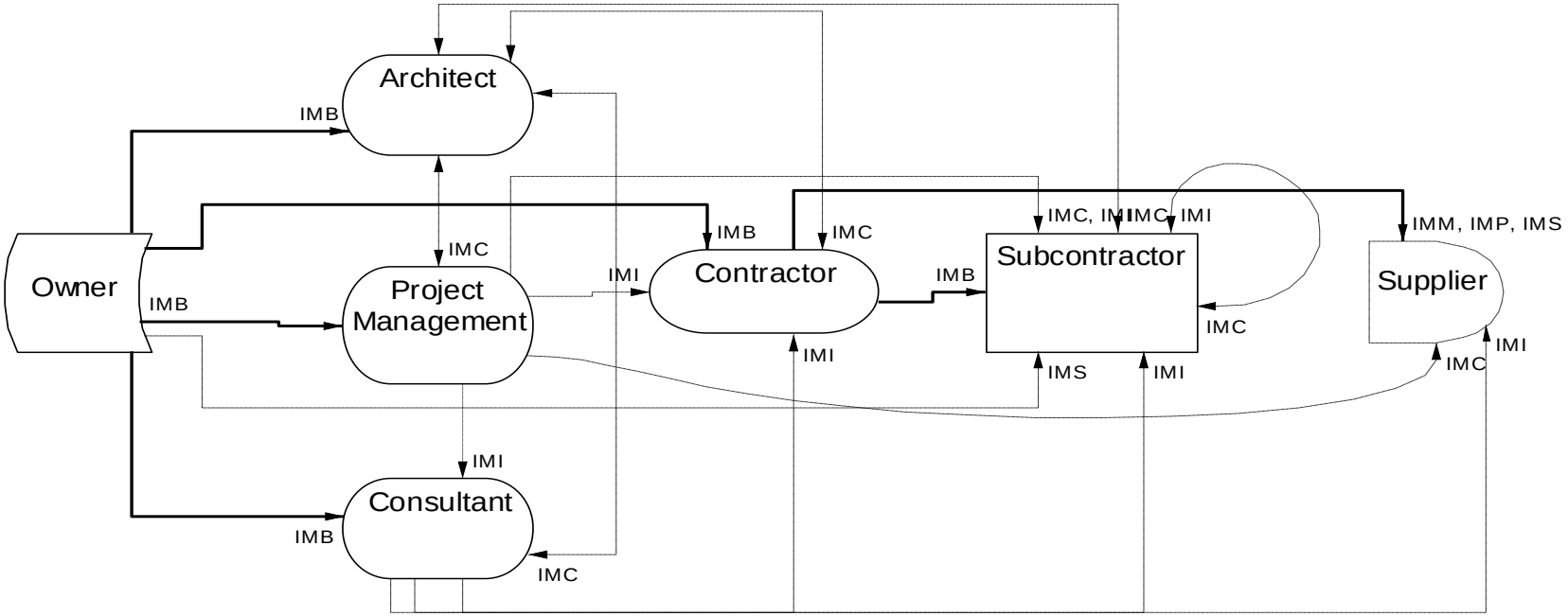
Information from the transcripts and notes recorded from studying project records was coded according to the emergent codes into a combined matrix reflecting dyadic links

within the master network. The information was then applied to the master network chart shown in Figure 5.2.

Figure 5.2 demonstrates the general contractual interaction between network firms. It is evident that Tier 1 is formed through project-based contracts (IMB) between the primary holders of the key resources required for the project. The project owner possesses the financial resources while the architect, consultant, and project management firms offer the technical know-how. The main contractor is the main source for human capital and physical resources that are made available directly from within the firm or indirectly through nominated or domestic project-based contracts (IMB, IMS) with subcontractors or through procurements from suppliers on individual projects (IMP) or in bulk (IMM).

Almost all firms within the network have dyadic interactions even if no contractual links exist between them. Given the drive to execute the project within tight timelines, all firms are expected to share specific information to allow close coordination of events according to the project schedule. The consultant, architect, and project management firms have the authority granted by the project owner to provide instruction and closely follow up on almost all members of the network to ensure their requirements are satisfied. The project management firm is in many cases acting as the owner's representative and is the primary source of instruction (IMI) to the other consortium members. This role is mainly visible on cost-control activities and on monitoring the timely flow of the project sequence as stated by respondent PM2 of network LSM:

> *When the developer has no technical knowledge he will rely on the project management [firm] to act as his five senses on the project to achieve all project goals especially for the financial concerns.*



Legend:

Heavy presence representing more than 50% of the sampled firms.

Light presence representing less than 50% of the sampled firms.

Figure 5.2: Nodal links

The interaction of project owner with network members beyond Tier 1 should be minimal. In the NAD, project the client hired project managers from the project management firm. This made the client interact directly with the consultant and main contractor. SC4 stated the following:

> *This type of communication is not normal for a client- consultant in general, but with [NAD], this is normal. With this intense communication, it does interfere and thus affects their work.*

The client has a tendency to change project specifications at his will without regard to any impact on project timelines. As paymasters, the clients believe they have that right. The attitude would be for the network members to incorporate the changes while meeting the same deadline with minimum financial implications. In a normal case, the project management firm or consultant would adhere to the client's approved requirements to ensure the same budgets and timelines are adhered to. The client representative RCL4 from project SIT described this relationship:

> *All designs, specification, and milestones were agreed with all project contractors; however, everything changed when the global economic crisis happened. Our boss wanted us to save 20% and wanted us to keep the same designs. All contractors had the option to walk away because we wanted to change the terms. Those who remained onboard showed a lot of flexibility because fewer projects were on the market…This experience required heavy involvement from all of us starting from our Chairman. He was even meeting with the supplier of sanitary ware to make sure specifications and savings matched the new targets.*

The results described in this section provide evidence that a network is formed through various modes of business interaction. A firm's engagement in a dyadic transaction depends on factors that may be attributed to historical events, existing qualifications and capabilities, or instruction from the project owner. This finding is in line with the main theme of this research, the possibility of repeating successful networks.

The remainder of this chapter holds the main analysis of this research. Presenting the gathered information and the subsequent analysis formed a challenge when I wanted to identify the best style of presentation. Analyzing and presenting each project as a standalone case was not an option considering that partial information was gathered from each project. Therefore, I combined the multi-case information into a single master network that served as the basis of research analysis. The analyses of results from different questions were grouped according to the research proposition as shown in the next sections.

5.2 Allocation of resources and capabilities

5.2.1 Phase 1 analysis

The first point of interest was to identify the allocation of resources and capabilities across the network as viewed by project based respondents (Phase 1). The sequence of analysis is summarized as follows:

Recording → *Transcribing* → *Aligning* → *Coding* → *Tier grouping*

Each of the 35 respondents listed all the resources and capabilities they believed were possessed by their firms. Initially the respondents were allowed to mention the resources and capabilities based on their understanding. The second step involved sharing with the respondent a priori list to help stimulate ideas.

Codes gathered from all firms for Question 3 (Appendix II) were combined into a single matrix that reflects the number of resources and their count under each firm. The codes were then further combined to group them under their relevant tier as shown in Appendix IX. This resulted in computing the number of appearances of each code under each tier that is listed in Appendix IX along with each resource and capability code. The numbers were then reversely cascaded onto the list of resources and capabilities to be reflected under each tier. A simple ratio was then generated by dividing the number of appearance of each resource and capability over the number of respondents interviewed in the corresponding tier. This ratio is labelled as "appearance factor". Table 5.3 lists the

appearance factor for each resource and capability under each of the three tiers in addition to examples drawn from selected transcripts. The list of respondents listed in Appendix V is broken down to 11 firms under Tier 1, 17 firms under Tier 2, and 7 firms under Tier 3.

According to Table 5.3, the first observation is the moderate appearance factor of financial strength in Tier 1. It is worth noting that financial strength was the key resource described by respondents from project owners. All four client representatives (owners) of four different sites described their employers as the source of funding for all members of the network. Since respondents from four of the 11 firms under Tier 1 reported financial strength as a key resource, the corresponding appearance factor came to 0.4 as shown in Figure 5.3. In each case, the funding involved a mix of contributions from equity, bank financing and proceeds from preliminary offerings at the concept stage. Phase 1 respondents were not able to quantify the breakdown of financial resources, as this information is usually restricted to the corporate level. The appearance factor of 0.4 is mainly attributed to the project owners. Other network members in Tier 1 (consultant, project manager, and architecture) did not show any significant reliance on strong financial resources since they rely on know-how (RKt) as their main resource (as will later become evident).

Further evaluation of Table 5.3 reveals a prominence of human capital resources across all three tiers. Tier 1 depends on experienced managers (0.8 appearance factor) while Tier 2 and Tier 3 rely on laborers (0.7 and 1.0 appearance factor, respectively). Another evident observation is the lighter presence of capabilities compared to resources in all three tiers. For instance, alliance management was not reported as a possessed capability by any of the 11 respondents in Tier 1 (0.0 appearance factor for CA). Similarly, none of the 7 respondents under Tier 3 confirmed that their firms own network competence (0.0 appearance factor for CN) respondent and network competence carry a 0.0 appearance factor under Tier 1 and Tier 3 for several sub-categories.

Table 5.3: Appearance factors

Resource/ Capability	Description	Code	Example		Tier 1	Tier 2	Tier 3
			Project/ Respondent	Quote			
Financial	Shareholders financial strength	RFs	MLA/ RCL2	*Owners have shares in several other industries, including oil and gas*	0.4	0.4	0.2
	Bank funding	RFb	NAD/RMC1	*Bankers always extend attractive funding offers for awarded projects*	0.0	0.4	0.2
	Strong cash flow	RFc	EPT/RSU3	*My trading is a cash business*	0.0	0.3	0.4
	Assets	RFa	PDT/RCL3	*[Company has] more than six sold towers*	0.2	0.0	0.0
Human capital	Experienced managers	RHm	ITW/RCO2	*Our main asset is the management by professional engineers*	0.8	0.5	0.2
	Technical staff (engineers)	RHt	ITW/RSC8	*Trades experts make all the difference*	0.6	0.5	0.4
	Workers (labour)	RHl	PVW/RSU7	*[Company] is carried by our hardworking crew of 500 workers on this site*	0.0	0.7	1.0
Physical	Land	RPl	LCB/RSU6	*Open storage space adds a lot of value to [SU6]*	0.0	0.3	0.8
	Buildings	RPb	CDP/RSC4	*Strength comes from [the company's] resourceful production yard*	0.0	0.2	0.2
	Equipment	RPe	BCD/RMC3	*We own our cranes and earth moving vehicles*	0.0	0.8	1.0
	Access to raw material	RPr	CDP/RSC4	*Incoming material is secured through long term contracts*	0.0	0.1	0.6
Legal	Lawyers employed by the firm	RLl	AMW/RMC2	[*Company] established 3 years ago a dedicated legal department*	0.0	0.3	0.4
	Contracted law firm	RLf	TOB/RSU1	*[Arbitration cases] are handled by external experts*	0.0	0.1	0.2
	In-house commercial department	RLc	TOB/RSU1	*We hired a commercial team to follow up contractual matters*	0.4	0.2	0.6

Table 5.3: *Continued*

Resource/ Capability	Description	Code	Example		Tier 1	Tier 2	Tier 3
			Project/ Respondent	Quote			
Know-how	Production process	RKc	ITW/RSC8	*The construction techniques that [SC8] follow have been developing over the years*	0.0	0.5	0.2
	Patents	RKp	LCB/RMC5	*I'm not aware of technical patents held by construction companies operating in this country*	0.0	0.0	0.0
	Technical competence	RKt	AMW/RCO1	*The knowledge accumulated by our team came from designing projects in at least 8 countries*	0.6	0.2	1.0
Systems & Procedures	International accreditation like ISO	RSa	TOB/RSU1	*Certificates from international accreditation bodies are crucial in our business*	0.0	0.4	0.4
	Standard systems and procedures	RSp	TOB/RAR1	*How can we work without the systems and procedures we have in AR1?*	0.6	0.5	0.2
Information technology	Engineering software such as CAD	RIs	THQ/RMC7	*My management invests in the latest CAD software*	0.4	0.7	0.4
	Enterprise Resource Planning	RIe	AMW/RMC2	*The ERP software has simplified our life*	0.0	0.5	0.0
	Customer management software	RIc	ITW/RSU5	*The software in [SU5] for customer management guarantees long-term interaction with clients*	0.0	0.1	0.4
Brand name	Reputation based on track record	RBt	NAD/RMC1	*We are proud of our brand name that is recognized in the region a s a leader*	0.4	0.9	0.8
	Shareholders image in the industry	RBs	SDT/RMC6	*When [member of the board] appears in a paper it is as if [MC6] is running a free ad.*	0.0	0.3	0.2

Table 5.3: *Continued*

Resource/ Capability	Description	Code	Example		Tier 1	Tier 2	Tier 3
			Project/ Respondent	Quote			
Organizational learning	Subcontracting strength	COs	NAD/RMC1	*Links with all required trades can be created as and when needed*	0.0	0.4	0.2
	Learning from associated companies	COa	LCB/RMC5	*Every project is a case study for future projects…Every interaction is a lesson we learn from*	0.0	0.4	0.2
	Standardization of externally acquired knowledge.	COd	TOB/RSU1	*Learning from mistakes is one thing we do but we also document and share knowledge across the company*	0.2	0.5	0.8
	Recruiting human capital strength	COh	SIT/RCL4	*[Recruitment] is a specialty of our human resources department and they do it professionally*	0.6	0.5	0.0
Social capital	Shareholders network	CSs	TOB/RPM1	*[PM1's] main source of business development is the founder*	0.4	0.5	0.4
	Staff network	CSn	NAD/RSC2	*Each member of the organization is a messenger [for] identifying new business opportunities*	0.2	0.5	1.0
Managerial capabilities	Resources coordination to enhance knowledge base	CMa	PVW/RCO3	*My role is also to link project entities to make sure information is shared for extra efficiency*	0.4	0.3	0.4
Alliance management	Individuals ability to link resources	CAi	PVW/RSC10	*Project managers draw on the synergies between different members of the project chain*	0.0	0.5	0.0
	Firms ability to manage external resources	CAa	NAD/RMC1	*[A management technique] is sending a representative to become resident in a subcontractor 's offices*	0.0	0.3	0.2
Network competence / Strategic Networks	Firms ability to form alliances	CNa	SDT/RMC6	*[MC6] has worked in joint ventures on similar projects*	0.0	0.3	0.0
	Managers ability to set strategies for managing resources	CNm	TOB/RCL1	*Communication from the headquarter through emails and the weekly managers meeting indicates a strategic plan is put by the bosses*	0.2	0.2	0.0

Upstream Tier 1 is more reliant on capabilities. Resources are more visible in Tier 2. Downstream Tier 3 is more dependent on resources but with limited variety as it becomes more specialized. So the main theme is that capabilities appear in Tier 1, with resources and capabilities in Tier 2, while Tier 3 is heavy on resources.

The information reported thus far presents a general comprehensive overview of the allocation of resources and capabilities. In order to utilize this information in Phase 2 interviews, a further grouping was conducted on the data listed in Table 5.3. Table 5.4 shows the result of the allocation of resources and capabilities according to the following three categories of appearance factor:

- Low (L): appearance factor between 0.0 and 0.3.
- Moderate (M): appearance factor between 0.4 and 0.6.
- High (H): appearance factor between 0.7 and 1.0.

According to firm employees active on construction sites (Phase 1) Tier 1 shows a moderate appearance factor of resources except for a high dependence on human capital. Capabilities are also moderate, with a low appearance factor of alliance management and network competence. Tier 2 relies heavily on human capital as well as on physical resources. Information technology and brand name also seem to play a role. Regarding capabilities, Tier 2 also has a moderate presence, except in the case of managerial and network competence. Tier 3 shows a lower appearance factor for human capital, while physical and brand name show a higher appearance. Tier 3 however, demonstrates a higher appearance of organizational learning and social capital. Alliance management and network competence were relatively low in all three tiers from the perspective of site managers.

Table 5.4: Allocation of resources and capabilities by tier

	Tier 1	Tier 2	Tier 3
Financial	M	M	M
Human capital	H	H	M
Physical	L	H	H
Legal	M	M	M
Know-how	M	M	L
Systems & Procedures	M	M	L
Information technology	M	H	M
Brand name	M	H	H

	Tier 1	Tier 2	Tier 3
Organizational learning	M	M	H
Social capital	M	M	H
Managerial capabilities	M	L	M
Alliance management	L	M	L
Network competence	L	L	L

5.2.2 Stages of decision making

The previous analysis described the positioning of resources and capabilities within a network. As described in Chapter 3, a construction project goes through a staged process starting from concept and ending in project handover. Therefore, the allocation of resources and capabilities happens at various times of network formation and at various levels of decision making. I wanted to know at what stage these decisions are made in the life of a project and what are the tools used for this decision. Interview responses from Phase 2 showed that decisions are made based on information accumulated from:

- Management reports (MR).
- Statistics (ST).
- Lessons learned (LL).

- Exchange of information in frequent meetings between various levels of management (EI).

The four modes of information flow constituted the basis of identifying the level of management's involvement in resource allocation at the corporate level. The level of appearance is defined according to the number of modes reported by respondents as follows:

- 3 or 4 methods: high level of involvement (H).
- 2 methods: moderate level of involvement (M).
- 1 method: low level of involvement (L).

Table 5.5 lists the results for organizations interviewed in Phase 2 with the level of involvement of decision making during each stage of the firms' contribution to the project.

Table 5.5: Decision making

		Concept	**Tender**	**Award**	**Mobilization**	**Execution**
Devco	**EPD**	H	H	M	L	L
Consco	**ECO**	-	H	H	H	H
Mangco	**EPM**	-	H	H	H	H
Arco	**EAR**	-	H	H	M	L
Contco1	**ECT1**	-	M	H	H	H
Contco 2	**ECT2**	-	M	H	H	H
Subco 1	**ESC1**	-	M	H	H	H
Subco 2	**ESC2**	-	M	H	H	H
Suplo 1	**ESU1**	-	-	-	-	H
Suplo 2	**ESU2**	-	-	-	-	H

The results in Table 5.5 are a realistic reflection of how a construction project progresses from concept to completion. If we zoom in on project owner Devco we see that the highest involvement in resource allocation is at the concept and tendering stage. This

involvement diminishes at later stages since all execution tasks are eventually allocated to the network members.

Respondent EPD of project owner Devco explained his firm's involvement:

> *After the shareholders approve a budget for the new tower we ask the CEO to present his plan to execute the project. Of course, he already did his homework even before budget approval. He already shortlisted the main players including proposed consultants and civil contractors with an idea of the main resources required for the tower. As executive committee we have to facilitate the funding to guarantee a smooth flow of plan…Our role becomes easier once all players start their work.*

The consulting firm and project management firm show a high level of involvement at the corporate level, from the time of their appointment throughout the life of the project. The main contractor and subcontractors show a similar trend. A moderate involvement is experienced at the tendering stage as few departments are included (e.g., procurement and commercial departments). However, once the project is awarded, the whole organization becomes involved in decisions for allocating resource and capabilities.

The dynamic nature of a construction project and the unexpected challenges that keep arising make it inevitable for site managers to seek guidance from corporate managers. The site management team continuously aims at solving the challenges without resorting to the head office; however, many issues stress the site team, and the corporate office needs to realign resources. Examples of such needs are demonstrated in Section 5.3.3.

5.2.3 Systems and procedures for allocation

The next point to evaluate is whether resources and capabilities are allocated based on mere personal judgment or according to specific guidelines. Phase 2 respondents determined three criteria for deciding on the allocation of resources and capabilities as per project requirements:

- Management experience (MX).

- Documented procedures (DC).
- Client requirements (TR).

Management experience is also linked to managerial capability defined in previous chapters. Dynamic managerial capability (coded CM in this research) is defined by Helfat et al. (2007: 57) as "the capacity of managers to purposefully create, extend, or modify the resource base of an organization".

Documented procedures form the backbone of retaining knowledge based on lessons learned from compiled experience through managerial capabilities (CM). Documentation is a fundamental tool in preserving knowledge transfer, which is relatively easy to implement in the construction industry given the unrestricted flow of technical information. Lee (2011) who studied knowledge creation and appropriation in the pharmaceutical industry, which has tighter barriers to information flow compared to the construction industry, found that contractual terms specific to resources alignment benefit the knowledge-sharing process. He suggests technological know-how accumulated through knowledge-creating relationships is usually tacit and difficult to document.

Respondent EPM of project management firm Mangco shared the following perspective on knowledge transfer.

> *The project manager has to be the funnel for many information coming from sales and marketing team at the corporate office to translate it into technical information that is reflected on the actual building such as optimizing the room size as per tenants needs,… the knowledge that is transferred doesn't exceed 50% transferred to the company in terms of systems and procedures but the rest remains with the individuals probably in their subconscious mind and that would surface at a later stage and maybe will be only partially documented on another job.*

The third criterion is client requirements that are project-based instruction from upstream entities in the project network. An example of a client requirement is the training all network members have to undergo to become familiar with a new project-tracking

software. After project completion, a client requirement either becomes documented procedures or management experience if not transferred to a database for future reference. Table 5.6 lists how each firm in a construction network decides on the allocation of resources and capabilities.

Table 5.6: Systems and procedures

		Experienced Management	Documented Procedures	Client Requirements
Devco	**EPD**	R&C	-	-
Consco	**ECO**	R&C	R	-
Mangco	**EPM**	R&C	R	-
Arco	**EAR**	R&C	R	-
Contco1	**ECT1**	R&C	R	R
Contco 2	**ECT2**	R&C	R	R
Subco 1	**ESC1**	R&C	R	R
Subco 2	**ESC2**	R&C	R	R
Suplo 1	**ESU1**	R&C	-	-
Suplo 2	**ESU2**	R&C	-	-

Table 5.6 reveals that managements experience is a common factor across all organizations in the network when determining resources and capabilities required for project execution. One of the primary responsibilities of managers is to utilize company resources and capabilities in favor of the firm's objectives. Respondent ESC2 offered a comprehensive explanation of the way in which Subco2 assigns resources and capabilities for its projects:

> *The master developer or the organization managing the new project on their behalf set basic requirements that all firms have to follow to be part of the project. Usually this includes organograms, equipment, and technical capabilities that are needed for the agreed scope of work. We also have our own guidelines for our required resources to mobilize before starting site activity. The other elements which you refer to as capabilities are sorted out by the chiefs high up in my company.*

The main contractor and all associated subcontractors showed evidence of documented procedures that stipulate project resource allocation upon project award. These firms participating in a project are instructed by the awarding party to present a resource mobilization plan that has to be approved by the project consultant or project manager before commencement. Examples presented by respondents include the following secondary data:

- Project organization chart listing the management (RHm) hierarchy planned for site management.
- Manpower histogram showing the allocation of site workers (RHl) throughout the duration of the project.
- Project execution plan listing the sequence of material (RPr) delivery to site based on project flow.
- Project cash flow (RFc) will plan for the financial requirements for the project. The inflow will be shared with the awarding party while the net flow will be shared with any financial institution intending to fund the project to complement equity contribution from the property developer.

The consultant, project management and architecture firms (Consco, Mangco and Arco) also showed evidence of documented procedures similar to the above-mentioned list. However, those form part of their internal procedures. They do present them to the project owner, but also maintain them as part of the working procedures. These form the guidelines for resource allocation and will be modified to fit each specific project based on value and duration of execution.

5.2.4 Involvement at corporate level

Interviews in Phase 1 revealed that the site management team was involved mainly in making decisions regarding resource allocation related to the project at hand. Phase 2, interviews provided further elaboration on who corporate-level managers expected to be the primary source of decision making on resources and capabilities allocation.

Respondents from Phase 2 involved shareholders as well as executive managers reporting to shareholders while managing various projects. Table 5.7 distributes the decision making among the three management levels; i.e., shareholders, executive management at firm level or site management. The idea behind this point was to see how the different levels of decision makers in a firm get involved in allocating resources and capabilities.

Table 5.7: Levels of decision making

		Shareholder	Firm Management	Site Management	Comments
Devco	**EPD**	R&C	R&C	R	-
Consco	**ECO**	R&C	R&C	R	depends on project size
Mangco	**EPM**	R&C	R&C	R	depends on project size
Arco	**EAR**	R&C	R	R	depends on project size
Contco1	**ECT1**	R&C	R&C	R	depends on project size
Contco2	**ECT2**	R&C	R	R	depends on project size
Subco 1	**ESC1**	R&C	R	R	depends on project size
Subco 2	**ESC2**	R&C	R	R	-
Suplo 1	**ESU1**	R&C	R	R	-
Suplo 2	**ESU2**	R&C	R	R	-

Executive members of Consco, Mangco, Arco, Contco1 & 2, and Subco1 & 2 indicated that the decision of resources and capabilities allocation is based primarily on project size. Table 5.7 presents the responses assuming large size projects, which is a feature of targeted projects in this research. However, on relatively smaller projects the decision on the allocation of resources and capabilities shifted from shareholder level to firm management level. Respondent ECT2 from Contco2 gave the following explanation.

> *When my organization is awarded a smaller project all we need to do is appoint one of the occupied project managers on another site. This way we share resources and he can handle it with minimum interference from our headquarters.*

It should be noted here that shareholder level and firm management level could be treated as the same level, depending on the size of the company. For instance, a family owned business that supplies building material may be managed by the owners.

Table 5.7 confirms that shareholders have a clear say in the allocation of resources and capabilities. The main point almost all respondents (8/10) mentioned was similar to the following comments made by ESC2 of Subcon2.

> *Take the appointment of key managers after obtaining our chairman's approval, this is done to make sure the firm owns the required experience…. Many managers build around them professional teams that may have worked with them on previous projects. This is always a special advantage.*

Besides having resource allocation addressed by all levels of a firm, the primary members of the network (Tier 1 and Tier 2 members) also have capabilities addressed by executive management. As will become evident later in this chapter, this is related to social capital and alliance capabilities.

5.2.5 Conclusion

The analysis presented in this section addresses the second proposition regarding the relationship of network formation with tangible resources and intangible capabilities. When evaluating the information provided by Phase 2 respondents, it is possible to visualize the evolution of a construction network as a progressive linkage of firms connecting to provide a comprehensive set of resources and capabilities aimed at a specific end product.

Shareholders of network firms provide the main source of knowledge and power for allocating project resources and capabilities. The resources assigned for projects depend on management experience as well as on specific sets of systems and procedures built around previous experience. After the main resources have been determined and mobilized to execute the project, the intangible management capabilities (CM) represented in management experience (MX) documented procedures (DC) and client requirements such as training (TR) provide the organizational tools to complete the project.

5.3 Movement of resources and capabilities

5.3.1 Movements observed at project-level

In order to evaluate the possibility of replicating the same network after project completion, I wanted to study the movement of resources and capabilities within the network to understand how a network evolves. The idea behind this step was to judge whether the movement of resources and capabilities creates an opportunity for companies to avoid outsourcing certain aspects of their businesses, which could eventually break the network link on future projects.

Information gathered from Phase 1 interviews provided a first-hand account of the movement of resources as witnessed by managers operating on the ground. The flow of resources among network entities was recorded in a firms' matrix (Appendix X) and then reflected on a master chart, which is portrayed in Figure 5.3.

Throughout almost all Phase 1 interviews, it was evident that the respondents were unaware of the fact that resources were shared or simply did not recognize the movement of resources as an important aspect of the project flow. Given the extreme conditions of project deadlines, the staff was more occupied with 'firefighting' their day-to-day challenges.

The immediate outcome of this analysis is that none of the respondents was able to identify a movement of capabilities compared to the clear mention of resources. When this was brought up in Phase 2 interviews the general perception was that capabilities movement is mostly intangible and requires more time to be transferred. Respondent EPM from Mangco in the Phase 2 interview stated:

> *Project managers are busy with their daily hustling to get work done and cannot pay attention to issues like strategic networks.*

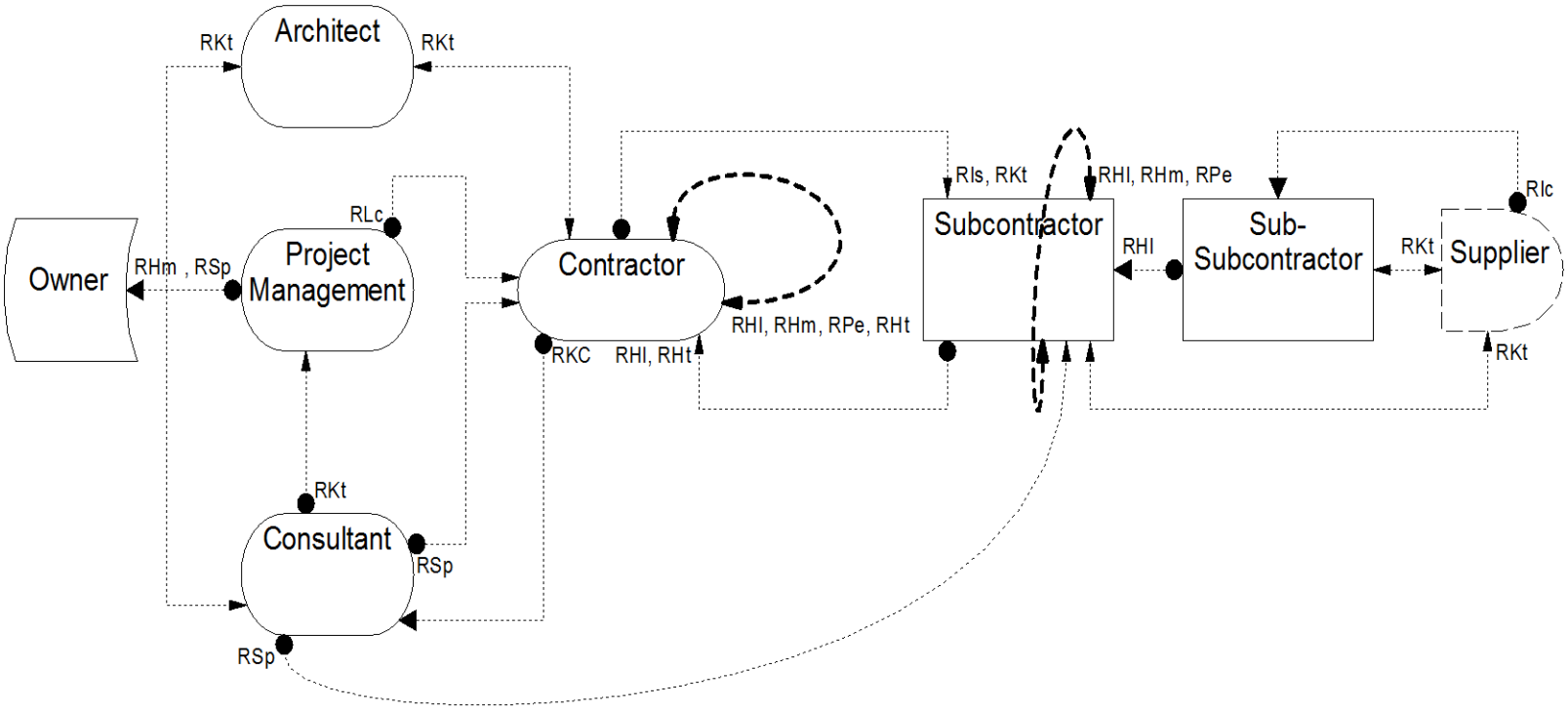


Figure 5.3: Movement of resources

It is evident from Figure 5.3 that the know-how resource (RKt) tends to be floating most often. This is due to the fact that building a project is know-how-intensive. Any new piece of information learned by any network member in any direction will constitute a transfer of knowledge. There are no trade secrets in the construction industry. The project architect or consultant asks each network member to submit a clear method statement for all relevant activities to ensure all works are integrated with the main project plan. All upstream network members should be aware of all details to ensure compliance with project specifications. The site coordinator from main contractor MC5 on project LCB explained that:

> *[The transparency of information] especially on technical matters is required from all [firms] working on the project to avoid any construction risks that may jeopardize the safety of manpower on the ground or on the long run the final project.*

The client may request testing reports, including either chemical or structural, to ensure that risks are minimized. Third-party advisors may be employed to verify specific aspects of construction. Labor movement is another major floating resource. This labor movement is predominantly moving upstream as subcontractors and sub-subcontractors present a source for labor to support in executing the project.

Data collected from the interviews in Phase 1 did not identify any movement of capabilities during the life of the project. Discussions with executives in Phase 2 showed that capabilities movement only occurred over time and in many cases as a result of movement of individuals. Thus, while human capital was restrained from moving during the life of the project, several movements took place after the project was completed.

One movement of technical engineers was witnessed on project TOB. According to CL1:

> *The site manager from our electromechanical contractor was dissatisfied with his employer and resigned. The construction company immediately offered him a job with a better salary and he became responsible for supervising the works conducted by his previous employer. The knowledge transferred in this movement of personnel*

would have taken more time especially considering the specialized equipments being installed for security cameras under the scope of electromechanical works.

There is insignificant transfer of resources and capabilities downstream at Tier 3. This is due mainly to a lesser extent of interaction between firms beyond the trading part. Upstream interaction happens on a daily basis. The level of coordination enhances the shifting of resources among network members. However, downstream interaction might be limited to human capital at the managers' level.

The most evident capability development by project owners is project management. The technical capability they develop is initially done through subcontracting project management to a firm. In the case of project ECT, the project owner employed project managers from subcontractor SC6.

Although brand name requires time to be built, and notwithstanding the fact that brand name is not equal to firm reputation, the mere participation of network members in a particular high profile project constitutes a movement of some sort. The inward transfer of the brand name resource (TF-RB) was witnessed in project AMW. MC2 in AMW referred to the effect of brand names held by other members of the network as follows:

Working with [AMW] is in itself a reputation-booster that will help with future projects when we include this job in our completed projects list.

To simplify the results gathered from Phase 1 on resource movement across the network, Table 5.8 lists them according to directional categorization.

Table 5.8: Directional movement

Direction	**Resources**				
Downstream	RKt	RLc	RSp	RIs	
Upstream	RKc	RHm	RHt	RHl	RIc
Across (2-way)	RKt				
Intra-firm	RHl	RHm	RHt	Rpe	

Knowledge-based resources show a clear movement across the network as depicted earlier in Figure 5.3. On the construction technical know-how side (RKt) the wealth of engineering information is pooled between the consultant, architect, project management and construction firms. This knowledge moves down the network in the form of official engineering instruction to execute the project. Movement of production knowledge (RKc) shows upstream movement from the contractors, who develop new techniques, to consultants and architects, who utilize this knowledge on future projects. Respondent ECO from consultant Consco in Phase 2 expressed this:

> *Every time the consultant asks engineers from the contactor to clarify a drawing detail they are actually learning more from the consultant….; engineering workshops are good for exchanging expertise.*

Human capital upstream movement was evident from the Phase 1 interviews. As shown in Table 5.8, experienced management, technical staff, and workers transferred upstream through a projects hierarchy. Experienced management and technical staff did not show movement during the life of a project. I studied eight contracts between various parties in different projects where there was no mention of any restrictions for the movement of staff among the engaged parties. However, during the execution of a project, it was ethically and professionally agreed that staff would be restricted from moving within companies in the same network. I also enquired about employment contracts in the construction industry. Even in such binding agreements there was no mention of restrictions to transfer employment to other members of a network. Movement to competitive firms, on the other hand, is clearly restricted in employment contracts. But since no competitors work on the same running project, this point did not contribute a limitation in the scope of this study. Upstream movement of skilled workers (RHl) also appeared in two ways:

- Temporary: Skilled labor is a key offering from sub-subcontractors to subcontractors and the main contractor. Depending on the construction activity required, skilled workers do not always operate under the main contractor.

- Employer shift: Respondents from the main contractors and subcontractors agreed to the fact that skilled workers, especially at supervisory (foreman) level, were being headhunted by upstream firms after project completion.

For example, respondent ECO from consultant Consco narrated the following scenario. During ECO's previous experience in project management, one of his main operational assignments was to ensure the right supervisors were assigned to each construction trade. After completing the main structural works that were assigned to his direct workers, he had to execute the balance of the work by using firms specialized in electro-mechanical works and interior finishes. His role at that stage was mainly supervisory. In order to perform this task he had four or five supervisors on each trade whom he had recruited from previous subcontractors on similar old jobs.

5.3.2 Monitoring movements at project level

This section discussed the movement of resources at the network level and how capabilities are rarely addressed at the project level. Therefore, it is unsurprising that project-level managers could not address the occurrence of capabilities' movement. When I inquired about the perspective of corporate-level decision makers in Phase 2 interviews, the respondents' attention was shifted to the monitoring of movement and development of resources and capabilities.

The same criterion used in Section 5.2.2 was used to label the level of appearance of the following tools used to monitor and develop resources and capabilities:

- Management reports (MR).
- Statistics (ST).
- Lessons learned (LL).
- Exchange of information in meetings between various levels of management (EI)

Furthermore, the two-way interview questioned the direction of focus on movement or development of resources and capabilities. The main idea behind this investigation was to elaborate more on the indication generated from Phase 1 interviews. During Phase 1 interviews I gained the general feeling that members of the network spent more time inquiring and seeking information about their downstream dyadic nodes. This behaviour is governed by the transactional relationship between the client and supplier, where the client imposes an inquisitive approach about the supplier's resources and capabilities.

Table 5.9 affirms that all network members in the first two tiers except the architect firm follow up on downstream development or movement of resources and capabilities in the network. As will be revealed later, monitoring the development of resources and capabilities is a key capability or serves as a prerequisite for developing the managerial capability needed to align resources and capabilities for the project. The architect firm (Arco) seems to be less interested in downstream activity since its role is less interactive with other members of the network except for advice on engineering requirements. At the firm level, the project management firm and main contractor seem to monitor resources and capabilities development within the firm with a high rate of appearance (H). Moderate (M) attention is given by other members of the network, while Tier 3 members show insignificant appearance factors.

Table 5.9: Monitoring the movement of resources and capabilities

		Firm	**Downstream**
Devco	**EPD**	M	H
Consco	**ECO**	M	H
Mangco	**EPM**	H	H
Arco	**EAR**	M	M
Contco1	**ECT1**	H	H
Contco 2	**ECT2**	H	H
Subco 1	**ESC1**	L	H
Subco 2	**ESC2**	M	H
Suplo 1	**ESU1**	L	-
Suplo 2	**ESU2**	-	-

5.3.3 Practices by firms

While most respondents came from the same industry, the firm structures varied from a multi-billion-dollar corporation (property developer) to a small building material trading company. This broad spectrum provided a diverse array of experiences, especially in terms of developing resources and capabilities. To understand the aspect of resources and capabilities development, respondents of Phase 2 were asked to describe the practices employed by managers to develop resources and capabilities.

The respondents relied on their knowledge about their current firms and other experiences they have gathered from the industry. For instance, respondents ECT2 or main contractor Contco2 and ESU1 of supplier Suplo1 were employed in at least four companies from the same industry before holding the executive position at the time of the interview. Therefore, their input was always reflecting experience from various levels of a construction network. Table 5.10 highlights the main techniques used by different construction companies.

Table 5.10: Practices for resources and capabilities development

		Training	Transfer of R&C	JV/Partnership /Acquisition	Social networks	Lessons learned
Devco	**EPD**	X	X		x	
Consco	**ECO**		X		x	x
Mangco	**EPM**				x	x
Arco	**EAR**		X			
Contco1	**ECT1**	X	X	X	x	x
Contco2	**ECT2**		X		x	
Subco 1	**ESC1**		X	X	x	
Subco 2	**ESC2**					
Suplo 1	**ESU1**		X			
Suplo 2	**ESU2**				x	

According to Table 5.10, the two most common practices are transfer of resources and capabilities between network firms, and social networks. Transfer of resources and

capabilities among network members was discussed in Section 5.3.1, especially pertaining to the directional movement of resources among the firms. However, social networks need further elaboration in the context of social capital capability. The social capital capability was defined earlier in Chapter 2 as an intangible resource built on social structures comprising personal relationships and trust. This capability relates to creating a sustainable competitive advantage. In the context of this interview question, a network might form the same platform but with a focus on identifying resources and capabilities required for the firm. See Table 5.11 for examples extracted from Phase 2 interviews, of key resources and capabilities that might be developed through the network. Respondent ECO from Consco gave an interesting example of his consultancy firm's social network:

> *I cannot imagine we were going to grow without the great network of people we have as a group. We cherish all relationships we build because every person we know can get us a step closer to another solution. When I say solutions I mean new business, new government relation, new financial institutions, maybe a new trader or even a new idea...This network I'm talking about is one of the reasons we have survived for such many years [in the region].*

Table 5.11: Resources and capabilities developed through social network capability

R & C	**Examples**
Human capital	• people who could be candidates to join the company
Financial	• banks to fund new projects
Physical	• new raw material suppliers
Alliance management	• new subcontractors
Network competence	• potential joint venture partners

Table 5.10 also showed training, lessons learned and acquisition to be other ways of developing resources and capabilities especially for main contractors and subcontractors.

Phase 1 interviews showed no movement on capabilities among network firms. However, in-depth interviews revealed that capabilities experience a secondary movement based on

Table 5.12: Examples of alignment of resources and capabilities

Firm	Case	Alignment	Challenge	Action (corresponding R & C)
Subco1	The scope of work involved an activity that was not a core competence of the subcontractor. Gypsum partitioning and boarding.	A sub-subcontractor was assigned to the project and a manager was appointed to supervise the work.	Local authorities identified the sub-subcontractors' usage of illegal workers and ordered them off site. Subco1 was facing delays and the refusal of any sub-subcontractor to take over the work at an economical price.	Subco's senior management immediately hired (**CSs, COh**) 3 experienced managers (**RHt, RHm**) in this field of work and recruited 80 labourers (**RHl**). They created a completely new division to finish the work (**CAi**).
Subco2	Subco2 had direct access to the plumbing valves required for irrigation systems. They had a long-term relationship for the timely delivery of the valves.	The order was placed with the main source according to the planned schedule, taking into consideration the long lead time, including installation.	Two weeks before the dispatch date from Europe the supplier informed Subco that a four-week delay was expected due to technical faults and the need for rework.	Given the critical dates required for timely testing and commissioning of the system, Subco2 managed through its supplier's network to arrange temporary valves (**RPr**) that may serve the purpose of testing and commissioning the main plumbing system. The management sent out an internal memo about setting contingency plans to mitigate risks of material delay (**CNm**).

Table 5.12: *continued*

Firm	Case	Alignment	Challenge	Action (corresponding R & C)
Suplo2	Prior to the project award and during the factory inspection, the consultant raised the concern that to execute the project Suplo2 would need a special machine for certain products.	Given the high value of the project Suplo2 management convinced the shareholders of the need to invest in a new machine.	The new machine is capital intensive. Although the payback is justified based on project value, there was a risk of losing the project although the machine was procured.	Management agreed (**CAi**) with the machine supplier to place the order and to provide evidence to the main project owner (**RPe**). To mitigate the risk, Suplo2 management agreed with the supplier to downsize the machine and accept a smaller final payment (**RFs**) if the project was not awarded.
Contco2	An international contractor was nominated by the hotel operator to execute the project in a new territory.	The project requires junior management and skilled labor that is familiar with local working conditions.	Contco2 doesn't have local experience and it would be unfeasible to bring their skilled workers from the country of origin.	Shareholders decided to form a joint venture (**CNa**) with a local main contractor, which would provide junior staff and skilled workers (**RHt, RHl**) while construction management (**RHm**) would remain with the international partner. Daily meeting were held to synchronize activities (**COd**).

movement of managers (RHm) that hold capabilities such as network competence (CNm) and social capital (CSs). According to respondent ECO of consultant Consco:

> *During management meeting they kept on insisting on dramatic change until this came with a new CEO who transformed the company using new styles of communication*.

A firm's ability to identify and manage resources is exemplified in its alignment of resources to overcome challenges. Table 5.12 lists examples defined during project execution. This information was compiled based on interview outcomes as well as one-on-one conversations and notes taken with other individuals who I met outside the planned interview process.

The main observation from the examples in Table 5.12 is the 'resultant' movement of resources and capabilities based on movements of key resources. The case of project CPD provides a more elaborate example. The client on project CPD requested a metal canopy to extend between both towers, the main contractor identified this as a major technical challenge given the short notice towards the end of the project, in addition to the complex architecture. The project manager's (on the main contractor side) alliance management capability (CAa) was demonstrated through his long experience in the industry and local connections with service providers. He immediately identified a local fabricator that has the ability to execute such a task.

Furthermore, the extensive experience of the main contractor made them form a task force that established a strong base for alliance management (CA) and network management (CM). They also hired a specialized engineering firm to conduct specialized structural calculations to ensure loads passed structural and architectural requirements. Neither the main contractor nor the fabricator had this technical competence (RKt) of structural calculations. The main contractor's strength to link these resources and capabilities allowed for completion of the task. The project manager admits he was impressed with the engineers' approach to the problem and had already expressed interest in hiring the engineer.

Upon transfer of the structural engineer to join the main contractor, this becomes a successful movement of human capital (RHm), which will result in enhancing technical competence (RKt). It was alliance management (CA) and network competence (CN) that drove this movement.

Another example of the movement of human capital driving the movement of resources and capabilities was experienced by respondent ECO from the consultant Consco. When the international firm got its first job in the UAE they had to create a joint venture with a local consultancy firm. While they possessed the capability of managing resources and capabilities (CNm) they were able to execute such capability only after the project manager from the JV agreed to move to their new company after project completion. This enhanced their position in subcontracting and aligning resources, which developed their organizational learning capability; specifically subcontracting capabilities (COs).

Lessons learned

As gathered from the interviews, experience compiled from projects was mainly retained with individuals. This experience included new technical knowledge (Rkt) systems and procedures (RSp) and other intangible capabilities such as network competence (CN) organizational learning (CO), and managerial capabilities (CM) mainly from interacting with different members of the network. This gained knowledge becomes an integral part of a firm's operations, especially for future projects. However, with the witnessed movement of human capital between firms (RHm) a firm runs the risk of losing this knowledge.

As seen in Table 5.10; the consultant, project manager and main contractor (Consco, Mangco, and Contco1) identified lessons learned as a means to develop their resources and capabilities. Table 5.13 provides further details on the methods of retaining lessons learned.

Table 5.13: Methods used to preserve lessons learned

		Method
Consco	**ECO**	Integration into systems and procedures
		Project closure sessions
Mangco	**EPM**	Integration into systems and procedures
Contco1	**ECT1**	Project closure sessions
Contco2	**ECT2**	Non-conformity reports
		Integration into systems and procedures

The most important aspect of preserving lessons learned is documentation. Whether the method is integration into systems and procedures, minutes of meetings of project closure sessions, or non-conformity reports, the ultimate goal of such documentation for the sake of preservation is to create a resource that becomes part of the firm's knowledge base.

5.3.4 Movements observed at firm management level

Respondents in Phase 1 identified the movement of human capital as the main resource monitored at project level. Respondents in Phase 2 reacted the same way. None of the corporate managers was able to identify any capability as being monitored for inflow or outflow between firms interacting on projects. A further drill-down into this aspect was done by enquiring about addressing the movement of resources and capabilities at the firm management level. Once again, Phase 2 respondents determined human capital as resource closely monitored especially for managers (RHm) and labor (RHl) as summarized in Table 5.14.

Table 5.14: Resources and capabilities monitored by firms at various levels

		Shareholders	Executive Management	Project Management
Devco	**EPD**	RHm	-	RHl
Consco	**ECO**	RHm	-	-
Arco	**EAR**	-	RK	-
Contco1	**ECT1**	-	RS, RH	-
Contco 2	**ECT2**	RHm	RHl	RHl
Subco 2	**ESC2**	-	-	RHl

Movement of knowledge (Rk) was addressed by the architect Arco. The company described its know-how as the main source of business; hence, it was continuously updating internal records for newly acquired knowledge. The outflow of knowledge from Arco's side was inevitable, as they had to instruct downstream network entities on how to execute work on many occasions. For instance, Arco had been involved in a project in a neighboring country where the building façade involved a complex design that required special structural computations to ensure resistance to severe weathering effects. At that time, Arco engineers had various workshops with the façade subcontractor and other consultants and contractors on the project. The technical knowledge Arco gained from this experience became a standard technical requirement on all subsequent projects in which they were later involved. The installation guidelines and safety factors they developed on that project became part of all new method statements they developed for new projects. Subsequently, that knowledge transferred from their records to other façade subcontractors and consultants that engaged with Arco. That movement was monitored and managed by executive managers at the corporate level. The corporate level of the Main Contractor, Contco1, also monitored and managed the movement of systems and procedures. That took place at the upstream and downstream sides of the business. Systems and procedures, especially on documentation methods from consultants, were integrated into the company's management system. The same applied to subcontractors. Contco1 made sure their project documents where standardized across all subcontractors.

Meetings and daily interaction are the main source of knowledge transfer between parties, according to Subco2:

> *All firms have their own project quality plan, where it is given in advance to the client who will make amendments, and then it will be signed off by both parties. PQP is the exact procedure which tells each company how to proceed. It answers the questions: how do I communicate, whom do I communicate with, what language to use for communication. It also indicates method of submission, who to submit to and approve, formats of forms, etc. People can amend PQP but must be with mutual consent...If a firm wants to interact with the other parties it is usually done*

contractually through letters. For example, if [Subco1] wants information from the client, the site manager will write to [the[main civil contractor, who will log that request so that it can be tracked automatically. Other forms of interactions are slated meetings, contractual sessions, and site walks.

5.3.5 Controls

The previous question established that there is limited monitoring and management of resource movement among network members. The main subsequent question that was supposed to follow was about the controls firms employed to monitor such movement. However, given the previous response that human capital was the main point of interest, the question focused on that resource. The response from all firm representatives did not provide significant evidence of the existence of comprehensive tools and measures for monitoring resource movement. Perhaps the only concrete mechanism is the movement limitation on human capital transfer between competitive firms in the same industry. Given the diverse range of products and services offered in the construction industry, this is a loose control. So even though consultant Consco and architect Arco demonstrated employment contracts that limited their engineers from moving to competitive firms, they were still not able to restrain them from moving to an upstream or downstream firm. Respondent EAR from Arco commented:

Similar to technical information flowing freely among network companies, people also change jobs when they find a better offer from another company serving on the same project…. Companies can block people's movement during the project only. I have seen a lot of transitions after the site is handed over to the client.

5.3.6 Conclusion

The interaction among network resources contributes to the main objective of bringing the construction project to completion. The interview results analyzed in this section demonstrate that the two resources with the most visible movement among network members are the technical know-how (RKt) and the human capital (RHm) of experienced

management. The knowledge gained from know-how transfer becomes an integral part of the firm's resources to be utilized on future projects. The shift of managers from one company to another is also an addition to the firm's human capital resources. However, one of the main outcomes of this research is the identification of the importance of movement of human capital. The resultant movement of capabilities possessed by the incoming managers provides for the development of the firm's capabilities, especially in terms of network competence, alliance management, and organizational capabilities. This section focused on the third proposition of this research. The value of resource and capability movement has been identified in terms of its positive contribution to a firm's tangible and intangible assets. However, the analysis has not yet evaluated the benefits of movement in terms of sustainable competitiveness. This will be the focus of the following section.

5.4 Firm level competitiveness

5.4.1 Contributing factors

After examining the allocation and movement of resources and capabilities within a network, the next step was to understand the reason for appointing a specific firm by an upstream network member to provide the required resource or capability. In other words, what competitive advantages render a firm more successful in winning a project bid? Addressing this question would subsequently lead to the next question of how a firm can sustain its advantage to win the next bid with the same client on the next project.

When Phase 1 respondents were asked about the key resources and capabilities that contributed to their sustainable competitive advantage, they were limited to the list of resources and capabilities presented to them according to a priori code. Therefore, in order to gauge the competitive strength of each firm, the respondents were asked about the factors that contributed to successfully bidding on the project at hand. The project records I reviewed complemented the respondents' feedback. For example, in projects like NAD, ETW and LCB, neither the developer nor the consultant agreed to sit for an interview, but both granted me special permission to study all project commercial

records, which offered valuable information on bidders' technical and commercial evaluations.

Figure 5.4 schematically presents the key contributors to the transactional link between the three network tiers based on the emergent code list shown in Appendix VII. Figure 5.4 presents the emergent factors according to a scale that rates the ratio of appearance as: high (1.0-0.7) moderate (0.6-0.4) and low (0.3-0.0).

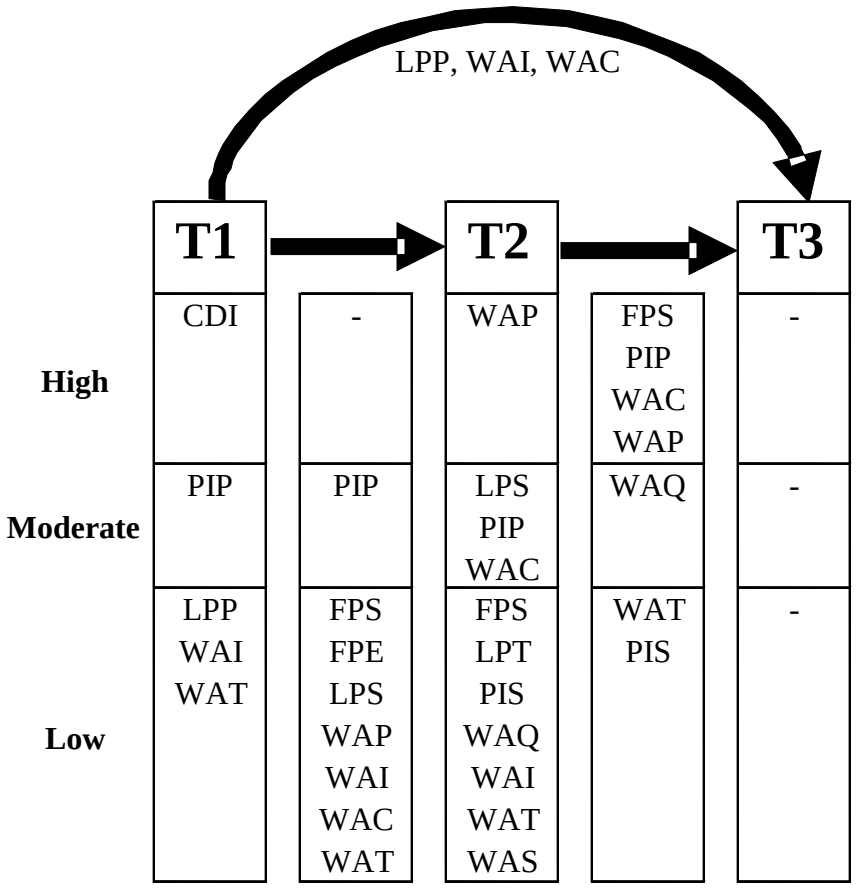


Figure 5.4: Contributing factors to transactional links among network tiers

The following observations are made from Figure 5.4:

- Tier 1 firms rely on international experience (CDI). This is understood since know-how and project engineering reside with consultants and architects.
- There is a moderate presence of interaction on previous projects between all network levels. While indications in the preliminary stages of the research revealed that no networks are entirely replicated, Figure 5.5 proves that previous dyadic links had a moderate contribution to repeating a transactional node. These previous links provided a platform to allow firms to interact and participate in new bids. However, other parameters played a role in the final decision making.
- Firms under Tier 1 seem to rely on previous interactions not just limited to previously executed projects. Support at the tendering stage (WAT) on previous projects also played a positive role.

5.4.2 Sustainable competitive advantage

Managers interviewed in Phase 1 had different levels of academic and business knowledge. Maybe they shared the same industry standards but had variable understanding of the terminologies used to build the propositions. Therefore, a significant amount of time was spent on trying to normalize the level of understanding of the priori and emergent codes as well as some key terminologies such as sustainable competitive advantage.

The explanation provided by Barney and Hoskisson (1989) was adopted as a primary source of description of sustainable competitive advantage as the ability to create value that has not been created by existing or potential competition. Appendix XI is a compilation of all resources and capabilities identified by Phase 1 respondents as being the source of sustainable competitive advantage. The same information is reflected onto a

Venn diagram (Figure 5.5) to visualize the common parameters among the various firms grouped under the three main network tiers.

Results from the Venn diagram show the sustainable competitive advantages to be a mix between resources, capabilities, and other emergent factors such as:

- CDW - product and service diversification
- CDI - international experience
- CDG - firm is a member of a larger group
- CDP - pricing structure
- CDQ - product and service quality

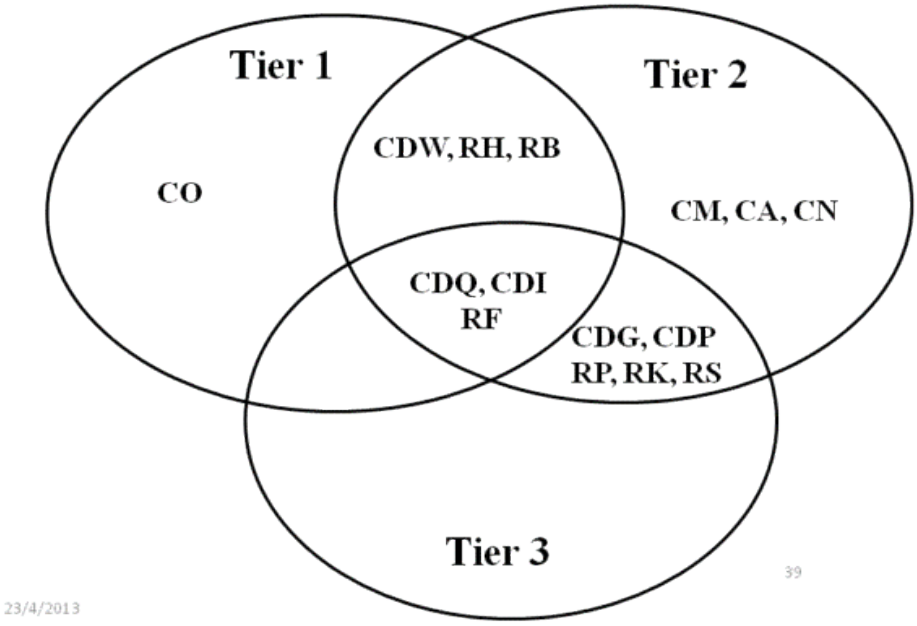


Figure 5.5: Sustainable competitive advantage

One of the very common competitive advantages respondents used was 'timely delivery'. This was excluded from the code system as it is a normal expectation from any project. The matrix of emergent codes is simplified by removing factors that were only mentioned once (Appendix XI). Two parameters that appeared more than once and are reflected in the Venn diagram were the competitive advantages price structure (CDP) and quality

(CDQ). I find these two parameters to be subjective and should be disregarded in the analysis of sustainable competitiveness. Pricing structure (CDP) cannot be a unique parameter that cannot be replicated. Product and service quality (CDQ) is a factor judged by the provider in the context of these interviews; hence, it could be exaggerated from a promoting perspective. Therefore, CDP and CDQ were also excluded from this analysis.

SU7 supplier of concrete on PVW stated that "*continuous relationship is not important anymore, it's more of pricing now*". At the Tier 2 and Tier 3 levels the pricing structure is a key parameter. The relationship will certainly play a role in making the first entry into the bid. However, it is the price that has a main role in determining the relationship on the project. On the other hand, upstream network interaction relies more on technical competency as well as price.

Among the emergent factors, product, and service diversification CDW seem to be a common factor between Tier 1 and Tier 2 firms. As explained by respondent RMC7 on project THQ:

> *The concept of one stop shop for my requirements on the project is a main driver for placing orders with subcontractors. It's always easier to deal with one party.*

In fact, on project THQ the main contractor had assigned the interior fit-out work to one company. Respondent RMC7 recalls his previous experience:

> *Our senior management decided on the previous project to squeeze the prices of various subcontractors like for internal glass, metal, joinery and other trades. Maybe my company saved on the overhead a single subcontractor would have applied to coordinate between the different activities but we ended up hiring more engineers and supervisors to ensure we manage the coordination between the various interior works. The result was more wastage of money and time for sure.*

Although timely delivery was not explicitly labelled as a sustainable competitive advantage in this section, a few points deserve further clarification. The advantage of timely delivery was expressed by many respondents to indicate meeting deadlines.

However, when asked what constituted a true timely delivery, the response may be summarized as offering flawless products and services within project timelines at affordable prices. Such qualities would be the best selling point for any company. Failing to meet any one of the components would tarnish the firm's reputation for efficient project delivery.

International experience CDI is the only emergent factor that is common among all three groups. This is understood as international experience demonstrates the firm's ability to work in different business environments. Several respondents also attributed the preference for an internationally experienced firm to the knowledge that might have been acquired through interaction in other countries.

Resources had been identified by Phase 1 respondents as factors of sustainable competitive advantage. Human capital was identified as a key contributor to sustainable competitiveness among Tier 1 and Tier 2 firms. This result is not surprising given the firm's dependence on management, engineers, and workers on site. Respondent RMC5 on project LCB labels the architects in his firm as *"the creative brains behind translating the clients imagination of the building into a real tower".*

Labelling the brand name or company's reputation in the market as a sustainable competitive advantage may also fall under the category of subjective judgment. Hence, I was initially hesitant to consider this factor in the analysis. The main concern was the possibility that a firm's staff would by default promote their company as a brand name in their industry. However, only those companies that were identified by other firms as brand names were considered. For instance, firm CO2 was clearly labelled by at least three other external managers as a firm with a reputable track record and a long history in the industry.

Physical assets (RP) know-how (RK) and systems and procedures (RS) were all sustainable competitive advantages identified by Tier 2 and Tier 3 firms. Physical assets labelled as equipment and machinery for Tier 2, and factories and access to raw material

in Tier 3 form the strength in any value proposition the firm offers to the project. Respondent RSU4 on project ETW described the firm's access to raw material for the supply of ready mix concrete as follows:

> *When our shareholders invested in a clinker factory they were initially thinking of upstream integration from economic perspective. Actually the main advantage I can tell you now is that we have secured our raw material which is sometimes a challenge for our competitors.*

In other words, when the demand becomes higher in the market for concrete, the ready-mix suppliers with access to raw material are the ones able to serve the market more efficiently.

Know-how (RK) as well as systems and procedures (RS) provide a level of comfort for any client when evaluating the level of competence of a supplier or subcontractor. Know-how is gauged by decision makers based on previous track record and preliminary technical submissions. Subcontractors that are shortlisted based on their successful commercial bids are asked on most projects to execute a mock-up of their target scope of work. This becomes the primary source of judgment on the subcontractor's competence. When a subcontractor firm possesses know-how with special skills that other competitors have difficulty replicating, this becomes a sustainable competitive advantage.

Systems and procedures (RS) were referred to by at least eight respondents as a source of sustainable competitiveness. Respondent RSC4 on project CDP described this factor as something "*that cannot be established overnight. It's rather an accumulation of experiences gathered from many previous completed projects*".

According to Figure 5.5 the financial strength (RF) is shared by all three tiers. One may argue that financial position is a variable and hence cannot be attributed to sustainable competitive advantage. However, we should look at the nature of the construction industry this research examines. One of the key factors evaluated during the tendering stage is the financial position of the bidding firms. Tender bonds and other forms of

financial collaterals supported by bank guarantees are a prerequisite for any firm planning to be engaged in the project other than in supplying material. Project commercial records revealed that the main contractor and many other critical subcontractors were also requested to submit their audited financial statements for the previous three years. RMC5 on project LCB summarizes this in a few words:

> *One of the biggest fears of a developer is the inability of a main contractor to perform the rest of the project after groundbreaking.*

The sub-subcontractor could not identify any sustainable competitive advantage. This is reflected in the blank area of Tier 3 in Figure 5.5. The sub-subcontractors are pretty much complementing subcontractors. The closest explanation for this result is that if they had any competitive advantage they would easily be elevated to being a subcontractor under Tier 2.

Capabilities were identified without showing any common factors among the various tiers. Tier 1 firms found organizational competence (CO) to be a source of sustainable competitiveness. Tier 2 firms found network, alliance and managerial capabilities to be the sources of sustainable competitiveness.

5.4.3 Future project interaction

So far the analysis has focused on enquiring about the existing status of a network. The interviews especially in Phase 1 were all conducted on the construction sites of running projects. This gave a unique opportunity to the research to have firsthand interaction with the managers on site to get their opinion about the current form of the network while all challenges are being tackled. The assumption is that, had these interviews been conducted with the same managers outside the context of their jobs when the projects were completed, then they would be relying on memory. Therefore, I directly asked the project-level managers about their willingness to use the same network on future projects.

Due to the responsibility falling on upstream members to manage project deliverables, the majority of respondents from Tier 1 had reservations about using the same network. This explains the findings from the initial analysis in Chapter 3 where no single network is repeated. Even if the project was executed on time, it seems managers tend to only remember the hardship they experienced to get the job done. In addition, they seem to assume that the project would be executed more efficiently if the network is changed. On the contrary, downstream the suppliers and sub-subcontractors look up at the network and see only the business coming to them with little concern for the network challenges. Therefore, Tier 3 respondents were in favor of maintaining the network. Project manager RPM1 on TOB stated the following:

> *If the project is completed according to targets this means the network succeeded. But once a new project starts, we cannot guarantee that the same requirements will exist and not all companies can serve the next project*.

In Phase 1 interviews the respondents were specifically asked whether a firm would use the same network on future projects. The intention behind this question was to gauge the opinion of the individuals experiencing the network on a daily basis during the project's lifetime. The rationale here was that if the individuals on the ground were supporting the notion of network replication, then the missing link would be at the corporate level. Results from this question are tabulated in Table 5.15 according to the four emergent results grouped under the three network tiers.

Table 5.15: Future interaction

		Tier 1	**Tier 2**	**Tier 3**
The manager supports using the same network on future projects. This includes the same firms.	AFN	33%	46%	86%
The manager supports using the majority of the network on future projects. But would exclude few companies due to poor performance.	AMN	33%	15%	14%
The manager supports using members of the network but not the same network structure due to lack of efficiency.	APN	17%	38%	0%
The manager refuses to use any of the members of the network on future projects to due to poor performance.	ARN	17%	0%	0%

It is evident that the decision to replicate the same network is almost evenly split in the interviewed population. However, Tier 3 firms seem to be the most enthusiastic (86%) about replicating the network. This should not be a surprise as T3 firms are at the bottom of the network hierarchy and at the time of the interview, the respondents were satisfied with the service or product offered to the project without any downstream obligations for the project. Tier 2 respondents seemed less excited (46%) about the network replication as they witnessed all the difficulties that came from both sides of the project chain. Only one-third (33%) of Tier 1 expressed interest in using the same network for future projects. Respondent RCO3 on project PVW summarized this perception:

> *Why do you think I should use the same list of contractors and suppliers if they did not meet our project program… .I have yet to see a project where we don't reach to a stage of threatening to apply penalties or to liquidate their bank guarantees.*

Around half of Tier 1 and Tier 2 firms were interested in using parts of the network on future projects. In this part of the interview, many respondents referred to previous experience. Several managers mentioned that when a downstream firm is promised a future project if it meets current targets, the future project becomes the main driver for meeting, and exceeding performance targets. Therefore, it is not an exaggeration to say that all firms within a network execute their scope with a future plan to reconnect the same dyadic link on the next project. Firms participating in a network bring with them the expectation that if they efficiently deliver the project then they build confidence and trust with the other members and thereby improve their chances of being awarded more projects in the future. Respondent RAR2 from project SVC suggested that:

> *If a supplier meets the targets agreed at the contract stage and makes all of us look good in front of the paymaster then I'm sure this will go a long way in showing confidence for awarding new jobs.*

Along the same lines, the owner (ESU2) of Suplo2 explained that the primary source of new business is successful completion of projects:

> *It is true that I need to cut prices to gain market share especially when competition continues to become tougher, but the main driver for my growth in market share is hitting the dates and quality expected by my clients. More projects come with more confidence between me and the clients.*

Research results have shown thus far that replication of a network is not a favorable scenario on new projects while partial replications may be experienced. However, the numbers of permutations that could exist due to various factors interfering with the project flow may easily lead to breaking the network link, and hence preventing the network from an exact replication. This is in line with the result showing 42% of the sampled respondents accepting the majority or parts of the network for future projects.

There are dissatisfied clients in all industries, and the construction industry is no exception. The interviews returned four per cent of all respondents; all of them were from Tier 1 firms, and clearly refused to use any member of the network on future projects. While this might be a spontaneous reaction to an overall delay on many aspects of the project, it is worth noting that such a negative indication has a direct impact on the downstream firms' records with the commenting party. Respondent RPM2 recounted an experience with a previous employer. The project management firm that he worked for went to the extent of refusing to work with any firm from the network they were engaged with, including the consultant firm and project owner. The main concern the respondent had was the disorganized approach of the consultant and owner, including a stream of unjustified changes to the agreed scope of work. Although all such changes were within contractual limits, the changes slowed down the project progress, and reflected badly on the team's momentum on the project and financial gains. RPM2 summarized his experience as follows:

The main feeling we all had after the project finished was that how can we trust these people again after they allowed their management to take the whole project in a wrong direction. The problem was an accumulation of mistakes from all construction companies on the project… I think the whole project culture was strange.

RMC1 on project NAD refused to answer the question of whether he would use the same network in future projects. After several months a phone call was made to ask that same question again. His answer was that he would use the same companies but would arrange the network differently. In this project the foundation contractor was appointed under the project owner directly. RMC1 would have prepared to keep that within MC1's scope and subcontract that work. He claims that would have provided better control and coordination.

5.4.4 Positioning by executive management

Prior to showing the results from Phase 1 on sustainable competitiveness to Phase 2 respondents, I asked Phase 2 respondents to describe how they position their firms with respect to market competitiveness. This question aimed to identify the firm's strength as perceived by the respondents. Table 5.16 summarizes feedback from Phase 2 respondents.

Table 5.16: Sustainable competitiveness perceived by Phase 2 respondents

		Offering diversification	Commercial	Technical	R&C development
Devco	**EPD**	x			x
Consco	**ECO**	x		x	x
Mangco	**EPM**	x			
Arco	**EAR**				
Contco1	**ECT1**	x	x	x	x
Contco 2	**ECT2**		x	x	x
Subco 1	**ESC1**		x	x	x
Subco 2	**ESC2**		x	x	
Suplo 1	**ESU1**		x	x	x
Suplo 2	**ESU2**		x		

Results listed in Table 5.16 show a spread between offering diversification (product/service) commercial strength, technical strength and resources/capabilities development. The first three were backed up by lengthy evidences ranging from listing the wide range of offerings from the company, to listing genuine strengths in commercial and technical practices. Devco and Mangco presented a track record of projects that included residential housing, hotel complexes, and shopping malls. Consco and Contco1 showed a list of similar recent projects in addition to infrastructure projects such as airports and roads. Sustainable competitive advantage at the commercial level was portrayed in the rate of successful bids on new projects. The scale of success varied from one respondent to the other based on the firm's internal objectives. Both Contco1 and Contco2 perceived their commercial practices to be a source of competitive advantage. Contco1 identified 30% of its bids as successful based on the total value priced per year. Contco2, however, found that its 50% success rate is a source of competitiveness. Both respondents attributed this success rate to the comprehensive pricing structure and the technical elaboration on project details. The technical strength was also backed up by industry awards. For example, Contco2 had recently received an international award for participation in a uniquely designed building with special architectural effects. Suplo1 had been recognized by the government for the quality of its products. Respondent ESU1 from Suplo1 was eager to comment on the award:

> *It was great news when the municipality appreciated our work on [a local project]. They mentioned our name among others in the newspapers and local channel.*

The respondents seemed to revolve around weak examples on the subject of resources and capabilities development. Their responses were stimulated by the general theme of the interview. Therefore, I was not convinced by the proposition that resources and capabilities development was a competitive advantage any of the firms was able to demonstrate. Contco1 and Subco1, were an exception to this insofar as they were able to provide contributing factors with evidences, such as shown in Table 5.17.

Table 5.17: Examples of resources and capabilities development

R&C development	**Examples**
Training	Respondent presented a comprehensive training program that includes technical and interpersonal skills.
Lessons learned	Method statements, risk assessments and quality records are systematically documented for future reference.
Acquisition	Board of directors is always seeking downstream acquisitions to integrate technical capabilities from other firms.
Transfer of R&C among network members	Upon project completion attempts are made to recruit key skills from other members of the completed project network.

Results from Table 5.16 and Table 5.17 were based on the respondents' understanding of sustainable competitive advantage. To fine-tune their understanding in line with the research theme, resources defined earlier as key factors to the firms' competitiveness were presented to Phase 2 respondents. I asked the respondents to identify capabilities within the firm that contribute to these resources in terms of acquisition, development, and alignment.

The interactive dialogue with Phase 2 respondents sheds light on a very crucial point about capabilities that governs the allocation of resources and capabilities. The overall identification of resources and capabilities with respect to the position of the firm within the network resembles the results extracted from Phase 1 interview. However, the new information pertains to the source of sustainable competitive advantage provided by resources that are developed by capabilities. Results from six out of the ten respondents in Phase 2 are listed in Table 5.18. Responses from the other four respondents on this topic did not demonstrate depth and were therefore excluded.

Unlike in Phase 1, respondents at the executive management level (Phase 2) viewed resources and capabilities from a long-term perspective. They were able to specify their understanding of the capabilities that contributed to the development of resources.

Table 5.18 shows that managerial capability (CM) is a common factor among network firms for developing financial (RF) physical (RP) human capital (RH), and knowledge

(RK) resources. Social capital is a key to developing financial (RF) physical (RP) human capital (RH), and brand (RB) resources. Organizational capability (CO) is valuable in human capital (RH) knowledge (RK), and systems (RS) resources. Alliance capability (CA) contributes to physical (RP), and knowledge (RK) resources. General Manager (ECT1) from Contco explained his view:

> *When my team is able to identify and deal with new suppliers of material from less expensive sources then my company can offer more savings to our clients. I sit with my HR manager to hand pick staff with such skills.*

Table 5.18: Contribution of capabilities to resources

		SCA Resource		Source	SCA Capability
Devco	**EPD**	RF	Financial engineering	CS, CM	CM, CN
		RP	Land banks	CS	
Consco	**ECO**	RH	Management	CO, CM	CO
		RB	Track record	CS	
		RK	Engineering know-how	CO	
Contco1	**ECT1**	RH	Management	CM	CM, CA, CO
		RB	Track record	CS	
		RF	Financial strength	CM	
		RP	Material	CA, CM	
		RK	Engineering know-how	CO, CM	
		RS	Systems & procedures	CO	
Contco 2	**ECT2**	RH	Management	CO	CA
		RK	Engineering know-how	CO, CA	
		RF	Financial engineering	CS	
		RP	Material	CA	
Subco 1	**ESC1**	RH	Management	CM	CM, CA, CO
		RK	Engineering know-how	CO, CM	
		RF	Financial engineering	CS	
		RP	Material	CM	
Suplo 2	**ESU2**	RP	Material	CS	CA
		RK	Know-how	CM	

The enquiry about a firm's sustainable competitiveness in both interview phases was viewed primarily in terms of resources a firm possesses. However, all Phase 2 respondents recognized capabilities within their firms that governed these resources, and subsequently several capabilities emerged as sustainable competitive advantages.

Helfat et al. (2007) question whether the competitive advantage of a dynamic capability is sustainable. They address this point by considering competitive factors, environmental factors, and internal factors. According to the resource-based framework, an advantage that persists against the challenge of duplication is considered a sustainable competitive advantage derived from "barriers to imitation and/or substitution that prevent rival firms from matching the value created by a capability" (Helfat et al., 2007: 15). A construction project provides a medium for transferring resources and capabilities due to the keenness of all parties to complete the project. In such cases, the advantage may be sustainable to the life of the project. However, that advantage diminishes in significance when the resources or capabilities become accessible to other network members to be applied on other projects.

A firm's business efficiency was cited in Sections 2.7 and 2.8 as a factor of time. Section 5.4.2 and Section 5.4.3 described the efficiency of firms in completing projects as a way to improve the firm's chances to gain more projects in the future. This section brings a new perspective to a firm's efficiency. The resultant capabilities that are gained through movement and development of resources strengthen a firm's efficiency on future projects. Although the sustainability of acquired or developed capabilities may fall at the end of a particular project, the advantages they bring to the firm may enhance the firm's competitiveness on future bids. The sustainable competitive advantages listed by Phase 2 respondents in Table 5.18 were based on their experiences on previous projects. All respondents agreed that the dynamic nature of the construction industry makes it difficult to agree on a single set of capabilities that position a firm to have a long-term sustainable competitive advantage that extends after the life of a construction project.

Executive Director ESC1 from Subco1 recounted the following experience:

> *Each construction job has its own taste of difficulties and each difficulty needs a special set of tools of course including seeking technical knowledge from other specialized firms…. The shareholders including me can pump as much funds into the company if we know this will generate better returns, but what [capabilities] can my company have without the right management team to organize the resources and other abilities. As I told you previously, we learn from our mistakes.*

The resources and capabilities that apply to specific advantages might not always be transferable across the network because they do not always contribute to the products or services. For example, a subcontractor that learns a certain new skill from the main contractor will not compete with the main contractor, but would rather work in a complementary manner. Let us take the example of the elevator supplier on project ADN. The supplier acquired new knowledge from the fabricator of elevator cladding. That knowledge will enhance the elevators' supplier to make more informed decisions in future, that apply to their organizational learning; however, this knowledge will not add value to their know-how resource. On the other hand, if the main contractor acquires new techniques from a subcontractor, they can easily build it in-house.

5.4.5 Strategies to enhance competitiveness

Having reached a common platform among firms for the existence of resources and capabilities within network, the next task was to determine the level of corporate involvement to enhance resources and capabilities. The objective was to identify whether corporate managers had specific strategies for this development.

The main outcome from this analysis is that none of the Phase 2 respondents showed any realization of network level competiteveness. Therefore, the question about network level competiteveness was not valid any more. Contco2 explained this:

> *When a project meets its financial and commercial objectives everyone will forget that is is due to seamless coordination and will refer to the developer as worthy of all*

the credit. Trust me when I say no one will mention the overall chain of organizations that made this happen.

The same understanding was conveyed by all respondents. Although they all appreciated the fact that the network linkages were the main reason for successfully executing the project, none of the respondents referred to the overall network. Hence, the main idea of network-level competiteveness was not evidenced in this research.

In this question respondents were asked to specify at what corporate level they designed strategies for resource and capability enhancement. All of them ascertained that no development took place at the project management level. Executive management was predominnatly involved in resource development except for the archicture firm (Arco) and supplier firms (Suplo1 and Suplo 2) which showed no activity in this regard. The main contractor (Contco1) contributed to resource and capabilities development. It was no surpsise to see the shareholders or board of directors contribute to resource development in all firms. The property developer (Devco) the project management firm (Mangco) and the main contractors (Contco1 and Contco 2) also participated in capabilities development at the shareholder level, as seen in Table 5.19.

Table 5.19: Development of resources and capabilities

		Shareholders	**Executive Management**	**Project Management**
Devco	**EPD**	Resources + Capabilities	Resources	None
Consco	**ECO**	Resources	Resources	None
Mangco	**EPM**	Resources + Capabilities	Resources	None
Arco	**EAR**	Resources	None	None
Contco1	**ECT1**	Resources + Capabilities	Resources + Capabilities	None
Contco 2	**ECT2**	Resources + Capabilities	Resources	None
Subco 1	**ESC1**	Resources	Resources	None
Subco 2	**ESC2**	Resources	Resources	None
Suplo 1	**ESU1**	Resources	Resources	None
Suplo 2	**ESU2**	Resources	None	None

5.4.6 Links beyond project completion

The same question asked to Phase 1 respondents about network replication was asked to Phase 2 respondents with a slight modification that allowed for partial replication of a network. The extreme scenario of full network duplication cannot be promoted by any member except the project owner. If the main contractor was to push for a certain network to be employed for the project, the main problem of liability would be raised. The General Manager (ECT1) of Contco1 was very adamant when explaining that:

> *The primary contractor will be very delighted to have reasons for failing to meet deadlines if his subordinate companies such as a subcontractor were specifically appointed by the developer and that subcontractor was the reason for delays…. but this is never the case since the subcontractor has commercial obligations to the primary contractor and not to the developer.*

The various parameters involved in any project makes it difficult to have the main client dictating who will be in the entire network. Results from the initial industry assessment described in Chapter 3 indicate the rare presence of network replication. Investigating project manager's intentions in Phase 1 also showed little attention to network continuity beyond any project. A similar reaction came from Phase 2 respondents. The idea of replicating the entire same network was hardly considered an option. However, the willingness to replicate parts of the network was expressed by the project owner (Devco) main contractor (Contco2), and subcontractors (Subco1 and Subco2).

Respondent EPD of property developer Devco was confident of the advantages that might be brought by using the same consultant, project management and architect firms. Although Devco is the main pay master and the end client of the project, respondent EPD was very clear in describing the main obstacle in appointing the whole downstream network to execute the project:

> *I'm not interested in forcing my recommendation on the consultant to hire my preferred construction company without them doing the full appropriate due*

diligence. Imagine what will happen if the contractor fails to finish his scope of construction. Even if I'm paying the consultant's bill, he will hold me responsible for the contractor's delay. Take the other side of this relationship. If the contractor chosen by the consultant is delayed I will hold the consultant accountable for any delays.

Respondents ECO from consultant Consco, EPM from Mangco, and EAR from Arco did not show much interest in network replication. The Phase 1 interview revealed more enthusiasm from respondents on the concept of network replication. Section 5.4.3 reported that 54% of respondents supported network replication and another 42% favoured partial replication. Executive Director EPM from project management firm Mangco refers to this interest in network replication as a drive by site personnel to minimize the effort of testing new network suppliers or subcontractors. They would like to move faster on the project by dealing with entities that understand their *modus operandi*. Site managers such as RMC3 on project BCD and RSC5 on project CTD reported their interest in reappointing on future projects members of the downstream network, in order to enhance the efficiency of project execution. Respondents ESC2 of Subco2 concurred with the respondents in Phase 1:

During execution our site team tend to magnify the failures of suppliers and subies especially when we are running behind schedule…. When the project is handed over and we move to a new site our people go back to recommending some of the companies they used to complain about…The only explanation I have is the shortcut managers want to expedite the integration of companies into the new project.

Respondents ECT1 of main contractor Contco1, and ESC2 of subcontractor Subco2 attributed the willingness of site personnel to partially replicate a network to the social capital factor. The trust and confidence the individuals build among each other through inter-organizational interaction during project execution encourages longer term interaction that may extend beyond project completion.

Table 5.20 summarizes the positive intentions of corporate-level respondents on the topic of network replication for future projects.

Table 5.20: Network replication

		Replication on future projects
Devco	**EPD**	May consider Consultant + Project manager + Architect
Contco1	**ECT1**	May consider subcontractors and suppliers (bidding)
Contco 2	**ECT2**	May consider subcontractors and suppliers (bidding)
Subco 1	**ESC1**	May consider subcontractors and suppliers (bidding)
Subco 2	**ESC2**	May consider subcontractors and suppliers (bidding)
Suplo 1	**ESU1**	Priority to main source
Suplo 2	**ESU2**	Priority to main source

Managing Director ECT2 from Contco2 stated the following:

> *[I] find the best example of network replication is the extension of works to an existing contract. Take this [project], the first phase was completed last year. The second new phase is a totally different contract awarded from the client to the consultant and main construction company. The objective is to build an exact copy of this [project] with the same area and specifications on the north side. We as main contractors are very happy to copy the same work at almost the same price less 10% discount after going through the project-learning curve which is supposed to result in enhanced operational efficiencies. The perfect scenario is to bring back all previous network players. Now we are more knowledgeable about the actual cost and we know who delivered according to target time and quality. We decided to use two subcontractors for the building façade. One of them did not perform according to time schedule with significant re-work. We have negotiated significant savings from the other subcontractor and we are more confident about their ability to meet time and quality even with work under a direct contract with the main contractor. That resulted in savings. Now this was in agreement with the MEP contractor…The interaction between main contractor and consultant become less due to all approvals becoming easier. The first phase of the project served as a live reference point. The project owner has eliminated the role of project management company and assigned this role to the consultant for a discounted fee.*

5.4.7 Capitalizing on network links

Given the main research finding that network replication is unlikely, I wanted to understand how firms benefit from their network links after project completion. All respondents returned the same kind of response to the question on ensuring continuity of interaction after project completion. Although no future business is guaranteed with any firm engaged on the same network, there is a common interest in maintaining communication channels. All firms confirmed and presented evidence of documenting the downstream company's details into a database. Similarly, as shown in Table 5.21, firms built on their client network to make sure a professional interaction mode was maintained through their social capital (CS) capability management by their business development (BD) and supply-chain management teams.

Interview results showed that although there is no evidence of network replication, and in the absence of a drive for sustainable competitiveness at the network level, all firms strive to maintain their dyadic relations especially when their interactions were successful. This continuity at the dyadic level may serve as the initial step to partially replicate a network on future projects.

Table 5.21: Maintaining dyadic links

		Methods for maintaining links
Devco	**EPD**	Database
Consco	**ECO**	Database + BD network
Mangco	**EPM**	Database + BD network
Arco	**EAR**	Database + BD network
Contco1	**ECT1**	Database + BD network
Contco 2	**ECT2**	Database
Subco 1	**ESC1**	Database + BD network
Subco 2	**ESC2**	Database
Suplo 1	**ESU1**	Database + BD network
Suplo 2	**ESU2**	BD network

5.4.8 Conclusion

This chapter addressed sustainable competiteve advantage at the network level as demonstrated in Proposition 1. All respondents agreed that network-level sustainable competitiveness does not exist; hence, the event of network repetitiveness is not a favourable option. However, responses from both sets of interviews showed significant interest from firms to target sustainable competitiveness at the project level to enhance the companies' position for future projects that might occur under partial network replication. The refutation of sustainable competitiveness at the netwrok level also adds to Proposition 3 addressed in Section 5.3 in that movement of resources affects sustainable competitiveness at the firm level.

Section 5.4.1 described the reaosons Phase 1 respondents believed were behind their successful bid on a project. The results shown in Figure 5.4 reveal the common factor of previous interaction at various levels of project life among different tiers (PIP, LPP, WAI, and WAT). The explanation provided by Phase 2 respondents confirm that the main motive for re-inviting a firm to a new project is trust built on social capital and efficiency built on performance on the project.

5.5 International presence

One of the four propositions presented in this research relates to the possibility of international firms being more active than local firms in devising strategies for aligning resources. Before examining this topic, it is important to understand the orientation of the network firms with respect to their countries of origin. Given the UAE's young age (41 years) the fast pace of growth had to rely on international experience to accommodate the latest developments in the construction industry. All firms were either of international origin or hired technical expertise from outside the UAE's borders to complement their capabilities. Table 5.22 lists the distribution of firms among the three tiers.

Table 5.22: International experience

	Tier 1	Tier 2	Tier 3
International company with more than 10 years presence in the local market	17%	20%	33%
Local company that expanded regionally based on local experience and due to interaction with international companies working in the country	67%	60%	50%
Local company with management coming with international experience	17%	20%	17%

Tier 1 and Tier 2 firms have similar distributions. Two thirds (67% and 60%; respectively) of the companies are local entities with modern knowledge acquired from interaction with international companies. Several main contractors had executed projects during the past two decades under joint-venture partnerships with European firms that transferred a significant amount of technical knowledge. Many of these local companies have either merged with these international firms or continued to operate independently after their term contracts expired. The balance of firms in Tier 1 and Tier 2 are evenly split as either international companies with several years' experience in the region, or as local companies with senior technical positions held by foreign managers that come with international experience.

When managerial capabilities are viewed upstream in the first two tiers, only managers with local experience can show the ability to link resources. For example, an expat engineer can bring in a technical capability related to engineering, but local experience is necessary when hiring a manager to enhance resource alignment capabilities. The main contractor on TOB hired a general manager from the local market to manage this large-scale project. The manager's key strength was managing the subcontractors' network and identifying local capabilities that would allow the project to be executed on schedule. However, in addition to engineers with local experience, the general manager on TOB recruited additional construction managers from the UK who had worked on similar

projects with similar structural designs. The needs of this particular project led to the transfer of knowledge, that was new to the company. The design had very specific elevations that made structural calculations complicated.

The fact that all respondents were expatriates working in companies that in many cases originated internationally made it difficult to factor out strategies by local firms. Therefore, this research did not provide enough evidence to support the proposed advantage of international firms over local firms in terms of devising strategies for aligning resources and capabilities.

5.6 Summing results

The primary research question was stated in Chapter 1 in the form of a strategic management enquiry about the alignment of resources and capabilities to execute projects while maintaining a notion of longevity. The three events investigated in this research reflect possible scenarios of the replication of networks as described in Figure 5.6. The two extremes: full network replication versus complete dissolution of the network, conclude the main strategic question of whether resources and capabilities can be aligned for the sustainable competitiveness of a network. Research results have ruled out the existence of a complete replication of the network. Not only is this phenomenon non-existent, but it is also not a favorable option for most of the respondents. The most evident preference is the partial replication of networks.

To summarize in terms of critical realism terminology, a construction network is considered to be a dynamic system of entities connected by relations with specific behaviours. These relations and behaviours form clusters of necessary and contingent relations, producing tendencies for resources and capabilities to be aligned for the current project as well as future projects.

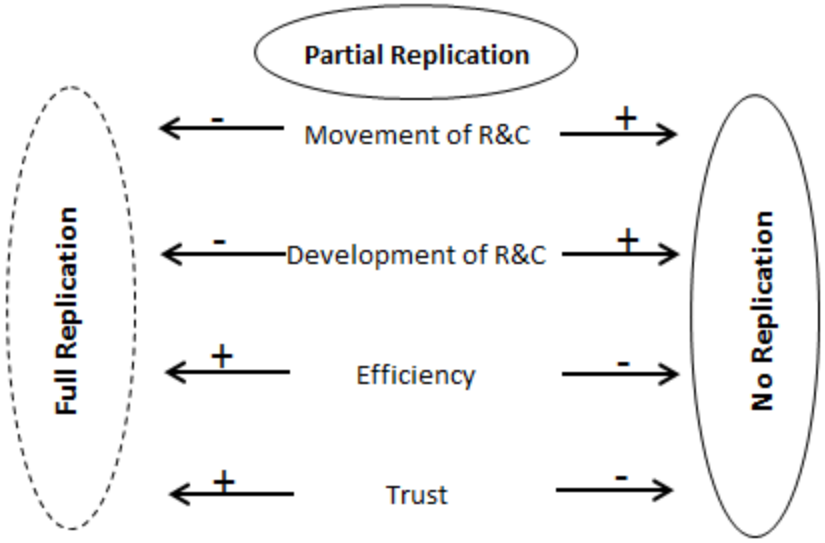


Figure 5.6: Replication scenarios

Each firm in a network owns two levels of causal powers that have a tendency to lead to any of the three events. Individual-level powers are governed by capabilities possessed by site personnel that they accumulated over the years through industry experience. These powers form the main driver for managing the utilization of resources and capabilities to execute a construction project. Powers that were revealed by the respondents included the internally driven movement and development of resources, and capabilities. Firm-level powers contribute to the initial stage of a project by aligning resources and capabilities at the firm level as described in Section 5.3.1. Research results have shown the impact of these powers in the ability to acquire resources and capabilities in various mechanisms such as procurement, recruitment, and in certain cases development. Firm-level powers also included developing resources and capabilities through training, documentation of lessons learned and knowledge transfer as shown in Section 5.3.3. The necessary relations established through these powers came in the form of dyadic links between network entities in the form of business transactions. Contingent relations also emerged from subsequent dyadic links such as the supervisory role of a consultant over the installation methods employed by a subcontractor.

Figure 5.6 describes the three potential events resulting from the various clusters of causal powers. The event of full replication is experienced when no movement or development of resources and capabilities take place. This is coupled with factors generated by external factors to the firm, including a buildup of confidence among members of the network through trust (Section 5.4.3) and satisfaction with efficient meeting of targets (Section 5.4.4). This idealistic scenario was not witnessed during the research, nor was it reported by any respondent as a possible event. The primary reason for not expecting such a scenario is that the opportunistic behaviour remains to be a reported characteristic of firms in the construction industry, which diminishes trust levels among firms. This finding is consistent with the remarks of Dubois and Gadde (2002) regarding tight resource interaction at project level with a loose coupling at industry level, which allows for more network permutations.

The other extreme shown in Figure 5.6 is the non-replication event. When movement and development of resources and capabilities represent a causal power in the hands of a firm and its project management team, the network entity reaches the end of a project with newly acquired resources and capabilities. When this is clustered with the liabilities of inefficiency and lack of trust, the network entities will seek network dissolution upon project completion. Data compiled for this research showed several cases of non-replication. While this might be true according to the extent of network boundaries considered in this network, a more thorough assessment of the network will show a certain level of dyadic replication beyond the three tiers. For instance, suppliers of accessories and consumables to main contractors and subcontractors were excluded from this analysis. Therefore, if the network boundaries had been extended one or two more levels, traces of replication might have been identified in all networks.

The predominant outcome is partial replication, which constitutes any network with even a single dyadic link from a previous project. This event is the result of any combination of causal powers and liabilities apart from the two extremes of full replication and non-replication.

6 CONCLUSIONS

6.1 Research evolution

The line of thought adopted in this research is close to the IMP discipline developed by European scholars (Axelsson & Easton, 1992; Hakanson & Snehota, 1995; Johanson & Mattsson, 1988). A major concept in IMP is that there is no single entity that controls a network. Centrality of command is disclaimed in favour of the decentralized and loosely coupled structure of a network (Hakansson & Johanson, 1993). This view contradicts the perception of the more dominant research work of scholars in supply chain management where the main client is considered as the commander of the tightly coupled network, and downstream entities weather out factors external to the network (Faria, 2004).

In this research the project owner represents the ultimate client who seems to have all the power to act as the main commander of the network that is acting towards the same goals and strategies set by the client. That main client has the contractual power to determine all members of the network. In other words, the project owner has the authority to request a full replication of a network upon the successful completion of a project. This view takes us back to treating a construction project as a network that fits into the supply chain network with a central commanding firm (Lamming, 1993). The downside of this privilege is that this power comes with a great liability placed on the developer rather than on downstream network entities. For example, respondent ECT2 of main contractor Contco 2 would not provide a product warranty on a lighting system that he refused to use but that the client insisted on installing in the building. The networks presented in Chapter 5 have shown that network replication was not experienced by any project and respondents have clearly indicated in Section 5.4.3 that none of them accepted a full replication in favour of partial replications.

The research setting departed from the centrality perspective after defining a construction project to be a rapid alignment of resources and capabilities for a specific period, unlike the long-term engagement of a supply chain network. Network examples presented in Chapter 5 show that each entity within the network shares the objectives set by the project developer to achieve time and budget targets. The respondents demonstrated the firms' ability to use and transform the network in their favour and interest.

Respondents at various levels of the firms showed a consistent perception of the criteria of identifying their downstream dyadic links. While previous interaction appeared to be a door opener (Section 5.4.1) for new transactions in construction networks, the commercial proposition along with technical qualifications seem to have acted as the primary drivers unlike in innovation-based embedded ties such as those studied by Noordhoff et al. (2003). Noordhoff et al. (2003) defined embedded ties as a dyadic relation between vertically integrated firms; i.e., supplier-customer. Several researchers (Ahuja, 2000; Levin & Cross, 2004) described weak ties as a source of novel information compared with strong ties that allow recycling redundant information. Other researchers found that strong ties built on partnership alliance (Hansen, 1999; Reagans & McEvily, 2003) are willing to exchange sensitive information because they have a certain level of trust. In this research, the exchange of information was not driven by reciprocal trust among network entities. It was rather a requirement dictated by the project developer to ensure that all network members are aligned with the main project objectives. This encourages a more relaxed flow of information among the network weak ties. This is in line with the understanding that the construction industry has negligible barriers to the exchange of technical information, that allows any network entity to re-evaluate its dyadic links after every project based on newly acquired knowledge, hence minimizing the chance of repetitiveness.

A common risk that downstream network members consider is that upstream members will use gathered knowledge to vertically integrate and compete directly with them. Subcontractors and sub-subcontractors who are human capital-intensive have a low entry barrier into their specialty domain. Managing Director ESC2 with the electromechanical

firm Subco2 explained that any main contractor with captive business should consider having its own electromechanical firm. In fact, according to their managing director one of their strategies for the next two years is to identify a serious buyer for the company to integrate it with an existing major construction firm.

As described in the beginning of this study, the extreme scenario of network replication is based on sustaining relationships built in a certain project. Results compiled through the research have shown that this continuity has a slim chance of occurrence due to various factors. The factor of trust plays a significant role when evaluating long-term relationships. However, this factor did not appear to be reflected as a major player in building sustainable networks. In this research the trust factor was viewed through the lens of the social capital possessed by a firm with an opposing opportunistic behavior that several scholars have attributed to the construction industry. Relationship length is defined as the duration of two firms' engagement in a business relationship. The commitment component required for a longer-term relationship (Dwyer et al., 1987) was not demonstrated by the respondents, who did not show evidence of aligned interests with other members of the network except to meet the main client's targets for completion. Section 5.4.1 highlighted the importance of previous successful interaction to form new links but at the dyadic level only. The social capital capability was not highlighted as a sustainable competitive advantage that could be directly linked to future businesses. However, Section 5.3.3 demonstrated how social capital aided in the development of resources and capabilities. Along the same lines, Section 5.4.4 offered a new perspective on the ability of social capital to develop the financial and physical resources that would lead to sustainable competitiveness.

The repetition of dyadic links occurred as a normal scenario of returning customers. However, there was no evidence that a repeated dyadic link would recreate subsequent downstream links. The chain of replication breaks at various stages due to the consideration of commercial liability. It takes only one break in the chain to then cascade down a new set of combinations. At the main source of the network, for example, the developer cannot stipulate the subcontractors a main contractor should employ. On the

other hand, material selection and nomination of a source of supply by various entities was a common exercise.

Respondents who were asked to comment on the possibility of taking the same network on future projects were reluctant to give a firm answer. This is understandable because inefficiencies were evident during the course of the project, and even after project completion they still remember the negative parts and generalize about them. However, at a higher level, when the project achieves target budgets and completion dates, the higher-level decision makers seem to be happy with the network performance, and seem to support the partial replication of that model.

Since repetition of a network was not proven throughout the research, the concept of sustainability of a network fails. Therefore proposition 1 is supported by claiming that firms participating in a time-bound network align and manage resources to serve the target project without considering network-sustainable competitive advantage that extends beyond project completion. Had networks been repeated, the sustainable competitiveness of a network would have been possible.

6.2 Alignment of resources and capabilities

A key finding of this research is that the capabilities construction firms possess provide a powerful tool for the successful alignment of resources and capabilities at the firm and network levels. The term capabilities in a similar context to that of Teece et al. (1997: 516) when defining dynamic capabilities as a "firm's ability to integrate, build, and reconfigure internal and external competencies to address rapidly changing environments". The dynamic nature of a construction project calls upon all members of the network to own a certain level of capability to allow an efficient flow of resources as well as other capabilities. Capabilities of organizational learning, social capital, alliance management, and network competence have proved to be important to the development of other resources and capabilities that eventually lead to sustainable competitiveness.

The analysis presented in Chapter 5 provided a comprehensive view on how managers at various levels decide on the allocation and development of resources and capabilities based on their individual experience, coupled with systems built by the firms at corporate level. One of the main conclusions that became evident towards the end of this research is that there seems to be no specifically dedicated strategy by a firm's corporate level to address the alignment and development of resources and capabilities in the long run. Instead, that decision is made at the project level; and it is driven by the client's main requirements.

At the beginning of a project, executive management of a construction firm would initially allocate the resources required to execute the scope of work. After that, capabilities held by firm managers and capabilities possessed at the corporate level play a mediating role to align, move and manage all resources and capabilities required for the project. Therefore, tangible resources determine the initial structure of the network, while intangible resources and capabilities define the network evolution pattern. Hence, Proposition 2 is supported.

Resources and capabilities defined in this research were acquired from external sources or transferred within a network. A significant movement of resources and capabilities through the transfer of knowledge or human capital showed an impact on developing the firms' sustainable competitiveness that was important beyond project completion. That supported Proposition 3. Movement of resources and capabilities among members of the network is a source of developing firm-level sustainable competitiveness, but has little effect on network-level sustainable competitiveness.

6.3 Internationalization

As seen in Section 5.5, firms from Phase 2 interviews have foreign ownership in six out of the ten firms. What is more important is the fact that more than 95% of their human capital is expatriates mainly from the Indian subcontinent, Europe, and other Middle Eastern countries. Therefore, the definition of an international firm is not an easy task

based on the compiled data. With all firms having an international factor Proposition 4 faces the challenge of not having enough evidence to be validated. Proposition 4 expected that foreign firms are more active than local firms in devising and implementing strategies for aligning resources in time-bound networks. Even without the ability to differentiate between local and foreign firms, the research results show no consistent drive at the corporate level to set specific strategies for long-term development of resources and capabilities.

6.4 Research summary

Resources and capabilities aligned for one project follow a dynamic path of movement among network members through different governing parameters, driven by capabilities of the individual firms, regardless of the network structure. Table 6.1 summarizes the results from the four propositions studied in this research.

This study addressed the dynamic business environment of construction projects, specifically focusing on the rapid alignment of resources and capabilities to execute large projects. The research setup benefited from the booming construction sector in Dubai-UAE by having access to a vibrant market. The study addressed the question of why construction networks do not rely on the alignment of resources and capabilities generated from a single project to replicate the same network for the subsequent execution of a new project. The main finding was that there is insignificant replication of networks from one project to another. However, resources and capabilities aligned for one project seem to have a residual continuity effect that is partially carried on to other projects.

The analysis from this research provided a thorough understanding of the behavior of firms through organizational systems and management decisions that align resources and capabilities to achieve project results. The research results identified four parameters as the drivers for the interorganizational links that determine the fate of a network following project completion. The internal parameters of movement and development of resources

and capabilities; and the external parameters of trust and efficiency reconnect dyadic links after project completion. The findings have shown that partial replication is a common behavior in the construction industry.

6.5 Research quality

The technique followed in this research involved analyzing case studies. At the broader philosophical level, one of the main criticisms for using case studies is the reduced external validity due to the lack of representativeness of the cases used as the point of observation (Yin, 1994). According to Paz-Vega (2008) valid knowledge according to the critical realist philosophy requires the identification of causal powers in addition to the contextual contingencies that feature the activities being studied and the way that they interact to lead to particular events. A case study is "externally valid, because it is in a position to make general claims about the world, i.e., the case exhibits the properties that are exemplary for understanding the general case, despite its particularities" Paz-Vega (2008: 52). Similarly, the various cases across many construction networks studied in this research provide generalities that render the case studies externally valid.

The second criticism of case studies is the impact on internal validity and reliability due to the lack of rigor in data collection (Hamel et al., 1993; Yin, 1994). This research was built on various sources of information, including primary and secondary data. Comparisons between compiled information took place at various levels throughout the research. Coding and decoding was conducted by the primary research student and then validated by an independent person who was provided with the coding guidelines, and assisted in the note-taking process during interviews.

Researchers who employ qualitative techniques (e.g., Eisenhardt, 1989; Waring et al., 2008; Yin, 2009) suggest validity and reliability are areas that need special attention when conducting research. In principle, reliability and validity in qualitative research are conceptualized as trustworthiness, rigor, and quality (Golafshani, 2003).

Table 6.1: Research findings

Proposition	Statement	Status	Comments
1	Firms participating in a time- bound network align and manage resources to serve the target project without considering network sustainable competitive advantage that extends beyond project completion.	Supported	Results from Stage 1 & 2 interviews do not show much evidence of a structured strategy at any company level that aims at replicating the network.
2	Tangible resources determine the initial structure of the network but intangible resources and capabilities define the network evolution pattern.	Supported	Firms start by mobilizing resources at the beginning of a project; possessed resources at various firm levels define the movement of resources and capabilities.
3	Movement of resources and capabilities among members of a network is a source of developing firm-level sustainable competitiveness but has little effect on network-level sustainable competitiveness.	Supported	Results show an impact on a firm's sustainable competitiveness; there was no evidence of network-level sustainable competitiveness.
4	Foreign firms are more active than local firms in devising and implementing strategies for aligning resources in time-bound networks with the aim of gaining sustainable competitiveness beyond the life of one project.	Not supported (Not enough evidence)	Foreign firms, just like local firms, did not show any evidence of devising special strategies.

Bowen (2005) warns that a common threat to research trustworthiness is the possibility of respondent bias, which may lead the respondents to say what they think the interviewer wants to hear. To address this limitation, data triangulation and verification were applied to the data through the two independent research phases. Triangulation in this research took place through corroboration between interviews, observations, and document reviews.

Furthermore, information gathered from Phase 1 interviews was demonstrated to Phase 2 respondents. Various researchers (Cresswell, 1994; Merriam, 1988; Miles & Huberman, 1994) described this technique as a way of ensuring qualitative data reliability and internal validity through generalizability and the ability to replicate results. Table 6.2 describes the quality of this study.

Another element of the research criteria considered in this study is reflexivity. King (2004) regarded reflexivity as an important element, especially when using template analysis. The researcher's indirect involvement in the industry being explored provided an advantage in terms of accessing information and participants for interviews. This may also have contributed to epistemological reflexivity, which could improve data analysis. However, the information is well documented and maintained to provide an audit trail.

6.6 Limitations

The primary limitation of this study was the lack of research culture among the industry practitioners involved in the study. The recruitment success rate was 53%; many candidates refused to participate in Phase 1 interviews. Many of those who agreed to participate showed some reluctance at the beginning of each interview. I believe the level of acceptance would have been greater if this research had been conducted in affiliation with a local university, since in such a case firms would consider the support of local knowledge as an ethical obligation. A suggestion for future similar research would be to tie up with a local university in the target country to enhance the research objectives by giving a local academic benefit.

Another limitation is the diversity of the respondents' countries of origin and academic backgrounds. While this provided a wider spectrum of opinions, bringing the respondents to the same level of comprehension of the terminologies and concepts presented during the interview was time consuming.

Table 6.2: Research quality

Criteria	Description	Procedure
Reliability	Demonstrates that the same study can be repeated with the same results in terms of data collection. To ensure data reliability, the research documented procedure, protocols and database. An important element to ensure reliability in qualitative research is trustworthiness of data sources. Randomness of data sources is eliminated in the study since interview candidates were directly identified as decision makers. At each project level, the participants were the ultimate source of reliable information.	− 20 cases − 45 interviewees − Primary and secondary sources of data − Documented interview protocol − Interviews (partly) tape-recorded for accuracy
Construct Validity	This is covered by identifying correct operational measures for the concepts being designed. The research methodology applied two layers of data collection followed by a third-party validation. The intensive interviews in Stage 2 provide another layer of data validation. Displaying the map in front of the participants of Stage 2 and discussing its content provided an opportunity to cross-check information pertaining to the network interactions.	− 20 cases − 45 interviews − Cross checking between Phase 2 and Phase 1 candidates
Internal Validity	Relates to causal relationships.	− Documented interview protocol − Compare information sources
External Validity	Concerned with the domain to which the study can be generalized.	− Generalized to a model, not a population − Results compared with known theories from literature review including DCV and RBV.

Although the English language was used in all interviews, the depth of language fluency varied from one respondent to the other. To minimize the impact of this limitation, I spent a lot of time trying to ensure the respondents clearly followed the terminologies and concepts presented in the interviews.

A common limitation in case studies is the lack of variety in the data used. Welch et al., (2009) observed that, in interview-based case studies, a larger number of cases tends to have fewer participating respondents per case. This is exactly what this research experienced. The initial plan was to have 10 respondents from five cases. However, this plan changed in the early stages in favour of more cases with less participants per case study. Welch et al., (2009) found that the average number of interviews per case in a large sample size case study was 2.8. On the other hand, 40 participants were found in a single case study and six respondents in studies with up to 10 cases.

Besides limited time for interviews, other comments on case studies include the inefficient reference to or quotation of information gathered from documentation compiled during the research, such as annual reports, contracts, and other internal documents (Parkhe, 1993). I tried to capture this information in many instances.

6.7 Implications

As explained in Section 1.2, many construction experts sense some underdevelopment in their industry as a result of its focus on short-term business objectives (Cox & Thompson, 1997). This research has provided a very important strategic management perspective that could stimulate improvements in operational efficiencies at the firm and network levels and perhaps even at the industry level.

Findings from this research provide a window of opportunity for industry practitioners to focus on sustaining gains from completed construction projects. The evolving nature of a construction project from concept to completion creates a dynamic environment for the inter-organizational interactions of resources and capabilities. One of the main outcomes of this research is the finding that a firm's decision makers show no strategic drive to

consider the longer-term benefits of these interactions. Based on results from this study, I am not encouraged to recommend that project owners consider a full replication of a network. The opportunistic behaviors of departing network members remain an area of concern for future projects. While trust and confidence in a firm's performance could be a basis for inviting that firm for new bids, a firm's predominant intention is to deal at arm's length with all potential network members.

The creation of a totally new network with no previous interaction is the opposite extreme of full network replication, which is also not recommended. A new developer entering a new market avoids this scenario by employing network members who have local experience with a capability that may bring previous dyadic links into the project.

In order to develop a balanced strategy, I recommend that the developer of a new project follow a partial replication of a network. This replication applies to any part of the network with a preference to have that replication generated at Tier 1 or Tier 2. The following basic guidelines may be adopted.

- Tier 1 firms, as well as the main contractor in Tier 2, should conduct a full assessment of network performance at the end of each project to determine the extent of network replication that may be considered on future projects. All shortcomings in terms of quality, timeliness, and technical challenges should be recorded along with proposed preventive measures.
- Project-level managers should document all information gathered during the life of a project, especially knowledge related to technical competence.
- Corporate-level managers should monitor movement of resources and capabilities to ensure the sustainability of competitive advantage when bidding for new projects. The key resources to monitor and develop are human capital and technical know-how. Training and documentation are among the most common tools used by construction firms to enhance their capabilities.

In addition to recommendations for enhancement of performance at the firm and network levels, another dimension that should be considered is performance at the industry level. At the time of the completion of this project, the UAE had started to see a new wave of economic growth after the government managed to minimize the impact of the economic crises of 2008-2009. This was achieved through government activities that regularized exposures of financial borrowings with the increased influx of foreign investments. The prospects of visible growth have created a need to re-evaluate lessons learned at the industry level. The task requires members of the construction community and other crucial players such as funding institutions and government bodies to share their collective wisdom. During this research I also noticed some fragmentation in the industry unlike the more closely knit pharmaceutical or banking sectors. Regular conferences and other international conventions are convenient forums in which solutions for sustaining gains at various business levels can be found.

While these recommendations are derived from the knowledge gathered from this study of the UAE's construction industry, they may also be applied to similar industries. The oil and gas industry in the UAE and neighboring countries is even stronger dominant than the construction industry. Exploration of oil and gas is based on concessions from the government with tight timelines that require the formation of networks that are capable of aligning the resources and capabilities that can meet business objectives. Managers in such networks can also benefit from the recommendations made here.

Furthermore, business situations are similar to project-based transactions, such as new venture creation and new product development, which rely temporarily on external resources and capabilities. In such cases, aligning resources and capabilities may be aimed at securing long-term benefits that could be transferred from one special project to the other.

6.8 Contributions and suggestions for future research

The knowledge gained from this study provides insights into strategic management practices that aid in decision making when any of the parameters of a PBT are involved. Even in more relaxed business transactions, these insights should strengthen any sustainable competitive advantages.

The findings of this study can benefit firms at two levels. At the project execution level, actions should sustain competitiveness by taking into account long-term interaction with direct links. The corporate-level managers should also be in a position to devise strategies that consider longer-term advantages rather than only the more commonly considered short-term benefits, paying special attention to the time, economic, and management factors. Executive managers in the construction industry are encouraged to create a more proactive approach to developing internal capabilities that play a significant role in enhancing a firm's sustainable competitiveness. While this study uses the construction industry in the UAE as a case study, firms outside the UAE can also use these findings to position themselves in similar markets.

Furthermore, this research is a unique approach in which qualitative clinical techniques are used to study management science-based topics. Applying the critical realist approach in the context of this research presents a new dimension for evaluating the dynamic construction industry, which is a complex and causally linked interaction of resources and capabilities. The organizational structures in this industry present a platform to study other similar socially real practices and entities.

The research findings of this study suggest a number of other areas for future research. While qualitative methods were used to provide a more comprehensive understanding of the alignment of resources and capabilities, future researchers may build on this understanding using quantitative methods. For example, numerical scales for the levels of efficiency and trust may be associated with a firm's performance to gauge its ability to meet project targets.

Powel et al. (1996) highlighted the significant growth in corporate collaborations and reliance on partnerships. The construction industry is part of these patterns of partnerships. Construction projects may require the allocation of extensive resources that no single contractor can provide; in such cases, joint ventures are formed especially at the level of the main contractor. Future research may focus on alliances and partnerships and how they affect the alignment of resources and capabilities that possess long-term sustainable competitive advantages beyond a single project.

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Appendix I: Preliminary Study – Coded Network

Project Code	Project Value USD M	Client/ Owner	Consultant / Architect	Main Contractor	Project Management	MEP Contractor	Glass & Aluminium	Readymix Concrete
1	300-500	O1	A10	C29	PM-IH/O1	MEP3	GA9	RM11
2	100-300	O1	A10	C12	PM-IH/O1	MEP7	GA10	RM-IH/C12
3	<100	O1	A5	C10	PM-IH/O1	MEP18	GA29	RM11
4	<100	O1	A5	C48	PM-IH/O1	MEP-IH/C48	GA24	RM7
5	<100	O1	A27	C39	PM-IH/O1	MEP-IH/C39		RM10
6	<100	O13	A13	C25	PM13	MEP28	GA21	RM1
7	100-300	O13	A20	C52	PM13	MEP4	GA10	RM9
8	<100	O15	A12	C16	PM-IH/O15	MEP-IH/C16		
9	<100	O15	A13	C30	PM-IH/O15	MEP35	GA26	RM6
10	<100	O15	A12	C16	PM-IH/O15	MEP-IH/C16	GA17	
11	<100	O17	A12	C11	PM-IH/O17	MEP8	GA10	RM18
12	<100	O17	A22	C11	PM-IH/O17	MEP12	GA11	RM11
13	100-300	O17	A6	C14	PM-IH/O17	MEP7	GA10	RM11
14	100-300	O17	A30	C17		MEP7	GA3	RM18
15	<100	O17	A3	C17		MEP12	GA20	RM9
16	100-300	O17	A15	C27		MEP16	GA6	RM19
17	300-500	O18	A3	C13	PM8	MEP8		
18	<100	O18	A26	C34	PM9	MEP4	GA28	RM14
19	100-300	O19	A39	C6	PM4			
20	>500	O19	A43	C8	PM4	MEP8	GA8	RM11
21	100-300	O19	A28	C8	PM4	MEP8	GA23	RM11
22	100-300	O19	A41	C15		MEP-IH/C15	GA31	RM1
23	>500	O2	A47	C22	PM7	MEP3		
24	200	O2	A31	C7	PM7			RM2
25	200	O2	A29	C7	PM7	MEP20	GA30	RM2
26	100-300	O2	A37	C8	PM3		GA31	RM2
27	100-300	O2	A34	C46	PM6	MEP15	GA18	RM11
28	100-300	O2	A42	C7	PM7	MEP19	GA31	RM2
29	100-300	O2	A4	C9	O2	MEP10		RM1
30	100-300	O2	A4	C9	O2	MEP10		RM18
31	100-300	O20	A15	C23	PM3	MEP8	GA7	RM1
32	100-300	O20	A19	C45		MEP-IH/C45		RM11
33	100-300	O20	A48	C18	PM10		GA4	RM-IH/C18
34	100-300	O20	A46	C51	PM10	MEP2		
35	>500	O20	A14	C3	PM10			
36	100-300	O21	A36	C15				RM20
37	100-300	O21	A7	C32		MEP15		RM-IH/C32
38	<100	O21	A35	C41		MEP17		RM14
39	100-300	O22	A11	C6		MEP1		RM15
40	100-300	O22	A5	C6		MEP1		
41	100-300	O22	A2	C8		MEP4	GA13	RM11
42	100-300	O22	A2	C8		MEP34	GA16	RM19
43	300-500	O23	A8	C13				
44	<100	O23	A1	C38	PM1	MEP-IH/C38		
45	300-500	O23	A40	C54		MEP7	GA9	RM17
46	300-500	O23	A21	C47		MEP23		
47	100-300	O4	A1	C10				
48	300-500	O4	A13	C40		MEP5	GA26	RM3
49	100-300	O4	A8	C49		MEP9		RM12
50	100-300	O4	A13	C42		MEP27	GA23	RM12

Appendix II: Phase 1 Interview Protocol

1. Introduction
   1.1. Welcome participant and introduce myself.
   1.2. Explain the purpose of the interview.
   1.3. Explain the purpose of the recording equipment and seek approval to use it.
   1.4. Address the issue of confidentiality.
2. Warm up
   2.1. Can you provide an overview of the project including size, timelines, expectations, etc ?
   2.2. How long have you been working with this company?
   2.3. Where were you working prior to this company?
   2.4. What exactly is your role in the company?
   2.5. What is your company's role in this project?
   2.6. What are the firms from the project network that you interact with?
   2.7. What is the level of interaction with network members? How does this support the project?
3. Resources and capabilities
   3.1. Describe all the following resources in terms of their position within your organization; i.e., in-house versus out-sourced:
      3.1.1. Physical assets
      3.1.2. Human capital
      3.1.3. Technology and information
      3.1.4. Legal
      3.1.5. Financial
      3.1.6. Process and procedures
   3.2. What about the intangible capabilities owned by your company? Probe on:
      3.2.1. Networking capabilities
      3.2.2. Managerial capabilities
      3.2.3. Learning capabilities
   3.3. Regarding the resources you mentioned earlier which of them are used on this project?
   3.4. What capabilities does your organization use on this project?

4. Interaction
    4.1. Describe the type and intensity of relationships that organizational capabilities and resources have with other members of the network that directly interact with your firm.
    4.2. Prior to working for this company, did you interact with any of these firms? If yes, how does it compare to the current interaction?
    4.3. Are you aware of the movement of the resources and capabilities between your firm and other firms in the network? If yes please explain how?
    4.4. Would you or your organization take the current organizational interaction into consideration on future projects? If yes, why?
    4.5. Are there any policies or procedures that facilitate this continuity of interaction?

5. Competitive advantage
    5.1. What are the points of strength in your organization? What is your competitive advantage?
    5.2. Will these strengths and competitive advantage help you secure new projects with the network members?
    5.3. Did your firm acquire new resources or develop new capabilities from the network that will be used in future projects? Explain such developments.

6. Close session
    6.1. Thank the respondent for participation.
    6.2. Will you be interested in receiving the research executive summary?

Appendix III: Phase 2 In-depth Interview Guidelines

1. Introduction

1.1. Welcome participant and introduce myself.

1.2. Explain the purpose of the interview.

1.3. Explain the purpose of the recording equipment and seek approval to use it.

1.4. Address the issue of confidentiality.

1.5. Explain the background of the research.

1.6. Describe University of Waterloo and research group.

1.7. Summarize research status and the remaining stages before completion.

2. Discussion of Phase 1 Results

2.1. If the interviewee comes from a company that had one of its managers interviewed in Stage 1, then present the templates generated for this company and the overall project network to which it belonged.

2.2. If the interviewee's company was not represented in Stage 1 then present any anonymous template and network to explain what has been accomplished in Stage

3. Allocation of Resources and Capabilities

This section refers to two levels: project level, and firm level. Project level involves the project managers and their project network. Firm level involves BOD, owner, executive and their personal or company network.

3.1. At what level does the organization get involved in identifying resources and capabilities required to execute a project.

3.1.1. Are there standard systems and procedures that allocate resources and capabilities for the project? [*examples and details*]

3.1.2. Does higher management (corporate, executive, owner, BOD) get involved in allocating resources and capabilities? This involves identification, revision, or approval. [*examples and details*]

3.2. Is movement/development of resources monitored?

3.2.1. At project level or firm level?

3.2.2. What measures or practices does management employ to ensure resources and capabilities are developed?

4. Sustainable competitive advantages
   4.1. How does executive management position the firm in terms of market competitiveness?
   4.2. Show the interviewee a list of identified sustainable competitive advantages defined in Stage 1. Explore how management addresses these parameters in terms of improving competitiveness.
   4.3. Does the firm clearly define and implement strategies to enhance sustainable competitiveness? [*examples and details*]

5. Movement of resources and capabilities
   5.1. Is movement of resources and capabilities addressed at the firm's management level?
   5.2. Are there any controls on inward or outward movement of resources and capabilities?

6. Relations beyond project completion
   6.1. Does the firm consider repeating a network structure or parts of it on future projects? [examples and details]
   6.2. Does firm management consider lessons learned from projects?
   6.3. How is such knowledge transferred across the organization?
   6.4. How does management capitalize on new networks created during the project? [examples and details]

7. **Close session**
   7.1. Thank the respondent for participation.
   7.2. Ask if interviewee is interested in receiving the research executive summary?

Appendix IV: Respondents Recruitment Guidelines

Telephone interview script

This document proposes a potential conversation script that may take place when contacting an interview candidate to arrange an appointment for an in person interview. In this dialogue, C stands for Candidate and M is for Mousalam Alabdul Razzak (Student Investigator).

M: Hi, I would like to speak to [Candidate]

C: This is [Candidate] speaking.

M: I am Mousalam Razzak. May I take 3 minutes of your time to describe a PhD research project that I would like you to participate in? I would like to arrange a meeting with you next week to learn from your experience in the construction field.

C: No call back later.

M: I shall call you back after (agree on a time to call back)

OR

C: Yes tell me, what is this about?

M: I am a PhD student in the Management Sciences Department at the University of Waterloo in Canada. I passed my first stage of research proposal, which was approved in March 2010 under the supervision of Dr. Rod McNaughton. The title of my research is Rapid Alignment of Resources in Time-bound Networks: The Case of Construction Projects in Dubai (UAE)". Part of my research is conducting interviews with construction industry experts who had been part of capital intensive construction projects in the UAE. I understand that you and your company are involved in [project name]. Let me tell you what this involves:

- The interview will last for about 1 hour. This will be arranged at a time and location that is convenient to you.
- There are no known or anticipated risks from this interview. This will seem like an informal discussion that will draw on your expertise on the [construction project name] specifically and in the construction field in general.
- The questions pertain to your general construction experience and how you view resource management on [project name]; for example, I will be asking you to describe the resources and capabilities used by your company in this project.
- You may decline to answer any of the interview questions you do not wish to answer and may terminate the interview at any time.
- With your permission, the interview will be audio recorded to facilitate collection of information, and later transcribed for analysis.
- All information you provide will be considered confidential.
- There is a possibility that an assistant interviewer will accompany me during the session to assist in note taking and data management.

- The data collected will be kept in a secure location and disposed of in 4 years time.
- If you have any questions regarding this study, or would like additional information to assist you in reaching a decision about participation, please feel free to contact Dr. Rod McNaughton at 001-519-8884567 ext. 32713.
- I would like to assure you that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. However, the final decision about participation is yours. Should you have any comments or concerns resulting from your participation in this study, please contact Dr. Susan Sykes in the Office of Research Ethics at 001-519-888-4567, Ext. 36005 or ssykes@uwaterloo.ca.
- If you are interested in learning about the research results, an executive summary will be sent to you via email after completing the final report.
- With your permission, I would like to send you an information letter which has all the details along with contact names and numbers on it to help assist you in making a decision about your participation in this study. May I email or fax this information to you today?

C: No thank you, I am not interested.

M: I understand. Thank you for taking the time to hear my request. If you later decide to participate please let me know (provide phone number).

OR

C: Yes I don't mind participating.

M: Thank you. So I will send you the information on (confirm email address or fax number) and will call you in the next 2 days to see when and where we can meet.

End conversation

Recruitment letter

Dear [*Participant's name*],
Thank you for taking my call to hear my introduction of the research study I am currently working on. As discussed, I am conducting interviews as part of my Ph.D. dissertation under the supervision of Professor Rod McNaughton, Department of Management Sciences at the University of Waterloo, Canada; and I am inviting you to participate in this study.

The proposed research aims to study resource alignment in construction projects that are characterized with time-bound organizational relationships. The study focuses on transactions that provide limited flexibility in terms of duration of setting up resources and their alignment within a specific network. This situation appears in sectors as diverse as the construction, filmmaking, and oil exploration industries. The time allocated for building a network of resource interdependencies and the duration of resource engagement is by default limited.

I am seeking your approval to participate in the study through a 45 minutes in-person interview. Research results could benefit industry experts in the following aspects:

- Identify key resources and capabilities that contribute to successful execution of a project.
- Define management practices and policies that support the alignment of resources beyond the limited life of a single project.
- Devise strategies that render a firm's resources and capabilities more competitive for future projects.

Probably an assistant interviewer will accompany me during the session to assist in note taking and data management. During the interview you may decline to answer any questions that you do not wish to answer and you can request ending the session at any time. There are no known or anticipated risks in the study.

It is important for you to know that any information that you provide will be confidential. All of the data will be summarized and no individual participant or company could be identified from these summarized results. The information collected from this study will be accessed only by the two researchers named above and will be maintained on a password-protected computer database. This research is not supported by any industrial or marketing organization.

If you have any questions regarding this study, please contact me at 050-5582342, malabdul@engmail.uwaterloo.ca or my supervisor, Dr. Rod McNaughton at 001-519-8884567 ext. 32713, rmcnaughton@uwaterloo.ca .

Please note that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. If you have any comments or concerns resulting from your participation in this study, please feel free to contact Dr. Susan Sykes, Director, Office of Research Ethics, at 001-519-888-4567 ext. 36005 or by email at ssykes@uwaterloo.ca.

I shall call you again in the next few days to arrange our meeting at your convenience. Thank you for considering participation in this study.

Yours Sincerely,

Feedback email

Dear [*Participant's Name*],

Thank you for taking the time to meet me on [*insert date*] as part of my research study on rapid alignment of resources in construction projects. Your valuable input will provide a significant contribution to the study. As discussed during our meeting, I will analyze the information collected from you and other industry experts to address the following areas:

- Identify key resources and capabilities that contribute to successful execution of a construction project.
- Define management practices and policies that support the alignment of resources beyond the limited life of a single project.
- Devise strategies that render a firm's resources and capabilities more competitive for future projects.

If you expressed interest during the interview to view the research results, I shall send you an executive summary via email once I conclude the study.

Please note that this study has been reviewed and received ethics clearance through the Office of Research Ethics at the University of Waterloo. If you have any comments or concerns resulting from your participation in this study, please feel free to contact Dr. Susan Sykes, Director, Office of Research Ethics, at 001-519-888-4567 ext. 36005 or by email at ssykes@uwaterloo.ca.

Once again, if you have any questions regarding this study, please contact me at 050-5582342, mrazzak9@hotmail.com or my supervisor, Dr. Rod McNaughton at 001-519-8884567 ext. 32713, rmcnaughton@uwaterloo.ca .

Yours Sincerely,

Appendix V: Phase 1 Project/Respondent Codes

Project Name	Firm Type	Firm Code	Respondent Designation	Respondent Code
AMW	Consultant	CO1	Senior Resident Engineer	RCO1
AMW	Main Contractor	MC2	Project Manager	RMC2
AMW	Subcontractor	SC3	Project Manager	RSC3
AMW	Supplier	SU2	Sales Manager	RSU2
BCD	Main Contractor	MC3	Project Manager	RMC3
BUD	Contractor	MC4	Project Manager	RMC4
CDP	Subcontractor	SC4	Site Manager	RSC4
CTD	Subcontractor	SC5	Project Manager	RSC5
ECT	Subcontractor	SC6	Business Development Manager	RSC6
EPT	Supplier	SU3	Operation Manager	RSU3
ETW	Subcontractor	SC7	Deputy Director	RSC7
ETW	Supplier	SU4	Technical Manager	RSU4
ITW	Consultant	CO2	Senior Resident Engineer	RCO2
ITW	Subcontractor	SC8	Project Manager	RSC8
ITW	Supplier	SU5	Materials Executive	RSU5
LCB	Main Contractor	MC5	Site Coordinator	RMC5
LCB	Subcontractor	SC9	Senior Resident Engineer	RSC9
LCB	Supplier	SU6	Operations Director	RSU6
LSM	Project Management	PM2	Project Manager	RPM2
MLA	Owner	CL2	Project Manager	RCL2
NAD	Main Contractor	MC1	Project Manager	RMC1
NAD	Subcontractor	SC2	Planning Engineer	RSC2
PDT	Owner	CL3	Sr. Project Manager	RCL3
PVW	Consultant	CO3	Project Manager	RCO3
PVW	Subcontractor	SC10	Construction Manager	RSC10
PVW	Sub-subcontractor	SU7	Area Manager	RSU7
SDT	Contractor	MC6	Project Manager	RMC6
SIT	Client	CL4	Project Engineer	RCL4
SVC	Architect	AR2	Project Manager	RAR2
THQ	Contractor	MC7	Sr. Project Manager	RMC7
TOB	Architect	AR1	Senior Resident Engineer	RAR1
TOB	Owner	CL1	Client Representative	RCL1
TOB	Project Management	PM1	Supply chain Manager	RPM1
TOB	Subcontractor	SC1	Project Manager	RSC1
TOB	Supplier	SU1	Sales Manager	RSU1

Appendix VI: A Priori Code

Resources				
Type	**Reference**	**Definition**	**Indicators**	**Code**
Financial	Hunt, 2001; Enz, 2008	Monetary resources from that a firm can draw funds.	**Shareholders financial strength** and willingness to support project execution.	**RFs**
			Firm's ability to **secure bank funding** for executing projects based on successful track record.	**RFb**
			Strong cash flow and financial stability of the firm.	**RFc**
			Assets owned by the company. Although these assets might not contribute to project execution they might indicate the firm's financial strength. Assets that are used for project execution fall under the category of Physical assets.	**RFa**
Human capital	Barney, 1991; Hunt, 200; Enz, 2008	Skills, background, and training of staff, and the way they are organized. Including recruitment and building career paths.	**Experienced managers** in the firm's field of business.	**RHm**
			Number of **technical staff (engineers)** available to deploy on projects.	**RHt**
			Number of **workers (labour)** available to deploy on projects.	**RHl**
Physical	Barney, 199; Hunt, 2001, Enz, 2008	Land, buildings, equipment, and access to raw materials. Physical assets are the resources people usually observe before all others.	**Land** owned by a firm is applicable primarily to a developer. Contractors might also benefit from their land bank as staging area for storage if within project vicinity.	**RPl**
			Buildings owned by the firm.	**RPb**
			Equipment owned by the firm and used to execute the scope of work.	**RPe**
			Access to raw material provides the level of comfort needed for project execution.	**RPr**
Legal	Hunt, 2000	Experience in contractual and legal requirements.	**Lawyers employed** by the firm.	**RLl**
			Contracted law firm with a fixed term engagement plan for a limited scope of legal activities.	**RLf**
			Commercial department within the firm that addresses all commercial contracts before and after project award.	**RLc**

Appendix VI: A Priori Code *(continued)*

Type	Reference	Definition	Indicators	Code
Know-how	Daft, 1983; Teece et al., 1997; Hunt, 2001	Operational know-how exemplified in patents, advanced industrial systems. Unique designs and material selection may also constitute know-how.	**Production process** whether at a factory or on site.	**RKc**
			Patents owned by the firm.	**RKp**
			Technical competence possessed by the firm such as such as a unique design.	**RKt**
Systems & Procedures	Daft, 1983; Hunt, 2001	Administrative, quality assurance, efficient documentation and implementation of procedures.	International **accreditation** like ISO or other international certifications.	**RSa**
			Standard **systems and procedures.**	**RSp**
Information technology	Daft, 1983; Hunt, 2001	Use of computer software and other information technology to manage operations internally and externally.	**Engineering software** such as CAD or other design packages.	**RIs**
			Enterprise Resource Planning (**ERP**).	**RIe**
			Customer management software.	**RIc**
Brand name	Enz, 2008	Brand equity, image and reputation.	**Reputation** based on track record.	**RBt**
			Shareholders image in the industry.	**RBs**

Appendix VI: A Priori Code *(continued)*

Capabilities				
Type	**Reference**	**Definition**	**Indicators**	**Code**
Organizational learning	Enz, 2008; Javernick-Will, 2009	Firm's ability to acquire externally possessed knowledge that is important to operations.	Strength in **subcontracting services and activities** that are needed to complete a project	**COs**
			Learning from **associated companies**	**Coa**
			Standardization of externally acquired knowledge. This is achieved through documentation and internal workshops .	**COd**
			Ability to recruit **human capital** that is needed for the project.	**COh**
Social capital	Putnam, 1995; Hakansson & Snehota, 1995	Social structures comprising of personal relationships and trust.	**Shareholders** network. Social events. Personal trust.	**CSs**
			Staff network. Social gatherings. Technical events and seminars	**CSn**
Managerial capabilities	Helfat et al., 2007; Griffith et al., 2010	Firm's ability to integrate the cumulative knowledge and skills to effectively react to competitive market needs.	**Managers ability to coordinate** between resources to maintain or enhance knowledge base.	**CMa**
Alliance management	Helfat et al., 2007	Knowledge of forming and managing alliances to acquire new resources and capabilities.	**Individuals ability** to link resources and capabilities.	**CAi**
			Firms ability to acquire and manage external resources and capabilities.	**CAa**
Network competence / Strategic Networks	Van De Ven, 1976; Gulati et al., 2000); Ritter et al., 2003	Firm's ability to handle, use and exploit inter-organizational relationships.	Firms ability to **form alliances**.	**CNa**
			Managers ability to **set and execute strategies** for managing resources and capabilities.	**CNm**

Appendix VII: Emergent Code

Topic	Cases	Code	Remarks
Movement of resources and capabilities between firms in the same network	Movement **within the firm** between parallel running projects	**TC-xx**	xx= a priori code
	The firm experienced **outward** transfer of resources or capabilities to another network member.	**TT-xx**	xx= a priori code
	The firm experienced **inward** transfer of resources or capabilities from another network member.	**TF-xx**	xx= a priori code
Replicating the project netwrok in future projects	The manager supports using the **same network** on future projects.	**AFN**	This includes the same firms. The firm might have control over the downstream entities only.
	The manager supports using **majority of the network** on future projects.	**AMN**	Would exclude few companies due to poor performance.
	The manager supports using **members of the network** but not the same network structure due to lack of efficiency.	**APN**	
	The manager **refuses** to use any of the members of the network on future projects to due to poor performance.	**ARN**	
Facilities and the procedures that will help maintain continuity of interaction between firms after project completion	The firm uses **databases** and records firms performance to document results from the current project for future references.	**FPS**	This is a system and procedure resource.
	The firm extends extra support to **facilitate services** that are beyond scope of work or core competency to satisfy client needs.	**FPE**	
Previous interactions	Firms interacted on **previous** projects.	**PIP**	
	Staff interacted through previous projects under different companies.	**PIS**	
	There was **no prior** interaction with any member of the network.	**PIN**	

Appendix VII: Emergent Code (*continued*)

Topic	Cases	Code	Remarks
Levels of interaction outside project execution period	Interaction on **previous** projects.	**LPP**	
	Prior to project interaction was at **tendering** stage for other projects.	**LPT**	
	Firm conducts **post-project survey** after project to continue interaction.	**LPS**	
Respondent's work experience	**Competition** in the same country.	**PEM**	
	Similar business in another country.	**PES**	
	The current company was a **client** to previous employer.	**PEC**	
	The current company was a **supplier** to previous employer.	**PEP**	
	Respondent grew **with the company** through experience gathered from various projects.	**PEL**	With the company over 8 years.
	Joined the company from a **different industry.**	**PEN**	
Mode of interaction between members of network	**Project based contract.**	**IMB**	
	Specified and **nominated** by project owner but contract placed with main contractor (or with the project owner)	**IMS**	
	No contractual agreement but regular **coordination** and sharing of technical information is required.	**IMC**	
	Receive **instruction** from the party but without contractual agreement.	**IMI**	
	Procurement **specific** to the project	**IMP**	
	Procurement in **bulk** applied to many projects	**IMM**	

Appendix VII: Emergent Code (*continued*)

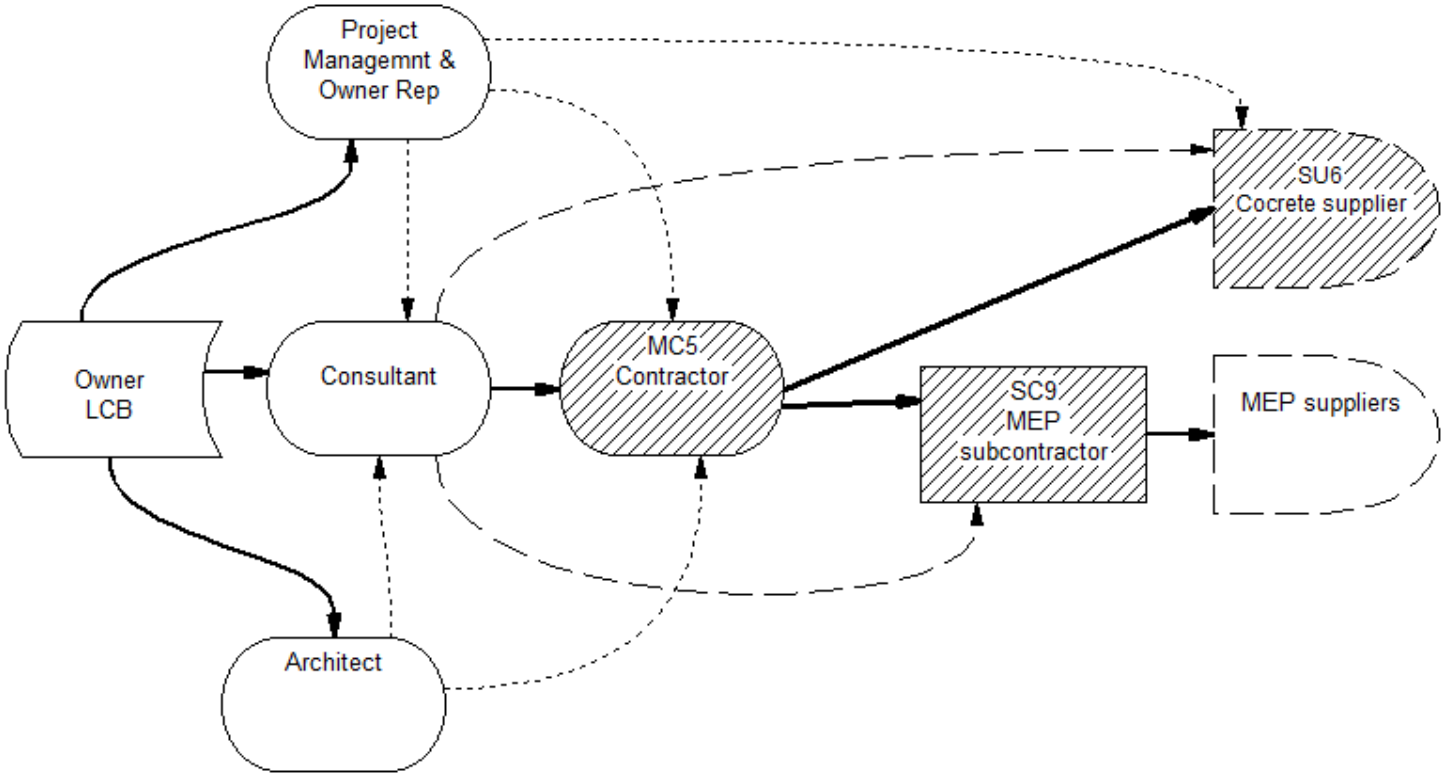
Topic	Cases	Code	Remarks
Reason to engage in business transaction	Refer to **resources or capabilities.**	**xx**	As per priori code
	Commercial **price** and terms.	**WAP**	
	Quality on previous projects.	**WAQ**	
	Previous successful interaction.	**WAI**	
	Production **capacity.**	**WAC**	
	Continuous support at the early tendering stage.	**WAT**	
	A **subsidiary** if the firm or share common shareholders.	**WAS**	
	Instruction from main client (**nomination**) followed by commercial and technical due diligence.	**WAD**	
Sustainable competitive advantage as perceived by manager	Refer to **resources or capabilities.**	**CD-xx**	As per priori code
	Product or service **quality.**	**CDQ**	
	International experience.	**CDI**	
	Member of a **larger group** having supporting sister companies that provides confidence in firm's strength.	**CDG**	
	Pricing structure and **economical competitiveness.**	**CDP**	
	Wide range of products and services	**CDW**	

Appendix VII: Emergent Code (*continued*)

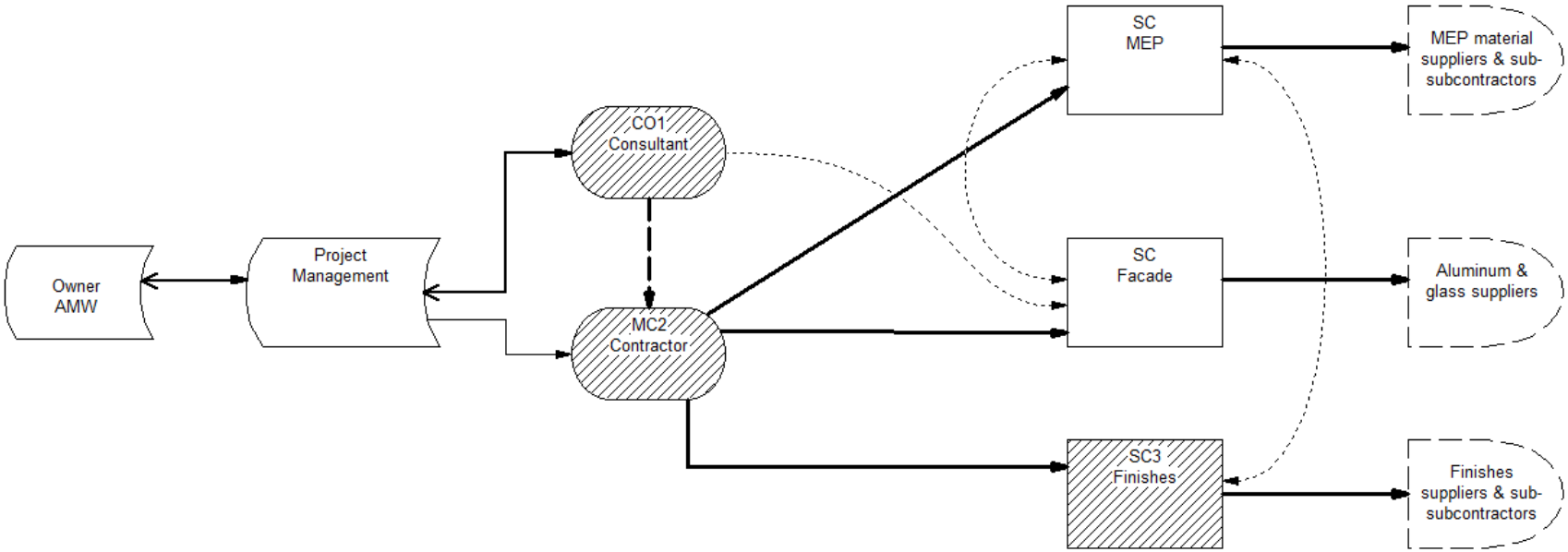
Topic	Cases	Code	Remarks
Will the competitive advantage mentioned help your firm secure new projects with the network members after project completion?	**Yes**, and certain **resources or capabilities (xx)** will decide on future interaction.	**SN-xx**	
	No, this will not help because each project has its special features and different challenges.	**SNN**	
	This **depends** on the overall success of the project regardless of the positive or negative performance of a single transaction.	**SND**	
Company position in terms of internationalization	**International company** with "x" years presence in the local market.	**IC-x**	x = number of years
	Local company that has expanded regionally based on local experience and due to **interaction with international companies** working in the country.	**ICL-x**	x = number of years
	Local company with management coming with **international experience.**	**ICE**	

Appendix VIII: Samples of Mapped Networks

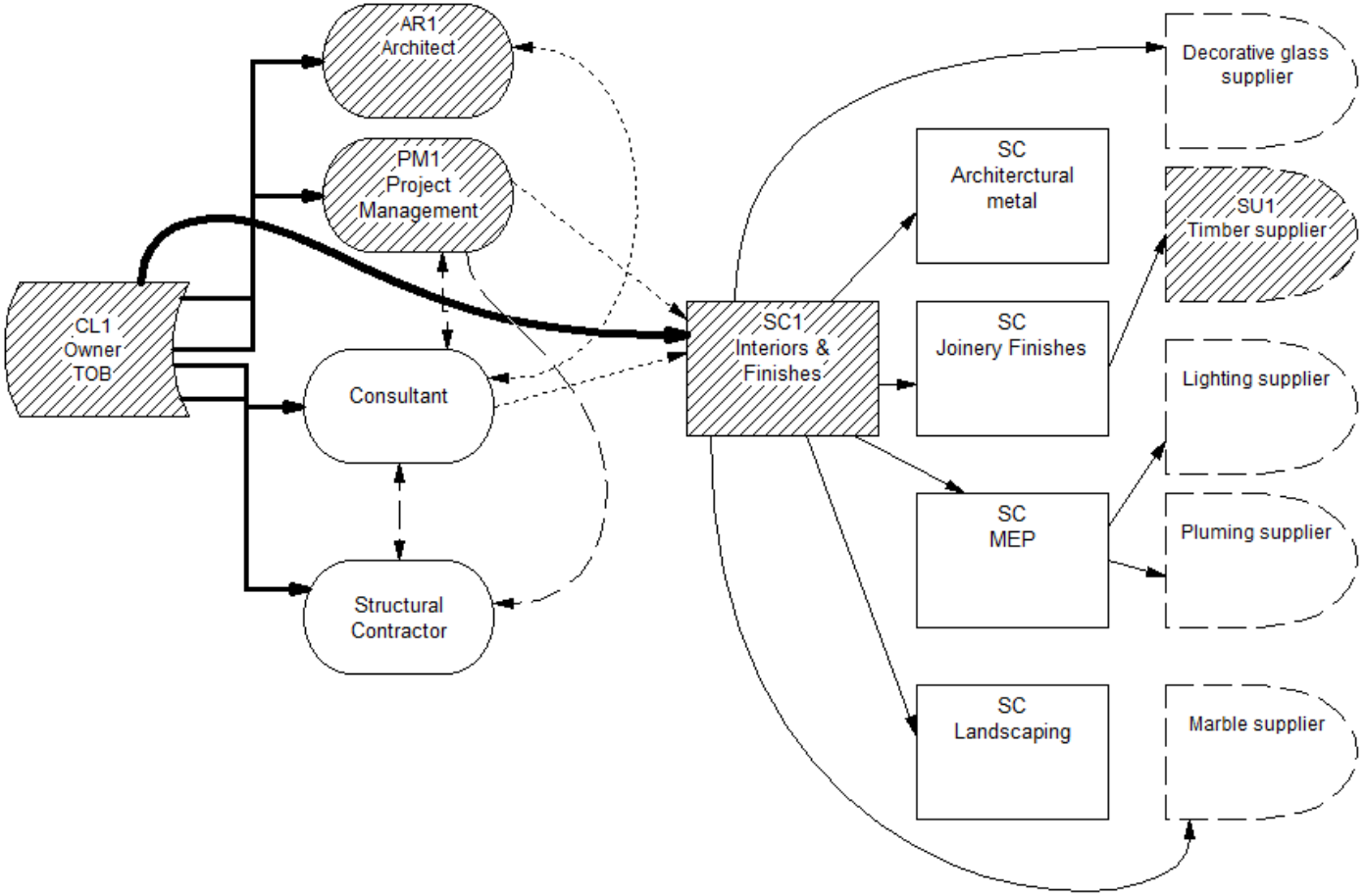
Project LCB



Project AWM


Owner
AMW
Project
Management
CO1
Consultant
MC2
Contractor
SC
MEP
SC
Facade
SC3
Finishes
MEP material
suppliers & sub-
subcontractors
Aluminum &
glass suppliers
Finishes
suppliers & sub-
subcontractors

Project TOB


AR1
Architect
PM1
Project
Management
CL1
Owner
TOB
Consultant
Structural
Contractor
SC1
Interiors &
Finishes
SC
Architerctural
metal
SC
Joinery Finishes
SC
MEP
SC
Landscaping
Decorative glass
supplier
SU1
Timber supplier
Lighting supplier
Pluming supplier
Marble supplier

Appendix IX: Q3- Resources and Capabilities Possessed By The Firm

	Tier 1	Tier 2	Tier 3
Tier 1	2RFa, 4RFs, 9RHm, 7RHt, 7RKt, 7RSp, 4RIs, 4RLc, 4RBt, 7COh, 2CNm, 4CMa, 2CSn, 4CSs		
Tier 2		8RSp, 7RSa,6RBt, 6RBs, 9RHm, 12RHl, 8RHt, 14RPe, 5RLl, 3RLc, 2RLf, 5RPl, 3RPb, RPr, 7RFs, 7RFb, 9RKc, 3RKt, 6RFc, 12RIs, 9RIe, 3RIc, 9CSn, 7COs, 9COd, 7COa, 9COh, 8CSs, 6CMa, 8CAi, 8CAa, 3CNm, 5CNa	
Tier 3			1RBs, 6RBt, 1RFs, 1RFb, 3RFc, 7RHl, 1RHm, 3RHt, 3RIs, 3RIc, 1RKc, 7RKt, 4RLc, 1RLf, 3RLl, 6RPl, 4RPr, 7RPe, 1RPb, 3RSa, 1RSp, 1CAa, 6COd, 1COs, 3CMa, 3CSs, 7CSn, 1COa

Appendix X: Movement of Resources Between Firms

	Owner	Project Management	Architect	Consultant	Main Contractor	Subcontractor	Subcontractor	Subcontractor	Subcontractor	Sub-Subcontractor	Sub-Subcontractor	Sub-Subcontractor	Sub-Subcontractor	Sub-Subcontractor	Supplier	Supplier	Supplier	Supplier
Owner		TF-RHm, TF-RSp, TF-RSp																
Project Management				TF-RKt														
Architect				TF-RKt	TF-RKt													
Consultant			TF-RKt		TF-RKc													
Main Contractor		TF-RLc	TF-RKt	TF-RSp	2TC-RHl, TC-RHm, 2TC-RPe, TC-RHt													
Subcontractor					TF-Rls, TF-RHl	TC-RHl, TC-RPe, TC-RHl, TC-RHm									TF-RKt, TF-Rlc			
Subcontractor					TF-RKt, TT-RHt													
Subcontractor												TF-RHl						
Subcontractor		TF-RSp		TT-RK, TT-RSp														
Sub-Subcontractor																		
Sub-Subcontractor																		
Sub-Subcontractor																		
Sub-Subcontractor																		
Sub-Subcontractor																		
Supplier						TF-RKt												
Supplier																TF-RPe		
Supplier																		
Supplier																		

Appendix XI: Sustainable Competitive Advantage

Description	Code	Tier 1	Tier 2	Tier 3
Product or service quality.	CDQ	0.4	0.40	1.00
International experience.	CDI	0.4	0.13	0.20
Member of a larger group having supporting sister companies that provides confidence in firm's strength.	CDG	0	0.47	0.20
Pricing structure and economical competitiveness.	CDP	0	0.27	0.40
Wide range of products and services.	CDW	0.4	0.53	0.00
Monetary resources from which a firm can draw funds.	RF	0.2	0.27	0.20
Skills, background, and training of staff, and the way they are organized. Including recruitment and building career paths.	RH	0.6	0.53	0.00
Land, buildings, equipment, and access to raw materials. The physical assets are the resources people usually observe before all the others.	RP	0	0.33	0.20
Experience in contractual and legal requirements.	RL	0	0.00	0.00
Operational know-how exemplified in patents, advanced industrial systems. Unique designs and material selection may also constitute know-how.	RK	0	0.40	0.60
Administrative, quality assurance, efficient documentation and implementation of procedures.	RS	0	0.07	0.20
Use of computer software and other information technology to manage operations internally and externally.	RI	0	0.00	0.00
Brand equity, image and reputation.	RB	0.4	0.53	0.00
Firm’s ability to acquire externally possessed knowledge that is important to operations.	CO	0.2	0.00	0.00
An intangible resource that is built on social structures comprising of personal relationships and trust.	CS	0	0.00	0.00
Also defined as marketing capability as a firm’s ability to integrate the cumulative knowledge and skills to effectively react to competitive market needs.	CM	0	0.20	0.00
Knowledge of forming and managing alliances to acquire new resources and capabilities.	CA	0	0.27	0.00
Firm’s ability to handle, use and exploit inter-organizational relationships.	CN	0	0.07	0.00