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**INNOVATION IN ARM'S LENGTH &  
EMBEDDED TIES: A STUDY OF  
MANUFACTURING SMEs IN THE  
NORTH EAST OF ENGLAND**

T E COTTAM

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2015

**INNOVATION IN ARM'S LENGTH &  
EMBEDDED TIES: A STUDY OF  
MANUFACTURING SMEs IN THE  
NORTH EAST OF ENGLAND**

**THOMAS EDWARD COTTAM**

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of the requirements of the  
University of Northumbria at Newcastle  
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## **Abstract**

This comparative study explored the process by which SMEs innovate in embedded and arm's length relationships. In particular, this research asked how the nature of problem-solving, knowledge creation, innovation drivers and innovation outcomes differ in arm's length and embedded (collaborative) ties. Contemporary strategy research recommends organizations manage close collaborative relationships to innovate and achieve a competitive advantage; however these relationships are resource intensive, prone to failure and often fail to provide an adequate return on investment. By investigating the under-researched innovative potential of low maintenance arm's length relationships this research aimed to inform more sustainable SME innovation strategy, as these organizations are especially vulnerable to the perils of close collaboration.

This thesis followed a qualitative research design utilizing a mono-method strategy of enquiry and conducted 21 semi-structured interviews with senior engineers, designers, MDs and management level staff across 10 north east-based manufacturing SMEs.

The main findings based on thematic analysis of the data highlight that knowledge creation occurs via externalization, combination and internalization modes in arm's length ties, whilst embedded ties also facilitate socialization knowledge creation. Incremental process innovation was most typically associated with collaborative relationships which often tended to be driven by isomorphic pressures, these pressures also manifest during initial problem-solving activity. In contrast, arm's length ties were associated with both radical and incremental product innovation and the identification of new markets; this activity was exploratory in nature and primarily explained via organizational learning theory.

These findings provide an alternative solution to addressing the challenges of networked SME innovation and help orientate future research into more sustainable innovation strategy.

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My undergraduate and postgraduate students who are an un-ending source of fulfilment and remind me why I am in academia to begin with.

This research stemmed out of an interest in informing more sustainable SME innovation strategy in times of relative paucity. Something I believed was not adequately tackled in the contemporary innovation literature.

Finally, to Amy & Carla, I'm sorry...

## **Declaration**

I declare that the work contained in this thesis has not been submitted for any other award and that it is all my own work. I also confirm that this work fully acknowledges opinions, ideas and contributions from the work of others.

Any ethical clearance for the research presented in this thesis has been approved. Approval has been sought and granted by the Faculty Ethics Committee on 30<sup>th</sup> October 2013.

**I declare that the Word Count of this Thesis is 68, 998 words**

Name: Thomas Edward Cottam

Signature:

Date: 07/02/2016

## **Chapter 1: Introduction**

### **1.1 Background**

Inter-organizational relations and innovation represent key components of contemporary strategy research (Funk, 2014; Operti & Carnabuci, 2014; West, Salter, Vanhaverbeke & Chesbrough, 2014); their impact on performance and competitive advantage has been documented by a wealth of significant studies in the strategic management domain (Dyer & Singh, 1998; Mone et al, 1998; Pittaway et al, 2004; Lavie, 2006). Mone et al (1998) stated that innovative ability is the most important determinant of firm performance, and Pittaway et al (2004) argue that network relationships are one of the most significant factors affecting innovative performance. Given strategy scholar's main focus is the study of superior performance, it should come as no surprise that work on networks and innovation continue to propagate in the field, the wide spread diffusion of the open innovation paradigm is an excellent example of this (Chesbrough, 2003; West, Salter, Vanhaverbeke & Chesbrough, 2014).

### **1.2 Rationale**

The North East has suffered from decades of under-investment, which has led to long term unemployment and low wages (Centre for Local Economic Strategies, 2014). The 2008 global recession and current austerity measures have had a marked impact on unemployment, illustrating the relative weakness of the private sector in the region.

Traditionally a manufacturing community, the North East has been largely disregarded since the rise of service industries within the national economy (Government Office for the

North East, 2011). Small to Medium Sized Enterprises (SMEs) are particularly vulnerable in times of paucity, and these firms constitute the majority of organizations in the north east manufacturing cluster. In these times, the need to innovate is perhaps more crucial than ever, however one could argue that contemporary strategy research does not provide effective guidance for sustainable SME innovation. Scholars continue to condone highly risky, taxing networked innovation strategies to already stretched SMEs. Despite their clear innovative value, collaborative relationships, especially highly embedded ones, often require high investment of scarce resources (Venkataraman et al, 1990), incur significant coordination costs (Grant, 1996) and leave firm's vulnerable to exploitation and opportunism (Lavie, 2006). Furthermore, it is generally not known whether the significant investments will reap dividends, as these alliances are highly likely to fail (Porter, 1987; Park & Ungson, 1997). SMEs in particular are vulnerable to the threats of opportunistic behaviour, and often do not even possess the resources to maintain a network of highly embedded relations (Lee et al, 2010). In fact, Colombo et al (2012) dedicated a literature review to addressing the challenges SMEs face whilst engaging in networked innovation. Despite these issues, a review of government reports and documentation which are informed by this academic research highlights how the government is actively encouraging corporations and SME's to increase their collaborative activity (Innovate UK, 2015; BIS, 2014), without adequate mention of the risks of doing so. This thesis recognizes the value of innovation to firm performance; but argues that insufficient research exists on the different contributions arm's length and embedded relationships make to innovation at an in-depth level. Arm's length relationships (ALRs) benefit from minimum dependence on suppliers (Nohria & Garcia-Pont (1991), lower prices (Uzzi, 1997), low switching barriers (Dyer & Singh, 1998) & increased bargaining power (Bensaou, 1999), which would all alleviate the resource strain on SMEs whilst pursuing innovative strategies, and there are

indications that such relations do provide some degree of value (Uzzi, 1997; Lechner & Dowling, 2003; Rolfo & Calbrese, 2003; Geneste, 2010). This study into more sustainable SME networked innovation strategy could facilitate the continued growth in North East manufacturing in these times of paucity.

For the purposes of this research, an arm's length or non-collaborative relationship will be defined as *a relationship with limited social closeness or familiarity between actors, devoid of commitment and resource investment, with no expectation of future transactions on either side*. This definition is partially derived from Geneste (2010), who provides one of the most detailed reviews of non-collaborative relations. Prior studies simultaneously considering arm's length and collaborative relationships have been conducted (Uzzi, 1997; Lechner & Dowling, 2003), although the literature often conceptualizes the former in the narrow economic, or shallow informational, terms attributed to Williamson (1975). These often fail to take a detailed look at the innovative potential of arm's length relations beyond their ability to serve as conduits for novel information. A simultaneous comparative study will allow the researcher to examine the rich nuances of innovation from each side of the collaborative spectrum. Such a study will help facilitate greater understanding of how the innovation process, including knowledge creation and problem-solving activity and their drivers, manifests in arm's length and collaborative relationships. The resultant knowledge will be exploited to inform a conceptual framework which can be used to inform an SME's strategic orientation, enabling them to efficiently manage their relationship portfolios to enhance their innovative performance. Readers should note this thesis is an exploratory piece of research; therefore the analysis and subsequent findings of this thesis represent interesting and exciting possibilities which require further investigation.

As stated earlier, the majority of studies referencing arm's length relationships view their inherent benefits in short-term economic terms, or dismiss their innovative value to surface level 'opportunities' and novel information identification. Very little research has been conducted looking into the detailed difference in innovative value, these opposing domains deliver. Therefore, this research seeks to discover how the innovation process differs within arm's length and collaborative dyadic SME relationships. The research will enable us to expand the current distinction of collaborative and non-collaborative relations based on their unique roles in the innovation process, rather than the short-term economic (or narrow informational) value of one and the innovative potential of the other. It is also expected that the emergent findings will inform theory which provides a more realistic model of how SMEs can engage in networked innovation in times of paucity.

### **1.3 Research Aim and Objectives**

This research addresses key questions relevant to the discovery, implementation and commercial development of innovation by small to medium sized (SMEs) manufacturing firms. The proposed research program attempts to answer the following research question:

*What is the process by which SMEs innovate in collaborative and arm's length relationships?*

Whilst this research project is a comparative study, innovation in arm's length relationships is the focal point of this thesis because their innovative capacity remains under-explored in the literature. Contrasting innovation in ALRs to embedded ties will facilitate the generation of a more nuanced understanding of the former's role in the SME innovation context. In particular, this study explores how the nature of problem-solving,

knowledge creation, innovation drivers and innovation outcomes differ in arm's length and embedded ties. Therefore, the following complementary objectives are outlined:

1. To explore how the nature of problem-solving differs within arm's length and collaborative relationships.
2. To explore how knowledge is created within arm's length and collaborative relationships.
3. To explore the unique drivers of innovation in arm's length and collaborative relationships, and review their effect on SMEs' innovative outputs and capabilities.

#### **1.4 Thesis Outline**

Chapter 1 provides a brief outline of the research gap, rationale for this study and its importance to both theory and practice. The section concludes with the presentation of the research question and supporting objectives.

Chapter 2 initially outlines the research gap in more detail and establishes the theoretical foundations and context for this study. This includes a discussion of the strategic management field, resource based theory and the SME context. The section proceeds to outline the importance of innovation, inter-firm relationships and their combined importance in contemporary management research. Innovation is subsequently conceptualised as a process broken down into different theoretical concepts, including; drivers, problem-solving, knowledge creation and innovative outputs. Discussion of these concepts draws from prominent management theories such as organizational learning and

isomorphism. The abductive nature of this research leads to the presentation of a set of propositions and conceptual framework in the conclusion.

Chapter 3 begins by outlining the epistemology and research philosophy underpinning this research; social constructionism. The rationale for adopting qualitative research methods and semi-structured interviews is presented, followed by a discussion of the decision to utilize deductive qualitative analysis within this thesis. The abductive nature of this research is then subsequently discussed. The section proceeds to outline how the interview questions were developed, the initial study and how these were refined prior to the main data collection phase. Finally, details regarding the thematic analysis of the data are presented and the quality of emergent data is evaluated using Fossey, Harvey, McDermott & Davidson's (2002) criteria.

Chapter 4 provides a brief overview of the main findings emerging from the interview data with minimal reference to theory, in an attempt to provide a transparent account of participant responses. Collaborative and arm's length relationships are discussed in terms of their utility for sourcing information, perceived effectiveness for supporting innovation, modes of communicating knowledge and challenges. Business process imitation and copying behavior are then discussed in more detail.

Chapter 5 analyses and discusses the findings in light of current academy theory, outlining how apriori propositions regarding innovation drivers, problem-solving and innovative outputs are supported by the data and how these findings relate to prior studies. Furthermore, propositions regarding knowledge creation emerge abductively from the thematic analysis. Finally, the relationships between these themes are discussed, the

framework is revised and the theoretical and practical contributions of the study are outlined.

Finally, Chapter 6 finalizes the thesis by providing an outline of the main conclusions of this study in relation to the initial objectives outlined. Limitations and areas for further work are outlined, concluding with a reflective piece evaluating this project's claims for 'Doctorateness' referencing Trafford & Leshem's (2008) 'Components of Doctorateness' framework.

## **Chapter 2: Literature Review**

### **2.1 Introduction**

The introduction chapter highlighted that the aim of this thesis is to explore the process by which SMEs innovate in collaborative and arm's length relationships. Furthermore, the prior section outlined three objectives designed to facilitate the fulfilment of this aim.

These are:

1. To explore how the nature of problem-solving differs within arm's length and collaborative relationships.
2. To explore how knowledge is created within arm's length and collaborative relationships.
3. To explore the unique drivers of innovation in arm's length and collaborative relationships, and review their effect on SMEs' innovative outputs and capabilities.

The following literature review chapter is structured in a manner which attempts to facilitate clear discussion of the historic and contemporary research pertaining to each of these objectives.

There is a large body of literature concerning the management of knowledge and commercial development of innovations by business organisations (Van Wijk, Jansen & Lyles, 2008, Dahlander & Gann, 2010; West, Salter, Vanhaverbeke & Chesbrough, 2014; Andries & Czarnitzki, 2014). However, there are gaps within the research. The majority of

established and contemporary studies pertaining to knowledge and innovation management focus on collaborative relationships (Schilling & Phelps, 2007; Patel, Fernhaber, McDougall-Covin & van der Have, 2014; Gupta & Polonsky, 2014; McAdam, McAdam, Dunn & McCall, 2015). The role of embedded (also referred to as collaborative relationships throughout this thesis) or arm's length relationships on the innovation process have been significantly under searched, partially due to the arguments of some seminal papers (Uzzi, 1997; Dyer & Singh, 1998). However, limited empirical comparative studies comparing innovation between such ties exists to back up such a strong focus on collaboration (see Partanen, Chetty & Rajala (2011) for an exemption). Despite this, recent government reports and documentation shows that this unbalanced academic research is directly informing government policy (Innovate UK, 2015; BIS, 2011; 2014; 2015), encouraging businesses to collaborate with one another to aid innovative activity. Collaboration, however, can be a very costly endeavour and the resources required to pursue such strategies are frequently underestimated (Birkinshaw, Bouquet & Barsoux, 2011). This can be particularly challenging for small to medium-sized enterprises that tend to lack resources, and sheds some light on why relationships fail so often (Colombo et al, 2012). In light of the current state of research, it appears prudent to evaluate collaboration in relation to alternative approaches which could potentially be more effective, but first scholars need to understand the differences between innovating in relationships featuring different levels of social closeness and trust. Consequently, the primary aim of this research is to analyse the process by which SMEs innovate in collaborative and arm's length relationships.

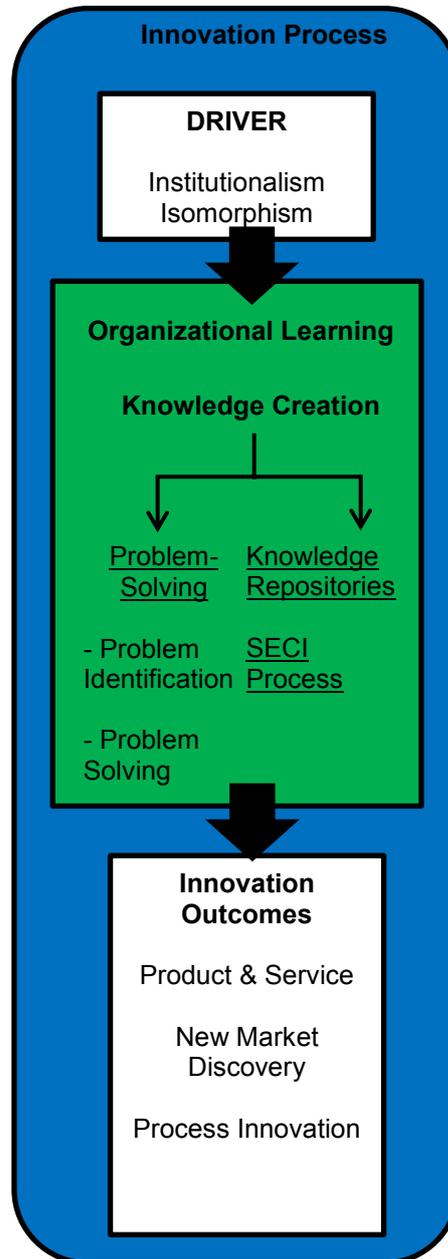
In addition to pursuing the main comparative study, this exploratory research project takes the opportunity to explore several additional questions related to networks & innovation.

The first of these objectives is to contribute towards our understanding of how problem-solving differs within SME relationships, whilst the second attempts to explore how and what type of knowledge is created in such ties. Finally, this thesis explores the impact isomorphic and organizational learning-induced innovation has on SMEs' innovative outputs and capabilities. These objectives will serve to integrate some of the prominent concepts that constitute innovation in contemporary strategy research. Partanen, Chetty & Rajala's (2011) comparative study of strong and weak ties and the types of innovation they espouse in SMEs is the most similar to this thesis in nature than any other article reviewed. However, the authors focused primarily on commercialized product innovation in 4 SMEs operating in an open economy, whilst this thesis explores innovation from a more holistic perspective, reviewing how arm's length and embedded ties generate product, service and process innovations, and highlights the subtle differences in how such innovations are diffused in such relationships.

This literature review first outlines the theoretical underpinning of this thesis, continues to introduce the relevance and nature of the SME context before introducing the broad domain of strategic management in which this study is embedded. The inter-firm relationships literature is then presented, outlining the importance and distinctions between embedded and arm's length relationships. Moving on, the innovation literature is introduced and institutionalism theory is then discussed, highlighting isomorphism as a driver in the innovation process. From here the literature review progresses linearly through the innovation process as conceptualized in this thesis, outlined in Figure 1. Organizational learning is introduced, before focusing in on its sub-component, knowledge creation. At which point problem-solving, knowledge repositories and the knowledge

creation process (SECI) are outlined. Finally, innovation outcomes are introduced, focusing on; product & service, new market identification and process innovation.

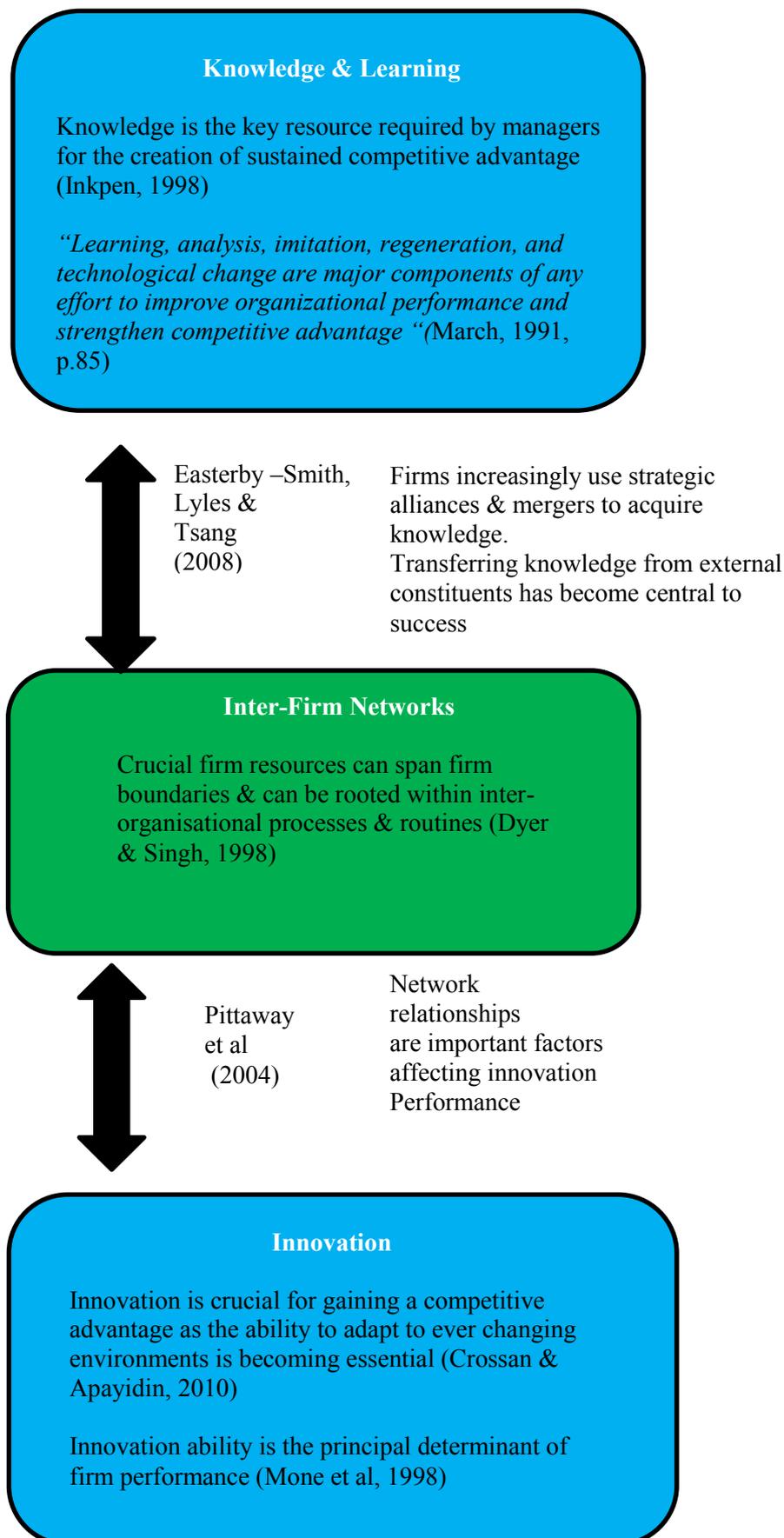
**Figure 1. Literature Review ‘Innovation Process’ Structure**



This literature review considers work on organizational learning, networks and innovation, all of which emphasise the respective importance of these concepts to firm performance.

Figure 2 outlines the core logic of these literature streams and how they intertwine to facilitate superior firm performance.

**Figure 2. Literature Streams**



## **2.1 Theory**

The proposed study is underpinned by the concept of the resource-based view (RBV) of the firm (Penrose, 1959; Wernerfelt, 1984; Barney, 1991) and by extension, the knowledge-based view (KBV) of the firm (Grant, 1996). RBV purports that firms can gain economic rents and a competitive advantage if they obtain resources which are valuable, rare, unsubstitutable and imperfectly mobile. RBV also asserts vertical integration and diversification can be the source of Ricardian rents, i.e. profits derived from possessing scarce resources (Teece, Pisano & Shuen, 1997; Peteraf, 1993). KBV is an extension of RBV, and purports that knowledge is the key resource required by managers for the creation of sustained competitive advantage (Inkpen, 1998), and its transfer is of vital importance for the survival of any small or medium-sized enterprise (Albino, Garavelli & Schiuma, 1999). Lavie (2006) offers a further extension of RBV which takes into account how inter-firm relationships can help firms gain a competitive advantage by acquiring new resources and integrating them into their existing base to add further value to their bundle of assets. The research questions and arguments this thesis proposes are primarily underpinned by these perspectives.

## **2.2 The SME Context**

This thesis will analyse networked innovation from an SME perspective. SMEs are defined here as firms with between 10 and 250 employees (Lindic, Bavdaz & Kovacic, 2012; Ruzzier & Ruzzier, 2015). In their introduction to a special issue on networked innovation in SMEs, Colombo et al (2012) highlighted that scholars cannot simply extent research on the network patterns of larger firms to smaller, entrepreneurial ones. Highlighting distinct differences in their behaviour, Colombo et al (2012) argue how SMEs are less inclined to in-source knowledge and possess limited network resources for the development and

exploitation of ties. For example, smaller firms are said to rely heavily on local and regional partners due to their small size, the customized nature of their innovations and smaller scale of markets (Arndt and Sternberg, 2000; Kaufmann and Todtling, 2000). Intriguing to this study are Lowik et al's (2012) and Gronum, Verreyne and Kastle's (2012) complementary findings that stress the importance of leveraging the 'strength' of strong ties to overcome such resource limitations. Whilst the R&D activity of SME's are often cited as being more productive than those of larger firms (Lee et al, 2010), studies indicate that due to liabilities of smallness, smaller firms often cannot innovate alone, and tend to become increasingly dependent on external knowledge and capabilities (Van de Vrande et al, 2009; Colombo, Piva & Rossi-Lamastra, 2014). In fact, the SME innovation process is often characterized by opening up during the commercialization phase (Christensen et al, 2005), since they often possess limited manufacturing capabilities and lack marketing channels. Although, Alvarez & Barney (2001) highlight that small to medium-sized enterprises need to develop strategies to prevent exploitation by larger firms whilst collaborating. On review, it appears that relying on external knowledge and capabilities is often the default approach to innovation in SMEs, rather than an attractive option. Furthermore, recent research highlights that SMEs may be ideally positioned to fully exploit collaboration (Colombo, Piva, Rentochini & Rossi-Lamastra, 2014), and flexible enough to amend their mode of coordination in respect of an innovation venture's lifecycle (Gardet & Fraiha, 2012). Consequently, inter-firm innovation is perhaps more important to the survival of SMEs than to larger firms, despite being under-represented within the literature (Colombo et al, 2012; Love & Roper, 2015), which is intriguing given the UK economy largely consists of SMEs.

### **2.3 Small Manufacturing Firms**

Laforet & Tann (2006) argue that the innovation characteristics of manufacturing SMEs, or SMMEs, are similar to those of other small to medium sized enterprises. For example, SMMEs benefit from being closer to customers and have greater flexibility. However, manufacturing SMEs are identified as being more focused on process innovation and incremental product innovation (Laforet & Tann, 2006); furthermore, British manufacturers in particular are noted as being very secular and autonomous (Scott et al, 1996). Intriguing for this study is that Scott et al (1996) and Laforet & Tann (2006) both assert SMMEs struggle in the arenas of networking and knowledge. With regard to the north east manufacturing SME context, a number recent studies have focused on the cluster, including Sainidis, Robson & Heron's (2013) study of post 2008 recession manufacturing strategy, Alshamaila, Papagiannidis & Li's (2013) investigation into cloud computing adoption and Goddard, Robertson & Vallance's (2012) piece on Universities, Technology and Innovation Centres and regional development. Readers should note this doctorate study is interested in multiple forms of innovation, including product innovation, which is the primary reason the project investigates manufacturing SMEs. Therefore, whilst it is outside of the scope of this thesis to discuss the literature on manufacturing firms in great detail; these characteristics are highlighted to shed light on the nature of organizations used in the sample and elucidate the limitations of this study.

### **2.4 Strategic Management**

This study into inter-firm innovation adopts a strategic management lens, as the author is primarily concerned with how such networked innovation can ultimately help SMEs attain a sustained competitive advantage, as opposed to primarily studying the nature of the relationships themselves, like network theorists (Borgatti, Brass & Halgin, 2014). The field

of strategy was originally established to help managers navigate an increasingly complex, uncertain and fast-paced business environment. It was borne out of entrepreneurs & CEO's disillusionment with economics for failing to provide practical solutions to their everyday problems (Faulkner & Campbell, 2006), and at its heart, aims to explore how firms can achieve sustained competitive advantage (Teece, Pisano & Shuen, 1997). A firm is considered to have a competitive advantage when *"it is implementing a value creating strategy not simultaneously being implemented by any current or potential competitors"* (Barney, 1991, p.102). Initially, industrial economic and later industrial organisation perspectives dominated the field of strategy (Porter, 1981). However, these views have since been superseded by capabilities or resource-based perspectives (Penrose, 1958). Barney's (1991) criticism of the structure-conduct- performance approach advocated by industrial organisation economics echoes that of Ansoff's (1969) critique of the value of micro-economics as a basis for strategy. By using the 'representative firm' as the primary unit of analysis (i.e. a model not necessarily reflective of all), industrial organisation economic models of competition cannot adequately explain intra-industry firm performance differentiation. This is the primary argument used by advocates of the resource-based view to rationalize their focus on the internal characteristics of the firm.

The resource-based view (RBV) of the firm is currently the most dominant perspective in strategy (Eisenmann, Parker & Alstyne, 2011; Lonial & Carter, 2015; Sodhi, 2015), its central tenet is that firms need to possess valuable resources which are rare, un-substitutable and imperfectly imitable (Barney, 1991). Inkpen (1998) purports that knowledge is the key resource firms can utilize to attain a sustained competitive advantage; indeed the emergence of RBV has arguably prompted a surge of interest into knowledge as a valuable strategic asset. However, Grant (2006) concedes the works of Hayek (1947),

Polanyi (1962), Arrow (1962), and March and Simon (1958) all identify the strategic importance of knowledge several decades before the RBV rose to prominence. As knowledge has been recognised as key to achieving sustainable competitive advantage (Tsai, 2001; Zahra & George, 2002), the importance of obtaining new knowledge and transferring existing repositories has been seen as increasingly important (Kogut & Zander, 1992; Grant, 1996; McAdam et al, 2014). The recognition that crucial firm resources can span firm boundaries & may find root within inter-organisational processes & routines has reiterated the importance of networks within strategy (Dyer & Singh, 1998). Van Wijk, Jansen & Lyles (2008) confirm this point, stating that organisations increasingly engage in strategic alliances, mergers & acquisitions to acquire knowledge.

As evidenced above, currently the most dominant explanation for differential firm performance is the degree to which firms possess bundles of resources that fit Barney's (1991) VRIN model. The most strategically important of these is arguably knowledge (Grant, 1996), yet the specific knowledge required by an organization may exist outside the boundaries of the firm. Thence, acquiring and creating new knowledge, perhaps via an inter-firm relationship, is essential for the survival of a firm and for gaining a competitive advantage over its rivals, particularly SMEs (Van de Vrande et al, 2009; McAdam et al, 2014). Understanding these theories of strategy and superior performance are crucial, as they lead us directly to the contemporary state of strategic management and provide a rationale for the current focus on knowledge transfer in inter-organizational relationships. A focus which this thesis purports leans heavily towards the more collaborative forms of knowledge sharing (e.g. strategic alliances, joint-ventures, long-term supply chain relationships).

## **2.5 Adopting a strategic theoretical underpinning**

Lavie's (2006) networked based view of interconnected resources has been adopted as the primary lens via which this thesis seeks to understand and explore the previously defined research question. Embedded in resource-based theory (Penrose, 1959; Peteraf, 1993; Barney, 1991) this perspective asserts that heterogeneous firm performance within industries is explained via the internal and network resources firms can access which fit the VRIN model. A dynamic capabilities perspective (Teece, Pisano & Shuen, 1997) was considered during the initial writing of this thesis, as the path dependent effects of exploiting an opportunity discovered via an arm's length relationship, and the capability to effectively manage a portfolio of arm's length and embedded relationships ties, lend itself rather neatly to this approach. However, the aim of this thesis is to compare the respective innovative potential of arm's length and embedded relationships, providing a detailed account of how these disparate forms of relationships can provide access to external knowledge and resources, which when combined with internal resources facilitate innovation. This, as previously identified, is a key means of gaining a competitive advantage and driving superior performance (Mone et al, 1998).

Transaction cost economics (Williamson, 1975) represents an alternative perspective via which to understand and explore the research question, and some academics would consider such a theory more appropriate. However, at its core, this study is more aligned to resource-based theory's primary theoretical question, why firms differ (Madhok, 2002), and aims to explain how firms can gain a competitive advantage via the effective management of internal and networked resources, whilst transaction economics, due to its origins in theory of the firm literature, attempts to explain why firms exist (Madhok, 2002). The focus of this study are not the transactional attributes, i.e. (Transaction) costs, that TCE perspectives attribute to arm's length ties, rather, this study asserts that the overuse of

short-term economic lenses to study the benefits of arm's length relations is *the cause* of the current gulf in arm's length induced innovation.

## **2.6 Inter-firm Relationships**

### **2.6.1 Introduction**

The aim of this study is compare the innovation activities that occur within collaborative and non-collaborative (arm's length) relationships. In order to do so we must understand what constitutes an inter-organizational relationship, appreciate why they are formed in the first place, recognise different forms (and antecedents) of relationship and then present the types of knowledge shared between each one. Finally, we must differentiate between collaborative and non-collaborative forms of relationships and their respective uses.

### **2.6.2 Background of the field**

Encapsulating the essence of research on networks, Brass et al. (2004, p.795) provide the following explanation of the field;

*“Network research embraces a distinctive perspective that focuses on relations among actors, whether they are individuals, work units, or organizations. According to the network perspective, actors are embedded within networks of interconnected relationships that provide opportunities for and constraints on behaviour. “*

It is reasonable to assume that inter-firm relationships have existed for as long as there have been organizations to form them (Huxham, Cropper, Ebers, Huxham & Ring, 2008). In their review of the field, Huxham , Cropper, Ebers, Huxham & Ring (2008) traced back initial work in the area as far back as the 1920s (Marshall, 1923), yet, although some

authors continued to touch upon the topic since then (Weber, 1947; Selznick, 1949), some contend that it was not until the publication of Evan's (1965) pivotal research, drawing attention to the problems associated with, and the lack of research into inter-organizational relationships (IORs), that sparked an influx of interest in the field.

The field of IORs finds its origins in a number of different subjects, including; economics, politics, psychology and law. Such disjointed beginnings were still reflected in research decades later, which despite a proliferation of interest, research and reviews, remained fragmented (Brass et al., 2004). A review of the surrounding literature identifies numerous different attempts at categorizing the various perspectives, and subsequent motivations for establishing relations with other firms. Grandori & Soda (1995) sort the field into economic, organizational, sociological, social psychological, strategic, and managerial and population ecology approaches. Conversely, Brass et al. (2004) break down the field by levels of analysis, rather than a specific school of reasoning, considering; interpersonal (people), inter-unit networks (groups) & inter-organizational as actors, respectively. In another review of inter-organizational relationships research, Oliver (1990) adopts an antecedents perspective, summarising the cumulate body of work in the area to arrive at 6 distinct, but not mutually exclusive, rationales for forming relationships. These are; necessity, asymmetry, reciprocity, efficiency, stability and legitimacy.

Akin to knowledge management literature, research on strategic alliance formation is similarly embedded within resource perspectives of the firm (Gulati, 1999; Rothaermel, 2001). Despite an early technology focus, Grant & Badenfuller (2004) highlight a transition whereby alliance research increasingly emphasised knowledge transfer as a key objective of engaging in alliances (Albino, Garavelli & Schiuma, 1998; Inkpen, 1998;

Inkpen, 2008). This development is actually linked to a larger trend, namely, the absorption of the technology management literature into the knowledge management domain (Grant & Badenfuller, 2004). Powell et al (1996) highlight how firms in high-tech industries are reliant on their external partners for maintaining their innovative capabilities, shortening product lifecycles and increasingly complex technologies make it difficult for such firms to solely rely on internal innovation (Chesbrough, 2003). Networks remains crucially important in the innovation field (Pittaway et al, 2004; Funk, 2014; Operti & Carnabuci, 2014), and specific focus on addressing the challenges associated with collaboration and more collaborative business models appears to present the next hurdle in IORs research (Colombo et al, 2012; West, Salter, Vanhaverbeke & Chesbrough, 2014).

Past research on idea sharing in the innovation process refers to collaborative and non-collaborative approaches of knowledge transfer (Uzzi, 1997; Dyer & Singh, 1998), but the lines between the two are often blurred indicating the presence of a collaboration continuum rather than two distinct categories. Collaborative relationships, often taking the form of strategic alliances, networks and joint ventures, frequently involve close inter-organisational involvement in development, marketing initiatives and other key processes. Chandler (1962) cites one of the key benefits of this being that organisations engaging in these relationships can often gain from more effective information transfer. Uzzi (1997) also regards joint problem-solving and ‘favours’, e.g. placing an order early to help a manufacturer through a slow period, as advantages of such relationships. By contrast, arm’s length relationships are more impersonal by nature and tend to be short-term, with organisations constantly shifting exchange ties in order to take advantage of lower prices or superior conditions offered by another organisation (Larson, 1992; Uzzi, 1997; Bensaou,

1999). These two domains of relationship will be compared within this study to identify their respective roles in the innovation process.

For the sake of this thesis it is critical to decide what constitutes an inter-organizational relationship and what does not. Unsurprisingly, the increasing IOR literature has not arrived at a consensus definition of the phenomena. The table 1 below consolidates the definitions presented by some of the most prevalent literature reviews in the field.

**Table 1. Literature Definitions of Firm Relationships**

<b>Author</b>	<b>Term</b>	<b>Definition</b>
Levine & White (1961)	Organizational exchange	“Organizational exchange is any voluntary activity between two organizations which has consequences actual or anticipated, for the realization of their respective goals or objectives” (Levine & White, 1961, p.588)
Schermerhorn (1975)	Inter-organizational cooperation	“Inter-organizational cooperation may be defined as the presence of deliberate relations between otherwise autonomous organizations for the joint accomplishment of individual operating goals” Schermerhorn (1975, p.847)
Van De Ven (1976)	Inter-organizational relationship(s)	“Relationships among two or more organizations linked together as an action system to solve complex problems or attain joint goals” (Van De Ven, 1976, p.24)  <i>“An IR can be temporary or long-lasting”</i>
Oliver (1990)	Inter-organizational relationship	“Relatively enduring transactions, flows, and linkages that occur among or between an organization and

		one or more organizations in its environment.” Oliver (1990, p.241)
Grandori & Soda (1995)	Inter-firm network	“A mode of regulating interdependence between firms which is different from the aggregation of these units within a single firm and from coordination through market signals (prices, strategic moves, tacit collusion, etc.) and which is based on a cooperative game with partner-specific communication. “ (p184-185)
Brass et al. (2004)	Network	“A set of nodes and the set of ties representing some relationship, or lack of relationship, between the nodes.” (p.759)

**Table 1. (Continued)**

Although diverse, a quick review of these definitions reveals some telling similarities. The fulfilment of goals lies at the heart of many of these descriptions, whether this is for improved efficiency, stability, out of necessity etc. (Oliver, 1990). Yet these goals might not be mutual, as Fitch & Oppenheimer (1970) point out when documenting the tendency of some banks to establish relations with firms to gain power over them, leveraging the latter’s dependence on the bank’s capital in order to gain control over their resources.

Closer analysis of these definitions reveals, as one might expect, a degree of divergence of opinion between authors. As noted above, Brass et al. (2004) present a very liberal definition of networks, as any tie between nodes, disregarding any restrictive criterion (e.g. strength or duration). This is as opposed to the likes of Schermerhorn (1975) and Levine & White (1961) who limit the classification of IOR to behaviours which are goal-seeking and voluntary, respectively. This author certainly has reservations about assuming that a

relationship is voluntary by default, especially given Whetten's (1981) perspective that the formation of IORs can be mandated by a higher authority. Perhaps more relevant to the context of this thesis, is Oliver's (1990) assertion that IORs need to be *relatively* enduring. Yet the set of measures used to establish whether a relationship is 'relatively enduring', are not absolute. It should be noted that arm's length ties as proposed by Uzzi (1997) and Cooper & Gardner (1993) can by their very nature be un-enduring, "on off" transactions with no expectation of further dealings. Whether ALRs could be deemed as enduring within the context of their lifespan is open to debate, but there is a danger that Oliver's (1990) definition of IORs is not robust enough to benefit our context.

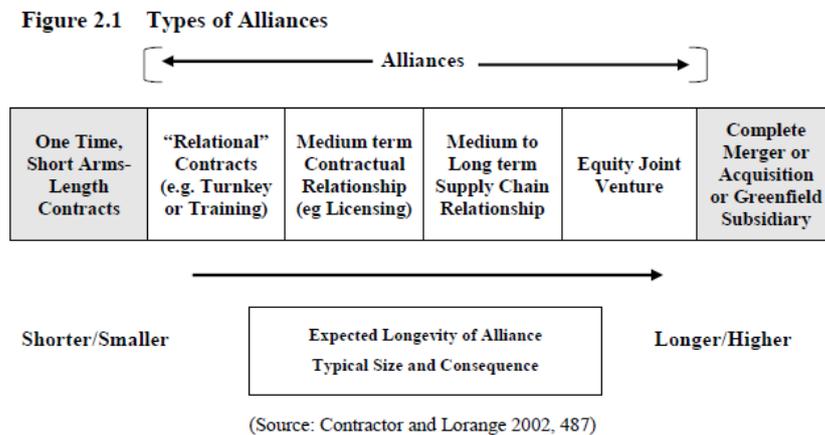
In order to keep the initial discussion regarding inter-firm relations and networks as open as possible, this thesis will adopt Brass et al's (2004) definition. It can be applied at the individual, work unit or organizational level, although our focus will be strictly on inter-organizational ties. This definition offers sufficient scope to consider relationships where collaboration is limited or short-lived, thus offering a superior alternative to those offered by Oliver (1990) in this context. In the next section the characteristics impacting upon the degree of collaboration within a relationship are researched and defined to narrow our focus.

### **2.6.3 Degrees of collaboration**

It's important to note that, despite the phrasing of the research aim, collaboration is considered as a continuum within this thesis. Arm's-length and more collaborative relationships (e.g. strategic alliances) are not regarded as dichotomous entities; they are merely different sides of the same spectrum. This view is purported by various researchers (Dyer & Singh, 1998; Hausman, 2001). Contractor & Lorange (2002) present a diagram, shown below, which sorts various forms of inter-organizational relations by degree of

collaboration. However, in their conceptualization Contractor & Lorange (2002), like many scholars (Uzzi, 1997; Dyer & Singh, 1998), still draw a distinction between arm's length ties and even short-term collaborative engagements. In their study the example of training arrangements is provided. Thus, whilst this thesis appreciates these shades of grey will always occur, and respects that arm's length and collaborative relations exist on a scale, there is sufficient conceptual distinction between the two notions to facilitate a comparative study.

**Figure 3. Collaboration Continuum**



On review of Contractor and Lorange's (2002) framework (Figure 3), the inclusion of mergers and acquisitions within the diagram is perhaps a little controversial, as some researchers would contest that these agreements do not constitute a relationship at all. This reasoning is valid, as both a merger and acquisition consolidates two firms into one (Huxham, Cropper, Ebers, Huxham & Ring, 2008). Of course, Contractor & Lorange (2002) do not posit such that such activities constitute 'alliances', but this thesis would argue arm's length relationships still represent a form of dyadic relationship, whilst mergers and acquisitions do not.

A review of the network literature reveals several common factors which are indicative of the degree of collaboration within a relationship. At this point it should be noted that the presence of trust is a significant concept differentiating collaborative from arm's length relationships within the literature (Uzzi, 1997; Bstieler, Hemmert, Barczak, 2015). A review of the prior studies discussed below validates this point. However, Geneste & Galvin (2013) provide an extensive study of trust in the context of arm's length SME relationships; therefore, due to scope limitations this study will not dedicate significant time to discussing the concept.

#### **2.6.4 Embedded relationships**

Embedded, or collaborative relationships, are "*characterised by trust and personal ties, rather than explicit contracts*" (Uzzi, 1997, p. 37) and are perhaps best encapsulated by Oliver's (1990, p.241) definition of an inter-organizational relationship as "*relatively enduring transactions, flows, and linkages that occur among or between an organization and one or more organizations in its environment*". Embedded relationships are commonly regarded as lasting a significant period of time, with substantial commitment (both resource and emotional) from both parties.

Granovetter (1985) asserted that almost all economic activity was embedded, and thus influenced, by an immediate social context, and attempted to join economic and sociological perspectives of organizational theory by reconciling the alleged shortcomings and atomization of each approach. In tandem with this, strategic management gradually shifted to an internal focus, attributed to the successful diffusion of the core capabilities (Hamel & Prahalad, 1990; Leonard-Barton, 1992) and resource-based perspectives (Wernerfelt, 1984; Barney, 1991). Thus, the internal-perspective rose to prominence and slowly evolved to account for the immense value organizational knowledge presented as a crucial firm resource (Grant, 1996), and described how it's successful transfer between

organizations could fuel innovation, and help generate quasi and Ricardian rents (Dyer & Singh, 1998; Pittaway et al, 2004 Lavie, 2006; Easterby –Smith, Lyles & Tsang, 2008). Consequently, an influx of research documenting the performance and innovative value of collaboration was published and recognised by scholars (Uzzi, 1997; Dyer & Singh, 1998; Pittaway et al, 2004). It is on this premise, that contemporary scholar’s unbalanced and limited understanding of the innovative value of arm’s length relations was cemented. Dyer & Singh’s (1998) assertion epitomized this line of thought, arguing that arm’s length relationships (ALRs) are of limited strategic importance, as there is nothing unique therein. This perspective has since influenced subsequent works (Bensaou, 1999; Uzzi & Lancaster, 2003; Lavie, 2006).

Some researchers argue that partners within highly collaborative relationships are likely to display a larger amount of commitment to those ties (Nohria & Garcia-Pont, 1991; Hausman, 2001; Contractor & Lorange, 2002), the relationships themselves tend to span larger periods of time & the consequences of the performance of those relationships are often greater for all parties involved. This research is consistent with Uzzi (1997), Cooper & Gardner (1993) & Dyer & Singh’s (1998) accounts of arm’s length ties, which are often described as ‘one shot deals’, with minimal asset investment, in which costs are the bottom line. Such costs may be important in the short-term, but arguably, the performance consequences of achieving a less than favourable outcome are less severe, especially in the long-term, than the permanent breakdown of a strategic alliance (i.e. a highly collaborative relationship). A breakdown of the dimensions along which the literature has conceptualised levels of collaboration can be seen in table 2.

**Table 2: Factors affecting perceived levels of collaboration**

<b>Factors</b>	<b>Firm Interdependence</b>	<b>Relationship longevity</b>	<b>Relationship intensity</b>	<b>Commitment</b>
<b>Authors</b>	Nohria & Garcia-Pont (1991)	Nohria & Garcia-Pont (1991)  Contractor & Lorange (2002)	(Nohria & Garcia-Pont (1991))	(Nohria & Garcia-Pont (1991))  Contractor & Lorange (2002)  Hausman (2001)
<b>Factors</b>	<b>Governance Structure</b>	<b>Social Closeness</b>	<b>Size</b>	<b>Consequence</b>
<b>Authors</b>	(Larson, 1992)	(Nohria & Garcia-Pont (1991))	(Nohria & Garcia-Pont (1991))  Contractor & Lorange (2002)	Nohria & Garcia-Pont (1991)  Contractor & Lorange (2002)

A key assumption underpinning this thesis is that there may be situations in which knowledge emerging from arm’s length relationships take precedence over knowledge originating from more collaborative ties. Recall, that we are studying the effectiveness of such knowledge by the emergent innovative outcomes they facilitate, and innovation has been previously identified within this literature review, as a key determinant of firm performance (Mone et al, 1998). In light of this assumption, it is important to assess the limitations of intense collaborative relationships.

### **2.6.5 Limitations of Embedded Relationships**

Venkataraman et al (1990) assert that highly collaborative relationships can require huge investments of often scarce resources. Within the open innovation literature, SMEs are often cited as pouring hugely rare and valuable knowledge resources into such relationships (Lee et al, 2010), whilst larger firms often commit R&D facilities

(Christensen et al, 2005). This ties into Grant's (1996) arguments regarding exploitation and opportunism, ties between smaller entrepreneurial firms and large corporations can result in the abuse of the former as they are coerced into revealing their knowledge resources, which are subsequently absorbed by the larger firm, eroding the former's competitive advantage. It is not uncommon for the latter to go onto commercialize the SME's knowledge alone, without the entrepreneurial firm's involvement. Grant (1996) goes onto warn against the high coordination costs involved in collaborative behaviour, which are laid out very clearly by Oliver (1990), who provides a thorough account of the resources required to set up the various mechanisms that facilitate inter-firm networks. The establishment of information systems, planning control systems, hierarchical & authority relations and the employment of common staff dedicated to a specific relationship are merely a handful of mechanisms that often become essential in coordinating highly collaborative ventures. These costs and threats become increasingly concerning when you consider that strategic alliances and other collaborative relationships are not always profitable (Van de Ven & Walker, 1984), and suffer from high failure rates (Porter, 1987; Park & Ungson, 1997). On reviewing the arguments above, the assertion that inter-firm knowledge transfer research focuses too greatly on more collaborative arrangements (e.g. strategic alliance, joint ventures, long-term supply chain relationships) and could benefit from reviewing the effectiveness of more arm's length approaches appears to have some basis in prior research.

To review, the main drawbacks of highly collaborative relationships include; the high investment of scarce resources (Venkataraman et al, 1990), high costs of coordination (Grant, 1996), unknown pay-off (Van de Ven & Walker, 1984), high threat of relationship failure (Porter, 1987; Park & Ungson, 1997), the threat of exploitation/Opportunism

(Grant, 1996), high switching costs and organizational dependence on a third party. So far, we have identified that inter-firm relationships have received widespread attention within the strategy literature. Taking a knowledge-based perspective, the logic behind collaboration appears sound, organizations, especially SMEs (Albino, Garavelli & Schiuma, 1999), establish partnerships with other firms to gain access to knowledge, a vital resource required to obtain a competitive advantage. Such knowledge is vital for innovation, which again can be hugely important in helping a firm achieve superior performance (Mone et al, 1998). But, a review of highly collaborative endeavours highlights that the vehicles used to gain access to this knowledge are often expensive, unreliable, prone to failure, and the consequences of such failures, especially in the case of SMEs, can be devastating (Lee et al, 2010). Let us now turn to an arguably overlooked area of the collaborative spectrum, that of the arm's length relationship. There is some research (Salter & Gann, 2003; Partanen, Chetty & Rajala, 2011) which alludes to the value of knowledge derived from less collaborative forms of idea sharing in the innovation context. Furthermore, these relationships are not bound by the same limitations as their more collaborative counterparts. But first, the concept of a non-collaborative (or arm's length) relationship needs to be defined.

#### **2.6.6 Arm's length relationships**

Commonly cited characteristics of arm's length relationships delineating them from embedded ties include; a lack of trust and social closeness and their adversarial and 'one off nature' (Larson, 1992; Uzzi, 1997, Bensaou, 1999). Furthermore, a review of the literature reveals that arm's length relationships tend to be characterised as price data driven, generally motivated by profit and self-interest (Larson, 1992; Gardner & Cooper, 1993; Dyer & Singh, 1998; Uzzi, 1997). Generally, no further dealings are expected by

either partner (Uzzi, 1997; Gardner & Cooper, 1993), and investments in integration, commitment, emotion and governance mechanisms are extremely limited.

Many prior studies of arm's length relationships tend to try and push dominant transaction cost perspectives of make/buy decisions into the social sphere. Work by Larson (1992), Uzzi (1997), Dyer & Sign (1998) and Gulati (1995), all influenced by Granovetter (1985) seems to epitomize this. Such framing is a throwback to the traditional under-socialised perspective of economic action adopted by both classical and neo-classical economists, who consider social relations as impediments to competitive markets, exemplified in Smith's (1776; 1979 p. 232-233 in Granovetter (1985) assertion that "social atomization is prerequisite to perfect competition". Adam Smith claimed that such relations would only result in market failure, primarily due to conspiracy or contriving to raise prices. Thus, earlier economics literature stressed the strategic value of arm's length transactions from a short-term cost perspective, purporting that such arrangements result in the efficient allocation of resources, as firms retain high levels of bargaining power.

Following on from this, the majority of seminal work reviewed (Larson, 1991; Uzzi, 1997; Dyer & Singh, 1998) tends to view arm's length relations in the narrow economic terms attributed to Williamson (1975), rather than attempt to fully embed them into a multi-level relational perspective. Many authors do, in passing, mention the benefits of maintain arm's length ties (Larson, 1992; Uzzi, 1997), but thus far a more integrated strategic perspective of how embedded and arm's length ties can be combined to generate above average rents seems to have been neglected. This is probably due to the fact that most studies of arm's length relationships limit their contribution to transferring price-based data, and fail to review their innovative potential in adequate detail.

Two of the primary reasons the innovative value of arm's length relations has been regarded as minimal, is there inability to transfer tacit knowledge as effectively as

embedded relationships (Uzzi, 1997), and the reality that it is hard to contract for radical or technical innovation (Bensaou, 1999), as their outputs can be ambiguous a priori .

Despite receiving relatively little attention within the studies pertaining to inter-firm innovation, there are a respectable number of academics who have referenced arm’s length relationships. Below, table 3 provides a summary of the most prominently used definitions within the literature. Unfortunately, a review of the literature highlights that academics have adopted numerous different names to refer to the same phenomena, which undermines theoretical development. Whilst arm’s length relationships (Uzzi, 1997), informal ties and weak ties (Granovetter, 1975; Lechner & Dowling, 2003) all represent and relate to slightly different dimensions of inter-firm relationships, academics are prone to using the terms inter-changeably, or adopting completely unsuitable terminology. Such practice does not just undermine the robustness of inter-firm relations research; it also makes reviewing and distinguishing between strands of literature more difficult.

**Table 3. Literature definitions of non-collaborative relationships**

<b>Author</b>	<b>Relationship Term</b>	<b>Relational Characteristics</b>
Uzzi (1997)	Arm’s-length tie	Cool, impersonal and motivated by profit and self-interest, where actors would regularly switch to new buyers and sellers. Lacking reciprocity and social content. Referred to as “one shot deals” and a deal where “costs are everything”.
Uzzi & Lancaster (2003)	Arm’s-length tie (used interchangeably with market tie)	A relationship lacking social closeness to and familiarity with the client
Cooper & Gardner (1993)	Arm’s-length relationship	Neither party in the relationship expects further transactions. Driven by price-related

		data
Gopalakrishna Pillai & Sharma (2003)	Arm's-length exchanges (used interchangeably with transactional exchange relationships)	A relationship lacking trust, flexibility and solidarity. Lacking relational norms and behaviour. Regarded as adversarial.
Dyer & Singh (1998)	Arm's-length relationships	Minimal information exchange, lacking asset investments by parties in such relationships. Prices form primary source of information. Low levels of interdependence and low transaction costs with minimal governance mechanisms.
Beckman, Haunschild & Phillips (2004), Hansen (1999)	Weak tie	Less intimate, less emotional intensity and have less reciprocity than stronger ties. Lacking in relational intensity.
Bensaou (1999)	Market exchange relationship	Relationships involving firms that shift to other business partners at low cost and minimal damage
Larson (1992)	Arm's length market exchange	Price-based adversarial linkages featuring low levels of cooperation, integration and trust.

**Table 3 (Continued)** *Source: Geneste (2010)*

A review of the literature reveals that arm's length relationships tend to be characterised as price data driven, generally motivated by profit and self-interest (Larson, 1992; Gardner & Cooper, 1993; Dyer & Singh, 1998; Uzzi, 1997). Generally, no further dealings are expected by either partner (Uzzi, 1997; Gardner & Cooper, 1993), and investments in trust, integration, commitment, emotion and governance mechanisms are extremely limited. In essence, they can be described as a short-term relationship motivated by self-interest whereby a get-in get-out mentality is not necessarily expected, but neither party holds on the belief that there will future dealings with one another. Social network perspectives

generally consider arm's-length market ties as relatively unstable and short-lived (Huxham, Cropper, Ebers, Huxham & Ring, 2008). It should be noted that the literature indicates that the majority of an SME's ties are customer relationships (Reuber & Fisher, 2005). This thesis draws upon the work of Geneste (2010), defining an arm's length or non-collaborative relationship as *a relationship with limited social closeness or familiarity between actors, devoid of commitment and resource investment, with no expectation of future transactions on either side.*

Arm's length knowledge sharing activities could include attending conferences, visiting web forums, professional trade shows, and lunch with customers etc. (Geneste, 2010; Galvin, 2006). The knowledge transfer mode itself has no bearing on whether the relationship is collaborative or at arm's length. Lunch with a client could constitute a highly collaborative relationship, especially if they were a lead user (Von Hippel, 1986) and highly involved in the firm's R&D process. Or it could represent an arm's length tie. Context is therefore essential; the specific characteristics of the relationship are more important than the mode of knowledge transfer itself. However, a partnership involving equity is likely to be collaborative. This thesis accepts that the terms arm's length and weak ties are conceptually similar.

This thesis adopts Granovetter's definition of strong and weak ties. Granovetter (1973 p.1361) defines tie strength as *"a combination of the amount of time, the emotional intensity, the intimacy (mutual confiding), and reciprocal services which categorise the tie"*. He measured tie strength based on how often participants *saw* their contacts, highlighting that weak ties are more likely to be acquaintances and *"more likely to move in circles different than their own"* (p. 1371). Strong ties by contrast contain more frequent

interaction and are typically embedded within a similar network cluster. Strong and weak ties are conceptually similar terms to embedded and arm's length relationships, and are often used inter-changeably. That being said, for the sake of conceptual clarity the arm's length relationships studied in this thesis most specifically resemble the characterization of Geneste (2010) wherein such ties are explicitly defined as having limited resource investment, little expectation of future transaction and are characterized purely at the level of the dyadic relationship. Thus, in this thesis strong/weak ties are broader terms conceptualized at both dyadic and network levels.

### **2.6.7 Benefits of arm's length relationships**

Many arm's length relationships are adversarial. A firm can utilize competitive markets and the threat of competition to drive down the prices of raw materials, transport and various other business expenses. With no vested interest or dependence on the supplier, the client firm has maximum bargaining power (Bensaou, 1999). Dyer & Singh (1998) assert that these conditions make it relatively easy for firms to shift between suppliers, provided that their product or service is undifferentiated. These characteristics mean less collaborative relationships do not suffer from the same major limitations as their more collaborative counterparts, i.e. high resource commitments; inter-dependence and opportunism. Although, in line with Dyer & Singh's (1998) reasoning, this logic would indicate that it is in a firm's interest to attempt to collaborate more closely with a supplier who offers a very unique product/service upon which it was reliant, in an attempt to obtain a favourable deal. Much in the same way airlines would benefit from partnering up with prominent aircraft manufacturers such as Boeing, who's highly specialized expertise and differentiated products means many of their customers are involuntarily reliant on them, and a small selection of other manufacturers, for their aircraft and components (Porter, 2008).

In short, arm's length ties provide maximum bargaining power (Benssaou, 1999); minimum dependence on suppliers, lower prices and are easy to switch between (Dyer & Singh, 1998). Perhaps more important from our perspective is that they are a source of potentially valuable knowledge which do not require significant resource commitment to establish or exploit. Li, Veliyath, & Tan (2013) discovered that trusting relationships with suppliers and customers had negative performance implications in their study of 252 Chinese, cluster-based firms. It was concluded that high degrees of trust increased a tie's bargaining power which eroded profit within the relationship. Furthermore, the frequency of interaction conceptualised by Li, Veliyath, & Tan (2013) as 'tie strength' had no impact on firm performance, and distant ties were deemed as having a marginally greater effect on firm performance, which supports the work of Giuliani and Bell (2005), Boschma and Ter Wal (2007) and Morrison and Rabellotti (2009). These arguments are becoming increasingly important as concepts such as crowd sourcing and multi-agent problem solving become more popular (Prpić, Shukla, Kietzmann, McCarthy, 2015; Benner & Tushman, 2015; Boss, Kleer & Vossen, 2014),

Given the benefits of arm's length relationships, a prudent reader may question why such ties have received so little attention within the inter-organizational knowledge transfer literature. In a previous article, Dyer & Singh (1998) argue that mutual gains cannot accrue from such relationships as there's nothing unique about them. It is inferred that neither party can obtain resources from the other, in this case knowledge, which fit the VRIN model outlined by Barney (1991). The logic being that any knowledge derived from such a source would be imitable as the same knowledge could easily be acquired by a competitor if they were willing to make the *minimal* resource investments required to contact the supplier of said knowledge themselves. However, Chrisman & McMullan (2004) argue that the combination of tacit and explicit knowledge can make up a bundle of resources

which can endow firms with a competitive advantage. In this sense, the explicit knowledge in question may be easy to obtain, but the tacit knowledge that complements it might not be. If we apply this to our context, it is feasible that a firm can receive explicit knowledge from an arm's length tie which complements its existing tacit knowledge base, allowing it to innovate or improve its performance. For an example of this, consider the following scenario.

A guitar manufacturer phones up one of its prior customers concerning a lack of follow up orders, the retailer retorts that more orders would have been forthcoming, had the instruments been available in a greater variety of finishes, as their standard black veneer proved unpopular with younger audiences. The guitar store continues to assert that the black finish did not attract much attention in the shop, and despite its superior performance, customers purchased the guitars which were more visually appealing. The retailer does not intend to do further business with the instrument manufacturer, and yet has supplied their client knowledge that vital to their success.

In this scenario, whilst the knowledge provided was explicit, it is still highly valuable. In this example, the arm's length relationship has resulted in an incremental product innovation which will ideally lead to increased performance.

To summarise, the respective merits and drawbacks of both collaborative and non-collaborative relationships have been reviewed. An argument has been presented for the strategic value of explicit knowledge derived from arm's length relationships which can subsequently be integrated in a bundle of both tacit & explicit knowledge (Chrisman & McMullan, 2004), and firm resources which collectively constitute a set of resources that fit the VRIN model (Barney, 1991) and firms can leverage to gain a competitive advantage. In their calls for further research in the field, Geneste & Galvin (2013) cite that

more qualitative research into knowledge intensive industries could help drive the argument forward, particularly by aiding the identification of knowledge related outcomes (e.g. innovation) derived from arm's length transactions. Furthermore, this literature review has identified a gulf in theory regarding the innovative contributions of arm's length relationships and the nature of innovation therein. Based on the significant challenges collaboration poses (Colombo et al, 2012), this thesis intends to compare the innovation process, in both ALRs and collaborative relations, which may shed light on instances whereby arm's length arrangements may be more appropriate than embedded ties in the innovation process.

## **2.7 Innovation**

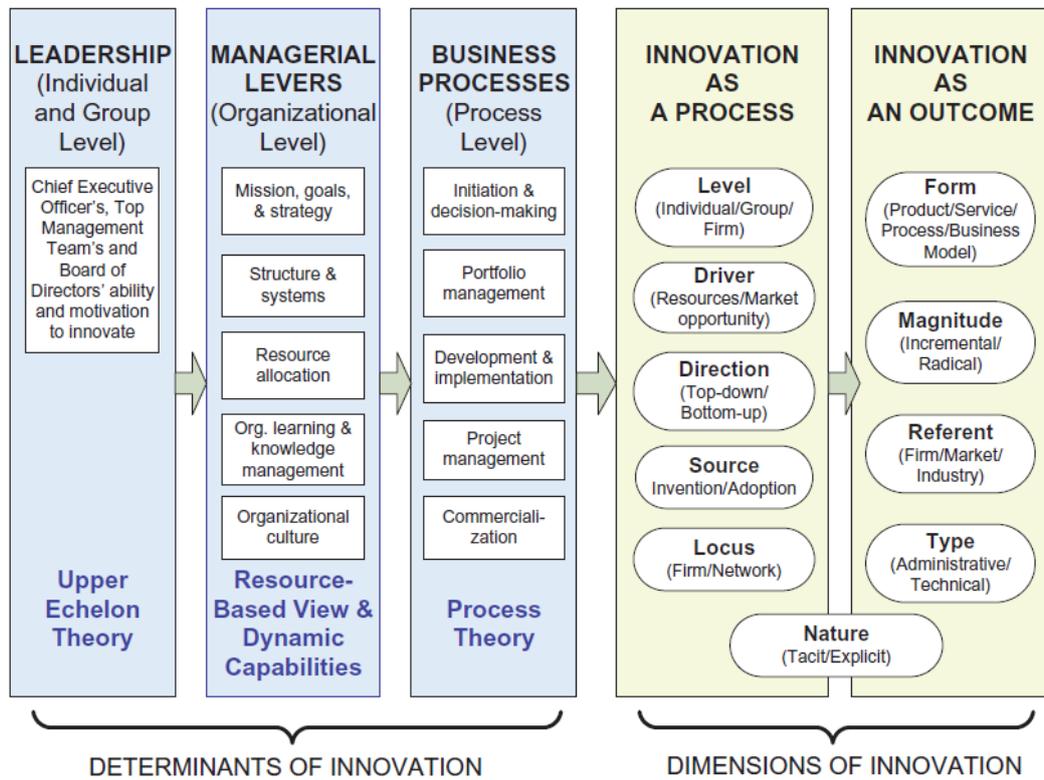
Considering that innovation has received a startling amount of attention from strategy scholars over the past few years, and innovative ability has been cited as the key determinant of firm performance (Mone et al, 1998), it is important we review the area to ascertain its relationship with inter-firm collaboration.

Many management scholars concede that the ability to innovate is the key factor in determining firm performance (Mone et al., 1998), and increasingly changing business environments makes the ability to innovate and change key to gaining a competitive advantage (Ireland & Hitt, 1999; Crossan & Apaydin, 2010; Martinez, 2014). But what is innovation? One of the most commonly accepted understandings is offered by Damanpour (1991, p.556), who describes it as any "*new product or service, a new production process technology, a new structure or administrative system, or a new plan or program pertaining to organizational members*". Whilst this definition appears robust enough for our purposes, the term 'new' is open to interpretation. Especially since apparently new innovations can often be no more than the application of an old practice in a new context

(Enkel & Gassmann, 2010). This problem was acknowledged by Rogers (1995, p.11), when he described innovation as “*an idea, practice, or object that is perceived as new by an individual or other unit of adoption*”. So whilst methods such as patent counts have been employed over the years to attempt to objectively measure innovation, there are many who will testify to the subjectivity of the term.

Scholars have become increasingly interested in innovation over the last 2 decades (Nonaka & Takeuchi, 1995; Pittaway, 2004; Keupp, Palmie & Gassmann, 2012; West & Bogers, 2014; Fay, Shipton, West & Patterson, 2015), replacing previously dominant transaction cost business models with ones that focus on innovation (McGrath, Tsai, Venkataraman and MacMillan, 1996). The popularity of the open innovation paradigm is a prime example of this point (Chesbrough, 2003; West, Salter, Vanhaverbeke & Chesbrough, 2014). Crossan & Apaydin (2010) offer a framework indicating the multiple dimensions of the concept (Figure 4).

**Figure 4. A multi-dimensional framework of innovation**



*Source: Crossan & Apaydin (2010)*

A review of the innovation literature highlights that range of innovation types in the literature, even Crossan & Apaydin's (2010) rigorous multi-dimensional review omits numerous manifestations, including open innovation (Chesbrough, 2003; Dahlander & Gann, 2010) and, less popular systemic and autonomous innovations (Partanen, Chetty & Rajala (2011).

Whilst providing an excellent overview and providing a strong representation of the multiple perspectives and dimensions that surround the study of innovation, the above framework is by no means perfect. It does not adequately account for innovation diffusion, which Crossan & Apaydin (2010) omitted from their study. This is intriguing, given that the ability to diffuse an innovation is considered by some to be *the* key part of the process (Teece, 1986). However, despite these limitations it Crossan & Apaydin (2010) still offer a

useful framework through which to communicate the scope of this thesis, in respect of the field of innovation.

This research project conceptualises innovation as a process, with a specific interest in network determinants. However, the study does not fit rigidly within the confines of one dimension. Resource-based theories are utilized to measure the impact determinants such as knowledge and inter-firm relations have on the broader innovation strategies of firms. Thus, whilst impact of some of these determinants will be studied on the process dimension, e.g. isomorphism in the innovation process, there is some focus on the outcome dimension, e.g. type of innovation.

### **2.7.1 Contemporary Innovation**

Demonstrating the recent surge of interest the field of innovation has enjoyed in recent years, Keupp, Palmie & Gassmann (2012) reference the proliferation of some new strands, including; international innovation, knowledge management and open innovation. In the past, research focused on how industrial firms tended to innovate and generate new ideas for products internally (March, 1991). This ‘producer model’ of innovation has been dominant since Schumpeter’s ideas on innovation first rose to prominence (Baldwin & von Hippel, 2011). Such thinking inspired the demand pull and technology push models of innovation which, whilst useful, resulted in innovation often being conceptualised as a very linear process. Subsequent work on alliances (Mowery, Oxley & Silverman, 1996; Simonin, 1999), networks (Powell, Koput & Smith-Doerr, 1996) & ‘lead users’ (Von Hippel, 1986) began to deviate from this closed model and develop a networked/external perspective of innovation which emphasised the crucial role parties and knowledge external to the firm had on the innovation process. However, much of this literature was

fragmented and was never consolidated into a more holistic framework. For example, the new product development literature had an inherent internal focus, ignoring the contribution of external parties on innovation, whilst the technology management literature failed to relate its ideas on technology management process and technology change to innovation processes (Lichtenthaler, 2011).

Open innovation served to consolidate much of this existing literature, e.g. by integrating previously disconnected ideas about inward and outward knowledge transfer (Lichtenthaler, 2011; West & Bogers, 2014; West, Salter, Vanhaverbeke & Chesbrough, 2014), allowing for theoretical advancement within the field. Furthermore, whilst the importance of external knowledge and technology has been well documented by several leading authors (von Hippel, 1986; Prpić, Shukla, Kietzmann, McCarthy, 2015; Benner & Tushman, 2015), Chesbrough et al (2006) assert that in the open innovation model, internal and external sources are viewed as equally viable, with no mode being more favourable or advantageous than the other, thus setting the paradigm apart from previous research. On a practical level, open innovation was arguably embraced by industry because industrial R&D was becoming an increasing financial burden (Huston & Sakkab, 2006) and the innovation cycles were shortening, making it more difficult for organisations to remain afloat by internal innovation alone (Gassman & Enkel, 2004). This research project has potentially strong implications for open innovation, given its focus on engaging in deep and wide search activity in pursuit of innovation (Laursen & Salter, 2006). Popular concepts such as crowdsourcing and innovation competitions could benefit from deeper theoretical development of the process of innovation in arm's length relationships, given their proclivity to manage large numbers of often unknown innovators (Prpić, Shukla, Kietzmann, McCarthy, 2015; Benner & Tushman, 2015).

## **2.8 Innovation Drivers**

The third objective outlined in this thesis was to explore the drivers of innovation induced from arm's length and collaborative relationships. This section outlines the fields of institutionalism and neo-institutionalism, reviews the concept of isomorphism and discusses how past studies have examined isomorphism in a network context.

### **2.8.1 Introduction**

The link between collaborative behaviour and firm homogeneity has been established in the literature (DiMaggio and Powell, 1983), especially in regards to mimetic behaviour (Galaskiewicz & Wasserman, 1989). However, the specific nature of inter-firm isomorphism within the innovation process has received less attention. This section reviews the fields of institutionalisms and neo-institutionalism, the schools of thought behind the organizational isomorphism concept. This is followed by a discussion of the isomorphism literature to date. Finally, the concept is used to address more contemporary management issues and gaps in the literature, by theorising how it may impact innovation processes and outcomes.

### **2.8.2 Institutionalism & Neo-Institutionalism**

The concept of isomorphism is embedded in the neo-institutional, and by implication, institutional perspectives. Institutionalism is rooted in the wider theory of organization (Selznick, 1984), and can be defined as *“the emergence of orderly, stable, social integrating patterns outside of unstable, loosely organized, or narrowly technical activities”* (Broom & Selznick, 1955), p.238). Neo-institutionalism attempts to develop a sociological view of institutions. Arguably the major difference in institutionalism and neo-institutionalism is that, in the latter, legitimization is seen as the key driver for actors within the organization, and it must be continual. It is the main justification for the

structures, processes and practices of the organization (Selznik, 1996). The foundations of neo-institutionalism were arguably laid by two works, Meyer & Rowan (1977) and DiMaggio & Powell (1983). Both articles describe separate behaviours which firms perform in order to gain legitimacy. Meyer & Rowan (1977) note that in order to legitimize themselves, firms would tell (often fictional) stories about their activities. These corresponded to “*social pre-described dictates about what firms should do*” (Mizruchi & Fein, 1999, p.656). DiMaggio & Powell (1983) extended this concept, arguing that firms became increasingly similar in order to legitimize themselves within their environment. In the case of isomorphism, gaining legitimacy from your external environment is crucial because to some degree, firms are reliant on these environments for resources (Pfeffer & Salancik, 1978).

### **2.8.3 Isomorphism**

Levitt (1966) argued that attempting to be the first in everything within a given field was neither feasible, nor optimum. *"A simple look around us will, I think, quickly show that imitation is not only more abundant than innovation, but actually a more prevalent road to business growth and profits."* (Levitt, 2006, p.1). March's (1994) ideas complement this, stating that innovation is actually instigated from the imperfect imitation of others.

Building on the work of Meyer & Rowan (1977), DiMaggio & Powell (1983) attempted to find an explanation for the striking similarity of firms, describing 3 types of isomorphic processes which they claim are responsible for firms' growing gravitation towards homogeneity. These fall under the categories of coercive, mimetic and normative isomorphism, and can be conceptualized as driven by power, uncertainty and culture, respectively. In an article synthesizing the multiple perspectives of inter-organizational networks, Brass, Galaskiewicz, Greve & Tsai (2004) cited that imitation (mimetic isomorphism) was one of the most prominent outcomes of collaboration.

#### **2.8.4 Types of isomorphic pressures**

Coercive isomorphism prompts organizational change in response to an external actor(s). This could be an organization upon which they are dependent, or by the expectations of the society in which they are doing business (DiMaggio & Powell, 1983). This can range from mild persuasion (informal) to the implementation of a new law tackling CO2 emissions (formal). Reviewing these initial points, it becomes apparent why a group of firms adhering to a new tax law will become similar. The process of coercive isomorphism draws parallels with a wider networking trend highlighted by Warren (1967 in Oliver, 1991), who identified mandates from higher authority as an antecedent of some inter-firm relationships.

Normative pressures are rooted in professionalization, DiMaggio & Powell (1983, p.152) draw from the work of Sarfatti-Larson (1977) and Collins (1979) to define these pressures as *“the collective struggle of members of an occupation to define the conditions and methods of their work, to control “the production of producers” (Sarfatti-Larson, 1977:49-52), and to establish a cognitive base and legitimation for their occupational autonomy.”* If we consider an accountant within an organization, under this argument he/she will resemble their counterpart in another firm because they have had a standardized university education. Furthermore, recruitment protocols, e.g. hiring the elite achievers in the field, often serve to reinforce this phenomenon. The proliferation of professional networks within, and across organizations means all firms are subjected to the same pressures which are forcing them to adapt to a standardized professional body in a similar fashion (DiMaggio & Powell, 1983).

In mimetic processes firms model themselves on one another, generally in the face of environmental uncertainty and/or complex environments, in order to gain legitimacy and reduce the risk of their ideas being rejected within the field (DiMaggio & Powell, 1983; Ordanini, Rubera & DeFillipi, 2008). Again, comparisons can be made between this behaviour and inter-firm networking, as both literature bases cite legitimization as a common rationale for their respective practices (Oliver, 1990).

It is DiMaggio & Powell's (1983) contention that as firms adapt themselves to these three different external forces, they become isomorphic. Mizruchi & Fein (1999) assert that mimetic isomorphism has received the majority of attention from scholars and a review of the current literature confirms that this is still the case. However, coercive and normative forms of isomorphism have been receiving increasing levels of attention. This comes despite DiMaggio & Powell's (1983) assertion that either of the pressure or forces could be in effect simultaneously, and as Mizruchi & Fein (1999) reiterate, may be difficult to distinguish from one another empirically. In this fashion, this research deviates away from the more prominent debate regarding networks and mimetic behaviour, by considering both mimetic and coercive pressures within the network context.

### **2.8.5 Mimetic behaviour**

In a review of imitation inter-organizational imitation literature Ordanini, Rubera & DeFillipi (2008) cite their understanding of the common theoretical lenses through which the phenomena has been studied, complete with a list of reasons for this behaviour and their respective antecedents (Figure. 5).

**Figure 5. Purposes, driving forces and target of inter-organizational imitation: risk reduction and search for Effectiveness**

Theory	Purposes of imitation	Driving forces	Target of imitation	
NIT and mimetic isomorphism	Gaining legitimacy in the fields	Environmental uncertainty	The most, the best	RISK REDUCTION
Information cascades	Reducing consequences of strategy failures	Perceived information asymmetry	The most, the best	
Industrial organization	Smoothing rivalry competition	Resource similarity/Weak reactions	The best, the peers	SEARCH FOR EFFECTIVENESS
Organizational learning (vicarious and contact)	Externalizing exploration	Outcome uncertainty	The best, the peers	
Decision-making	Rational choice costs reduction	Resource gap and complex decision-making	The most, the best	
Resource-based view	Competitive shortcuts	Low linkage causal ambiguity	The best, the peers	

*Source: Ordanini, Rubera & DeFillipi (2008)*

Figure 5 is provided to highlight that imitative behaviour can be rationalized by several different schools of thought, although discussion is restricted to organizational learning & isomorphic theories in this study due to scope.

### 2.8.6 Isomorphism & inter-firm relationships

It is argued within the literature that firms that collaborate together are likely to become similar, DiMaggio & Powell (1983) claim that increased dependence and involvement in inter-firm relations leads those firms to become isomorphic. Furthermore, Lawrence, Hardy & Phillips (2002) argue that collaboration can cause institutionalism within those fields through a process of structuration, whereby rules and resources that characterize the field are influenced by common understandings and practices born out of this collaborative behaviour. Indeed, DiMaggio & Powell (1983) did describe increased firm interaction as the first step of the structuration process. This process places pressure on organizations within the same field to adopt these emergent practices. Thus, it is argued that

collaboration between two firms can breed isomorphic organizations within entire fields and not just within the boundaries of that specific relationship.

### **2.8.7 Collaboration and isomorphic innovation**

Research suggests that firms attempt to copy the innovations of other firms (Levitt, 1966; March, 1994), and that collaborative activity breeds homogeneity between firms. A significant number of studies associate collaboration with imitation and innovation adoption, many of these study this phenomenon in the context of director interlocks (Haunschild, 1993; Haunschild & Beckman, 1998; Westphal, Seidel & Stuart, 2001). The interest in corporate interlocks is probably due to the ease of accessing the relevant data.

Galaskiewicz & Wasserman (1989) demonstrated that firms imitate those within their social networks. Moreover, they were more likely to do so if they knew and trusted an organization. Thus, the link between collaborative and mimetic behaviour is fairly well established. The findings of Galaskiewicz & Wasserman's (1989) study would indicate that firm's innovation creation activities would gradually begin to resemble those of their partners', as their relationship continued and trust grew. Furthermore, Lai, Wong & Cheng (2006) highlighted that institutional pressures along supply chains often lead to the adoption of IT systems by organizations. This could infer that close collaboration leads to the transfer of partner's successful routines and solutions, perhaps manifesting in the form of standard operating procedures (Berger, 1997; Hoerl, 1998). As a side note, Galaskiewicz & Wasserman (1989) also claimed that trust and relationship duration were significant factors in mimetic behaviour. Interestingly, the literature asserts that these are key variables in determining degree of collaboration, i.e. whether a relationship is at arm's length or more collaborative (Uzzi, 1997; Cooper & Gardner, 1993; Larson, 1992; Gopalakrishna Pillai & Sharma (2003). DiMaggio & Powell (1983) argued that dyadic ties

could become structurally similar. Additionally, from an organizational learning perspective, Levinthal & March (1993) argued that firms could learn of numerous innovation strategies by imitating the successful strategies of others in an industry, learning from their exploratory investments. However, it could be postulated that such imitation will stifle novelty, albeit facilitating the transfer of best practice between dyadic ties. Lechner, Frankenberger & Floyd (2010) argue strong ties do not transfer novel information, and Terwiesch & Xu (2008) claim diverse solutions stem from engaging a large pool of problem-solvers, which are by their nature going to be arm's length relationships. Thus it proposed:

***Proposition 1a:*** *Innovation will be facilitated in strongly embedded relationships because they are conduits of tested, efficient solutions.*

***Proposition 1b:*** *Innovation may get hindered in strongly embedded relationships because isomorphic pressures lead to convergence in the innovation process.*

***Proposition 1c:*** *Novel innovation may be more supported by arm's length relationships because of limited isomorphic pressures.*

***Proposition 1d:*** *Innovation may be hindered by arm's length relationships because they are likely to impede the efficient transfer of best practice.*

Learning has also been demonstrated to occur within inter-organizational networks (Powell, Koput & Smith-Doerr (1996). Both isomorphic and organizational learning theories have particular relevance for the SME context, as Van de Vrande et al (2009)

assert smaller firms find it difficult to innovate alone and are heavily reliant on external knowledge. However, a review of the literature reveals that there is limited in-depth research dedicated to studying the innovation patterns of firms in highly collaborative dyadic ties, and whether these may be influenced by their partners. Thus, this thesis attempts to bridge this theoretical gap and address recently arisen management questions regarding the impact various external contingencies have on the broader innovation process.

Research on the relationship between isomorphism in an innovation context and collaboration is required to help integrate the concept of isomorphism into the networked innovation domain; in order to enhance our understanding of both phenomena. For example, this study could shed light on the explicit nature of the innovations such isomorphic pressures pertain to, and the process by which they are integrated into firms warrants further research. Furthermore, the degree to which isomorphic pressures are evident in arm's length relationships and how this manifests in the innovation process presents an interesting avenue for research. Innovation may indeed be more novel and radical in short-term interactions, as opposed to collaborative relations which are laden with strong pressures to conform to industry standards and practices (Galazkiewicz & Wasserman, 1989).

## **2.9 Organizational Learning**

### **2.9.1 Introduction**

The prior section provided an outline of the theoretical context of this thesis, and the state of current thought on networked innovation. Emphasis was given to the distinct characteristics and merits of collaborative and non-collaborative relationships. The

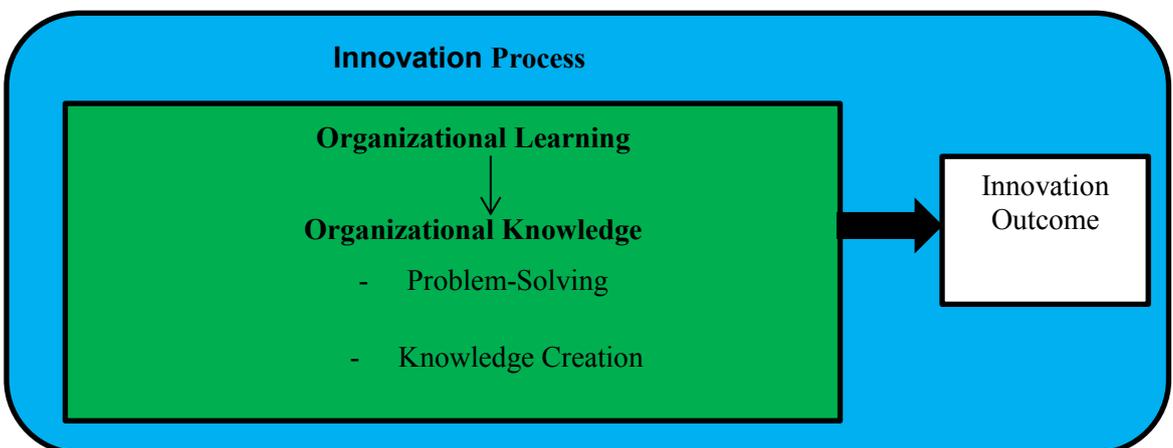
following section reviews literature on problem-solving activity and knowledge creation within the context of networking SMEs, the discussion is organized under the concept of organizational learning.

### **2.9.2 Exploring Organizational Learning**

Argote & Miron-Spektor (2011) define organizational learning as “*a change in the organization [usually their knowledge] that occurs as the organization acquires experience*” (p.1123). Organizational learning is an inter-disciplinary field (Argote & Miron-Spektor, 2001). A review of some of the seminal papers in organizational learning and innovation research highlights that these fields are intertwined (March, 1991; VonHippel, 1994). Thence it is no accident Cohen & Levinthal’s (1991) piece on absorptive capacity considers these concepts in tandem, arguably facilitating the conceptual union of these two fields. Indeed, this amalgamation has caused processes of problem-solving and knowledge creation to be conceptualised as sub-components of both innovation (VonHippel, 1994; VonKrogh, Ichijo & Nonaka, 2000), and organizational learning (Lam, 2000; Argote & Miron-Spektor, 2011). Conversely, Popadiuk & Chu (2006) argue “*knowledge creation is focused on the generation and application of knowledge that leads to new capabilities for the firm. Innovation, on the other hand, is also concerned with how these new capabilities may be turned into products and services that have economic value in markets*” (p.311). Whilst this thesis would criticise Popadiuk & Chu’s conclusion (2006) for failing to account for process and administrative innovation, conceptualizing both knowledge creation and problem solving as antecedents of innovation aids in the narrative of this work. Thence, this thesis studies innovation as a broad process, wherein the organizational learning processes of knowledge creation and problem-solving act as antecedents (Crossan & Apaydin, 2010). Outputs are then considered in-light of the forms of innovative outputs they represent. This thesis has adopted this conceptualisation, see figure 6 for a vision

representation, to aid the effective discussion of the forthcoming drivers of innovation in the analysis and discussion chapter.

**Figure 6. Relationship between organizational learning and innovation**



In their review of the field, Argote & Miron-Spektor (2001) highlight 5 themes of organizational learning research; organizational experience, the context, organizational learning processes, and organizational knowledge. Organizational knowledge is broken down further into 3 sub-components, knowledge creation, retention and transfer. From an organizational learning perspective, this thesis primarily focuses on the process of knowledge creation. Furthermore, whilst problem-solving is not explicitly mentioned by Argote & Miron-Spektor (2001), Nickerson & Zenger (2004) purports it is an essential activity in the creation of valuable knowledge. Therefore, this section will provide an analysis of the literature on knowledge creation and problem-solving activity and how it applies to innovation within collaborative and arm’s length SME relationships.

### **2.10 Problem-Solving**

Nickerson & Zenger’s (2004) knowledge based theory of the firm highlighted problem-solving and knowledge formulation as key tenets, arguing organizations could be extended

by the creation or absorption of new knowledge. This section outlines the current state of problem-solving theory in relation to SMEs networks, highlighting gaps therein.

### **2.10.1 The Nature of Problems**

Jonassen (2000) highlighted that problems consist of two key attributes, firstly, they are an unknown entity constituting the difference between an organization's current state and its goal state, and secondly, value (either intellectual, social or cultural) must be generated from its solving. Furthermore, Jonassen (2000) argues that problem-solving requires some awareness of the unknown, and placing some value in its discovery. In their educational study into the effectiveness of competition and cooperation for individual problem solving, Quin, Johnson & Johnson (1995) conducted a meta-analysis of 46 papers to address, seemingly, contradictory findings. Authors argued problems differ on two dimensions, the manner in which they are *presented* (verbal/non-verbal), and the degree to which they are *defined* (well-defined/ill-defined). Linguistic problems (verbal) are principally "*represented and solved in written or oral languages*" (Quin, Johnson & Johnson, 1995 p.130), whilst non-linguistic problems are mainly manifested and addressed via "*graphs, mathematical formulas, symbols motor activities, materials or actions in real situations*" (p. 130). Furthermore, well-defined problems have clear operational rules and a clear end-result, therefore lending themselves to mechanical activities such as mathematics or chess (Quin, Johnson & Johnson, 1995), whilst Ill-defined problems, which constitute the vast majority of real-life issues, are much vaguer and hard to scope. It should be noted that Quin, Johnson & Johnson's (1995) classification bears close resemblance to Jonassen's (1997) concept of well-structured and ill-structured, who embellish upon the concept, citing the common need to integrate multiple knowledge domains to arrive at solutions (e.g. psychology, computer programming, mathematics etc.) and, due to this complexity, the often unpredictable nature of such solutions, of which there can be multiple viable

options. On reflection, both Quin, Johnson & Johnson (1995) and Jonassen's (1997) ideas around problems bear close resemblance to Polanyi's (1966) definition of tacit and explicit knowledge. It should be noted that a study by Quin, Johnson & Johnson's (1995) revealed that cooperation was deemed more effective than competition in all forms of individual problem-solving.

Smith (2012) argues that problems are domain and context-specific, and as such, domain specific knowledge is essential for good problem solving, this supported by Jonassen (2000) and Sternberg & Frensch (2014). Therefore, problems cannot be effectively solved by extrapolating them from the situation as the context is a fundamental dimension of their nature. This concept complements the work of Cohen & Levinthal (1990) on absorptive capacity, which highlights that the ability of a firm to learn and exploit external knowledge is context-specific, as firms with overlapping knowledge sets find it easier to transfer knowledge.

Funke (1991) highlights the complexity of problems as another key differentiating factor, referencing "*the number of variables, the degree of connectivity among the variables, and the type of functional relationship (linear vs. nonlinear)*" (p.186) in addition to the stability of such variables/properties over time, as key elements influencing the complexity of a given problem. Dynamic problems, those whose constituent properties and variables are prone to change over time, are highlighted as the most complex. Jonassen (2000) provides a succinct summary of Funke's (1991) conceptualization of complexity, stating "*complexity is more concerned with how many, how clearly, and how reliably components are represented implicitly or explicitly in the problem*" (p.68).

### **2.10.2 Problem Identification**

Literature on inter-firm networks acknowledges that firms learn from the experiences of others within their network (Haunschild, 1994; Beckman & Haunschild, 2002). Nickerson & Zenger (2004) argue that, in order to create valuable knowledge, managers must identify and select valuable problems; these are evaluated based on the desirability of the knowledge, or capabilities, generated by an effective solution. Rather than simply being a matter of choosing valuable knowledge to absorb, they argue such knowledge often does not currently exist and thus needs to be created via the effective solving of a problem. Early work on problem identification highlighted that ‘informal sensing techniques’ helped managers become aware of problems, rather than formal reporting (Lyles & Mitroff, 1980), this could be via intuition or informal communications with staff, customers, suppliers or friends; depending on whether the problem resides within or outside the firm. VonHippel & Tyre’s (1995) research into manufacturing revealed that 81% of problems related to the novel process equipment were identified by factory personnel (internally) in the field, whilst 19% were identified beforehand but had not been fixed. Such an internal focus in regard to problem identification is also evident in Kohl & Depner’s (2010) ‘decisions for customized competitive strategy framework’. In contrast, open user innovation and user entrepreneur literature focus on problem identification by lead users, external to the firm (vonHippel, 2010; Shah & Tripsa, 2007). As opposed to ‘closed collaborative innovation’, where a producer proposes a solution to be solved by numerous external parties where users can identify and solve a problem for themselves acting on their own initiative for personal gain (vonHippel, 1986; Baldwin & vonHippel, 2010). Of course, utilizing users to identify problems is nothing new, market research and consumer feedback/reviews have long been utilized to spot problems with products and service offerings. Continuing the collaborative nature of problem identification, Kessler et al

(2012) argue that relational closeness between partners is required to facilitate joint problem solving and generate solutions which are satisfactory for both parties, the authors are informed by the work of Batt (2008) who maintain social capital found in collaborative relationships generates good outcomes not found in narrow, market transactions and facilitates cooperative behaviors. Batterink et al's (2010) study into SMEs in the agri-food sector highlighted that innovation brokers that maintained large networks and are embedded within the networks of SMEs, were more likely to be aware of commonly occurring problems such firms faced in the industry. Furthermore, Kessler et al (2012) state "*not only can social capital enable early identification of problems through information sharing, it can also facilitate collaborative problem solving by encouraging cooperation and joint work*" (p. 87). Therefore it is proposed:

***Proposition 2a:*** *Innovation may be supported by more collaborative relationships because they are more likely to identify commonly occurring problems in the innovation process.*

A review of the literature reveals there is little specific research into how SMEs utilize their networks for problem identification activities. Furthermore, research into the relative utility of arm's length and more collaborative ties in the identification of problems has not been found by this study. It stands to reason that collaborative ties may have more insight into the focal firm and industry, and highlight more commonly occurring problems.

However managing a multitude of arm's length relationships could logically bring more product or service problems to the attention of SMEs, than collaborative relations. This could help generate path dependencies and orientate the broader strategic direction of the SME. Identifying a new product line to pursue could significantly shape the future market trajectory of the firm. Thus it is proposed that:

***Proposition 2b:** Innovation may be supported by ALRs because problems identified are likely to help orientate broader innovation strategy.*

### **2.10.3 Problem Solving**

Problem solving activity is an important theme in both innovation and strategic management research (Cohen & Levinthal, 1990; Von Hippel, 1994; Nickerson & Zenger, 2004). Moreover, whilst arm's length relationships are said to facilitate idea generation, the literature maintains that collaboration is more effective in managing problem-solving activities (Ulhoi, 2005; Leonard-Barton & Sinha, 1993; Hansen, 1999). Problem solving and knowledge formation were central to Nickerson & Zenger's (2004) knowledge bases theory of the firm, theorising that an organization's knowledge can be extended by either absorbing external knowledge, or developing new knowledge, achieved by identifying a problem and finding a valuable solution for it. Thus, problem solving is posited as one of the core means by which firms sustain above-normal profits.

Scarbrough, Swan, Amaeshi & Briggs (2013) identified that in the deal-making process of early stage technology ventures, arm's length relationships would be exploited in the early stage for opportunity identification activities, however, significant problem-solving activity in the later stages was only facilitated by the establishment of closer, embedded ties. However, the findings of Perry-Smith & Shalley (2003) and Lechner, Frankenberger & Floyd (2010) were not considered in light of the SME context, wherein organizations are faced with severe resource limitations and lack formal problem-solving processes yet are often socially closer to their customers, more flexible and are burdened with markedly less knowledge to manage. Aarikka-Stenroos & Jaakkola's (2012) study of the dyadic joint problem-solving and value creation process with a mixture of SMEs and large firms

conceptualised a non-process consisting of 5 key activities, including; “*diagnosing needs, designing and producing the solution, organizing the process and resources, managing value conflicts, and implementing the solution*” (p.23). Therein, the authors identified that business-to-business (B2B) customers, through the application of resources and negotiation, had a substantial role in the creation of the value proposition, of which joint problem-solving activity played a significant part. Aarikka-Stenroos & Jaakkola’s (2012) work is one of the few exploratory studies of the process of joint problem-solving in customer-supplier relationships. However, the study only focused on embedded vertical relationships; the process of problem-solving within arm’s length relationships has been under-explored and, given the proliferation of research in related fields such as crowdsourcing and innovation contests (Prpić, Shukla, Kietzmann, McCarthy, 2015; Benner & Tushman, 2015), presents an interesting opportunity to develop theory beyond the vague notion of being conduits of novel ideas.

The successful diffusion of the open innovation paradigm in management research has prompted increased attention into external channels for problem solving (Chesbrough, 2003 West, Salter, Vanhaverbeke & Chesbrough, 2014), such as multi-agent problem solving and innovation contests (Terwiesch & Xu, 2008; Boss, Kleer, Vossen, 2014). Utilizing innovation tournaments and contests are a means by which organizations open up their innovation processes and have external problem solvers, often from diverse industry backgrounds, work on solutions to their problems. However, Koput (1997) argued that over-searching may have a negative effect on performance, one reason being that there are simply too many ideas to choose from. This could arguably be the case when relying on arm’s length relationships to identify gaps in the market. Studies into research contests have argued that limiting the pool of solvers to two helps mitigate the impact of

underinvestment of effort (Fullerton & McAfee, 1999). Indeed, Uzzi (1997) highlighted that embedded relationships facilitated joint problem solving activities, as problems were solved on an improvised, on-the-fly basis which served to reduce production errors.

In their study of 5 multi-national organizations Lechner, Frankenberger & Floyd (2010) identified that maintaining groups featuring a large number of stronger ties was negatively related to performance in exploratory initiatives, in contrast to exploitative endeavors, as these relationships did not facilitate the transfer of novel information. Therefore, it could be posited that arm's length relationships are more likely to provide novel solutions to problems, than embedded ties (Granovetter, 1985; Uzzi, 1997). Furthermore, Terwiesch and Xu (2008) highlighted the diverse set of solutions offered by tapping into a larger pool of solvers is of real benefit to firms, and that the aforementioned risk of low effort can be reduced by adopting a performance-contingent reward structure, rather than a fixed-prize award. Jeppesen & Lakhani (2010) also discovered that those problem solvers which were distant from the field from which a problem originates were often more successful, as they brought a set of new perspectives, tools and heuristics to the table. Perry-Smith & Shalley (2003) also identified that weak ties facilitate individual creativity and autonomy *as "the relationships are sufficiently weak to avoid automatic conformity with one group"* (p. 95). Furthermore, Hargadon & Sutton (1997) argued by exploring different domains firms could begin to conceptualize problems and solutions in unique ways, applying solutions from one domain into another, Ahuja & Lampert (2001) and Fleming (2001) argue such rigorous combination of knowledge leads to extremely novel innovations. Indeed, it could be argued Ahuja & Lampert (2001) and Fleming (2001) findings highlight that arm's length relations are likely to provide successful solutions to problems, as more numerous solvers can be effectively managed, potentially representing a diverse set of industries.

March (1991) supports these claims, highlighting that exploration is more significant for competitive advantage in the long term, although he does postulate that such exploration activity is plagued with uncertainty and longer time horizons. Furthermore, the inherent uncertainty of exploration activity and unknown pay-offs arguably makes the activity considerably more resource intensive for SMEs. Reviewing the above and reflecting on aforementioned research into isomorphism studies, it is proposed:

***Proposition 3a:*** *Innovation may be hindered by ALRs because SMEs lack the resources to effectively explore and evaluate often ambiguous problems.*

***Proposition 3b:*** *Innovation may be hindered by arm's length relationships because exploratory problem-solving tends to be more resource intensive.*

***Proposition 4a:*** *Innovation may be supported by ALRS because problem-solving is exploratory and solutions novel in nature.*

***Proposition 4b:*** *Innovation is likely to be supported by ALRS because problem-solving activity facilitates greater organizational learning and internal problem-solving capabilities.*

***Proposition 4c:*** *Innovation may be hindered in more embedded relationships because solutions represent "pre-packaged", consensus recommendations, breed over-reliance and reduce SME's internal problem-solving capabilities.*

This section has reviewed the problem-solving literature from networked perspective. It's been acknowledge that problem-solving importance is of key importance to the firm (Cohen & Levinthal, 1990; VonHippel, 1994; Nickerson & Zenger, 2004). But the nature of problem-solving activity, the initial problems and subsequent solutions adopted by SMEs have been shown to be under-explored from an embeddedness perspective. Given problem-solving's key role in the innovation (VonHippel, 1994; Felin & Zenger, 2014), this thesis contends that exploring the types of problems identified and how these are solved in arm's length and collaborative relationships will further inform our understanding of the nature of innovation therein. This should serve to move discussion closer to a more holistic conversation of sustainable networked SME innovation in both short and long-term ties.

## **2.11 Knowledge Creation**

### **2.11.1 Knowledge**

One of the key resources transferred via collaboration is likely to be knowledge (Grant, 1996), in fact, the tacit nature of the knowledge transferred is the primary reason more collaborative relationships are valued as superior to arm's length transaction from a RBV perspective. Furthermore, knowledge and its transfer are crucial for innovation (Liao & Marsillac, 2015). This section reviews the concept and related analytical frameworks.

### **2.11.2 Knowledge Management**

The proliferation of the aforementioned resource and knowledge based views sparked a growing interest in the factors that influence performance differences amongst firms (Barney, 1991; Rumelt, 1991). Grant's (1996) proposition that knowledge is the chief

resource a firm can utilize to gain a competitive advantage caused growing interest in knowledge as a strategic asset, and concordantly sparked greater interest in the knowledge management field. Argote, McEvily & Reagans (2003) highlighted that knowledge based theories of the firm were particularly helpful because of their dynamic nature, they explained how knowledge changed and was distributed over time, and demonstrated how this affected firm performance. The effectiveness of knowledge based theories in explaining performance variation between firms further increased interest in organisational learning and knowledge management literature.

### **2.11.3 The nature of knowledge**

Knowledge has been an area of keen interest for strategic management scholars, traditional resource-based theories and its various iterations increasingly present knowledge and its management is of key strategic importance (Grant, 1996; Inkpen, 1998). The following section provides a brief review of common understandings and definitions of explicit and tacit knowledge (Polanyi, 1962), establishing a clear definition is essential for this thesis, as these core concepts underpin and influence the nature of the wider concept of knowledge creation (Nonaka, 1994).

*“We know more than we can tell”* is Polanyi’s (1966, p.4) oft quoted summary of the essence of tacit knowledge. Lam (2000) provides further clarity on the concepts, arguing explicit and tacit knowledge differ on 3 dimensions, firstly, he highlights that explicit knowledge is codifiable, can be stored, shared and understood without a ‘knowing subject’. Unlike tacit knowledge, which refers to know-how and operational skills, it can be transferred with relative ease. In regards to its acquisition, Lam (2000) highlights *“Explicit knowledge can be logically generated by logical deduction and acquired by formal study”* (p.490), whilst tacit knowledge *“can only be acquired with practical experience in the relevant context, i.e. learning by doing”* (p.940). In regard to its transfer and

appropriation, exploiting the full potential of tacit knowledge can only be achieved from close collaboration with ‘the knowing subject’, given the personal and contextual nature of such knowledge, whilst explicit knowledge can be effectively stored and managed without the ‘knowing subject’. As previously highlighted, it is argued that arm’s length relationships cannot facilitate the transfer for tacit knowledge (Grant, 1996), as it’s hard to codify. This presents an issue, as we’ve established that knowledge is of strategic importance to the firm, especially SMEs (Albino, Garavelli & Schiuma, 1999; Hite & Hesterly, 2001) and Podalyni (1962) argues that most knowledge is tacit. However, as explored below, knowledge creation occurs via the interaction between different knowledge sets, including explicit and tacit (Nonaka, 1994), indeed Alavi & Leidner (2001) argue the two are mutually dependant and should not be conceptualised as separate terms.

#### **2.11.4 Creating Knowledge Repositories**

A review of the relevant literature suggests knowledge repositories as the units within which knowledge of relevance to the firm is embedded, and can be transferred (Argote and Ingram, 2000; Argote & Miron-Spektor, 2011; Argote, 2011). Different literature bases define and conceptualise knowledge repositories in unique ways, for example, Davenport, De Long & Beers (1998) identified 3 different types of knowledge repositories; external knowledge, this could take the form of competitive intelligence, structured internal knowledge, e.g. product-orientated marketing materials research reports etc., and informal internal knowledge, such as ‘know-how’ laden discussion databases. An information systems focus is also shared by Zack (1999). Both Davenport, DeLong & Beers (1998) and Zack (1999) represent significant information systems and some knowledge management research that focuses primarily on structured, often digital, databases in their studies of knowledge repositories (Fichman, Hara & Rosenbaum, 2014; Aggestam, Durst & Persson,

2014). However, organizational members can also represent repositories (Walsh & Ungson, 1991); as can task sequences & routines (Knott, 2001; Winter & Szulanski, 2001), tools (Kane & Alavi, 2007) and social networks (Walsh and Ungson, 1991; Gulati, 1999; Argote and Ingram, 2000). Acknowledging this diverse set of understandings, Hong et al (2006) prefer not to provide a categorical definition of the broader term, but draw from Cook & Brown (1999) to state “*The notion of knowledge repositories signifies ‘epistemology of possession’ (Cook and Brown, 1999) and highlights the importance of knowledge, tacit or explicit, as something acquired, accumulated and circulated within organizations*” (p.1038). These repositories embed cultural or technical knowledge in images, venues, sources or locations (Hong et al, 2006).

#### **2.11.5 Hong et al’s Typology of Knowledge Repositories**

In their study of Japanese manufacturing firms, Hong et al (2006) highlight 5 subcategories of knowledge repositories transferred across subsidiaries, these were; physical artefacts (e.g. product samples) , canonical documentation (e.g. technical instructions, operations manuals, reports), personal experience (sharing knowledge, skills and techniques), social interaction (storytelling, dialogue, coaching) and off the job training (formal face-to-face sessions). Intriguingly, the authors conceptualized routines separately, as underlying patterns and routines implemented during the process of knowledge creation and knowledge sharing. However, it could be postulated the authors do not adequately address this conflict within the existing literature, particularly in reference to the work of (Darr et al, 1995; Knott, 2001; Argote & Miron-Spektor, 2011). Instead, Hong et al (2006) present ‘collective learning routines’, which are organized into 3 types; integrative, sense-making and dissemination routines.

Integrative routines are identified as serving to link and harmonise all relevant groups and individuals, often spanning horizontal and vertical organizational boundaries, concerning a given problem via general alert protocols, cross level reporting and more spontaneous cooperation. Sense-making routines take the form of following a standardized process of evaluating various facets of a given problem, referred to as ‘prescribed experiential learning cycles’, or ‘improvised dialogues’, which is likened to an open discussion regarding a problem. Dissemination routines could take the form of reports, briefings or documents that are utilized to communicate the outcomes of meetings with staff (Hong et al, 2006). These routines appear much more specific to the authors’ research context, provide less of a generalizable typology of organizational routines, and thus are not a suitable framework for this study, however, they are included here to explain why routines, more generally, were considered important, but ultimately omitted from Hong et al’s (2006) map of knowledge repositories.

The importance of organizational routines is outlined by Feldman & Pentland (2003); Levitt & March (1988) built upon the work of Cyert & March (1963) in their research by recognizing the existence and importance of such organizational routines whilst developing their ideas around organizational learning. Defining the scope of such routines, the authors argue *“The generic term "routines" includes the forms, rules, procedures, conventions, strategies, and technologies around which organizations are constructed and through which they operate”* (Cyert & March, 1963 p.320). Embedded within this conceptualisation, is an appreciation of the recurrent nature of such practices, which serves to differentiate a routine from a one-off exercise or solution. Reviewing this definition, the ‘technology’ component provides certain leeway to integrate the use of information systems (Davenport, De Long & Beers, 1998) and tools (Kane & Alavi, 2007)

within the broader concept of routines. Furthermore, social networks (Walsh and Ungson, 1991), both embedded (Gulati, 1999) and arm’s length (Geneste & Galvin, 2013), can be accounted for within the ‘social interaction’ dimension of Hong et al’s (2006) forms of knowledge repository, thus representing a more holistic framework in keeping with more contemporary, and broader discussions, such as that provided by Argote & Miron-Spektor (2011). A visual illustration of this framework is presented in Table 4.

**Table 4. Types of knowledge repositories**

<b>Forms</b>	<b>Examples</b>	<b>Literature</b>
Physical Artefacts	Products/Product samples	Hong et al (2006)
Canonical Documentation	Instruction documents	Walsh and Ungson (1991) Gulati (1999)
Personal experience	Experience of OEDM available for sharing	Argote and Ingram (2000)
Social interaction	Discussions regarding product specifications/requirements with a supplier/customer.	
Off the job training	External personnel development training courses (e.g. course on weld maps implementation)	
Routines	Utilizing engineering change notes  Tools: Information Systems (e.g. stock control software)	(Cyert & March, 1963)  (Davenport, De Long; Beers, 1998)

		(Kane & Alavi, 2007)
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**Table 4 (Continued)** *Adapted from Hong et al (2006)*

Thus, this study will utilize an adapted version of Hong et al's (2006) typology of knowledge repositories, with the addition of the broader concept of organizational routines as discussed above (Cyert & March, 1963). Application of said typology should serve to provide the basis for a more holistic analysis of knowledge repositories emerging from embedded and arm's length relationships.

#### **2.11.6 Standard Operating Procedures**

A review of the literature reveals that standard operating procedures (SOPS) are applied in a diverse range of fields, including education, aviation, engineering, medical science and the military. In a manufacturing context these are often linked to a set of process improvement techniques and philosophies, e.g. Kaizen or Six-Sigma (Berger, 1997; Hoerl, 1998). Imai (1986) states "*there can be no improvement where there are no standards*" (p. 74), which epitomizes the rationale behind adopting standard procedure. Furthermore, Hoerl (1998) argues quality is ensured via the management and maintenance of 'the quality system', which utilizes SOPs to ensure product standards. These standards also represent knowledge repositories, often in the form of routines and canonical documentation, which as argued below, can be transferred within networks. Transfer of SOPs within firms may improve best practice, but also breeds homogeneity within dyadic relationships (Galazkiewicz & Wasserman, 1989). Further investigation into the consequences of such

activity from an innovation perspective could highlight trade-offs that need to be made between adhering to best practice and radical innovation within embedded relationships.

### **2.11.7 Knowledge Repositories & Networks**

Whilst, Hong et al (2006) identified such repository transfer can occur in foreign organizational subsidiaries, there is no logical impediment restricting their transfer within inter-firm relationships, indeed, the work of Walsh and Ungson (1991) & Gulati (1999) would indicate this is the case. If we review these forms of knowledge repository against our definition of arm's length and embedded relationships it is evident that physical artefacts and canonical documentation are tangible artefacts, the latter representing explicit knowledge, which can easily be transferred in the briefest of exchanges (Dyer & Singh, 1998) However, whether such relationships facilitate their creation, is under-researched. Literature would argue that embedded ties, particularly vertical relationships can facilitate the joint creation of products (Tsai, 2009). Joint product development with suppliers (Nieto & Santamaria, 2007; Bouslah, Gharbi & Pellerin, 2014) and customers (Brockhoff, 2003; vonHippel, 2010; Balka, Raasch & Herstatt, 2014) is a firmly established phenomenon in the academic literature; therefore one would expect the more collaborative inter-firm relationships studied to demonstrate such activity.

Logically speaking, 'off-the job training' can also be delivered at arm's length, in the sense that the tutor(s) and students may have little expectation of seeing each other again in their relatively un-enduring relationship, significant research has been conducted on this practice in embedded, customer-led supplier development initiatives (Krause *et al*, 2007), and if the material was revised in any way to accommodate the latter's circumstances, this would represent 'creation'. Finally, arm's length relations can also be postulated as facilitating social interactions, via storytelling and dialogue and the sharing of personal experience, although the degree is debatable given the complexity of the knowledge/skills

being transferred (Hansen, 1999). Given the one-off nature of arm's length relationships, such repositories are created by virtue of being utilized.

**Table 5. Forms of Knowledge Repository**

<b>Author</b>	<b>Types of Knowledge Repository</b>
Blackler (1995)	Encoded  Embedded  Embodied  Encultured  Embrained knowledge
De Long & Beers (1998)	External Knowledge  Structured Internal Knowledge  Informal Internal Knowledge
Hong et al (2006)	Physical artefacts;  Canonical  Documentation;  Personal experience  Social interactions;  Off-the-job training

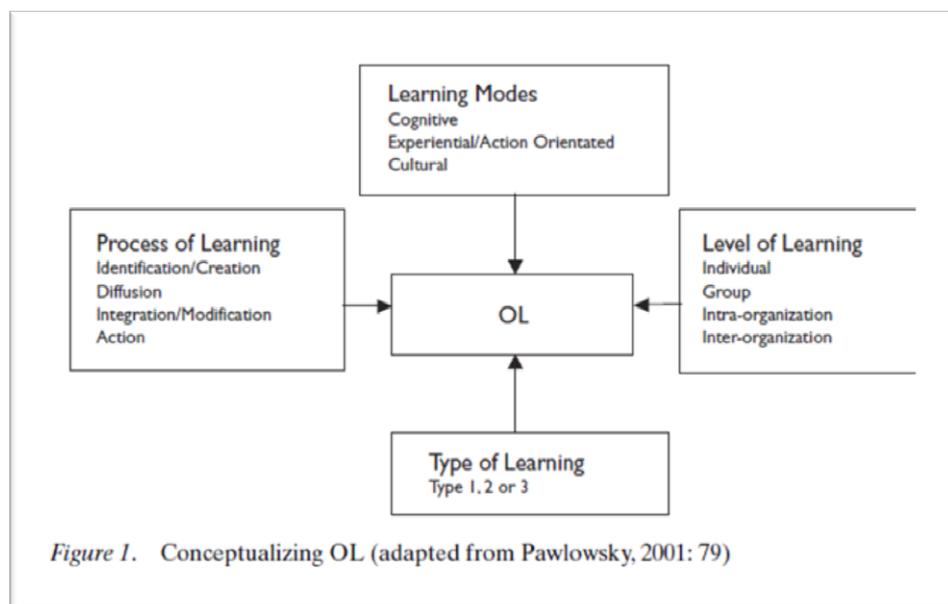
Understanding the nature of repositories created within different forms of inter-firm relationships could provide an insight into knowledge creation processes and the nature of innovations. Table 5 presents 3 of the main knowledge repository frameworks reviewed in the literature. Reagans & McEvily (2003), like much of the literature reviewed so far, highlighted that networks can facilitate knowledge transfer, i.e. networks and relationships are knowledge repositories and SME's in particular, can benefit from external knowledge (Van de Vrande et al, 2009). However, the nature of the knowledge repositories created in arm's length and embedded ties remains under-explored. Literature highlights that arm's length relationships can only facilitate the transfer of explicit knowledge; therefore it stands to reason that task sequences and tools can be transferred via such ties. Furthermore, it is posited that routines can also be created via such ties, as long as their nature makes them amenable to codification, although Nelson & Winter (1982) argue this is often impossible. An exploratory study into the nature of knowledge repositories created within arm's length relationships should serve to either reinforce current conceptualisations of the knowledge contributions such ties can provide, or else re-orientate assumptions and discussions regarding inter-firm innovation and the dominant view of embedded ties as a prerequisite to such activity.

#### **2.11.8 Knowledge Creation Processes**

Nonaka (1994, p.14) argued that "*knowledge is created through a continuous dialogue between tacit and explicit information*" and is acknowledged within the literature as being a function of internal and external learning (Bierly and Chakrabarti, 1996; Zhang et al., 2006). Pawlowsky's (2001) model of organizational learning, which was later adapted by Zhang, MacPherson & Jones (2006) for the SME context (see Figure 7), highlights identifying and creating new knowledge as the first of the four phases of organizational learning. These directly preceded: the diffusion of knowledge, the integration of

knowledge into processes and systems, and the application of that knowledge, which Zhang, MacPherson & Jones (2006) highlight is similar to Kolb's (1984) model, and more recent work in the area. Zhang, MacPherson & Jones' (2006) adapted model is based on their study into the unique learning processes of SMEs, by researching firms based in the North West of England the authors identified that innovative firms were much more likely to have regular contact with external knowledge providers.

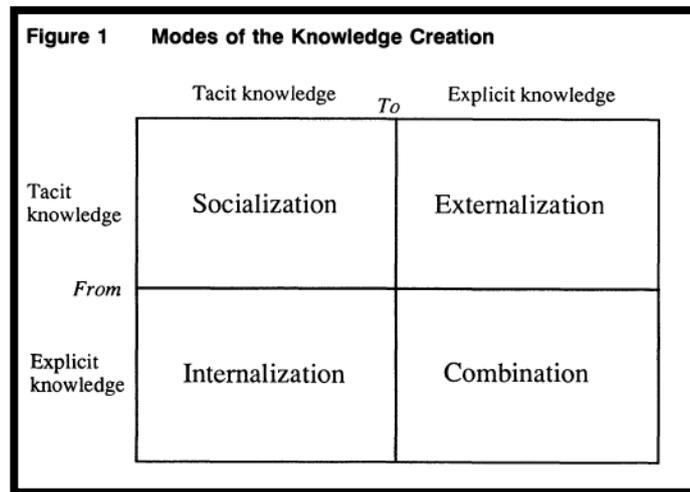
**Figure 7. Zhang, MacPherson & Jones (2006) SME organizational learning framework, adapted from Pawlowsky (2001).**



Nonaka & Nishigushi (2000) argue knowledge transfer and knowledge creation are separate processes, yet extremely difficult to disentangle, Easterby-Smith, Lyles & Tsang (2008) define inter-firm knowledge transfer as “*an event through which one organization learns from the experience of another*” (p.677), in contrast, this thesis investigates the process, drivers and outcomes of the “*continuous dialogue between tacit and explicit knowledge*” (Nonaka, 1994, p.14). However, it is acknowledged that this is essentially a study of inter-firm knowledge creation and can thus overlap with knowledge transfer. It is

partially for this reason that this thesis draws upon Nonaka’s (1994) SECI framework to make explicit how knowledge creation is being conceptualised (see Figure 8). Nonaka and his colleagues developed a multi-stage conceptualization of knowledge creation, highlighting 4 key activities; socialization, externalization, combination, and internalization (Nonaka, 1991; 1994; Nonaka and Toyama, 2003), which has since become known as the SECI model.

**Figure 8. SECI Model of Knowledge Creation**



Source: Nonaka (1994)

Socialization is said to be the process of “*creating tacit knowledge through shared experience*” Nonaka (1994, p.19), such tacit knowledge can be transferred without language, much like an apprentice observes, imitates and practices the work of a master craftsman. Combination occurs via social processes, such as meetings and phone calls, and involves the combination of different sets of explicit knowledge. Nonaka (1994) postulates that adding, sorting, categorizing and re-contextualizing of explicit knowledge represents knowledge creation activity which can result in new explicit knowledge being born. The next two forms of knowledge conversion pertain to interaction between tacit and explicit

knowledge sets. Externalization represents the process of turning tacit knowledge into explicit knowledge, whilst internalization, likened to traditional understandings of 'learning', represents the process of turning explicit knowledge into tacit knowledge. Organizational knowledge creation is said to occur when all aforementioned modes of individual knowledge creation are "*organizationally managed to form a continual cycle*" (Nonaka, 1994, p.20), this process begins at the individual level, transitions through collective and organizational levels and can manifest at the inter-firm level (Maskell, 2001; Rutten, 2004).

### **2.11.9 Critique of SECI**

In his critique of Nonaka's conceptualization of the knowledge creation process, Gourlay (2006) presents a revised framework to describe the phenomena, addressing his own criticism of Nonaka (1991; 1994; Nonaka and Toyama, 2003) for utilizing a subjective definition of knowledge creation and arguing the framework inherently omits tacit knowledge from the process. Gourlay's (2006) revised framework takes into account how different behaviors can act as a catalyst to different forms of knowledge, most notably the author draws upon the work of Dewey (1916; 1930 in Gourlay, 2006) to differentiate between reflective and non-reflective behavior, linking the two to explicit and tacit knowledge, respectively. This differentiation between explicit and tacit knowledge and their link to different forms of behaviour in the knowledge creation process represents an intriguing avenue for further research. Adopting Gourlay's (2006) revised framework, whilst acknowledging Desouza & Awazu (2006) review in light of the SME context, should provide an effective platform to further embed this comparative study in prior management theory. Especially given the research objective to comparatively review innovation and knowledge creation between collaborative and arm's length relationships,

and considering that literature highlights arm's length ties can be conduits of explicit knowledge only.

So far this section has discussed growing academic interest in the knowledge management field, the nature of knowledge and the distinction between explicit and tacit knowing. From there debate has progressed to types of knowledge and its creation by referencing and integrating Hong et al's (2005) typology into related work on routines and standard operating procedures, and exploring their transfer within inter-firm networks. Finally, various frameworks outlining the process of knowledge creation has been discussed with explicit reference to several iterations of Nonaka's (1994) SECI framework.

This section concludes with a discussion of knowledge creation in SMEs, how this occurs in the network context with specific reference to arm's length and embedded ties, and ends with a consolidation of the areas for future research outlined throughout this segment.

#### **2.11.10 Knowledge Creation in SMEs**

Desouza & Awazu (2006) have since criticized Nonaka's SECI framework for inadequately representing knowledge creation in small to medium-sized enterprises and thus developed the Seca framework. The revised framework was based on a study of 25 SMEs and highlighted the dominant role socialization played, above the other three activities. However, their sample could be criticized for focusing on relatively smaller (<100 employees) and younger (<5 years old) enterprises than are often examined in SME studies. In their review of knowledge management studies within the SME context, Durst & Edvardsson (2012) highlighted that knowledge creation in the SMEs context was significantly under-researched. In fact, they only found 6 empirical studies published since 2001. A review reveals that the limited work on knowledge creation within SME's features

both qualitative and quantitative studies, featuring interview data and case study research designs, in addition to surveys.

SME's rarely manage knowledge formally due to resource limitations, and it is argued their own knowledge management advantage is that they have little knowledge to manage (Desouza & Awazu, 2006). Egbu et al (2005) complement this point, highlighting that SMEs can find managing the knowledge creation process challenging, due to resource limitations and argued this hinders access to external sources of advice and expertise.

However, Hutchinson & Quintas (2008) discovered that SME do utilize both formal and informal knowledge creation approaches, and that these were specifically practiced to develop and improve products and services. In fact, in their study of 300 Spanish SMEs, Lopez-Nicolas & Soto-Acosta's (2010) structured questionnaire and face-to-face survey results identified that ICT systems facilitated all 4 SECI processes due to their information sharing capacity.

In their exploratory study of 5 small software firms, Spraggon & Bodolica (2008) discovered knowledge creation was facilitated by 5 interaction processes, namely; formal meetings; external interaction; informal communities; information technology-tools and project teams. With the exception of information technology-tools, all these were argued via the process of socialization, which is congruent with the arguments of Desouza & Awazu (2006); IT tools occurred via a mixture of externalization and combination processes.

Matlay (2000) argues that knowledge creation in SMEs is likely to originate from the most skilled employees, whilst Tolstoy (2010) argued network development, the process of establishing routines facilitating the transfer of knowledge, facilitated knowledge creation in international entrepreneurial firms operating in foreign markets. Of particular relevance

to this thesis is Tolstoy's (2009) study into international entrepreneurial firms, which identified that knowledge combination was positively related to knowledge creation, meaning renewing knowledge by combining it in new ways aided these firms in the development of new products and procedures. Furthermore, Tolstoy (2009) identified that entrepreneurial firms perceived customer networks as highly valuable in such combination activity, but suppliers were not. Since combination inherently refers to the transformation of explicit knowledge (Nonaka, 1994), this could indicate that arm's length relationships play a vital role in such innovation. Tolstoy's (2009) work complements the findings of (Haksever, 1996), who argued SMEs are in a strategically advantageous position in regards to interacting with their customers and involving them in the knowledge acquisition process as smaller firms tend to be socially closer to them.

#### **2.11.11 Knowledge Creation & Tie Strength**

Blomqvist & Levy (2006) argue knowledge creation is social in nature, making relationships crucial for knowledge creation. With regard to knowledge creation in embedded ties, the literature postulates high degrees of interaction makes individuals more accessible and helpful (Cross & Sproull, 2004), demonstrate greater levels of trust (Levin & Cross, 2004) and renders parties more likely to offer assistance within a relationship (Seibert, Kraimer & Linden, 2001). Furthermore, it is posited that private knowledge, beyond the common domain, is transferred within the remit of such ties (Szulanski, 1996), in addition to communicating tacit knowledge much more efficiently (Polanyi, 1966; Uzzi, 1997). However, codified knowledge can be communicated extremely efficiently in arm's length relations (Hansen, 1999), which provide access to novel ideas and require limited resource investment to maintain (Uzzi, 1997; Geneste, 2010).

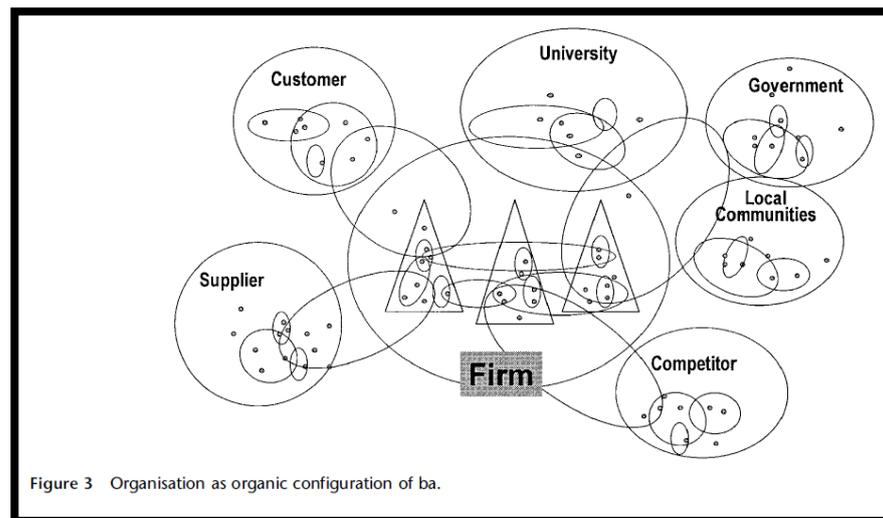
Thus far, inter-firm knowledge creation has been highlighted as a means by which SMEs can innovate (Lechner & Dowling, 2003). Lechner & Dowling (2003) discovered that strong ties facilitated knowledge creation in SMEs, somewhat complementing the logic of Dyer & Singh (1998), as their intense and trusting nature aided the socialization processes outlined by Nonaka (2004), whereas weak ties are purported as aiding knowledge acquisition. However, a review of the SECI model would indicate that knowledge creation, as conceptualised by Nonaka's (2004), is also likely to occur in arm's length relationships, as Dyer & Singh (1998) highlight explicit knowledge can be transferred in such relationships and *combination* represents one of the modes of knowledge creation. It stands to reason that combining different sets of explicit knowledge, either via simply adding to it or, by the very fact it is re-contextualized within a different organization. Therefore, it is proposed that both arms' length and more collaborative relationships both facilitate knowledge creation, but whilst the former may only be limited to *combination* on the SECI model, the latter can facilitate greater knowledge creation via *socialization*. However, given Desouza & Awazu's (2006) assert socialization is the dominant mode of knowledge creation in SMEs, this would infer collaborative ties are much more likely to generate knowledge frequently.

#### **2.11.12 Ba**

Nonaka & Toyama (2003) integrated Nonaka et al.'s (2000) prior work on the development of 'ba' into knowledge creation theory. 'Ba' is conceptualised as "*a continuously created generative mechanism that explains the potentialities and tendencies that either hinder or stimulate knowledge creative activities*" (Nonaka & Toyama, 2003, p.6), Ba is considered a dynamic, knowledge creating place which can span temporary meetings, individuals and email groups and extends beyond firm boundaries (see Figure 9).

The inter-firm nature of Ba lends itself well to the study of inter-firm knowledge creation and innovation, particularly given the transient nature of many arm's length ties, which the concept encapsulates. Nonaka & Toyama (2003) differentiate between the similar concept of communities of practice (Lave & Wenger, 1998), by stipulating Ba as constantly shifting and 'in the here and now', rather than referring to relatively fixed communities. Nonaka & Toyama's (2003) argument that communities of practice (COP) are stable and can take time for participants to identify and become a full member of, and as argued above, do not facilitate the arm's length knowledge transfer concept as well as Ba, which is why COP feature little in this thesis.

**Figure 9. Diagram representation of 'Ba'**



Source: Nonaka & Toyama (2006)

Based on a review of work it is predicted that knowledge identified and created in relatively short, arm's length engagements will represent codified, explicit knowledge (Nonaka, 1994; Uzzi, 1997; Dyer & Singh, 1999) primarily delivered via documentation (e.g. a client brief, project specifications), whilst collaborative ties will diffuse both explicit and complex, tacit knowledge, the latter being diffused via a combination of meetings,

phone calls, discussion and co-creation activity (Uzzi, 1997; Grant & Baden-Fuller, 1995; Inkpen, 1996).

A review of the literature highlights that the nature of knowledge creation within arm's length relationships is an underexplored phenomenon (Lechner & Dowling, 2003). Whilst knowledge creation in embedded relationships is a fairly well established phenomenon (Inkpen, 1996), whether knowledge can be created in arm's length relationships, and the nature of this process, remains elusive. Therefore, this thesis attempts to discover how SECI processes manifest in different forms of relationships, and how such processes inform the nature of emergent knowledge repositories and innovation. This analysis represents a novel contribution to the literature by drawing upon the contemporary SECI model of knowledge creation in SMEs (Nonaka, 1994; Gourlay, 2006; Desouza & Awazu, 2006) to compare and assess the unique manner in which knowledge creation occurs within dyadic, arm's length and collaborative inter-firm relationships. The above objectives will contribute to a more nuanced understanding of the nature of innovation process in arm's length and collaborative relationships.

## **2.12 Innovation Outcomes**

Thus far this chapter has reviewed the development of strategy and inter-firm relations as respective fields, and plotted how these two separate subjects became inter-twined due to the emergence and popularity of core capabilities, resource and embedded perspectives in strategic management. The relative strengths and weaknesses of arm's length and more collaborative relations has been reviewed in light of prior research, their importance to successful knowledge creation and problem-solving in SMEs has been highlighted. The following section discusses innovative outcomes, including product & service, new market identification and process innovation and how they occur in SME relationships.

At this point it should be noted that radical and incremental innovation are referred to throughout this thesis, for the sake of clarity this study draws upon the work of Kim et al (2012) to define incremental innovation as "*minor changes of existing technologies in terms of design, function, price, quantity, and features*" (p.291), whilst "*radical innovations encompass higher order innovations that serve to create new industries, products, or markets*" (p.23). Generally, radical innovation is considered more exploratory in nature and features more uncertainty (Kim et al, 2012).

### **2.12.1 Introduction**

The innovation advantages networking provides are considerable, and well established in the literature. Access to new technologies and markets (Chatterji, 1996; Ranft & Marsh, 2008), pooling complementary capabilities (Eisenhardt & Schoonhoven, 1996), sharing risk (Grandori, 1997), accessing external knowledge (Powell et al, 1996) and reducing product time to market (Almeida & Kogut, 1999) have all been highlighted as potential benefits of collaboration. Geneste & Galvin's (2013) study of Australian SMEs

documented how trust adds to SME owner knowledge acquisition in weak client-firm exchange relationships, providing vital empirical evidence supporting the assertion that significant knowledge acquisition can occur in arm's length relationships, a notion that runs somewhat counter to recent arguments to the contrary (Adler, 2001; Norman, 2004), and directly challenges Dyer & Singh (1998) assertion that such relationships are devoid of trust (Geneste & Galvin, 2013).

### **2.12.2 Product & Service Innovation**

Firms are increasingly aware of the strategic imperative to collaborate (Huston & Sakkab, 2006), in fact, a review of the research indicates networks, rather than organizations, are increasingly becoming the focal point of study, in regard to innovation (Colombo et al, 2012; West & Bogers, 2014; Schneckenberg, 2015). This is partially because industries are becoming increasingly complex, and products can require the combined and coordinated efforts of multiple actors to manufacture (Brusoni, Prencipe & Pavitt, 2001). Thus, it comes as little surprise that many technological breakthroughs are the culmination of contributions from numerous actors (Bougrain & Haudeville, 2002).

#### ***2.12.2.1 Networked Product & Service Innovation***

Networks and collaborative relationships have been highlighted as hugely useful accessing valuable, external knowledge (Lavie, 2006), and such external knowledge has been highlighted as playing a key role in the development of new products (Marion et al, 2015). The innovation advantages networking provides are considerable, and well established in the literature. Access to new technologies and markets (Leischnig, Geigenmueller & Lohmann, 2014), pooling complementary capabilities (Griffith & Dimitrova, 2014), sharing risk (Jack & Suri, 2014), accessing external knowledge (Ritala et al, 2015) and

reducing product time to market (Parker & Brey, 2015) have all been highlighted as potential benefits of collaboration. Different types of relationships have been highlighted as providing distinct innovative advantages, for example; DePropriis (2002) identified that product and radical innovations were positively associated with both supplier and customer cooperation.

Deeds & Hill (1999) highlight that SMEs are particularly reliant on inter-firm relationships for external knowledge sourcing, as resource limitations mean entrepreneurial firms find it difficult to develop new products due to increasing their increasing complexity and R&D costs. This is evidenced by the work of Sarkar, Echamabdi & Harrison (2001) who demonstrated alliances, acting as conduits of complementary know-how, improved SMEs performance on various dimensions, including market and product development. The literature highlights the majority of SME relationships take the form of clients, therefore, much of the benefits bestowed upon these firms is likely to occur via these customers (vonHippel, 1987). Yli-Renko, Autio and Sapienza (2001) study gives credence to this argument, citing that entrepreneurial firms that utilised key customers for market and technological knowledge highlighted superior new product development rates. Open user innovation literature (vonHippel, 2010; Balka, Raasch & Herstatt, 2014) also provides substantial support for these claims. However, Whittaker, Fath & Fiedler (2014) highlighted the age of the SMEs as having a mitigating effect on collaboration, training and innovative performance, as measured by revenue attributed to new or significantly improved products within a 3 year period. Highlighting that whilst young firm's collaborative endeavours (accessing external resources) often result in improved innovative performance, both collaboration and training (i.e. focusing on the development of internal capabilities) are required in older SMEs to ensure similar benefits. Furthermore,

such a practice was warranted as incremental innovation was positively related to sales turnover growth.

Regarding the types of innovation SMEs engage in; Oke, Burke & Myers (2007) discovered small to medium sized enterprises focused more on incremental rather than radical innovation, due to growth in sales turnover. Indarti and Postma (2013) found that interaction quality, as indicated by the depth of knowledge absorbed from numerous external ties and tie intensity (gauged by frequency of interaction) is superior to tie diversity in facilitating product innovation in SMEs. Since frequency of interaction is, by this thesis' definition, generally expected to be lower in arm's length ties than more collaborative ones, such a result serves to perpetuate current state of thought on the literature regarding the relative innovative potential of arm's length and more collaborative ties. In a similar study, Tomlinson and Fain (2013) conducted an analysis into the co-operation and innovation habits of 371 UK based manufacturing SMEs using panel data. Their study highlighted that product innovation was facilitated by the strengths of 'cooperative' ties, but the same benefits were not yielded from close ties with rivals. The study's primary thesis was that good, close dyadic ties benefit SME innovation activity (Tomlinson & Fain, 2013). However, the authors do state that in order to avoid the perils of over-embeddedness (Granovetter, 1973; Uzzi, 1997), research into identifying the 'appropriate level' of co-operation for SMEs could ensure such firms make effective use of finite resources. Furthermore, Ordanini & Parasuraman (2010) study of luxury hotels concluded that collaboration with customers and business partners facilitated an increase in service innovation volume and radicalness respectively. Therefore it is proposed:

***Proposition 5a: Product innovation is likely to be facilitated by embedded ties.***

***Proposition 5b:*** *Service innovation is likely to be facilitated by embedded ties.*

In a contrasting study, Rosenbusch et al's (2011) meta-analysis of SME innovation studies highlighted that innovative projects that invoked collaboration with external partners did not actually increase the performance of small to medium sized enterprises. This is intriguing given the huge emphasis on, and encouragement of, networked innovation in the strategic management domain, a field primarily interested in superior performance and crafting a competitive advantage. Rosenbusch et al (2011) hypothesized that such findings may be due to the increased complexity inter-firm collaboration adds to an already taxing activity, i.e. organisational innovation in firms which typically do not have substantial resources to begin with. A further explanation is provided, citing how resource scarce SMEs may fail to obtain favourable terms in such arrangements, and therefore may fail to accrue an adequate ratio of subsequent revenues to generate substantial profits.

Partanen, Chetty & Rajala (2011) made an initial step in this direction, by utilizing case studies of 4 Finish, science and technology SMEs to examine the specific impact different forms of network relationships have on types of innovation. The research identified both systemic and autonomous forms of radical innovation required greater input from strong relationships with customers, whilst incremental innovations can be commercialized via a variety of downstream network types (distributors, distribution partners and agents).

However, Partanen, Chetty & Rajala's (2011) study has limitations; firstly, their conceptualization of innovation is only limited to systemic, autonomous, radical and incremental forms of product innovations which have subsequently been commercialized. In their longitudinal case study of an international conglomerate's independent business

unit, Durmusoglu, Calantone, and McNally (2013) discovered that firms pursuing an organic growth strategy focusing on income expansion via the development of new to the firm products and service, should do so incrementally, ensuring proficiency in the commercialization process. In this manner, firms quickly demonstrate the effectiveness of such an organic growth strategy, whilst also developing and testing '*cross functional new product development teaming skills*' (p714). Thus, the impact arm's length and more collaborative relationships have on internal SME process and administrative innovation arguably still remains to be established. Furthermore, the study pertained to a relatively limited sample of four Finish, science and technology SME products. Changing the firms sampled or industries studied could have resulted in demonstrably different findings, particularly when you consider the research focused on only four product innovations.

### **2.12.3 Process Innovation**

Damanpour & Gopalakrishnan (2002, p.48) define process innovation as "... *new elements introduced into an organization's production or service operations (e.g., input materials, task specifications, work and information flow mechanisms, and equipment) to produce a product or render a service*". Broadly, process innovation can thus be regarded as referring to internal change within an organization. Rosenbusch et al (2011) argued that SMEs derive the greatest benefit from adopting an innovative orientation, rather than simply striving to develop innovative products. Such a focus can benefit small to medium sized enterprises by facilitating a challenging organizational culture, developing risk analysis and risk taking strategies. Thus, the 'innovation tasks' (Rosenbusch et al, 2011), synonymous here with internal process innovation and if/how arm's length and collaborative relations support the development thereof represents an intriguing avenue for this study. Hartley & Choi (1996) discovered that General Motors were able to boost

supplier productivity by 50%, lead times by 70% and inventory reductions by 70%, on average, during their supplier development projects. In a similar example, Kotabe, Martin & Domoto (2003) highlighted that car manufacturer's suppliers benefited from improved product quality, lead time, and process and product design due to inter-firm knowledge transfer. Finally, in the SME context, Yli-Renko, Autio & Sapienza (2001) highlighted that SME knowledge acquisition was highly effective at improving the efficiency of young firm's operations. These studies indicate that knowledge transfer can result in both MNE and SME efficiency and process innovation, and collaboration can facilitate such activity. However, in their study of industrial SMEs, Westerlund & Rajala (2010) highlighted that whilst product innovation facilitated and benefited from explorative, inter-firm collaboration-induced learning, process innovation was often more attributed to more exploitative internal, intra-organizational learning. In regard to the types of innovation different relationships can facilitate, Freel & Harrison (2006) discovered that process innovation in small firms was more related to cooperation with suppliers and universities, rather than product innovations, which were more often attributed to public sector and customer collaboration. DePropris (2002) supported these findings, and identified that process and incremental innovations were related to cooperation with a firm's suppliers. However, Chipika & Wilson's (2006) study into Zimbabwe-based, light engineering SMEs conclude that customer networks actually aid the development of processes, in terms of productivity and quality, whilst product innovation requires the additional involvement of Enterprise Support Organizations. Finally, Tomlinson and Fai's (2013) aforementioned study on 371 UK based manufacturing SMEs highlighted that the strengths of 'cooperative ties' supported process innovation. Thus it is proposed:

***Proposition 5c: Process innovation may be facilitated by embedded ties.***

#### **2.12.4 New Market Discovery**

Expansion into new markets presents an alternative means of growth for SMEs than product innovation (Carter & Ram, 2003; Carter et al., 2004; Navarro et al. (2012). This is particularly relevant for this thesis, because such opportunities could often be communicated via explicit knowledge which can be transferred in arm's length exchanges. It is well within reason that SMEs may be 'tipped off' regarding an alternative application for one of their products or services, by an inquiry from a third party operating in a new market. For example, a potential customer may ask whether an SME's sealed, steel doors marketed to cargo ship manufacturers, may be equally applicable to laboratories in the biochemical industry. Hite and Hesterly (2001) demonstrated that networks are an effective means of allowing SMEs to gain access to new markets and innovation sources. In fact, Lynn & Reinsch (1990) noted that 41% of business opportunities identified by diversifying small businesses came in the form of tip offs from other people, a notion complemented by the work of Soh (2003). Daneels (2002) study also supports this claim, citing the importance of both exploring new customers, and developing a clear undertaking of the needs of those new customers. Such exploration and awareness can be effectively achieved by seeking out and establishing relationships with potential customers from these new markets. Furthermore, the acquisition of external resources by SMEs engaging in proactive alliances is highlighted by Sarkar, Echambadi & Harrison (2001) as enabling new market entry. In a final example, highly relevant to this study of arm's length and collaborative relationships, Elfring and Hulsink's (2007) study of strong and weak ties (differentiated by closeness, tie duration and relationship depth) highlighted that finding new business opportunities were more likely to arise from weak ties, strong ties and weak ties on the other hand, were both required for more radical innovations (Rolfo & Calbrese, 2003). Therefore it is proposed:

***Proposition 5d:** Innovation is facilitated in ALRs because they are less resource intensive and lead to identification of new markets.*

This section has reviewed literature of the outcomes of networked SME innovation, these have been broken down into product innovation, process innovation and discovering new markets.

### **2.12.5 Conclusion**

It has been argued that problem-solving, knowledge creation and subsequent innovative outcomes all fall under the broader term or process of innovation. Furthermore, a review of the literature reveals work on networked knowledge creation, problem-solving and innovative outcomes, much like comparative studies of the performance, knowledge and innovative implications of maintaining strong and weak ties, often refer back to the debate regarding exploration and exploitation (Levinthal & March, 1993). In general, research into both networked problem solving and knowledge creation activity fundamentally lean in favour of collaboration. In light of the review of studies into networked SME process innovation, the nature and value of process innovation induced by arm's length and more collaborative relationships, respectively, still remains to be established. Rosenbusch et al's (2011) aforementioned findings regarding the benefits of adopting an innovative orientation, which were argued to result in larger brand equity, finding better collaboration partners, and attracting highly skilled employees, are especially intriguing given than the only other major comparative study into the relative impacts arm's length and embedded ties had on innovation (Partanen, Chetty & Rajala, 2011), only considered products. Therefore, the respective innovative potential of such ties is still remains relatively underexplored. This thesis attempts to address this gap by exploring instances of product,

service, process innovation and new market identification in both arm's length and collaborative relationships. Furthermore, this will be underpinned by an examination of the nature of problem-solving activity, knowledge creation activity and the underlying drivers for innovation.

Furthermore, whilst comparative studies of innovation within weak and strong ties do exist, these are often quantitative in nature and generally simply attempt to measure the implications of managing diverse portfolios of such ties in different contexts and altering mediating variables. Explorative comparison studies are in the minority, and one which assess the nature of knowledge creation and problem-solving within arm's length and collaborative relationships have not been discovered, but will serve to form a more sophisticated debate which moves a step beyond simple exploration/exploitation arguments.

Furthermore, particular emphasis was placed on the relatively few studies that examine the respective innovation contribution arm's length and embedded ties can make to SMEs, with an aim to identify deficiencies and make a significant contribution to the literature. Partanen, Chetty & Rajala's (2011) comparative study of strong and weak ties and the types of innovation they espouse in SMEs is the most similar to this thesis in nature than any other article reviewed. However, the authors focused primarily on commercialised product innovation in 4 SMEs operating in an open economy, whilst this thesis is more holistic in the respective contribution arm's length and embedded ties make to product, service and process innovation, and highlighting the subtle differences in how such innovations are diffused in such ties.

### **2.13 Summary**

This literature review has provided a brief overview of the chronological development and focus of strategy research, and described how it's inter-twining with network, innovation and knowledge theories, in the SME context, has led to scholar's current focus on networked & open innovation (Colombo et al, 2012; West & Bogers, 2014; Schneckenberg, 2015).. Furthermore, this chapter has argued how sociological theories of embeddedness (Granovetter, 1985), internal and capabilities focused theories of strategy (Penrose, 195; Leonard-Barton, 1992), have contributed to the resource, knowledge and network-based lenses currently employed to study these contemporary areas of research (Barney, 1991; Grant, 1996; Lavie, 2006). Debates regarding the relative value and optimum arrangement of strong/weak, informal/formal and arm's length/embedded ties are still on-going (Granovetter, 1973; Burt, 1992; Uzzi, 1997; Partanen, Chetty & Rajala, 2011; Geneste & Galvin, 2013). But the vast majority of knowledge-based driven studies in strategic management still primarily focus on embedded ties. Despite this, crowdsourcing and research into mass problem-solving is becoming increasingly popular (Prpić, Shukla, Kietzmann, McCarthy, 2015; Benner & Tushman, 2015; Boss, Kleer, Vossen, 2014), and a substantial analysis of the specific innovative potential of arm's length relationships could help refine the theoretical underpinning of such contexts.

Furthermore, contemporary networked SME innovation literature is focused on finding solutions to the significant challenges collaboration present (Colombo et al, 2012). This study aims to contribute to research by establishing how arm's length and embedded ties vary in their innovative and knowledge outputs, by simultaneous comparing relationships in a holistic manner. From an innovation perspective; the nature and dissemination of arm's length and embedded tie-induced product, service, process and business model innovations are studied. From a knowledge perspective, problem solving and the nature of

knowledge creation, in the form of processes, in-use & unutilized knowledge repositories and solutions are analysed. Knowledge creation in arm's length relationships has been highlighted as a particularly under-researched area. Furthermore, isomorphic pressures are explored in an effort to understand their role moderating the innovation process. This research will contribute to work attempting to ascertain the relative strategic and innovative value arm's length relationships in comparison to their more embedded counterparts, and develop our understanding of how best to organize SMEs portfolio of relationships in-light of significant resource limitations (Van de Vrande et al, 2009; Partanen, Chetty & Rajala, 2011; Colombo et al, 2012), and bearing in mind each firm's unique social context and neo-institutional pressures these contexts assert. A summary of the propositions drawn from the literature are outlined below in table 6.

**Table 6. Summary of initial propositions**

<i>Theme</i>	<i>Proposition</i>	<b>Relevant Literature</b>
<i>Problems</i>	<i>Proposition 1a: Innovation will be facilitated in strongly embedded relationships because they are conduits of tested, efficient solutions.</i>	Berger (1997) Hoerl (1998) (Galaskiewicz & Wasserman, 1989)
	<i>Proposition 1b: Innovation may get hindered in strongly embedded relationships because isomorphic pressures lead to convergence in the innovation process.</i>	(Galaskiewicz & Wasserman, 1989) Lai, Wong & Cheng (2006)

	<b>Proposition 1c:</b> <i>Novel innovation may be more supported by arm's length relationships because of limited isomorphic pressures.</i>	Lechner, Frankenberger & Floyd (2010) Terwiesch & Xu (2008)
	<b>Proposition 1d:</b> <i>Innovation may be hindered by ALRs because they are likely to impede the efficient transfer of best practice.</i>	Berger (1997) Hoerl (1998)
	<b>Proposition 2a:</b> <i>Innovation may be supported by more collaborative relationships because they are more likely to identify commonly occurring problems in the innovation process.</i>	Batterlink et al (2010) (Shah & Tripsa, 2007) vonHippel (2010)
	<b>Proposition 2b:</b> <i>Innovation may be supported by ALRs because problems identified are likely to help orientate broader innovation strategy.</i>	Kessler et al (2012)
	<b>Proposition 3a:</b> <i>Innovation may be hindered by ALRs because SMEs lack the resources to effectively explore and evaluate often ambiguous problems.</i>	March (1991) Van de Vrande et al (2009) Aarikka-Stenroos & Jaakkola (2012)
	<b>Proposition 3b:</b> <i>Innovation may be hindered by arm's length relationships because exploratory</i>	Koput (1997) March (1991)

	<i>problem-solving tends to be more resource intensive.</i>	
	<b>Proposition 4a:</b> <i>Innovation may be supported by ALRS because problem-solving is exploratory and solutions novel in nature.</i>	Terwiesch & Xu (2008) Jeppesen & Lakhani (2010) Hargadon & Sutton (1997)
	<b>Proposition 4b:</b> <i>Innovation is likely to be supported by ALRS because problem-solving activity facilitates greater organizational learning and internal problem-solving capabilities.</i>	Perry-Smith & Shalley (2003)
	<b>Proposition 4c:</b> <i>Innovation may be hindered in more embedded relationships because solutions represent “pre-packaged”, consensus recommendations, breed over-reliance and reduce SME’s internal problem-solving capabilities.</i>	(Galaskiewicz & Wasserman, 1989) Nohria & Garcia-Pont (1991) Uzzi (1997)
<b>Product/ Process/ Service</b>	<b>Proposition 5a:</b> <i>Product innovation is likely to be facilitated by embedded ties.</i>	Echamabdi & Harrison (2001) Yli-Renko, Autio

<b><i>Innovation</i></b>		and Sapienza (2001)
	<b><i>Proposition 5b: Service innovation is likely to be facilitated by embedded ties.</i></b>	Ordanini & Parasuraman (2010)
	<b><i>Proposition 5c: Process innovation may be facilitated by embedded ties.</i></b>	Hartley & Choi (1996)  DePropriis (2002 )  Kotabe, Martin & Domoto (2003)  Freel & Harrison (2006)
	<b><i>Proposition 5d: Innovation is facilitated in ALRs because they are less resource intensive and lead to identification of new markets.</i></b>	Elfring & Hulsink (2007)

**Table 6. (Continued)**

## **Chapter 3: Methodology**

### **3.1 Introduction**

The last chapter reviewed the literature on inter-organizational relationships across the collaborative continuum. The review specifically focused on the drivers of innovation, problem-solving and knowledge creation activity and innovative outputs, including; product /service, process innovation and new market identification within SME networks.

This section builds upon the gaps and propositions identified and generated from the literature review, describing the development of the research questions. The research design for this exploratory study is outlined, including an account and rationale of the epistemology, strategy of inquiry & research methods adopted in this thesis. Arguments for a social constructionist epistemology (world view) and qualitative methodology are presented. Furthermore, the decision to utilize semi-structured interviews as the research method will be discussed. A final section, regarding the research limitations and ethical considerations is also provided. The structure of both the chapter and research design is based upon Creswell's (2009) guidance.

### **3.2 Research Questions & Objectives**

To recap, the aim of this research is to explore the process by which SMEs innovate in collaborative and arm's length relationships. Thus, this thesis aims to:

1. To explore how the nature of the problem identification process, problems and their solutions differ within arm's length and collaborative relationships.
2. To explore how knowledge is created within arm's length and collaborative relationships.

3. To explore the impact of isomorphic and organizational learning induced innovation has on SMEs' innovative outputs and capabilities.

### 3.3 Epistemologies

It is generally regarded as good practice to make explicit, the philosophical ideas underpinning any research project (Creswell, 2009). These basic set of beliefs (Guba, 1990) are referred to by Creswell (2009) as *worldviews*, but several labels have been applied to them over the years, including; epistemologies and ontologies (Crotty, 1998) and paradigms (Lincoln, Lynham & Guba, 2011). In any event, it is accepted that a researcher's view of the world comes embedded with an array of distinct assumptions regarding the manner by which researchers can best understand phenomena (Saunders, Lewis & Thornhill, 2006). This thesis draws upon (Crotty, 1998 .p10) to define ontology as a particular method of understanding "*what is*", and epistemology as method of understanding "*what it means to know*". My epistemological stances are out lined below; ontology is not discussed as it could be argued my ontological position emerges, by default, with the adoption of the social constructionist epistemology. Crotty (1998, p.10) argued that "*ontological issues and epistemological issues tend to emerge together*", meaning it is not necessary to outline ontology separately. This assertion is supported by Hopkinson & Hogg (2007).

The key recurring epistemologies in the scholarly literature are; positivism and constructionism. Often referred to as objectivism and interpretivism, respectively. Objectivism holds that "*meaning, and therefore meaningful reality, exists as such apart from the operational consciousness*" (Crotty, 1998 p.8). In contrast, constructionism embraces a more subjective conceptualization of meaning, holding that "*different people*

*may construct meaning in different ways*” (Crotty, 1998 .p9), even if the phenomenon under examination is the same. Guba & Lincoln, two very prominent methodology scholars, agree and frequently draw from Crotty’s outline of objectivist and constructionist understandings of meaning (Kelnke, 2008). The objectivist stance being the most prevalent in the literature reviewed in the previous section.

### **3.3.1 Social Constructionism**

Social constructionism advocates that people determine ‘reality’, rather than it being a completely absolute and objective phenomenon (Easterby-Smith, Thorpe & Jackson, 2008). Meaning is said to be constructed, rather than discovered (Crotty, 1998).

Furthermore, constructionists claim “*that meanings are constructed by human beings as they engage with the world they are interpreting*” (Crotty, 1998 p.43).

Researchers adopting this stance, recognise that people associate different constructs and meanings to a phenomenon, and such research contributes to knowledge and adds value by attempting to *understand* and elucidate reason for these different perspectives.

Furthermore, meaning is said to emerge out of social interaction (Berger and Luckmann, 1967), rather than being conceptualised at ‘out there’ and waiting to be discovered. This is as opposed to a more objectivist, positivist form of inquiry which attempts to discover causality from external stimuli. Crotty (1998) extends this reasoning, claiming the social construction of beliefs and meaningful reality.

Burr (2003; 2015) argued that social constructionists are so diverse in nature and dimensions that universal characteristics were impossible to identify in practitioners, rather, advocates and practitioners of social constructionist research were highlighted as likely featuring one or more commonly occurring assumptions. These were; ‘a critical stance toward taken for granted knowledge’, ‘historical and cultural specificity’, ‘an understanding that knowledge is sustained by social processes’ and a belief that

‘knowledge and social action go together’ (Burr, 2003, p2-5). In essence, what Burr (2003; 2015) attempts to convey is that social constructionists believe that assumptions and observations do not necessarily align with the nature of the world or ‘what actually exists’. Thus, in the context of this thesis, product innovation may be observed by a participant, and perceived by interviewees, but this does not represent absolute reality. Furthermore, knowledge is dependent on culture, history, social and economic contexts at a given point in time, thence, what one employee or group of employees perceive as innovation in one SME, may be completely different from another firm, and even between groups of practitioners within the same firm. For example, a technical engineering introducing open source accounting software into an SME may not consider such a practice innovation, as existing code is simply being utilized to avoid to developing a package internally, however, management may consider the new system as innovation.

Social constructionists would argue that neither party is closer to the truth, they merely represent competing discourses. Social constructionism also argues that knowledge is socially created in daily interactions between people, and that this process serves to facilitate shared understandings. Thence, knowledge is ‘constructed’ via social processes and, within the context of this thesis, understandings of ‘innovation’ and any other word, are a fabric of participants interactions with the interviewer, their team, organization and their wider social network. Finally, Burr (2003; 2015) argues social constructionists unique conceptualizations of the world informs diverse action, thus if innovation is understood as a primarily serendipitous phenomenon, action may likely follow in the vein by the firm implementing little strategic processes to achieve it.

Critiquing social constructionism, Burr (2003; 2015) agrees with many of Willig’s (2001) concerns, highlighting individual characteristics of the self, bearing in mind social constructionism has strong origins in psychological research, and personal attitudes and

motivations often remain unaccounted for. It is here, in accounting for the experience of being an individual, that the social constructionist philosophy is criticised most often.

### **3.4 Methodology & Methods**

#### **3.4.1 Qualitative Research Methodology**

A qualitative mono-method strategy was adopted in this thesis, in order to explore the various ways in which relationship-induced innovation occurs within manufacturing SMEs. The researcher wanted to gain an understanding of the value different SMEs placed on knowledge derived from relationships, across the collaborative continuum.

The unit of analysis within this thesis is the organization; the data was collected using semi-structured, 1 to 1 interviews with 2-3 staff members within each SME studied. A case study strategy was avoided because these tend to focus on only a handful of organisations, drawing data from a far greater number of participants and triangulating findings with a wide array of additional sources. Whilst the objective of this research is to gain a deep understanding of arm's length and embedded innovation in SMEs, the researcher was wary in this sample that, due to the nature of their value offering, many firms would shun arm's length transaction (especially with regards to customers) and present a clear preference for collaboration. This may be due to the fact that many of the manufacturing SMEs sampled aimed to fill gaps larger manufacturers were unwilling to pursue. Many of the manufacturing firms in this sample gained a significant portion of their revenue from bespoke design and manufacturing, and often times these needed to be integrated into their customer's product. Since they were not dealing with 'off the shelf' products, the nature of the design and manufacturing work was often very collaborative; apart from where the SMEs were literally providing a large amount of standardised product on a commodity basis. The researcher expected this, and therefore, decided to sample a relatively large

number of organisations, larger than that is typically studied in case study research. The qualitative mono-method strategy approach helped gather a range of perspectives from individuals which was likely to include those who worked for SMEs who's prior experience or value offering meant they had a slightly different view of collaborative and arm's length relationships, thus allowing the researcher to gain a deeper understanding of the value of arm's length modes of knowledge transfer, resulting a comparative study which was not skewed by the nature of the organisations under study.

Furthermore, using an alternative approach, multiple mini case studies for example could have opened the thesis up to criticism, as findings could be accused of being too shallow, and failing to provide an accurate account of the organisation as a whole. Generally, the few studies that utilize multiple mini case studies in organizational research often only do so for pilot/initial studies.

To conclude, developing a small number of case studies, i.e. 1 to 4, may have resulted in a skewed comparative study of inter-firm relationships, as it was expected that, by their nature, manufacturing SMEs would be more prone to engage in collaborative engagements due to the nature of their position within the market and their service offering. By increasing the number of organisations being studied, the researcher can benefit from a deeper understanding of the advantages of various forms of networked knowledge creation and problem-solving activity within the innovation process, which may have been otherwise missed, thus creating a richer comparative study.

### **3.4.2 Deductive Qualitative Analysis**

This thesis utilizes deductive qualitative analysis (Gilgun, 2005) to evaluate propositions drawn out of the literature review. Gilgun (2013) argues the pervasive idea that qualitative

research need not find support for hypotheses or engage in theory guided research is linked to the emergence and popularity of Grounded Theory (Glaser & Strauss, 1967). Yet Gilgun goes onto state that “*there is no reason why they cannot test their theories and models qualitatively or do theory-guided research*” (Gilgun, 2013 p.109). It is argued that having a prior conceptual framework, whether this manifests in explicit hypotheses or not, can be important in qualitative research (Gilgun, 2005; 2010; 2013). As Glaser & Strauss (1967) argue, researchers are not without preconceived assumptions and hypotheses, therefore making these explicit from the start makes the research process more transparent and realistic (Gilgun, 2005). One mode of conducting qualitative deductive analysis is “*based on previous research and theory and from which researchers construct hypotheses to be tested qualitatively*” (Gilgun, 2013p.113), whilst another facilitates the iterative refinement of hypotheses upon review of emergent data. In this respect, many qualitative hypotheses (or propositions) are simply statements outlining a link between multiple concepts which serve to guide the research and rarely contain dependent and independent variables (Gilgun, 2014). Such models, as with all qualitative research are not generalizable, but as Gilgun states (2005, p.46) “*in qualitative research, generalizability is not assumed, but must be tested. The issue is whether findings are useful in new settings*”. Generalizability is not claimed, and it remains that any findings emerging from this thesis need to be tested in new contexts to ascertain their transferability to these new settings.

This research project is abductive in nature, in this logic generalizations often emerge out of the existing theory which can manifest in explicit propositions or hypotheses. However, some of the propositions in this study emerge from the data in a more iterative manner likened to abduction (Schvaneweldt & Cohen, 2010). Tavory & Timmermans (2012) describe abduction as “*an inferential creative process of producing new hypotheses and*

*theories based on surprising research evidence. A researcher is led away from the old to new theoretical insights”* (p.170). In this respect, support is sought for existing propositions based on the evidence, in line with Gilgun’s (2005) conceptualization of deductive qualitative analysis, but this evidence also serves to generate new propositions emerging from the data. Hyde (2000, p.82) argues “*deductive reasoning commences with generalisations, and seeks to see if these generalisations apply to specific instances*”. The use of qualitative data collection methods combined with deductive reasoning is beneficial as it facilitates the refinement and evaluation of initial assumptions and propositions derived from the literature, and also facilitates the exploration of new and surprising phenomena as they arise.

### **3.5 Initial Study**

For most quantitative studies, use of a pilot study to test questionnaires is commonly recommended. The use of pilot studies does not fall solely within the domain of positivist research, qualitative research designs can equally benefit from the use of initial studies. A trial run allows the researcher to ensure the research project is implemented successfully (Saunders, Lewis & Thornehill, 2006). Four individual interviews, across two manufacturing SMEs, were conducted for the initial study of this thesis. The primary objectives of this study were to assess the clarity of the questions being asked and the overall effectiveness of the instrument as a means to collect data (Fontana & Frey, 2003). It was paramount that participants clearly understood the questions for meaningful responses to be collected.

For the initial study, four individual, face-to-face interviews were conducted with senior management staff spanning two north east-based, manufacturing SMEs. The first two interviews were with Renegade, a north east-based engineering firm with an increasing

interest in energy and military markets. Participants from Renegade included a marketing manager and senior engineer. The second set of interviews was with Thor, an engineering firm attempting to implement its OEDM (Original Equipment Design & Manufacture) business model. Again, one design engineer and one marketing development manager were interviewed. All four interviews were recorded and subsequently transcribed. The recordings were supplemented with field notes taken by the researcher during the interviews. Interviews lasted between 45 and 70 minutes. Participants were also asked to fill-out a short profile about their company and their own position within it.

### **3.6 Development & Review of instrument**

The interview questions were devised based on the broad topics outlined in the aims and objectives and literature review sections. Despite the inductive nature of inquiry, the researcher was interested in exploring relatively specific knowledge domains within the data collection process; therefore, types & the structure of inter-firm relationships, innovation and its diffusion were explicitly addressed in the questions, albeit in layman's terms. For example, question 9 asked "*Which organizations provide your firm with new knowledge or expertise when your company is seeking advice outside your organization?*"

Terms such as innovation, knowledge creation, and problem-solving were actually defined post-hoc, based on the nature of participant responses, thus remaining faithful to the inductive nature of inquiry. Participants were actually informed the researcher's definition of innovation would emerge from their own conceptualization of the term. In contrast, the term arm's length relationship was the only one to be defined and presented to participants prior to the interviews, this was necessary to ensure the phenomena being compared in this thesis was being explored effectively and to give interview participants a specific idea of

what comprised ‘less collaborative’ ties. Such practice was deemed pertinent to ensure the research areas identified within the literature review were effectively explored.

To avoid repetition, this section will discuss the initial development of the interview questions, and subsequent review following the pilot study. The initial instrument consisted of 13 questions, split into 3 categories. These were; collaborative and non-collaborative relationships, imitation & process development and innovation & network centrality. See Appendix 1 for the tool used to review the pilot interview questions.

### **3.6.1 Research Q1: Collaborative & Non-Collaborative Relationships**

The four questions in section one attempt to explore the participants’ understandings of arm’s length and collaborative relationships, there was a specific focus on their scope and perceived innovative value.

- 1. To what extent are you able to obtain information and knowledge regarding your business from arm’s length ties, relative to your more collaborative partners?*
- 2. How effective have arm’s length relationships been in terms supporting or augmenting your propensity to innovate?*
- 3. How significant have such benefits from arm’s length relationships been relative to those from collaborative ties?*
- 4. Did your company’s treatment or attitude towards these arm’s length partner(s) change as a result of you obtaining valuable knowledge? If so how?*

### **3.6.1.2 Review**

Reflecting on the pilot study, it was felt that the first question should be far more general to orientate the interviewee and help develop rapport. For example, ‘Tell me about your main responsibilities in the organization?’ Following up with a question regarding a big project they’ve been working on recently, just to prime the participants. This was in response to participant’s initial difficulty answering the first few questions, but this problem did not arise when these same questions were revisited further into the interview.

When asked to compare, participants struggled. Perhaps because the questions was presented too early and, although they were familiar with the concepts, were not quite able to compare their relative effectiveness at this point in the interview. However, based on their answers, the researcher could make a comparison in the analysis. Furthermore, the opportunity to ask question 4 never really materialized. I used it to ask other questions that occurred to me in the moment.

The similarity of the questions meant that, even in answer to the first question, participants began answering the 2<sup>nd</sup> and 3<sup>rd</sup>. This meant, although the researcher received adequate answers to these questions, the order and phrasing of the answers would vary, i.e. question 3 may be address before 1.

Furthermore, the researcher was not sure if they asked leading questions, or provided too much detail of what an ALR could be. But, all accounts seemed legitimate and their effectiveness was indicated with genuine anecdotes (e.g. adoption of a product line mentioned in an ALR).

### **3.6.2 Research Q2: Process Development and Imitation**

The four questions in section two were based on the prior logic established in the literature, that firm’s become similar so within their networks (Galaskiewicz & Wasserman, 1989).

The questions attempt explore whether this has been the case in this sample, what specific processes were affected and the rationale for adoption and non-adoption.

5. *Since collaborating with a partner, have you recognised a change in any of your business processes or commercialisation techniques?*
6. *Would you say you and your partners' business processes have become similar as time has gone on? If so, in what way?*
7. *Have you ever chosen to adopt a partner's strategy or one of their processes? If so, explain what you adopted and why?*
8. *If not, have you ever thought of the possibility? If so, why didn't you go ahead with that idea?*

#### **3.6.2.1 Review**

The second set of questions seemed reasonably effective and generated some interesting, meaningful responses, therefore nothing was changed.

#### **3.6.3 Research Q3: Innovation & Centrality**

The final set of questions should rightly come as a surprise to readers; these questions were designed to gauge a participant's network (degree) centrality (Freeman, 1979) which would later be analysed to assess its impact on innovation. However, analysis of the findings highlighted little substantial results, so these were dropped in the findings chapter.

9. *Which organizations provide your firm with new knowledge or expertise when your company is seeking advice outside your organization?*
10. *Who comes to you for new knowledge or expertise?*
11. *In your view, how dominant is your firm in these relationships?*
12. *How does the relative dominance in these relationships affect your ability to innovate?*
13. *Are there any other players outside of this set who have consequences for knowledge flows relevant to your firm? If so, Please explain.*

At the end of the interviews the researcher was left unsure whether the respondent's answers were adequate to be used as a proxy of their centrality. Questions 1 and 2 often proved difficult for participants to answer. It was thought participants struggled to come up with many names of their ties; this could be largely due to the poor memories of participants rather than indicative of their network size. Dominance could also be associated with the nature of the relationship, e.g. customer and supplier, resources, firm size or in terms of knowledge endowments, rather than network position. Question 4 also prompted insightful responses regarding customers preventing product innovation due to time and resource limitations. All these questions were retained for the main data collection phases, despite the centrality concept being abandoned. References to centrality, referred to as network size, of participants is provided for information purposes and

transparency in the findings section, however, these are not carried further into the analysis, thence why the concept of centrality does not feature in the literature review.

### **3.7 Review of Pilot Instrument**

Responses to the non-collaborative and collaborative relations questions did seem to allude towards a contribution to knowledge, although the phrasing and order of the questions did require tweaking.

The imitation and process change questions prompted some good insights into how different industries (of both customers and focal firms) and the knowledge endowments of the focal firms mitigated the extent to which firms were influenced by peer pressures. Thus, these were retained without substantial alteration. The researcher was unsure how effective the instrument was at gauging centrality, but chose to retain the questions given they prompted some interesting responses.

#### **3.7.1 Reflection on Pilots & Modification and Development of Main Instrument**

Following the initial study, no significant changes were made to the questions. Although, initial questions regarding the nature of participant's roles and types of projects they were currently working on were introduced to generate rapport and provide some context for the subsequent questions. The lack of significant changes to questions informed the decision to incorporate the pilot's findings into the main study. The researcher did highlight clarity and accessibility issues with the wording of the first two questions, but this was offset by the facilitator's (i.e. the researcher) decision to avoid *reading* out the question word-for-word, deciding instead to ask the question in ad hoc manner to help maintain rapport and a natural conversational tone.

### 3.8 Data Collection: Semi-Structured Interviews

There are various forms of interview and these can be applied in numerous ways depending on the nature of the research undertaken (Bryman & Bell, 2011). Semi-structured interviews will be used to collect the data for this research project. Burgess (1982, p. 107) states that interviews allow "*...the opportunity for the researcher to probe deeply to uncover new clues, open up new dimensions of a problem and to secure vivid, accurate inclusive accounts that are based on personal experience*". Lee (1999) highlights that interviews can be descriptive, exploratory or explanatory in nature and are represent an iterative research process, whereby collection and analysis of initial data can be used to refine the collection instrument during the main study. Perakyla & Ruusuvuori (2011) argue that the majority of qualitative research utilizes interviews as they allow researchers access to subjective experiences and attitudes that would otherwise be difficult to attain. Furthermore, the collection method facilitates the exploration of historic or upcoming events (Perakyla & Ruusuvuori, 2011). Easterby-Smith, Thorpe & Jackson (2008, p. 145) identify that semi-structured interviews are appropriate when "*it is necessary to understand the constructs that the respondent uses as a basis for his or her opinions and beliefs about a particular matter or situation.*"

Semi-structured interviews often involve a pre-conceived set of questions which are delivered in the form of an interview schedule (Bryman & Bell, 2011); however, the researcher has some flexibility over the delivery of these questions, and has the option to ask follow up questions based on participant responses. This approach aids in giving the interview direction, often times non-directive interviews are criticised for lacking such direction (Easterby-Smith, Thorpe & Jackson, 2008). This is not necessarily a problem, but the researcher can benefit from participants knowing the types of issues the facilitator is interested in hearing. Use of semi-structured interviews complements Jones' (1985) belief

that presupposition cannot be eliminated from research. This particular argument is especially valid here, as the researcher does have significant knowledge of the innovation, knowledge transfer and inter-organizational relations literature. Rather than being a flaw, it is posited that this knowledge will allow the facilitator to change course of the interview, in-light of unexpected or curious developments therein.

The researcher did briefly consider the use of observational data (Sapsford & Jupp, 2006), however, such a collection strategy would not have allowed for the discussion of previously occurring innovative activity, relying instead, on phenomena which occurred in-the-moment. Such observation may have served to avoid one of the most significant limitations of interviews, namely the degree of ambiguity inherent in both written and spoken words, and “*the assumption that interview results give a true and accurate picture of the respondents’ selves and lives*” (Fontana & Prokos, 2007 p 11). Of course, social constructionist scholars would refrain from utilizing value laden words such as ‘accurate’ or ‘true’ as it insinuates there is an inherent truth ‘out there’ which simply needs to be discovered, preferring instead to explore multiple truths derived from various unique social contexts (Burr, 2003).

With regards to question formulation, these were developed around the core subject of inter-firm innovation, broken down into drivers, knowledge creation and problem solving activity and outputs. However, questions were grouped into sub-categories to touch upon interesting concepts and unresolved issues the researcher had encountered during the initial review of the literature. This ensured the resulting data did refer to a fairly broad area, but this did not impede free and open discussion within the interview process.

### **3.9 Sampling**

Participants for this study were chosen using non-probability sampling, as it is often the most practical approach for exploratory studies (Saunders, Lewis & Thornhill, 2012).

Purposive sampling was utilized to select participants, as the sample was relatively small and cases were selected on a 'most informative basis'. In this case, senior engineers, designers, MDs and management level staff were chosen as it was deemed that these positions would have highly rich knowledge of their SME's network of ties and the sources of their innovative activity.

Senior management staff were interviewed in all of the SMEs investigated, and MDs make up a significant ratio of the entire sample. These participants arguably have a very good understanding about the practices of their organisation, and in terms of innovation, senior designers and engineers are judged as having a good grasp of the product innovation process. Furthermore, interviewing manufacturing SME's MDs, senior management, design and engineering staff regarding their firm's innovation habits, relationships and network characteristics is not easy. Especially given these interviews were often conducted in a couple of minutes of each other. This, combined with the wealth of accumulated knowledge of these individuals, means this researcher is confident this thesis can contribute a significant amount to our understanding of how contemporary manufacturing SMEs innovate.

The study of dyads, i.e. pairs of firm which have been involved in some form of prior relationship, was considered upon a panel member's suggestion at a key progression point for this thesis. However, this was not deemed feasible by the author. The nature of arm's length encounters means such informants could be hard to track down, especially as some merely represented interested consumers at trade shows. Furthermore, snowball sampling proved to be extremely ineffective during this study, as none of the 21 participants referred

a single firm. Given that the cold email strategy only resulted in a 1.85% conversion rate, the likelihood of accessing and successfully persuading a specific firm/contact to take part was minimal. Finally, as some of the arm's length relationships were with consumers and did not represent actual firms and in one case provided information it probably should not have, the study of dyads simply was not feasible given the scope and nature of the phenomena studied. However, this thesis would argue the rich anecdotes provided by participants regarding the manner in which they solved problems, created knowledge and generated innovative outputs within their relationships provides more than ample empirical support for the nature of the collaborative innovation under study. In fact, this method is used by many studies of inter-firm relationships (Uzzi, 1997; Lechner & Dowling, 2003).

### **3.10 Accessing Participants**

This strategy of inquiry required a substantial amount of effort to secure access. The researcher had recently moved to the north east and did not have any substantial experience of working with manufacturing firms. This made gaining access particularly difficult, although, being located near a manufacturing cluster, did, in hindsight make the task more manageable.

The researcher used a combination of techniques to gain access to the sample. Personal contacts proved the most fruitful, colleagues who had either worked in, or were involved in knowledge transfer partnerships with a number of north east-based manufacturing SMEs proved particularly helpful. Once these leads had been saturated, the researcher began a cold emailing campaign, contacting MDs and senior managers and requesting their participation in the project. Email addresses were found using the FAME database, using a standard set of criteria to find relevant firms. In this case, firms which employed between

10 and 250 employees were targeted, with previous annual revenues below £50 million, operating in the north east (as indicated by their government postal region) and classified as a manufacturing firm.

The query resulted in a list of 300 companies, but 47 of these were dropped as the contact details on file with FAME were nothing more than generic email addresses. MDs and senior managers were given preference when requesting contact details. Once compiled, the researcher sent out an email template, addressing each contact by their first name, which highlighted the benefits of participating in the study. This included, fostering closer relations with the university and accessed to privileged information on innovation patterns in north east-based manufacturing firms. As gaining access to one organization usually involved gaining access to 2, or in one case 3, interview participants, this section will briefly review the success of these techniques in light of the 10 SMEs accessed.

Six SMEs were accessed through referrals from colleagues, whom had worked for, been involved in knowledge transfer partnerships or conducted prior research with the organizations. 3 SMEs were accessed via the cold emailing technique outlined above, representing a 1.85% conversion rate (of 247 email addresses). Considering this process was the most time consuming, taking roughly over 4 hours and 10 minutes over a period of 2 weeks, the referral strategy was far more efficient. This was primarily due to ensuring each lead was addressed by name, with a reasonably tailored email template. Finally, access to 1 SME was referred by the North East Chamber for Commerce, a relationship which was established via cold email.

### **3.11 Prior to the interview**

Prior to the start of the interview the researcher introduced himself and the purpose of the study, and reassured the participants that if they could not answer particular questions it was not a problem. Participants were given an informed ethical consent form to read and sign, and the most senior interviewee was asked to read and sign an organizational consent form (see Appendix 3 & 4).

The researcher asked the participants whether they understood the term ‘arm’s length relationship’, based on the sheet they were provided with beforehand. The definition was reviewed regardless to ensure data integrity. Following this, participants were asked whether it was acceptable to record the interview, it was re-iterated that anonymity was ensured, all of them accepted.

Field notes supplemented the audio recording during the interview, Halcomb & Davidson (2006) highlighted that written field notes taken during an interview have been argued to be superior to verbatim transcribed audio recordings.

1-on-1 interviews were conducted in the initial study; the pilot consisted of 4 participants representing 2 manufacturing SMEs. Two participants were recruited to represent each firm for data integrity purposes.

### **3.12 The interview process**

All interviews were conducted in person at the participant’s organization. These were generally held in meeting rooms or an interviewees’ office. No other parties were present during these periods and there were no significant interruptions to report. The researcher helped participants create a short profile of themselves and their firm prior to the interview, this contextual information will be used to aid in the analysis of their answers.

**Participants were asked to provide the following information:**

*Job title:*

*Length of time working in the industry:*

*Length of time working in the firm:*

*Firm age:*

*Firm size:*

*Firm annual turnover:*

After a quick review of the first question during the initial interview, the researcher decided the participants may benefit from asking more general questions to prompt engagement and allow them to orientate themselves. Thus, the researcher opted to begin all sessions by asking 1 to 2 more general questions regarding the nature of each participant's role within the organization, as well as details regarding projects they were currently working on.

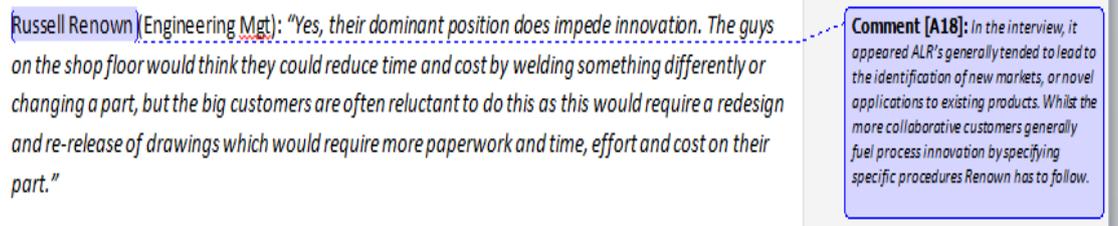
### **3.13 Transcription & Research Notes**

18 of the 21 interviews were recorded using a Dictaphone and mobile phone recording application, 2 participants refused to be recorded, one interview failed to record properly due to an error on the part of the researcher. Furthermore, the researcher took notes during the participant interviews to supplement these recordings and highlight additional information with regards to visual demonstrations of products and processes. All interviews were transcribed by the researcher using the MS ® Word package. It was also decided that the audio recordings be played back to the researcher at intervals to ensure the transcripts were congruent with participant accounts, this proved helpful during the findings and analysis sections when the specific nature of relationships had to be reviewed to ensure synergies between analysis and interviewee anecdotes.

### 3.14 Data Analysis

Thematic analysis was used to analyse the interview data, this thesis applied the analysis method outlined by Braun & Clarke (2006). Braun & Clarke (2006) outline a 6 stage process for analysing data which this researcher implemented; firstly one had to become familiar with the data,. This involved listening to and transcribing all 21 interviews and reading through each transcript repeatedly, making a note of any initial ideas that emerged from the first review. During this stage keeping an open mind was paramount and this required avoiding drawing too many links to existing literature at this stage. At this stage the researcher inserted all the interview transcripts into one large document and added initial ideas during the ‘comments’ function in MS office, see Figure 10.

**Figure 10. Stage 1 of thematic analysis (Initial ideas)**



The second step involved generating initial codes, here the initial list of ideas generated in stage 1 were used to identify interesting and intriguing dimensions or elements within the data, these initial codes were developed using the MS Word software package, the researcher had a full transcript of an interview in the left hand-section and a narrower box for codes on the right, as outlined in Figure 11.

**Figure 11. Stage 2 of the thematic analysis (initial coding)**

Transcript	Initial Code
<p>“ALR’s somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But R&amp;D budget doesn’t always allow follow up on enquiries.”...“Another prospective customer approached us at a trade show. They were asking us about our weather tight doors, they were using a Chinese door that wasn’t fit for purpose and they required a something a little more robust. So we sketched up a few designs, but the client lost interest. But this is an ongoing product we sell, despite the fact that the initial customer who inquired about it never actually purchased it.”</p>	<ol style="list-style-type: none"> <li>1. New market identification</li> <li>2. New products</li> <li>3. Trade show</li> </ol>

Stage 3 involved searching for themes by building upon the initial codes drawn out of the transcripts and sorting them into broader categories, this stage is transient and iterative and involved constant reflection on the data available. The initial conceptual framework derived from the literature did help in establishing boundaries for this process, although the framework was subsequently refined. Braun & Clarke (2006) argue that themes at this stage may be discarded, combined and ‘broken apart’. Figure 12 highlights how initial codes were eventually consolidated in the theme ‘benefits’, a theme which was later

dropped due to its ambiguity. Here, a theme is outlined next to a number in brackets, highlighting the number of instances in which a theme emerged from the data reviewed so far.

**Figure 12. Stage 3 of thematic analysis (Generating themes)**

**High order code**

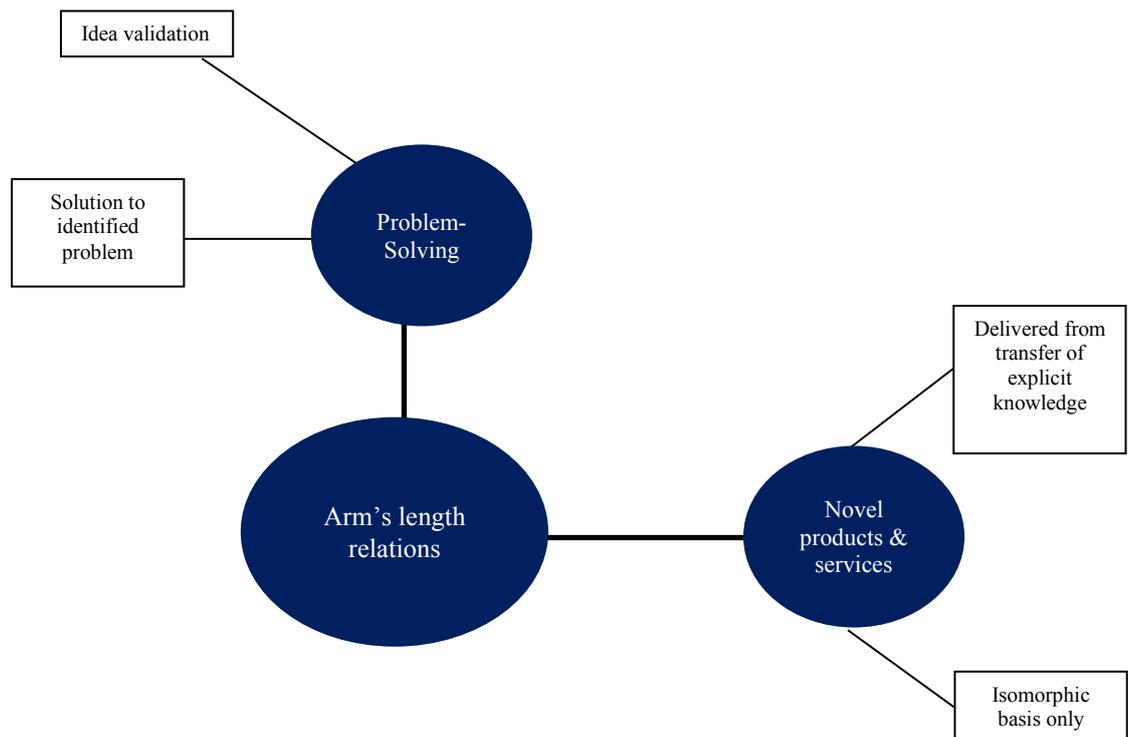
**Benefits**

<p><b>Innovation:</b> New market identification, new products (2), new application for products, cheaper solutions, product improvement)</p> <p>Growth: Sales</p> <p><b>Feedback:</b> Market validation, honest product conversations,</p> <p><b>Opportunities (5):</b> Exposure Learn, new technologies, helpful information (2), quicker learning, solutions (4)</p> <p><b>Research &amp; Advice:</b> Knowledge spillovers, analysing competitor Products, copying what competitors do well, free expert advice, enhanced understanding, using new technology (trade show) Validation (Testing suppliers) Uses (Integrating to products together)</p> <p><i>*Numbers denote instances within a given section</i></p>
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Stage 4 involved reviewing themes emerging from the last activity and identifying those which were inappropriate due to limited amounts of data, eclectic nature or a lack of identifiable distinction between the data which would make for relatively shallow discussion. This required each quote and extract used to formulate the tentative theme to be reviewed to ensure they are complementary, at which point the theme or individual excerpts within that theme may need to be altered. Secondly, the researcher reviewed the entire dataset to ensure the theme had resonance and adequately reflected the nature of the

interview data. The resultant themes emerging from this process were then referenced to the initial framework derived from the literature, as seen in Figure 13,

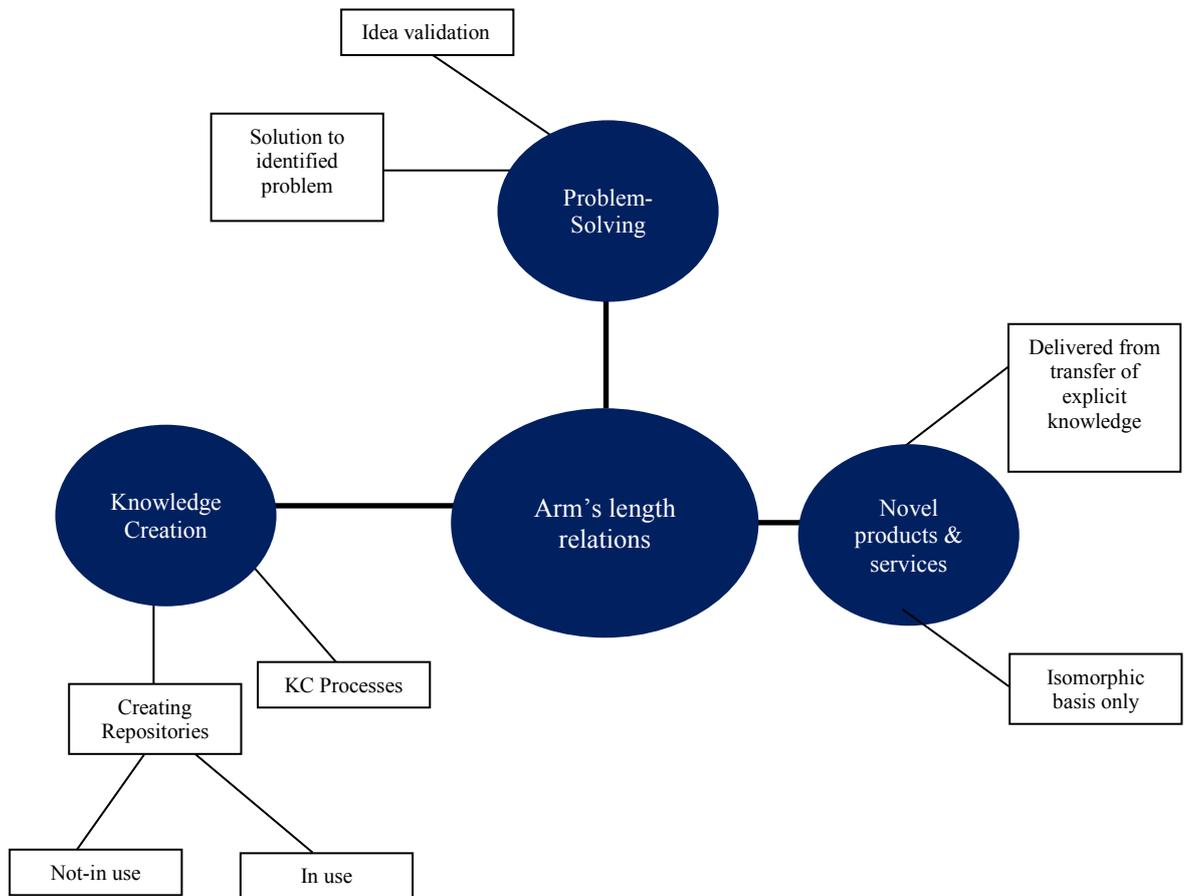
**Figure 13. Stage 4 of thematic analysis (Map resulting from theme review)**



Stage 5 involved defining and naming themes, but also identifying whether those themes have underlying sub-themes and attempting to comprehend and draw out the stories and relationships between these. Braun & Clarke (2006) state that it is through this process of refinement that the researcher comes to set clear boundaries and understands what a theme is, and perhaps more importantly, what it is not. It was during this process that the additional higher order theme of 'Knowledge Creation' was established and refined.

Figure 14 highlights a working thematic map devised from this process:

**Figure 14. Stage 5 of thematic analysis (Map resulting from defining and naming themes)**



Finally, stage 6 involved the write up of the findings and analysis which are presented over the findings and analysis chapters. These involve the selection of rich narrative excerpts from the interview data that epitomise the main thread of each theme and sub-theme they represent. Finally, the report concludes by outlining how all these themes link together and coalesce into a broader process of organizational innovation, in-light of relevant theoretical perspectives in the field. This follows the advice of Golden-Biddle & Locke (2007), who describe the analysis process as generating theoretical points using the most expressive comments in the contextual data.

### **3.15 Data Analysis Tools**

The bulk of the data analysis was conducted using MS Word, making particular use of the 'comments' and 'text box' functions to highlight initial ideas, codes and themes. The researcher had prior experience with the software and was aware its 'search & find' functions could make sorting through the data much easier. Finally, mind maps of potential themes and thematic frameworks were built using the shapes tools incorporated within MS Word. The researcher did attend training sessions on NVivo and made an initial effort to utilize the software, however it was deemed more of a hindrance than a help, and on reflection, offered little benefit given it is essentially a data management tool, and cannot really analyse data. More importantly, a number of colleagues had complained at the propensity of the software to crash and the researcher was uncomfortable with risks such as technical faults could impose, especially when arguably more reliable and familiar alternatives existed.

### **3.16 Ethical Issues**

This section will review the procedures and protocols the researcher adhered to, to ensure the ethical collection and interpretation of data. All procedures outlined were in line with both Northumbria University's and Newcastle Business School's ethical policy.

The process of gaining ethical approval for this research project was unusually lengthy, the initial documentation was submitted in July 2013 and the final approval was only granted in October 2013. The main reasons for the delay were the fact that the ethics committee next meeting was held 2 months after initial submission of the relevant forms, this also meant a back log of other research proposals sent over the summer months had to be approved. In the end, only a couple of changes were required to the documentation and the project was approved shortly thereafter.

The decision to use pseudonyms for both participants and organisations was made to alleviate participant concerns regarding the nature of their answers. Despite the fact that some organisations were quite happy to be named as participating, the researcher felt uncomfortable doing this, as they had already assured organisational anonymity during initial conversations. This would prevent, what was in this researcher's opinion, was the most significant ethical concern of the study, whether participating firms would somehow be at a disadvantage for disclosing sensitive information which was subsequently published. Particularly, relating to client and supplier names, and the sources of some of their major product or process innovations.

Prior to the interview, participants were also reminded that they were free to decline to answer any questions and were free to leave the interview at any time. This was to prevent any unnecessary discomfort experiences by the participant, and also ensured they only provided answers to questions they were confident they could answer. Participants were also asked whether they would be comfortable with their interview being audio recorded, all but two agreed.

To ensure the data gathered had resonance, the transcript of their own interview were forwarded to participants via email. Participants were free to change their answers to ensure nothing was lost in translation, or to provide an opportunity to highlight cases where their answers had been taken out of context.

### **3.17 Qualitative Research Guidance & Evaluation Criteria**

Fossey, Harvey, McDermott & Davidson (2002) outline a set of considerations to bear in mind when evaluating the quality of qualitative research, on a broad level these are separated in two sections, methodological rigour and interpretive rigour (see Figure 15). Methodological rigour acts as a basis for reviewing the research design and data collection processes, these are broken down into congruence, responsiveness to social context, appropriateness, adequacy and transparency. In contrast, interpretive rigour broadly attempts to assess to degree to which the research findings remain faithful to the data, studies are evaluated based on their authenticity, coherence, reciprocity, typicality, permeability of the researcher's intentions, engagement, and interpretations. Using Fossey, Harvey, McDermott & Davidson's (2002) criteria, this section provides a detailed evaluation of the qualitative methodological and interpretive process executed within this thesis below. Furthermore, the application and results of this review process are then utilized to backup claims of 'Doctorateness' using Trafford & Leshem's (2008) PhD evaluation criteria in the conclusion chapter .

## Figure 15. Methodological Rigour

<i>Table 3. A summary of key issues to consider when evaluating the quality of qualitative research</i>	
Criteria	Considerations
<b>A. Methodological rigour</b>	
<i>Congruence</i>	Research design – Does the chosen methodology (i.e. philosophical/theoretical approach) 'fit' the research issue? – Do the methods used 'fit' with the chosen methodology? – Is the study conducted in a way that is congruent with the stated methodology (i.e. philosophical/theoretical approach)?
<i>Responsiveness to social context</i>	Emergent research design – Was the research design developed and adapted to respond to real-life situations within the social settings in which it was conducted? Sampling, data gathering and analysis – Did the researcher's engage with participants, and become familiar with the study context?
<i>Appropriateness</i>	Sampling – Were the sampling strategies suitable to identify participants and sources to inform the research question being addressed? Data collection – Were suitable data gathering methods used to inform the research question being addressed?
<i>Adequacy</i>	Sampling – Have sufficient sources of information been sampled to develop a full description of the issue being studied? – Is a detailed description of the people who participated, how they were sampled, their levels and types of participation provided? Data gathering and analysis – Is there a detailed description of the data gathering and analytical processes followed? – To what extent did analysis inform subsequent data gathering in a cyclical (iterative) manner during the research process? – Were multiple methods and/or sources of information weighed in the analysis? – Were methods of gathering and recording/documenting data sensitive to participants' language and views? – Were corroborating, illuminating, and rival accounts gathered and analysed to explore multiple aspects of the research issue? Written report – Is the description of the methods detailed enough to enable the reader to understand the context of what is being studied?
<i>Transparency</i>	Data collection and analysis – To what extent have the processes of data gathering and analysis been rendered transparent? – How were rival/competing accounts dealt with in the analysis? – To what extent do the processes of data gathering and analysis give privilege to participants' knowledge?

**Source:** Fossey, Harvey, McDermott & Davidson (2002)

### 3.17.1 Congruence

Congruence has been ensured by maintaining a high degree of fit between the research issue, chosen methodology and research methods. This thesis essentially explores the nuanced nature of inter-firm relationships, knowledge creation, innovation, and the social mechanisms by which innovation is facilitated. Social constructionism purports that knowledge is created in social interaction, which is precisely what is being explored within the study, to the extent that the subject has its own dedicated theme. Furthermore, semi-structured interviews are commonly cited as complementing interpretivist research philosophies, an umbrella term under which social constructionism falls (Easterby-Smith, Thorpe & Jackson, 2012; Crotty, 1998; Creswell, 2009; Denzin & Lincoln, 2011). All beliefs of social constructionists, outlined by Burr (2003), were adopted in the collection

and analysis of this study (see social constructionism at the beginning of this chapter for details).

### **3.17.2 Responsiveness to social context and real-life situations**

The research design was responsive to social context and real-life situations, non-probability, purposive sampling was utilized for this study as no claims for generalizability of the data are claimed or sought. Convenience sampling was used as participants were far more likely to volunteer on the basis of a warm introduction from a colleague, than a cold email utilizing contact details from the FAME database. During data gathering the researcher asked questions in an improvised manner and utilized the laddering technique (Price, 2002) where possible to build upon participant answers. Furthermore, questions were added and omitted based on the nature of the emerging discussion. One potential limitation of this study is the decision to investigate staff working within a sample of cross-industry manufacturing SMEs, which meant having a strong understanding of the intricate workings and dynamics of each trade was not feasible. However, participants intermittently provided key contextual information regarding the nature of the industry and its practices which helped inform the analysis. In most cases, the researcher was also given a tour of the premises. Furthermore, the researcher contacted participants with excerpts of their own transcripts and a layman's account of the ascribed analysis to ensure 'coherence'.

### **3.17.3 Appropriateness**

With regard for appropriateness, a sample of managing directors, senior engineers, designers and managers were interviewed to ensure depth of understanding and authenticity. The research question at hand attempted to explore and compare the nuanced nature of knowledge creation and innovation within SME's arm's length and collaborative

relationships, this is a relatively under-researcher area and thus, in-depth, semi-structured interviews with the key personnel involved were highly appropriate for the subject matter.

#### **3.17.4 Adequacy**

With regard the adequacy of the data collection process, 21 face-to-face, semi-structured interviews were conducted for this study. Sanders (1982) claimed that for organizational research, 3 to 6 individual interviews are usually sufficient, although they were originally referring to phenomenological studies. By contrast Guest, Bunce & Johnson (2006) claimed saturation is usually researched after 12 interviews. Reflecting on this research, one could argue that too much data was collected for this thesis, however, the researcher would highlight that many prominent qualitative studies within the strategic management domain boast large sample sizes (Grant, 2003; Zhou & Li, 2012).

Detailed accounts of the personal and employer characteristics of each participant is provided in the profiles at the end of this chapter, including their age, years in the industry and years working for the SME in question. Whilst all 21 interviews provided some useful insights, naturally some participants were more articulate and detailed in their responses than others; therefore, such individuals' quotes were utilized far more frequently to encapsulate the collective thoughts of sections of the sample. In addition to this review section, extensive description of the systematic data collection and analysis is provided earlier in this chapter. Data collection was an iterative process, the initial study lead to refinement of the interview questions, and several new questions emerged mid-way through the main study to explore the exact nature of knowledge transfer and creation processes in more detail. Where possible, recorded and transcribed data was analysed and sent to the relevant participant's for review prior to incorporation within this written thesis to ensure interviewees were adequately protected and properly represented within the excerpts (no changes were suggested). Verbatim transcription also ensured participant's

language and views were sufficiently honoured. Additionally, rival accounts were explored when these arose. These added to the richness of the emergent findings and discussion, thus multiple aspects of an event or practice were demonstrated where possible, even if no satisfactory explanation for the contradiction could be found. This is indicative of the messiness of the qualitative research process (Corley, 2012). Finally, the researcher has made every effort to use rich, detailed and easy to grasp anecdotes to within the findings and analysis chapter. The ability of some participants to clearly articulate or provide simple analogies of complex processes meant adhering to such criterion meant, in relation to the specific quotes utilised to represent particular themes, some participants are cited more frequently than others. Furthermore, the researcher has provided further clarification on the nature of a given anecdote, based on a review of the entire transcript, if the context was not succinctly communicated.

### **3.17.5 Transparency**

This chapter has outlined in explicit detail, the processes for gathering and analysing data. Insight into the sampling methods used, means by which access was sought, development of the interview questions, dynamics of the interviews themselves, recording, transcription and analysis processes have been outlined, and where possible, linked to published research and frameworks.

A version of the final interview questions can be found in Appendix 2, however, readers should note that some of these were prone to change given the dynamics of the interview. As aforementioned, rival and contradictory accounts and opinions were embraced during the analysis process, as these added to the richness of the emerging data. In fact, the comparative nature of this thesis made such adversarial accounts essential. The participant's knowledge has been honoured by using verbatim excerpts from the interview transcripts to allow the reader to critically review subsequent analysis based on this data.

Furthermore, transcripts were emailed to all but one participant, accompanied by a brief analysis for review purposes, no participants suggested amendments to the excerpts or opposed the analysis.

### 3.17.6 Interpretive Rigour

<i>Table 3. Continued</i>	
Criteria	Considerations
<b>B. Interpretive rigour</b> <i>Authenticity</i>	Presentation of findings and interpretations – Are participants' views presented in their own voices, that is, are verbatim quotes presented? – Are a range of voices and views (including dissenting views) represented? – Would the descriptions and interpretations of data be recognizable to those having the experiences/in the situations described? – To what extent were power relations in data collection and analysis taken into account, for example, were participants involved in documenting, checking or analysing data, or reviewing the analysis?
<i>Coherence</i>	Presentation of findings and interpretations – Do the findings 'fit' the data from which they are derived, that is, are the linkages between data and findings plausible? – What proportion of the data is taken into account? – Have the perspectives of multiple researchers (e.g. research team) been taken into account, e.g. are corroborating and compelling elements considered?
<i>Reciprocity</i>	Data analysis, findings and interpretations – To what extent were processes of conducting/reviewing the analysis/negotiating the interpretations shared with participants? Written report – Were participants involved in presenting the study?
<i>Typicality</i>	Written report – What claims are made for generalizability of the findings to other bodies of knowledge, populations, or contexts/settings?
<i>Permeability of the researcher's intentions, engagement, interpretations</i>	Findings and interpretations – Is the researcher's role transparent in the interpretive process? – Did the study develop/change the researcher's initial understanding of the social worlds/phenomena studied? Written report – Are the researcher's intentions, preconceptions, values, or preferred theories revealed in the report? – Is the researcher's personal experience during the research process made explicit?

**Source:** Fossey, Harvey, McDermott & Davidson (2002)

### 3.17.7 Authenticity

Authenticity has been ensured within the analysis by utilizing verbatim quotes, and where dissenting voices have been gathered, these have been acknowledged in the analysis.

Where possible participants involved in the study were sent the transcriptions of their interviews and analysis of the data via email, none argued with the process. Thus, one could argue significant efforts have been made to ensure participants recognized their experiences within the analysis provided, and their lack of challenge goes some length to

ensuring this was indeed the case. Whilst participants were given the opportunity to ‘check’ the transcripts for accuracy, and read the brief analysis of excerpts to ensure the context was fully understood by the researcher, the researcher never intended to allow participants to participate in the analysis of their own data. This would not have prompted a change in the write up had they done so, as this could have served to skew the analysis due to participant perception management practices. For example, if the researcher identified an instance of mimetic isomorphism within the innovation process, i.e. copying, participants may not be comfortable with this assessment due to preconceived beliefs attached to the term/practice.

### **3.17.8 Coherence**

Every effort has been made to ensure findings ‘fit’ the data. Significant effort has gone into authenticating the nature of innovation and inter-firm relationships as described by participants, this often required careful review of the transcripts, and even the original recordings, to understand context where the excerpt utilized did not fully encapsulate all relevant details required to make for effective analysis. Following on from this, Braun & Clarke (2006) recommends researchers acknowledge the portion of collected data taken into account. This is difficult to quantify, given that by default, all 18 recordings and subsequent transcripts were coded, grouped into themes and reviewed. Furthermore, whilst around 1% of all collected data is presented within the findings and analysis chapters, these were specifically chosen to represent the voices and experiences of the entire sample on specific phenomena. It should be noted that the data has been solely analysed by the author of this thesis, whilst utilizing his supervision team as a sounding board, therefore multiple perspectives did not emerge as prominently as it would in co-authored studies.

### **3.17.9 Reciprocity**

Many of the dimensions of reciprocity were already covered in the prior sections; however, the researcher does note that participants were not involved in developing and critiquing the findings and analysis due to feasibility. The majority of participants interviewed were MDs and senior level staff with little available time to dedicate to the analysis and presentation of this study, beyond commenting on the accuracy and authenticity of transcripts and brief analysis.

### **3.17.10 Typicality**

Davis (1995), Rice & Ezzy (1999) and Fossey, Harvey, McDermott & Davidson (2002) like many scholars assert that qualitative researchers need to stress the importance of settings and context when understanding a phenomenon. As Rice & Ezzy (1999 p.42) state, *“The aim is not to generalize about the distribution of experiences, or processes”*, therefore, *“the applicability of findings from one setting to another depends on the likeness between the bodies of knowledge, or contexts”* (Fossey, Harvey, McDermott & Davidson, 2002 p.730). No claims for generalizability are made in this study; the researcher has merely attempted to provide an account of research findings, interpretations and context in sufficient detail to allow others to assess the applicability of these findings in their own unique contexts.

### **3.17.11 Permeability**

This thesis attempted to compare the strategic and innovative role and value of two different forms of inter-firm relationship, arm’s length and collaborative ties. The latter type has enjoyed a huge amount of scholastic attention over decades of research, especially since the proliferation of resource; knowledge-based and core competence theories, whilst the former was under-explored. By virtue of conducting this comparative study the

researcher is, at least subtly, highlighting a larger appreciation for the potential of arm's length relations than most other management scholars.

Furthermore, this study was initially conceptualised by the researcher as rather one-dimensional, emerging from an effort to tease out the strategic value of ALRs in light of contemporary resource-based theory. This was due to the extensive management literature dedicated to collaborative ties. Towards the end, the researcher acknowledges these two complementary relationships performed specific roles in an organic innovation process, and the study became much more orientated towards understanding the subtle differences in their nature, than a rather adversarial study of the two. No qualitative research is free from bias, but *“the question is not whether the data are biased, but to what extent has the researcher rendered transparent the processes by which data have been collected, analyzed, and presented.”* (Popay, Rogers & Williams, 1998 p.348).

### **3.18 Concluding Thoughts**

Upon application of Fossey, Harvey, McDermott & Davidson's (2002) criteria the researcher reflects that the framework is a little repetitive in certain dimensions, e.g. reciprocity and sampling and suggests that future work could be conducted to collapse some of the themes into one another to avoid monotony. That being said, the framework still provides a helpful tool for structuring methodological discussion in a manner which is critical, rigorous and readable.

### **3.19 Limitations**

Limitations exist within all empirical research and whilst the greatest care has been taken to ensure the emergent findings are valid, it is good practice to highlight some of the shortcomings of the research design.

Network centrality was gauged using the number of parties giving and receiving information to participants & their wider organization, and any other relevant 3rd party relations, as a proxy. Of course, this approach is limited to a participant's ability to recall all relevant parties that fit this description. Furthermore, many participants were naturally cautious about naming specific parties, especially customers, in such cases it is difficult to gauge with accuracy whether a lack of ties was more of a reflection of the firms/participants level of openness, rather than their network centrality. This is partially why the decision was made to drop the concept after initial reporting of the findings.

This thesis set out to understand patterns of networked innovation within a specific context, and whilst the qualitative nature of enquiry means the findings cannot be generalised, they can still provide us with a detailed understanding of innovative behaviour in both collaborative and non-collaborative settings, gaining first-hand executive level accounts and evaluations of the effectiveness of different forms of collaboration.

Furthermore, an argument could be made that the phrasing of particular questions meant participants failed to provide accurate accounts. For example, in a question related to open innovation, it was noted that an MD failed to identify that his company engaged in an outside-in, open innovation process. Specifically, he did not acknowledge that a licensing agreement represented sourcing outside knowledge into the business for commercial ends. It was only once the facilitator specifically asked about licensing agreements, due to the information provided by the afore-interviewed technical director, that such a practice was recognised by the MD. Of course, this is a minor point consider the concept is not discussed in much detail in this thesis.

**Table 7: Participating SME Operating Profiles**

Organization	Size (# employees)	Firm Age	Annual Revenue
Renegade	140	27	£13 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Russell	Engineering Manager	3	3
David	Marketing Manager	3	3
Operational Profile			
<p>Operating from a 37,000 sq. ft. facility, Renegade are able to manufacture a huge variety of components as well as offer auxiliary services, including:</p> <ul style="list-style-type: none"> <li>- fabrication and welding</li> <li>- precision machining</li> <li>- design</li> <li>- repairs</li> <li>- armour welding</li> <li>- painting</li> <li>- assembly and test of complex components.</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- oil and gas</li> <li>- defense</li> <li>- marine</li> <li>- energy</li> </ul> <p><b><u>Volume</u></b></p> <ul style="list-style-type: none"> <li>- Metal fabrication of up to 10 tonnes</li> <li>- Turning of components up to 6 tonnes</li> <li>- Milling up to 4 tonnes</li> </ul>			

Organization	Size (# employees)	Firm Age	Annual Revenue
Thor	120-150	49	£11 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Craig	Marketing Development Manager	5	5
Kelso	Design Engineer	15	4
Operational Profile			
<p>Thor design and manufacture a wide range of metalwork components, sub-assemblies and complete electro-mechanical products.</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- sheet metal</li> <li>- welding</li> <li>- fabrication</li> <li>- specialist engineering</li> <li>- <u>OEDM</u> (original equipment design and manufacture) services</li> <li>- laser profiling and cutting</li> <li>- CNC punching and forming through to finishing including paint and assembly</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- defence,</li> <li>- offshore, oil and gas</li> <li>- transport</li> <li>- security and energy</li> </ul> <p><b><u>Volume</u></b></p> <p>Specialize in design, assemble and process for low to medium batch volume requirements.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
TouchTech	150	40	£17.2 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Mark	CEO	23	23
Andrew	Technical Director	15	12
Operational Profile			
<p>TouchTech manufacture a range of touch technology products for use in electronic displays in information kiosks, ATM's, ticketing and gaming machines to name a few.</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- glass processing includes; <ul style="list-style-type: none"> <li>- automated cutting</li> <li>- edge grinding</li> <li>- polishing</li> <li>- bending</li> <li>- lamination</li> </ul> </li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Gaming</li> <li>- Finance</li> <li>- Military</li> <li>- Computer</li> <li>- Telecommunications</li> <li>- Health</li> </ul> <p><b><u>Variety</u></b></p> <ul style="list-style-type: none"> <li>- Touch Tables</li> <li>- Point of Sales</li> <li>- Digital Signage</li> <li>- Gaming Tablets</li> </ul> <p><b><u>Volume</u></b></p> <p>TouchTech boast an array of large multi-national clients, including Coca-Cola and Microsoft. Their touch technology is integrated into hundreds of different product lines across the world.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
Armour Core	59	40	£5 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Russell	Area Sales Manager	21	8
David	Design Engineer	30	8
Operational Profile			
<p>Armour Core custom design, development and manufacturing of highly-engineered thermal management systems.</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- Design, Prototyping, Testing, and Qualification</li> <li>- Life &amp; Reliability Testing</li> <li>- R&amp;D and Advanced Technologies</li> <li>- Metal Processing and Fabrication</li> <li>- Aluminium Vacuum Brazing</li> <li>- Materials Testing and Characterization</li> </ul> <p><b><u>Client Industries</u></b></p> <p>Aerospace/Avionics  Military  Chemical Processing  Communications  Government/Education</p> <p><b><u>Variety</u></b></p> <p>Electronics Cooling  Enclosure Cooling  Fuel Cells  High-Temperature Heat Pipes</p> <p><b><u>Volume</u></b></p> <p>2015 annual sales are £7.1 million with manufacturing capacity for double this. Armour Core's top 3 clients contribute £1.2, £0.9 and £0.85 million respectively.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
White PLC	70	26	£20 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Nigel	Managing Direct	30	26
Simon	Project Manager	16	*7-8 Months
Operational Profile			
<p>White PLC is an engineering company specialising in the integrated design, construction, validation and maintenance of hygienic, cleanrooms, laboratories, containment facilities, sterile processing environments and manufacturing facilities.</p> <p><b><u>Services:</u></b></p> <ul style="list-style-type: none"> <li>- Design &amp; Project Management</li> <li>- Clean Room Environments</li> <li>- Process Plant Manufacture</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Pharmaceutical</li> <li>- Biotechnology</li> <li>- Cosmetics</li> <li>- Food processing</li> </ul> <p><b><u>Volume</u></b></p> <p>White PLC fulfils multi-million pound contracts for the complete design and manufacture of processing facilities; these are completed on a bespoke basis.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
Equestrian	25	27	£2 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Lucy	Head of Design/Former MD	27	27
Julie	Design Technologist	1.5	1.5
Operational Profile			
<p><b>Equestrian design manufacture equestrian safety garments to the global riding market.</b></p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- Design</li> <li>- Manufacture</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Horse Riding</li> </ul> <p><b><u>Volume</u></b></p> <p>Equestrian is a small organization that offer hundreds of products and sell to retailers and direct to consumers via their online store.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
VAC	220	40	£18 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Pam	Managing Director	27	25
Ron	Technical Director & Engineer	44	15
Operational Profile			
<p>VAC design and manufacture de-humidifiers, washing machines and bottles and filtered water coolers.</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- Design</li> <li>- Manufacturing</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Commercial</li> <li>- Direct to consumer</li> </ul> <p><b><u>Volume</u></b></p> <p>VAC supply to 100s of retailers across the UK, including large retail stores such as Argos and Debenhams. VAC offer over 100 products from de-humidifiers, water coolers to accompanying accessories.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
Flanders	190	105	£20 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Kevin	Managing Director	26	26
Chris	IT Development Manager	18	11.5
Danny	Works Manager	34	24
Operational Profile			
<p><b>Flanders printing.</b></p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- digital printing</li> <li>- print and packaging</li> <li>- supply chain and logistics services</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Education</li> <li>- Toys</li> <li>- Home &amp; Leisure</li> <li>- Food &amp; Drink</li> </ul> <p><b><u>Volume</u></b></p> <p>Flanders handles the traditional and digital printing for dozens of established firms, producing thousands of different brochures and packaging for SMEs and MNCs.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
ABBID	30	10	£2 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Ryan	Managing Director	20	10
Chris	Electronics Engineer	8	8
Operational Profile			
<p>ABBID's core business is the electrification and intelligent control of engine ancillaries (sub-ordinate components), thermal management systems and hybrid systems</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- Thermal Management System Design</li> <li>- Hybrid Systems Integration and Electrification of Sub Systems</li> <li>- Electrical Machine and Controls Design and Manufacture</li> <li>- Alternators &amp; Crank Assist</li> <li>- eFans</li> <li>- eFan Micro Hybrid Systems</li> <li>- Thermal Systems</li> <li>- Custom Solutions</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Bus &amp; Coach</li> <li>- Mining &amp; Heavy Machinery</li> <li>- Heavy Duty Vehicles (Fleet)</li> <li>- OEM Customers</li> </ul> <p><b><u>Volume</u></b></p> <p>In 2015 ABBID sold 1, 000 eFan micro hybrid systems and 5, 000 e-pumps. These represent the firm's top selling product ranges.</p>			

**Table 7 (Continued)**

Organization	Size (# employees)	Firm Age	Annual Revenue
GS	220	67	£25 million
Interviewee Name	Role	Experience In Industry (In Years)	Experience In Firm (In Years)
Neil	Managing Director	12	12
Mike	Senior Designer	24	24
Operational Profile			
<p>GS deliver high quality, made-to-order furniture solutions throughout the UK and Europe.</p> <p><b><u>Services</u></b></p> <ul style="list-style-type: none"> <li>- Furniture Design</li> <li>- Furniture Manufacture</li> <li>- Furniture Delivery</li> </ul> <p><b><u>Client Industries</u></b></p> <ul style="list-style-type: none"> <li>- Education</li> <li>- Commercial</li> <li>- Health</li> </ul> <p><b><u>Volume</u></b></p> <p>118,669 seating products sold on average per year  150,000 SQ. ft manufacturing facility</p>			

**Table 7 (Continued)**

## **Chapter 4: Findings**

### **4.1 Introduction**

The following chapter attempts to present an overview of the key initial findings emerging from respondent's answers to the interview questions. Key themes emerge from the field notes, recordings and transcriptions, and initial conclusions are drawn regarding the nature of observed responses. Finally, the themes and the researcher's corresponding conclusions are tabulated in order to inform the analysis section of this thesis.

For the purposes of this exploratory study, themes will be organized into various high order codes (HOC), this is indicative of the phenomena and concepts they refer to. It should be noted that these HOCs are both concept and data-driven (Saunders, Lewis & Thornhill, 2012). Strauss & Corbin (1998) highlighted that codes can be derived from analysis of the data, the terms participants used during interviews and the existing literature. This approach is in line with the abductive nature of this research (Tavory & Timmermans, 2014). The origins of each theme are made explicit in each section, highlighting the questions which elicited key answers instrumental to their construction. That being said, the semi-structured nature of the interviews means such cut and dry attribution is not always possible and it is acknowledged that off-hand or additional comments occurring throughout the interviews have had some impact in their formation. An overview of the initial themes emerging from participant responses is outlined in table 8. The sections outline how participants utilized arm's length and collaborative relationships, their respective effectiveness for supporting innovation, challenges posed and how these were manifested into specific knowledge communication modes. Finally, in respect to collaborative relationships, the nature, perceived value and rationale for imitation and convergence are presented. This represents the initial step in addressing the

primary research aim of reviewing how the process of innovation differs in arm's length and collaborative relationships.

Readers should note that all quotes feature participants' first names as pseudonyms, followed by their organization (again using pseudonyms) and their job title in brackets.

**Table 8. Overview of Initial Themes**

<b>Higher Order Theme</b>	<b>Theme</b>
<b>Arm's Length Relationships</b>	Utility of ALRs for sourcing information Perceived effectiveness of ALRs for supporting innovation Modes of communicating knowledge Challenges
<b>Collaborative Relationships</b>	Utility of collaboration for sourcing information Perceived direct effectiveness of collaboration for supporting innovation Mode of knowledge transfer  Challenges Conflict Resource Strain Dominance
<b>Imitation and convergence</b>	Business processes Perceived value of copying Rationale for adoption

## **4.2 High order code: Arm's Length Relationships**

### **4.2.1 Utility (of ALRs for sourcing business information & knowledge)**

Utility has been identified as a key theme emerging primarily from participants' responses to questions 1 and 2 of the semi-structured interviews. The theme refers to the usage of arm's length relationships as a means of sourcing knowledge into an organization. As this is a comparative study, the same theme will be used to report participant's responses on the usage of more collaborative relationships in sourcing knowledge.

Of the 10 organizations studied, constituting interviews with 21 participants, the majority appeared to report a number of ways arm's length relationships and modes of knowledge transfer aided their organization for sourcing information and knowledge, even if an initial review of the data infers that collaboration seems to be the most useful overall. Their reported findings are categorized into the inherent usage of the information and knowledge obtained and the mode of knowledge transfer that facilitated its communication and challenges posed.

#### ***4.2.1.1 Usage***

Information & knowledge benefits emerging from the data come in the form of; aiding identification of new markets and viable products, sparking new product development, gaining feedback and suggested improvements to products, learning quickly about new materials, processes and technologies and finding solutions to existing problems. Arm's length relations have also been highlighted to play a part in evaluating the effectiveness and know-how of potential suppliers, gaining feedback and deeply understanding of new phenomena (technology, processes etc.), alternative approaches and raising general awareness of the organization.

Of the 10 organizations studied, 7 provided clear examples of how they utilized and benefited from arm's length relationships, in respect of information and knowledge sourcing. The quote below epitomized this:

*Pam VAC (MD): "Most of what we do under this roof is making those chance encounters and opportunities work. We're doing a BBC documentary; following some PR that I did...that got some somebody to pitch in for PR for part of our business. It didn't go anywhere, so it was an arm's length relationship, but it turned out one of his clients had this opportunity to do this documentary, they declined, so he emailed us and now we have the opportunity to do this BBC documentary. Hopefully we'll get in front of, at least a million people, and hopefully it'll spread the word about our chest freezers."*

Although the majority of organizations interviewed provided some examples of where arm's length relationships had been useful in obtaining valuable knowledge and information, not all participants agreed, one Managing Director had this to say;

*Nigel WHITE PLC (MD): "We don't really gain valuable information from ALRs; the form of our business makes us very collaborative."*

This relatively short, dismissal of ALRs as a source of valuable knowledge was echoed by data collected from two other SMEs in the sample, each having very little to say on the matter, alluding to the fact that these organizations had not benefited from these sorts of transactions, in regard to sourcing information and knowledge. Taking this cue, I decided to review the profiles of the 3 SMEs in question, namely WHITE PLC, GS & Flanders, against the rest of the sample. Upon analysis of both the participant and organizational profiles, the only striking similarity found was that staff within WHITE PLC & Flanders documented the highest number of inter-firm relationships in the sample. Unfortunately, data on GS's number of ties could not be collected due to an error in the interview recording. This analysis could infer a connection between a firm's utility of ALRs for information and knowledge sourcing and their network size, in fact, if we review VAC, the

standout SME who documented utilizing and valuing ALRs more than any other in the study, the staff interviewed had the smallest documented network of the entire sample, giving credence to the idea that there is a connection between utility of ALRs and the number of external relationships SME staff manage. Of course, the qualitative nature and limited sample size used in this research makes generalizing these findings impossible.

On an individual level, it is also noteworthy that it was the managing directors of all of these firms, who in each case, explicitly stated that they weren't utilizing ALRs for the purposes outlined above. Perhaps this is indicative of the fact that the utilization is so small and benefits of an individual case so insignificant, that these fail to permeate throughout the organizational hierarchy. This may allude to some collective benefit of all these arm's length knowledge exchanges which generally goes unnoticed at the individual case level.

#### **4.2.2 Mode of knowledge transfer**

Participants' answers highlight that the information and knowledge transferred, in the arm's length relationships explored, took place during; conversations at their own, supplier, customer and other third party premises (e.g. test houses), at trade shows and exhibitions, over the phone and via email. In the form of one off meetings, pitches, sales and marketing activities, through website enquiries, reading, customer complaints, competitor analysis ('copying') and one-off emails. Such information and knowledge was documented as being obtained through customers and potential customers, suppliers and potential suppliers, competitors and third parties (such as test houses, fellow exhibitors). Additionally, one firm in particular, Flanders, highlighted significant engagement with open source communities and web forums, such platforms helped in both finding solutions to specific problems, and disseminating their own solutions and work-around to issues at an arm's length basis, as the IT manager of Flanders explains;

Chris Flanders (IT Manager): *“We use an open system called EPICORE, it has an online community based in forums, Google groups, LinkedIn etc., we go through and post online when we've found a solution to a problem...we try to help other people out.”*

At this point it should be noted that a definition of arm's length relationship, i.e. *a socially distant, impersonal relationship where future transactions are not necessarily expected*, was presented to participants prior to the interviews to ensure their understanding of the concept broadly reflected that of the facilitator. Furthermore, when participants made reference to such an instance, the facilitator probed for more details to clarify whether situation could clearly be considered an ALR.

#### **4.2.3 Perceived Effectiveness (effectiveness of ALRs directly augmenting innovation)**

Perceived effectiveness of arm's length relationships in directly augmenting innovation is identified as another theme emerging from the data. This theme, referred to as perceived effectiveness, is largely informed by answers to questions 2 and 3 in the semi-structured interview (see Appendix 2). This theme refers to participant's views on ALRs as a means of supplementing various different types of innovative activity. Utility, in contrast, was more interested in the nature of information and knowledge flows.

Of the 10 SMEs studies, the general perception was that ALRs were moderately effective in facilitating innovation. The engineering manager at engineering firm Renegade, best sums this up:

Russell Renegade (Engineering Manager): *“I'd say our arm's length relationships are somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But R&D budget doesn't always allow follow up on enquiries.”*

Commenting on an occasion where an enquiry was followed up, Russell continues:

Russell Renegade (Engineering Manager): *“Another prospective customer approached us at a trade show. They were asking us about our weather tight doors,*

*they were using a Chinese door that wasn't fit for purpose and they required something a little more robust. So we sketched up a few designs, exchanged some emails, but the client lost interest. But this is an ongoing product we sell, despite the fact that the initial customer who inquired about it never actually purchased it."*

This perspective is shared by an area sales manager of another engineering firms:

Russell Armour Core (Area Sales Manager): *"Exhibitions epitomize arm's length relationships. These probably give us the best opportunities, finding solutions to new problems but not new technology (from customer interactions). On the flipside, we then provide potential customers with expert advice."*

As an aggregate of the entire sample, these insights are perhaps the most representative.

However, responses were mixed. Even the technical director of VAC, arguably the organization considered the biggest proponent of extreme vertical integration, 'Not invented here syndrome' and arm's length relationships in the firms sampled highlights the benefit of collaboration for innovation:

Ron VAC (Tech D): *"In my experience collaboration is most effective for innovation."*

That being said, it remains unclear which type of innovation the participant is referring to, considering his position, one could assume this to regard more technical innovation.

These initial findings appear to be fairly unanimous, in terms of *technical innovation*, arm's length relationships are not perceived as effective as their more collaborative counterparts, but have been known to result in the development of new product ranges and incremental product innovation. The data highlights, the main advantage of ALRs tends to lie in their ability to aid in the identification of new applications and markets, representing position innovation, rather than technical innovation.

Perhaps the most intriguing discoveries of this theme emerge from VAC, whose technical director still documents collaborative relations as a more effective means of augmenting

innovation, despite their lack of regular ties, cynical view of collaboration and penchant for vertical integration. Interestingly, Pam, the managing director of the same company never alluded to this fact and demonstrated a fairly disdainful opinion of collaboration throughout her interview.

As a final note, further analysis of the transcripts could highlight a tendency of (some) participants to inexplicitly equate technical innovation as being more effective, or even a propensity to conceptualise innovation as pertaining only to technological developments. This could potentially skew respondents' answers. This is arguably due to the nature of the sector sampled; the majority of participants represented firms with strong technology components, either in the form of their manufacturing and engineering processes or information technology infrastructure. Furthermore, significant numbers of technology orientated professionals, i.e. engineering staff, IT managers and technical directors, were interviewed.

#### **4.2.4 Challenges (of Arm's length relationships)**

Challenges associated with inter-firm relationships was another common theme explored during the interviews, particularly in response to questions 1, 2, 3 and 4 of the semi-structured interviews. This theme refers to the various shortcomings respondents associated with arm's length relations, and generally revolved around the rigidity of such relationships, their contribution to core technologies and the value of the information provided.

Of the 21 participants interviewed, Nigel (Smiths Ltd), Kevin (Flanders), Chris (Flanders) & Craig (Thor) all highlighted challenges of arm's length relationships in one form or another. With regards to the rigidity of such interactions, one participant stated the following:

Craig Thor (Marketing Development Manager): *“Sometimes it is about cost, quality and delivery, that’s all the customer wants. And there isn’t much scope to improve upon things with those types of customers.”*

Here, Craig is alluding to the fact efforts to improve or innovation can be impeded by the transactional nature of arm’s length relationships. This could represent a failure on behalf of the customer to consider pursuing a closer relationship with their supplier. It should be highlighted that such rigidity was also encountered in the data regarding collaborative partners, whereby large, seemingly dominant firms would display a disdain for adjusting job specifications or being involved in collaborative discussions aimed at improving product quality and performance.

In a similar statement, another participant states;

Chris Flanders (IT Manager): *“...these are often just price based and take the firm of online auctions which we bid for. It’s a negative on their part sometimes, as we can’t communicate to them that bidding for an extra 2000 orders will only cost a few hundred pounds more, but will often be cheaper for them in the long run.”*

In this extract, the IT manager of a printing house highlights how auctions, arguably an extreme form of arm’s length transaction, limit the transfer of fairly crucial explicit knowledge which could have significant financial implications to the customer. However, readers should take note that this is primarily a failure of this specific governance mechanism used, rather than arm’s length relations more generally, as the data demonstrates ALRs can facilitate the transfer of significant information (explicit knowledge).

Finally, some respondents merely highlighted the poor strategic value of ALRs in regards to their core competence as a problem. For example, one participant acknowledged that

one of their core projects was delivered on a collaborative basis, and ALRs simply would not facilitate the level of integration necessary to deliver such a core asset, stating:

Kevin Flanders (MD): *"Our augmented reality couldn't happen with arm's length relations."*

As noted above, Nigel (Smiths Ltd), Kevin (Flanders), Chris (Flanders) & Craig (Thor) all highlighted challenges of arm's length relationships. Interestingly, participants from both WHITE PLC and Flanders reported the largest network sizes and the SMEs cited the greatest revenues of the sample, each turning over close to or over £20 million annually. Large networks could highlight a penchant for collaboration and with it a distain for formal market relationships which are considered to offer little value from a technological innovation perspective; furthermore, such a collaborative focus could provide a reason for their high revenues (or high revenues may provide the resources for more frequent collaboration). Of course, this reasoning is merely conjecture given the limited number of issues raised and qualitative nature of this research project, but exploring such findings further during analysis may contribute to our understanding of the underlying factors influencing the perceived merits of arm's length and collaborative business relationships.

Furthermore, although several significant problems have been raised with regard to the strategic, informative and innovative merit of arm's length relations, it should be noted that issues and challenges were far less prevalent in the data set than more collaborative endeavours. This, arguably, may always have been the case, as some firms dismiss ALRs in pursuit of more challenging, collaborations which are perceived as being more valuable in the long-term. However, the strategic and innovative value of arm's length relationships has already been identified as significant by the prior themes established in this section.

Furthermore, whilst their innovative limitations must be acknowledged, it still remains that such ties were relatively free of significant management challenges and yet, were responsible for the identification of new markets, viable products, growth opportunities and incremental product innovation.

### **4.3 High order code: Collaborative Relationships**

#### **4.3.1 Utility (of collaboration for sourcing business information & knowledge)**

Of the 10 SMEs studied, all expressed a belief that collaborative relationships helped in obtaining business information and knowledge, even if individual employee perspectives differed on their overall effectiveness. Again, utility of collaboration for the purposes outlined above are split into usage and knowledge transfer modes categories.

##### ***4.3.1.1 Usage***

Emergent findings from the data reveal a number of ways by which collaborative relationships provided valuable business information and knowledge, specifically in; developing new product lines, keeping up to date with and finding new materials and technology, developing technology, integrating with client systems, co-designing products and solutions, and implementing new systems and processes and services. These often reflected added value activities firms would implement out of goodwill for their customers. A number of participants highlighted the information and knowledge transferred through collaboration was *essential* to their core business, for example:

Nigel Hall WHITE PLC (MD): *“Our process is inherently very collaborative, especially as a client may not always fully understand what he wants to do”*.

The degree of collaboration between client and supplier appeared to be closely related to the focal firm's value offering, a significant number of the SMEs sampled provided highly tailored service offerings, which required many meetings, idea sharing and problem solving activities to implement. In such cases, collaboration with customers was generally seen as more desirable and linked to increased margins. A final point illustrates this well:

Chris IT Mgt (Flanders): *“One of our customers didn't have a stock system, this came out of a conversation where the exec mentioned they were having problems with current stock. We presented them with a demo of what theirs could look like (Author note: an adaptation of their own) and we implemented it free of charge.”*

In this example, an IT manager of a printing firm highlights the significant knowledge gains to be made through collaboration, the quote illustrates the huge information and knowledge benefits that can be derived from collaboration, in this case, obtaining a stock control system for free. But, in this case, such collaboration is an essential part of their service:

Kevin MD (Flanders): *“Collaboration is crucial for what we do, integrating with clients systems (ERP). We work with their IT teams very closely...jaguar/land rover had a legal dirty it supply manuals for their cars ten years after they were supplied. We developed a webshop online catalogue for them, so their customers can get them directly from us”.*

Of the organizations reviewed, 3 SMEs documented offering a tailored, customized service was core to their activities, whilst another 5 stated it was a part of their business. VAC, on the other hand, had a more standardized service offering which did not require intense collaboration, and their MD's perspective on collaboration was markedly different from the rest of the sample:

Pam VAC (MD): *“Collaborations can work, but they need to have a long-term focus. It's a marriage, a compromise. Partnerships can be very messy and can get very tricky. They want all of the partner benefits, but will be the heavy handed*

*supplier if it comes down to it. Informal partnerships will turn sour if our costs go up...They say all these things, whilst beating you with a stick.”*

It could be argued that VAC's overall perception of the value of such close relationships differs greatly from the rest of the SMEs sampled, because their value offering is far less reliant on collaboration with their customers than the other firms. Thence, the usefulness of collaborative relationships as a means of sourcing information and knowledge could be mediated by the nature of a firm's value offering. In such a case, the fact that SMEs are more likely to offer a niche service which cater for demand not met by larger firms, their very nature could be impacting upon the relative utility they gain from collaborative and non-collaborative relationships.

#### **4.3.2 Mode of communicating knowledge**

Participants highlighted a number of different types of collaborative partners, means and contexts in which they engaged, SME relationships emerging from the data pertained to clients, suppliers, competitors and universities, all of which were highlighted as fairly long-term ties which featured a significant degree of collaboration. Knowledge was documented as being transferred via factory/firm visits, telephone calls, email, joint-work arrangements and sales meetings.

#### **4.3.3 Perceived Effectiveness (effectiveness of collaboration directly augmenting innovation)**

This theme pertains to the ability of collaboration to facilitate innovation, and is informed by answers to questions 2 and 3 in the semi-structured interview, and supplemented with answers to questions 11, 12 and 13.

Of the 10 SMEs surveyed, all alluded to the effectiveness of collaborative relations in facilitating innovation. A number of valuable innovative outputs were attributed to these sorts of ties, including; new product lines, joint problem solving, joint product development, process innovation (in the form of stock systems development, improved quality control procedures etc.), licensing agreements etc. Some of these relationships resulted in innovations which were considered key to the firm's future success:

Kevin MD (Flanders):” *We have an annual agreement for augmented reality software with a company called Layer. The company is really forward thinking, really open. I believe we can achieve more together...we're a very open business going forward.*”

In a further example, an area sales manager documents how influential collaboration is to product development in their firm:

Armour Core (Area Sales Mgt): *“95% of products came from enquiries which were then jointly created.”*

In particular, SMEs such as GS, WHITE PLC and Flanders highlighted collaboration was a core part of their value offering, either due to the bespoke nature of their business, or the degree of systems integration required. However, the fact that all organizations voiced some sort of innovative gain from collaborative activities fails to highlight some of the underlying issues and conflicting opinions on the matter. Even some of the most diehard advocates of collaboration had plenty of horror stories to tell, including tales of stolen ideas, fights for dominance, opportunism, ruthlessness and wasted resources. In the following example, one managing director questioned the value generated from one specific form of collaboration in particular:

Andrew Morrison Touchtech (Tech Director): *University collaboration is way too expensive. We end up doing it for them, explaining how things work, they get it wrong – we're paying money to educate them. University time scales can let us*

*down. Often times the knowledge isn't retained, goes into a black box. Quotations are often too high and the often don't result in anything tangible. It's a 'milking exercise'.*

No discernible pattern emerged regarding the nature of the organizations which provided these 'horror stories', in fact, rather counter-intuitively, those SMEs strongly convinced of the benefits of collaboration highlighted many of these issues. That being said, of the 4 'horror stories' highlighted in the interviews, all 4 came from executive level staff and 3 of these were MDs. This may be due to the fact that executive level staff has to spend more time dealing with those types of issues than employees lower down in the hierarchy, alternatively, such experiences of failed deals and relationships may be widely disseminated in executive networks.

Review of the data reveals that participants consider collaboration to most commonly augment technical, product and process innovation. Since this is a comparative study, in light of apparent ALRs' ability to aid in the identification of new markets, solutions and novel uses for products, one may find it prudent to ask 'what's more valuable, the knowledge of a gap in the market, or the ability to manufacture a solution to cater for this need? Contemporary resource-based theory would argue it's the latter.

#### **4.3.4 Challenges of Collaboration**

Of the 21 participants interviewed, 10 outlined significant challenges they faced whilst engaging in collaboration. These relationships included clients, suppliers, competition and universities. The challenges emerging from the data have been grouped into 3 themes; conflict and resource demands. The majority of challenges outlined in this section emerged from participant answers to question 12.

#### 4.3.4.1 Conflict

Several instances of conflict emerged from the interview data, this generally took the form of; fights for dominance, rejecting alternative processes and managing IP rights emerging from collaborative engagements. In one interview, the managing director provides an insight into the drawbacks of collaborating with a large, global firm, stating;

Nigel WHITE PLC (MD): *“[they] are ruthless and over-demanding, have no problem in destroying a company for their own benefit. Always requested extra iterations and work. There was no scope to argue with their global standards, they wouldn’t accept better ways of doing things.”*

This rather forthright quote provides a clear insight into the different dimensions of strain collaboration can provoke, SMEs are simply having their efforts to innovate processes impeded, a concern in its self, but large MNCs also appear to exploit their smaller partners, placing huge stresses on their resources. Interestingly, Nigel, MD of WHITE PLC was a strong proponent of collaboration, in-fact, it was core to their service offering, stating:

Nigel WHITE PLC (MD): *“We don’t really gain valuable information from ALRs; the form of our business makes us very collaborative”.*

The managing director of VAC, a firm much more sceptical of long-term collaboration echoed Nigel’s remarks, commenting on the often contradictory nature of such arrangements;

Pam VAC (MD): *“... They want all of the partner benefits, but will be the heavy handed supplier if it comes down to it. Informal partnerships will turn sour if our costs go up. They say all these things, whilst beating you with a stick. “*

Further conflicts have arisen due to engineers being over-protective of their work and purchasing departments sabotaging collaborative efforts by constantly attempting to drive down the price of projects.

Such references to conflict occur frequently in the interview data, with 9 participants citing such problems. However, such issues are not limited to customer relationships, participants were also quick to criticise the value provided by engaging in university collaboration and knowledge partnerships. Fights for dominance over projects with professors, withheld IP and concerns over value are all cited as challenges with university collaboration, as the technical director of Touchtech explains;

*Andrew Morrison Touchtech (Tech Director): “[On university collaboration] There’s some people who are just in it for the money. The results of some of these projects are none existent; it’s quicker, cheaper and better if we do it ourselves than outsource one of our problems to a uni. It’s fascicle.”*

Opportunist behaviour manifest itself in other ways than simply shrewd university partnerships, as previously highlighted, IP management and product copying was a reoccurring source of mistrust and conflict in the data. Whilst Craig from Thor provided a great insight into their firms pragmatic handling of jointly created IP, choosing to hand it over in favour of a long term contract with the client, Andrew, Mark and Ryan were more conservative in the their collaborative endeavours and views of which IP left the firm, stating;

*"Andrew Morrison Touchtech (Tech Director): If we’re collaborating with someone and there’s a joint thing at the end of it, we’d buy their part, because we have the distribution. As long as their getting a sale they shouldn’t be bothered. They’d be hungry for us to take care of customer problems."*

Managing joint IP allocation is a key management issue and above we can see 2 conflicting approaches, Andrew, Mark and Ryan cited partners letting them down, business model, margins and a belief that they can do things better fueled this behaviour. Mark of ABBID highlighted a particularly bad experience where a partner copied and went to market with one of ABBID’s products, after he himself convinced them of how effective

their new product was. The end result of these experiences and attitudes can manifest in fairly inflexible ways of working which could impede the pursuit of fruitful external ideas and paths to market. True, Thor may be relinquishing short-term profits, yet this is seen as an investment into future business by retaining the clients they've worked so hard for. Russell, Andrew, Kelso, Craig and Pam (representing Renegade, Touchtech and Thor and VAC respectively, all with small networks) all highlighted instances whereby, in their opinion, the most efficient or effective course of action, particularly in regard to innovation, was not adopted due to their partners' resistance. For example;

Russell Renegade (Engineering Mgt): *“Yes, their dominant position does impede innovation. The guys on the shop floor would think they could reduce time and cost by welding something differently or changing a part, but the big customers are often reluctant to do this as this would require a redesign and re-release of drawings which would require more paperwork and time, effort and cost on their part.”*

In a further example, Pam from VAC explains how firms can coerce SMEs into adopting new processes and, simultaneously, undermine the value of subsequent innovations;

Pam VAC (MD): *“[Firm] requested we implement a system to uniquely identify all our power coolers. They recommended some people, but we did it ourselves. We are thankful we did it, it's fabulous. Ten years on, Nestle still don't have such a system but they rejected our offer to help implement ours for free. They said, 'If we do it, we'll be doing it the right way'”.*

These examples illustrate the challenge SMEs encounter in the face of collaboration particularly when dealing with powerful and illustrious suppliers, being both coerced into adapting their processes and failing to have their solutions and ideas valued or implemented. It should be highlighted that Craig from Thor identified how his firm was able to mitigate this challenge in the face of their small nature, stating;

Craig Thor (MKT DEV MGT): *“Our knowledge base is valuable to us, it helps us maintain power.”*

Those participants highlighting conflict stemming from interactions with powerful customers and suppliers tended to have smaller networks; however, many had significant work experience and worked for fairly well established SMEs with significant revenues. Therefore, they were not necessarily at any greater risk of being considered a small or new player. It's also interesting to note that whilst participants with large networks with a penchant for collaboration were equally forthcoming with the drawbacks of managing such partnerships, no instance of partners abusing their dominant position in the relationship was highlighted by such embedded SMEs. Again, it is difficult to draw such links or conclusions from qualitative data, but perhaps SMEs perceived as being relatively less connected are more likely to fall victim to such displays of dominance, as the dominant party's reputation is unlikely to be significantly tarnished. This may be a potential avenue for future research.

#### **4.3.4.2 Resources**

The resource strain intense collaboration can place on SMEs also emerged as a frustration by participants. Issues regarding partners always requesting extra iterations and demanding more work have already been discussed, in addition to the aforementioned criticisms of university collaboration as being too demanding on both time and capital. Andrew, the technical director of Touchtech had the following to say on the topic;

Andrew Morrison Touchtech (Tech Director): *“Dealing with big customers, you tend to jump when they say so. We tend to get dragged in, more and more, into the customer's design.”*

Andrew, Pam and Nigel all highlight resource strain as a key problem when engaging in collaborative relationships, yet whilst Pam maintains a fairly cynical view of such arrangements, Andrew's and Nigel's negative experiences do not appear to impact on their broader, highly collaborative approach to their businesses.

#### **4.4 High order code: Imitation & Convergence**

The collaboration and innovation diffusion domain pertains broadly to questions 5 to 7 of the semi-structured interviews and pertains to the process by which collaboration results in SMEs processes, services and products. Findings regarding participant's experiences, perceptions and thought processes are consolidated under this higher order code. It should be noted that copying partner's innovation activity can be one cause of innovation diffusion, but not all instances are a result of imitative behaviour, therefore, the theme business processes refers to the broader process of organizations becoming similar, whilst the theme 'perceived value of copying', relates primarily to mimetic behaviour.

##### **4.4.1 Business processes**

The business processes theme emerged from data gathered in response to questions 5, 6 and 7 of the interview, it refers to the business process changes either organization experienced as a result of a dyadic relationship. More specifically, the cases investigated pertain to instances where one organization within the relationship, adopted similar processes or procedures to their collaborative partner. Of the 10 SME studied, 5 provided explicit examples of collaboration resulting in the diffusion of an aspect of one partner's business processes, into the other. For example:

*Chris IT Mgt (Flanders): "One of our customers didn't have a stock system, this came out of a conversation where the exec mentioned they were having problems with current stock. We presented them with a demo of what theirs could look like (an adaptation of their own) and we implemented it free of charge."*

In a similar example, the design engineer of engineering firm Thor stated the following:

*Kelso Thor (Design Eng.): "SafetyKleen have a bar code, puts an id tag on every product we do. Gives history on every product, history, repair history etc. We've since adopted this on other projects since the SafetyKleen's initial request... They wanted it because their products are in the field for quite a long time. We adopted it because we'd done quite a lot of upfront effort implementing, and it could benefit other projects."*

Finally, the managing director of another engineering SME highlighted how they intend to offer a service innovation to their customers:

*Ryan ABBID (MD/Eng.): "We're now trying to get into a different model, adopting a partner's model, based on their success. They make a very complex product, but maintain a lean, agile production facility where they can make relatively small batches of product very quickly. The competition is all Chinese manufactured, so we could go to the wholesale market, saying 'you don't have to buy a container full of these parts, it will take a week to get here, rather than 10 weeks on a boat'. You don't need to buy 1000, we're happy to give you 50 or 100 of that. "*

These examples demonstrate that some of the SMEs sampled have adopted similar quality control systems, manufacturing processes and commercialisation techniques to their partners. Other examples include the implementation of similar IT and administrative systems. As expected, the SME's with a penchant for collaboration were more likely to highlight and provide significant details about such activity in the sample. Anecdotes of such phenomena were equally spread between both executive and technical staff, and a review of the data highlights Flanders as providing the most numerous accounts of such behaviour, an SME whose participants cited some of the largest networks of the sample. No such activity was described by either representative of VAC, whose participants did not highlight a single collaborative relationship in their network. These findings are congruent with the argument that those SMEs which engage in the most collaborative activity are more likely to adopt similar business processes to their partners.

Taking an innovation perspective, it can be concluded from these initial results that those firms that engage in collaboratively are likely to experience more frequent process innovation, in the form of similar administrative & quality control systems, IT systems and manufacturing processes. The data also indicates collaboration can result in the adoption of similar service innovations; however, there is only one instance of this in participant responses.

#### **4.4.2 Perceived Value of Copying**

This theme, regarding the perceived value of adopting or copying third party or partner business processes is primarily drawn from answers to questions 4 to 6 of the semi-structured interview. It attempts to consolidate key participant perspectives on mimetic behaviour.

Of the 10 organisations studied, 8 SMEs provided examples of adopting similar business processes to their partners. This could take the form of more radical changes such as the adoption of commercialisation techniques and service innovations, or more often, incremental adoption of partner quality control systems and administrative systems. Of those 8 SME, 3 made explicit comments regarding 'copying behaviour'. For example:

Nigel WHITE PLC (MD): *“We adopt a ‘copy with pride’ attitude, if we see best practice we’ll often adopt it, e.g. the way we handle our documentation.”*

Mike GS (MD): *“We are very much ‘me too’, copying what is working well for competitors.”*

These comments, generally refer to copying from third parties in general, rather than partners specifically, but allude to a rather open view of imitative behavior. In these two examples, the copying appears to be coupled together with the broader concept of 'learning' and demonstrates a willingness to appreciate best practice. This would indicate that

copying is not deemed as bad, or something to be ashamed of by these SMEs, and is actually indicative of best practice in and of itself. Furthermore, the willingness to share this practice openly indicates that it is something they are proud of, rather than ashamed. Interestingly, the two SMEs who mention copying quite proudly are amongst the most collaborative in the sample, with participants from WHITE PLC boasting some of the largest networks in the sample. Unfortunately, network sizes for participants' working for GS could not be measured. However, whilst not directly mentioning the term 'copying', Flanders highlighted the most numerous examples of collaboration induced replication, and again, whose participants boasted some of the largest networks in the sample. This may demonstrate a link between the perceived value of 'copying' and the level of collaborative activity and/or ties maintained by an SME. The interview data provided only one instance of where copying was referred to in a negative light, the MD of one of the smaller SMEs in the sample explains:

Ryan ABBID (MD/Engineer): *“We did have a firm copy our product and go to market with it. It was a product we sell to the bus company, we convinced a company we were working with to install the product, and after initial doubts they saw it was good a good idea...and they ran with it.”*

This is an instance where, after significant collaboration, one firm chose to commercialise their own version of a product ABBID had developed. Their partner acted opportunistically, exploiting the knowledge and skills gained from the relationship in order to commercialise a solution themselves. Interestingly, the same managing director highlighted that they were implementing a similar service innovation and commercialisation technique to one of their other suppliers, having seen the latter's impressive facilities and capabilities on a site visit. This indicates the emergence of at least two different *kinds* of copying, one related to an abuse of trust to the detriment of the other

party, and another form, whereby the imitation is not at the expense of the partner, or is even mutually beneficial.

It must be highlighted that only 3 participants directly refer to such behavior as copying, and that another 3 SMEs in the sample do not highlight any specify examples of such activity. This may simply be because no example came to mind during the interview process. Touchtech, GS, Armour Core & VAC were the only SMEs in the sample that did not highlight engaging in isomorphic activity within collaborations, although GS did highlight engagement in broader copying behavior. Touchtech & Armour Core purported a more balanced perspective on the effectiveness of arm's length and collaborative activity and their staff cited network sizes mid/low range. VAC was cynical of collaboration, highlighting a penchant for vertical integration and participating staff highlighted the lowest network sizes of the sample. Based on such findings, one could argue that SMEs engaged in significant collaborative activity are more likely to endorse copying behavior and be open to the best practices, and allow the businesses process of their partners to permeate their organizational boundaries.

#### **4.4.3 Rationale for adoption**

Drawing upon participant answers to questions 5, 6 and 7 of the interviews, several rationales can be seen to emerge rationalising why the firm's business processes changed. Firstly, firms chose to adopt a particular practice because it was considered as an opportunity to improve efficiency or performance. Ryan, managing director of ABBID, exemplifies such behaviour when stating:

*Ryan ABBID (MD): "We're now trying to get into a different model, adopting a partner's model, based on their success."*

Russell, Kelso, Mike (on arm's length supplier product imitation), Lucy, Nigel and Ryan all document instances of such behaviour in their particular firms, interestingly participants working for all those firms had mid-to high network sizes (Renegade (7); Thor (9); GS (N/A) Equestrian (7); WHITE PLC(19); ABBID (18)). Maintaining a large number of regular ties could be attributed to placing greater value on outside knowledge which, again, could explain these firms willingness to adopt good practice when they see it. Furthermore, in 4 out of 6 cases it was the MDs who highlighted this favourable perspective on imitation, which may allude to the fact that some of these decisions to mimic partners and competitors' products, services and processes is coming from the top level, rather than on the whims of opportunist engineers and designers.

Secondly, firms were coerced into adapting existing, or adding new, processes by significant clients who demanded, in some cases, continuous iterations as a condition for retaining their business. In some cases this came in an outright request;

Pam VAC (MD): *“Nestle requested we implement a system to uniquely identify all our power coolers.”*

Generally these were indicative of larger, established firms' standardized ways of working, which the SMEs in this sample had to accommodate. Pam and Nigel were the only two who expressed vehement frustration at complying with such standards; this may be because, as the only managing directors to comment on such coercive pressures, they felt a loss of autonomy whilst trying to facilitate such demands. Both PAM & Nigel had substantial experience in their firms and industries, both having worked there for over 24 years, which may have compounded such matters further. Engineers, designers and managers tended to take adhering to third party standards in their stride, with Russell,

Craig, Kelso, Simon & Chris, even highlighting the overall benefits of such flexibility, for example;

Russell Renegade (Engineering Manager): *“Sometimes there’s a requirement for welders to work to a specific welding procedure and to be qualified. This varies between jobs and customers and quality requirements.”... “We now implement weld maps as an almost standard service. Not everyone asks for this, but we’ve implemented our own standard template. It could result in a better job.”*

However, such flexibility does not suggest the engineers sampled were all amenable, as highlighted in the prior section on dominance, frustrations do occur when efforts to innovate and improve the overall quality of work are impeded by the rigid work specifications of large firms.

Finally, some SMEs were offered their partners’ existing solutions to specific business issues the former party were facing. Whether such solutions were ‘imposed’ upon partners is open to debate, however, there was no evidence to suggest such ‘suggestions’ were stipulations. From example;

Chris Flanders (IT Manager): *“We implemented our fulfilment system for Pelicans manufacture, a firm who supplied wallets for handbooks, which is a complement to our own products. They ‘were’ working from a spreadsheet”.*

Such suggestions were highlighted by Lucy, Chris (Flanders) and Chris (ABBID), whilst Chris from Flanders instigated this solution, Lucy and Chris (ABBID) highlight that a partner suggested this iteration to them. Again, cited participant network sizes in this segment of the sample were in the mid-to high (Flanders (18); ABBID (17); Equestrian (7)), however, many similar firms did not highlight such experiences, so limited conclusions can be drawn from this.

## 4.5 Summary

This section has attempted to provide a face value account of the initial findings emerging from the data collection process, the author has identified various themes and sub-themes emerging from the data and, where appropriate, highlighted which interview question(s) these themes primarily emerged from. Throughout each theme, contrasting and similar opinions between participants were highlighted, and where possible, a tentative link and rationale for this position was posited based on the profile data collected beforehand. The analysis and discussion section will attempt to explore the reasoning behind such links and endeavor to consider these findings in light of past research, however, prior to this a brief overview of the key findings is required.

In regards to the informational and innovative value of arm's length relationships, the majority of participants sampled highlighted how such relationships helped their SME source knowledge. Of those sampled, participants with the largest networks acknowledged such benefits the least, and managing directors also rarely highlighted such benefits and were also the most critical of such ties, with the exception of PAM. A quick analysis could reveal that employees who are highly embedded in their networks could find less time to extract value from ALRs. In terms of MDs, it could be postulated that such information transfer fails to diffuse to the upper echelons of the executive, as such transactions may not appear noteworthy by engineers or middle management. Such embedded firms were also most likely to highlight the few issues attached to arm's length ties emerging from the data, namely; their rigid nature, poor contributions to core technologies and their limited informational value. In general, participants highlighted ALRs being moderately effective in augmenting innovation, this came in the form of new products, discovery of new markets and incremental product innovation.

A review of the interview findings indicates collaborative relationships as being, on the whole, more useful in sourcing knowledge. In particular, those SMEs which provided highly customized value offerings noted collaborative activity as a core means of information and knowledge sharing, whilst firms such as VAC, with more standardized products and services were much less inclined to view them as important. Participants representing all SMEs highlighted collaboration as an effective means of facilitating innovation, most commonly technical, product and process innovation.

The findings also revealed a tendency of participants to conceptualize innovation as primarily technical, and arguably valued such solutions more highly. This is arguably due to the significant number of Technical Directors, engineers and IT managers sampled.

Despite their high innovative and informational value, the data highlights that such collaboration does pose challenges; these were sorted into the sub-themes of conflict and resource strain. Instances of conflict often revolved around the fair division of IP rights, fights for dominance and shop floor level staff rejecting alternative processes and ways of working. Such dominance was primarily documented as occurring in SMEs whose employees were documented as having small networks, which may be explained by a reduced reputational risk at displaying such dominant behavior to SMEs with few connections, although this still would not explain other forms of mistreatment staff with larger networks report. The resource strains pertained primarily to excessive time and capital demands and highly demanding customers. Finally, issues of dominance primarily arose by larger, more established firms impeding innovation and vetoing more effective proposed solutions, coercing SMEs to adjust their business processes and undervaluing the solutions of SMEs. Interestingly, these issues were highlighted most frequently by

participants with large networks, meaning their penchant for collaboration has not insulated them from the problems such arrangements present.

With regards to the SMEs' business processes, several instances of adopting a partner's systems, methods and processes were highlighted. These primarily related to manufacturing processes, commercialization techniques and quality control systems. These findings could suggest firms experience isomorphic pressure compelling these SMEs to alter themselves during partnerships, in a manner which is seen in their administrative, quality control systems, IT systems or manufacturing processes resembling those of their partners. All 3 of the SMEs employing participants with the largest networks highlighted instances of such adjustments to their business processes, whilst VAC, a secular firm whose sampled employees cited the smallest networks of the study documented no such activity, even in their arm's length relationships. This could give credence to the idea that such isomorphic pressures may well be induced by collaboration. A theme closely related to isomorphism that of copying was also explored within this section. Participant perceptions of the value of copying were explored and concepts of benevolent and exploitative copying emerged. Benevolent copying occurred primarily through closer integration of systems, whilst exploitative copying was at the expense of a partner. Again a penchant for collaboration appeared to make SMEs more likely to endorse such benevolent copying behavior and take a more liberal view of their partner's business processes permeating their organizational boundaries. The data suggests multiple reasons for such isomorphism in SME's business process; sometimes a proactive decision is made to adopt a new practice to improve effectiveness or efficiency, clients may coerce SME's to change in order to retain their custom, or sometimes a solution (similar to their own) is freely offered by a client to an SME in goodwill.

It is important to discuss reasons why arm's length relationships may not be identified as important by participants. On reflection, some of this knowledge may represent minor explicit knowledge that goes unrecognised within the innovation process. Furthermore, by definition it may be more difficult to attribute valuable insights and information to a 'one off' encounter, meaning significant contributions by arm's length relationships may go unrecognized. And if they are, this understanding is unlikely to permeate to the top of the organizations' hierarchy. Finally, some of this knowledge does not pertain to technical issues, which the sample appears to value highly and would arguably be more inclined to remember and communicate.

This chapter has made progress in answering the research question – what is the process by which SMEs innovate in collaborative and arm's length relationships? It has attempted to present participant's thoughts, ideas and reflections on these phenomena, these are presented in table 9 below. The next section will attempt to integrate these themes more deeply with established theories and concepts in contemporary strategic management research.

Analysis reveals a tendency for more senior level staff to not recognize the impact of arm's length relations in the innovation process, and a more general tendency of participants to conceptualise innovation primarily in 'technical' terms. Isomorphic pressures at the process and business model level within collaborative relationships, particularly in alliances with larger, more established partners, are identified and potentially hold negative connotations for SMEs by creating lock-in. Furthermore, arm's length relationships are identified as capable of providing vast opportunities for future growth, setting positive path-dependencies and acting as a springboard for future success.

This concludes the findings chapter, and it expected that further, in-depth analysis will generate deeper novel insights into the role of arm’s length and collaborative relations in the innovation process.

Table 9 outlines the themes that emerged from a face value thematic analysis of the interview transcripts, for the sake of transparency these have not been analysed in relation to the academic literature. This table outlines the themes that emerged from a face value thematic analysis of the interview transcripts, for the sake of transparency these haven’t been analysed in relation to the academic literature. The following themes highlight preferences, challenges and details regarding the nature of the external relationships discussed. The following themes highlight preferences, challenges and details regarding the nature of the external relationships discussed.

**Table 9: Overview of Findings**

<b>HOC</b>	<b>Theme</b>	<b>Initial Findings</b>
Arm’s Length Relationships	1. Utility of ALRs for sourcing information	ALRs highlighted by majority of SMEs sampled as aiding knowledge sourcing  Participants with larger networks often didn’t highlight the benefits of ALRs for sourcing knowledge.
	2. Perceived effectiveness of	MDs were less likely to

	<p>ALRs for supporting innovation</p>	<p>highlight such benefits of ALRs (and were more critical), compared to those lower down the hierarchy.</p> <p>General perception was that ALRs were moderately effective in augmenting innovation. (MDs were less impressed)</p> <p>ALRs aid in identification of new markets, viable products and incremental product</p>
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	<p>3. Modes of knowledge transfer</p>	<p>innovation.</p> <p>Technical innovation focus and perceived as higher value</p> <p>Information and knowledge was transferred during; conversations at their own, supplier, customer and other third party premises (e.g. test houses), at trade shows and exhibitions, over the phone and via email. In the form of one off meetings, pitches, sales and marketing activities, through website enquiries, reading, customer complaints, web forums, online communities, competitor analysis ('copying') and one-off emails.</p>
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	<p>4. Challenges</p>	<p>Parties included; customers and potential customers, suppliers and potential suppliers, competitors, web &amp; open source communities and third parties (such as test houses, fellow exhibitors).</p> <p>Such relationships can be rigid, their contribution to core technologies is minor and the value of the information provided can be limited.</p> <p>Participants with larger networks working for SMEs with large revenues shared this view in particular.</p>
<p>Collaborative Relationships</p>	<p>5. Utility of collaboration for sourcing information</p>	<p>Collaboration appears most useful overall in aiding knowledge sourcing</p> <p>SMEs with highly customized</p>

	<p>6. Perceived direct effectiveness of collaboration for supporting innovation</p> <p>7. Mode of knowledge transfer</p>	<p>value offerings highlighted collaborative activity as a source of information and knowledge more than those firms with fairly standardized products/services</p> <p>All firms sampled highlighted effectiveness of collaborative activity for facilitating innovation.</p> <p>Data reveals collaboration tends to commonly augment technical, product and process innovation.</p> <p>Knowledge was transferred via: factory/firm visits, telephone calls, email, joint-work arrangements and sales meetings.</p> <p>Parties included; clients, suppliers, competitors and</p>
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<p>Imitation and Convergence</p>	<p>9. Business processes</p>	<p>Firms documented instances of collaborative partner's adopting each other's processes.</p> <p>Business processes adopted generally pertained to quality control systems, manufacturing processes and commercialisation techniques.</p> <p>The initial results may indicate that those firms that engage in collaboration are likely to experience isomorphic process innovation, in the form of similar administrative &amp; quality control systems, IT systems and manufacturing processes.</p> <p>The data also indicates</p>

		<p>collaboration can result in the adoption of similar service innovations; however, there is only one instance of this in participant responses.</p> <p>Two forms of copying emerge; <i>benevolent</i> imitation which can be mutually beneficial (e.g. through closer integration of systems), and exploitative copying at the expenses of the partner.</p>
	<p>10. Perceived value of copying</p>	<p>The data indicated more collaborative SMEs are likely to endorse copying behaviour and be open to the best practices, and allow the businesses process of their partners to permeate their organizational boundaries.</p>

	<p>11. Rationale for adoption</p>	<p>Chosen for improved effectiveness and efficiency;</p> <p>Coerced by customer and responded to maintain client;</p> <p>Solution freely offered by client in good will.</p>
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**Table 9. (Continued)**

## **Chapter 5: Analysis & Discussion**

### **5.1 Introduction**

The last chapter presented a face-value, initial review of the findings derived from the interview data. Before proceeding to a more thorough analysis of the findings in light of contemporary management literature, it is important to evaluate how the findings chapter has addressed our research question to date. This exploratory research asks, ‘What is the process by which SMEs innovate in collaborative and arm’s length relationships?’

As discussed in the literature review, strategic management's transition from endorsing the previously dominant industrial organization perspective to core capabilities and resource-based theories have had a marked impact on inter-firm relations research. A previous emphasis on and avocation for arm’s length ties, primarily due to their low switching costs, minimal risk and bargaining advantages has been superseded by collaborative and relational approaches. The later perspectives emphasize the innovation and performance benefits of strategic alliances and other forms of collaboration, particularly in the ability to foster resources which fit Barney's VRIN model. Uzzi (1997), building on the work of Granovetter (1985), then highlighted the benefits of managing a portfolio of both close and arm’s length ties, stating that trust, fine-grained information transfer and joint-problem solving arrangements provided by collaboration improved performance, whilst ALRs served to provide new and novel information and insulated firms from exogenous shocks. Subsequently, whilst some literature has built upon this to inform the effective management of a portfolio of such ties for maximum performance value the majority of significant strategic management literature has focused on the performance benefits of collaboration and is currently seeking to address the significant challenges such relationships present (Colombo et al, 2012).

The findings section revealed that SMEs have utilized arm's length relationships to identify new markets, new products and to improve their existing products. Such information was provided by a range of third parties, including; customers, suppliers, potential suppliers, test house and online communities (Open Source forums). In general, ALRs were perceived as moderately effective in augmenting innovation, particularly by engineering and management staff; however, their contribution to technical innovation was highlighted as relatively minor. By contrast, collaborative relations were highlighted as being highly effective in sourcing knowledge and facilitating innovation, particularly by firms with customized service offerings. Such innovative activity spanned technical, product and process innovations. However, collaboration was impeded by a variety of risky challenges such as conflict and resource pressures. Collaboration also appears to contribute to core competencies and technological development. Such appropriation goes beyond traditional economic transactions as ALRs continuously validate, guide and feedback on existing appropriation strategies, providing an effective environment for configuring their resources and core capabilities to their optimum.

The following section attempts to interpret these findings to uncover the respective innovative contribution of arm's length and collaborative ties by referencing prominent management theories. Activities are broken down into concepts and explored in light of existing research. Readers should note that all but four propositions discussed under the 'Problem-Solving' and 'Novel Products & Services' higher-order themes have been established apriori in the data and reviewed using qualitative deductive analysis (Gilgun, 2005; 2014), whilst all propositions under 'Knowledge Creation' emerged from the data via abductive reasoning (Schvaneweldt & Cohen, 2010). Whilst every attempt has been made to present the analysis and propositions in a structured manner, the nature of the data

and linkages between themes means it was not practical to organize them numerically as they initially appeared in the literature review chapter. Rather than being a flaw, this research asserts it is merely reflective of the ‘messiness’ of the qualitative research process (Corley, 2012).

## **5.2 Problem-Solving**

### **5.2.1 Collaborative Relations**

#### ***5.2.1.1 Identification of problems***

Nickerson & Zenger (2004) argue that through the identification and selection of valuable problems, firms can create new knowledge. The anecdote below provides an example of such problem identification behavior within an embedded relationship:

*Chris ABBID (Electronics Engineer): “Firms might say ‘you could do this process this way’. For example, changing calculations to get more accurate readings. Taking into account new things, you should record this parameter as well...you should note down who built it...who tested. Continent conducted a quality audit on us and stated, ‘your process should probably include these things’. We’ve since changed the processes and we adopted some of the quality procedures.”*

Here, electronics engineer Chris describes an interaction with an existing client, Continent, whereby ABBID’s key production processes was audited. This relationship serves as a conduit for diagnosis-solution problems (Jonassen, 2000), as it involves the identification and subsequent treatment of problems within the manufacturing process. These process inefficiencies are identified and contrasted to best practice (Berger, 1997; Hoerl, 1998), thus such relationships act as conduits of new knowledge and one could postulate that such review mechanisms prompting the extension of the firm. These findings backup up the arguments of Johannisson et al. (1994) and Hoang & Antoncic (2003) who claimed entrepreneurial firms are heavily reliant on their networks in problem-solving activity.

These findings are also congruent with Uzzi (1997) arguments that embedded ties help reduce production errors and the number of development cycles and Kessler et al's (2012) point that social capital facilitates the identification of problems. It should also be acknowledged that problems identified within the remit of collaborative relationships tended to pertain to the internal processes of one of the firms within the dyadic tie. Similar anecdotes offered by Chris (Flanders), Russell (Renegade), Kelso (Thor), Lucy (Equestrian), Simon (WH Smith) and Ryan (ABBID) all provide substantial support for proposition 2a.

***Proposition 2a:** Innovation may be supported by more collaborative relationships because they are more likely to identify commonly occurring problems in the innovation process*

However, neo-institutional theory may argue such problem identification mechanisms are a means of ensuring innovative convergence. Firms become similar over time due to mimetic, normative and coercive pressures (DiMaggio & Powell, 1983), which although serve to perpetuate industry norms and standard practice, can also stifle innovation as any practice deemed novel or 'wrong', such as in the example above, is teased out and criticised, representing coercive pressure. This argument is solidified further, by prescriptive the manner by which 'Continent' outline the solution within the problem identification phase. The data highlights that such a strategy does not prompt an exploratory solution search strategy (March, 1991), but rather, ends precisely when the partner identifies the problem at hand, again, hindering potential innovation within the manufacturing process. These findings are congruent with the arguments of Cengiz (2006), who argues strong ties are associated with exploitation strategies that pertain to the

refinement and implementation (March, 1991). Such behaviour could breed homogeneity within collaborating SMEs' processes, leading to inertia within the innovation process, as postulated but not empirically demonstrated by Cengiz (2006). Excerpts from Chris (ABBID), Pam (VAC) and Chris (Flanders) all highlight how problem-identification activity resulted in firm convergence, therefore it is proposed:

***Proposition 1e: Innovation may be hindered by collaboration because problem identification prompts firm convergence.***

#### ***5.2.1.2 Solutions to identified problems***

Solving problems has been identified as key for innovation and superior firm performance (Von Hippel, 1994; Nickerson & Zenger, 2004). Embedded relations were identified within the data as conduits for several solutions to pre-existing problems, for example:

Chris Flanders (IT Manager): *“One of our customers didn't have a stock system, this came out of a conversation where the exec mentioned they were having problems with current stock. We presented them with a demo of what theirs could look like (an adaptation of their own) and we implemented it free of charge.”*

Such examples of problem solving activity emerged regularly from the data and are congruent with the work of Ulhoi (2005) and Uzzi (1997) regarding problem-solving in collaborative relationships; yet as one might expect these solutions were not novel and all were merely solutions currently being adopted by their partners, or wider industry. This may aid the effective operation of these firms, but none were identified as a catalyst to novel innovation. The benefit of pre-packaged, prescriptive solutions such as the one described by IT manager, Chris, and to a certain extent by electronics engineer, Chris, in the prior anecdote, is that these represented tried and tested, effective solutions which are

relatively quick to implement and require little resource intensive search activity. Leonard-Barton & Sinha (1993), Hansen (1999) and Ulhoi (2005) all support this finding, citing that collaborative ties are more effective in managing problem-solving activity than arm's length relationships. This is also supported by Fullerton & McAfee (1999) who maintain limiting the number of problem-solvers avoids underinvestment of effort on behalf of the 'solver', making for more effective solutions. Furthermore, the findings also support Aarikka-Stenroos & Jaakkola's (2012) work that highlights B2B customer-supplier relationships play an important role in problem solving activity. When such prescriptive solutions do not overlap with the core capabilities of the focal firm (Leonard-Barton, 1992), these solutions may represent a low-cost means of increase organizational efficiency which may serve as a platform upon which further organizational innovation is founded. In addition to Chris' anecdote above, excerpts by Ryan (ABBID), Russell (Renegade), Craig (Thor), Kelso (Thor) and Lucy (Equestrian) provide substantial support for proposition 1a.

***Proposition 1a:*** *Innovation will be facilitated in strongly embedded relationships because they are conduits of tested, efficient solutions.*

One issue collaboration-induced solutions emerging from the data present is that they negate any exploration or search activity which could lead to novel and superior means of solving the problem. Furthermore, whilst the initial solution provided above may represent the optimal resolution, such search behaviour can act as a conduit of novel ideas, approaches and opportunities which the focal firm is not exposed to when a decision to negate this exploratory process is made (Cengiz, 2006; Terwiesch & Xu, 2008), in favour of a recommended tried-and-tested solution. These findings somewhat support the

transferability of Lechner, Frankenberger & Floyd's (2010) work into the SME, who discovered the performance of exploratory initiatives was diminished when multi-national corporations managed a large set of strong ties. It is posited here that such over-reliance on alliance partners for solutions could potentially erode SMEs problem-solving capacity, impeding innovativeness, as electronics engineer Chris reveals:

Chris ABBID (Electronics Engineer): *“Learning through experience, e.g. reading, I find enables you to learn more than speaking to one of their guys, despite the fact that you’ll get quicker knowledge transfer and problem solving with the latter method.”*

Here, ABBID's electronics engineer highlights how collaborative, and in fact any relationships, can potentially diminish learning and internal problem-solving capabilities by presenting quicker and arguably easier, results. Albeit, at the cost of diminished understanding. However, as we will see later, in contrast to solutions derived from arm's length relationships, solutions originating in collaborative relationships were often dictated and prescriptive, and as Chris demonstrated in his anecdote regarding the new fulfilment system above, regularly implemented by the third party. It is postulated that adopting such prescriptive solutions erodes the internal problem solving capabilities of the SMEs studied. These findings are backed up by Perry-Smith & Shalley (2003) who argue embedded relationships can often stifle creativity and autonomy, although this thesis provides actual empirical support for this assertion in the SME context. Analysis of the excerpts of Chris (Flanders), Ryan (ABBID), Russell (Renegade), Craig (Thor), Kelso (Thor) and Lucy (Equestrian) in light of the literature also finds substantial support for proposition 4c.

***Proposition 4c:*** *Innovation may be hindered in more embedded relationships because solutions represent “pre-packaged”, consensus recommendations, breed over-reliance and reduce SME's internal problem-solving capabilities.*

## 5.2.2 Arm's Length Relations

### 5.2.2.1 Identifying a problem

No detailed examples of problem identification by arm's length ties emerged during from the data, however, whilst discussing their utilization of such relationships, Pam's VAC (MD) highlights

Pam's VAC (MD): *"Complaints from customers lead to WaterTack Systems"*.

These short anecdotes are embedded throughout participant narratives emerging from the interview data and allude to the ability of arm's length relations to identify and communicate problems with products and services. Consumers may not be able to readily recommend a solution to these problems, but they arguably play a valuable part in the effective running of SMEs. For example, marketing development manager Craig highlights how arm's length relationships can provide new directions and potential technologies and products to explore:

Craig Thor (Marketing Development Manager): *"Arm's length relationships are useful for new opportunities; you see companies launching new products into their markets & have open & honest conversations about [each other's] products... I visit tradeshows to discover new technology and find people with new ideas. I don't exhibit; we talk to companies who have stands."*

The emergent data reveals arm's length relationships, in the form of customer engagement, aided the identification of product faults and issues. Furthermore, in the previous quote, Pam reveals how VAC's patented water dispenser sanitation system, dubbed WaterTrack, emerged out of commonly recurring customer complaints. The findings are consistent with the work of vonHippel (1986; 2010) and Shah & Tripsa (2007), who argued customers can aid in the identification and solution of valuable problems. Whilst such interactions served to *identify* problems, unlike many collaborative relationships, these usually weren't

accompanied by a potential solution, the ramifications of which will be explored in the next section. Arm's length relationship-induced problem identification, whether it be product faults and gaps in the market, appear to inform the broader innovation strategies of the firms referenced by participants. The concept of maintaining a large networks of ties to help identify commonly occurring problems is highlighted within the literature (Batterink et al, 2010), however, the data reveals that arm's length problem identification is more likely to relate to product faults and market gaps identified by customers. The nature of new products and incremental improvements to existing ones, appear to be strongly linked in the data, highlighting the long-term implications such brief interactions can have on SMEs' product portfolios. The literature posits such novelty stems from involving a large number parties from distant fields into the problem-solving process (Terwiesch & Xu, 2008; Jeppesen & Lakhani, 2010; Boss, Kleer & Vossen, 2014) and combining these disparate knowledge sets to generate novel innovation (Ahuja & Lampert; Fleming, 2001). This could generate new products which, if successful could radically change an SME's future market strategy. Furthermore, it could be suggested that one-off conversations regarding the latest technologies can also shape how staff working within the SMEs decide to integrate cutting-edge ideas and tools into their organization or service offering. Additional anecdotes by Pam (VAC), Craig (Renegade), Mark (Touchtech) provide substantial support for proposition 2b.

***Proposition 2b:*** *Innovation may be supported by ALRs because problems identified are likely to help orientate broader innovation strategy.*

Despite the potential to drive innovation and product development strategy forward, arm's length relationships arguably provide so many problems and new avenues to explore that these often are not pursued, as Russell highlights:

Russell Renegade (Engineering Manager): “*Arm’s length relationships are somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But the R&D budget doesn’t always allow follow up on enquiries.*”

Here, Russell sheds light on the fact that such problems, manifesting in the form of an opportunity, are often never explored further. In contrast to problems identified in more embedded relationships, those that arise in arm’s length encounters are often poorly understood and require further exploration, as argued Cengiz (2006), firstly to ascertain whether the problem is ‘solvable’, and secondly, to discover whether a solution would be feasible and improve firm performance (Ireland & Webb, 2009). This is in contrast to more embedded ties, whose problems are often more fully understood, have already been solved and provided some value to a third party. Furthermore, Russell’s account alludes to the fact that staff are often working with incomplete data and that resource limitations restrict further exploration of such problems. Therefore, whilst such problem identification activity can act as the catalyst to new product development and market identification, these are often unlikely to be pursued in light of ambiguity and resource restrictions. Russell’s excerpt above supports proposition 3a.

***Proposition 3a: Innovation may be hindered by ALRs because SMEs lack the resources to effectively explore and evaluate often ambiguous problems.***

#### ***5.2.2.2 Solution to identified problem***

Emergent discussions regarding arm’s length relations highlighted that these ties were rather effective at providing solutions to existing problems SMEs had been aware of. The quote below is one of several examples illustrating this point:

Kelso Thor (Design Engineer): *“We needed a tank to contain the water, we eventually purchased an off-the-shelf one, but initially we integrated with a rotational moulding supplier to get our own made. Initially they gave us a lot of help on the type of wall thickness, material, internal baffles, requirements for rotational moulding (design constraints). We learnt that from this supplier. You can quite quickly learn what you need to know if you are dealing with a specialist in their field. Just by asking the right questions, making them aware of the gaps in our knowledge and our concerns. We were quite open and honest and didn’t pretend to know people’s businesses.”*

Staff at Armour Core, Equestrian and VAC also documented rich examples of such arm’s length induced solutions, these can be highly valuable to the firm, especially given the limited resource investment in managing these arm’s length ties. These solutions, as one participant highlighted, did not represent radical technological innovations but could be mechanical in nature, for example:

Russell Armour Core (Area Sales Manager): *“Idea to use a bit of sponge in existing products, as a solution to a problem, came out of a one-off conversation with Techsoft.”*

Throughout the discussions regarding arm’s length relationships, their innate ability to test and evaluate markets, products, services and even suppliers and clients also regularly emerged from the interview data. The above anecdote highlights how, despite a limited investment in effort during problem-solving (Fullerton & McAfee, 1999), arm’s length ties can still be conduits of valuable solutions due to their diverse knowledge sets (Granovetter, 1973; Uzzi, 1997; Jeppesen & Lakhani, 2010). However, in this case the linguistic (Quin, Johnson & Johnson, 1995) nature of the problem meant significant resource investment was not required. Furthermore, whilst closer collaboration and effort investment may have accrued performance benefits by the combination of unique mix of resources and capabilities, it is also likely the subsequent solution may have represented a relatively commonplace solution (Cengiz, 2006). The anecdote below describes an example whereby arm’s length relations provided the basis for an initial viability test for a potential product:

David Renegade (Marketing Manager): *“I’ve been to trade shows and people have come up to use asking whether we could manufacture a product for this application...or that application...From that, we have looked into manufacturing products that could suit that application...One example is when we looked at developing a door with GLP which is a much lighter weight, stronger material than the normal steel. Light weight but still very strong. We looked at the viability of that, although we had been thinking about such a door before, but it was great to get some market validation of that.”*

The ability to easily manage a large number of arm’s length relations means such ties could be a more effective means of evaluating and testing the viability of suppliers and service/product offerings, prior to investing in more collaborative relations with the former and research and development of the latter. These findings are congruent with Jeppesen & Lakhani (2010) who identified that problem solvers from distant fields are often more successful as they draw upon a diverse set of tools and perspectives. The findings are somewhat in line with Scarbrough, Swan, Amaeshi & Brigg’s (2013) research which highlights the initial use of arm’s length relations for opportunity identification, before pursuing more embedded relationships. However, contrary to Scarbrough, Swan, Amaeshi & Briggs (2013), these findings reveal problem-solving does occur within arm’s length relationships, albeit mainly in response to product issues and market gaps.

These findings would indicate that arm’s length relations are effective sources of solutions for SMEs with substantial resource limitations, and may be superior and less resource intensive than solutions developed internally or via more collaborative relations. In contrast to problem-solving in more collaborative relationships, the process appears more exploratory in nature in ALRs, which arguably leads to more novel solutions. This is supported by Hargadon & Sutton (1997), Ahuja & Lampert (2001), Fleming (2001) and Terwiesch & Xu (2008) and sheds light on arm’s length-induced problem-solving activity which is downplayed by Uzzi (1997), Batt (2008) and Kessler et al (2012). In Kelso’s anecdote, he describes a relatively internally-driven problem-solving process whereby

external knowledge is drawn upon in a just-in time, exploratory basis. Similarly, Area Sales Manager Russell divulges how the engineering team used boundary spanning activity to solve their problem using arm's length relationships. One could posit that, much like in collaborative problem-solving, the solutions and knowledge provided was rather prescriptive, however, the one-off and multiplex nature of actors within this decision making process, rather counter-intuitively, provided the team with more autonomy in solving their problem. This exploratory process is a problem-solving capability (Cohen & Levinthal, 1990) which can be leveraged throughout the wider innovation process to generate novel solutions and reduce conformity to other industry players pressures (Cengiz, 2006). The approach insulates SMEs, in particular, from some significant isomorphic pressures. Developing such internal capabilities could build absorptive capacity, which facilitates the transfer of related external knowledge into the firm when required (Cohen & Levinthal, 1990), thus granting the SME with the capabilities to more effectively access external knowledge resources (Lavie, 2006). Furthermore, the just-in-time, knowledge accessing (Grant & Baden-Fuller, 2004) nature of the approach is far less resource intensive given it does not rely on prior management of relationships or internal knowledge. Finally, this process of integration and drawing out knowledge facilitates deeper organizational learning (March, 1991), a key factor in superior firm performance, rather than merely implementing pre-packaged solutions, or worse, having them implemented by a partner. Excerpts by Kelso (Thor), Russell (Armour Core), David (Renegade) and Ron (VAC) provide substantial support for propositions 4a and 4b:

***Proposition 4a:*** *Innovation may be supported by ALRS because problem-solving is exploratory and solutions novel in nature.*

***Proposition 4b:*** *Innovation is likely to be supported by ALRS because problem-solving activity facilitates greater organizational learning and internal problem-solving capabilities.*

Despite the argument that arm's length-induced solutions can facilitate the development of internal problem-solving capabilities, Nickerson & Zenger (2004) argued that managers are required to critically evaluate the problems to identify which ones provide the most valuable solutions to the firm. Given that any problem-solving activity requires some organizational resources to complete, and these can often be substantial, it may be in the SME's interest to replicate partner firm's solutions when such problems pertain to secondary activities that do not fall within the remit of their core capabilities (Leonard-Barton, 1992), as developing novel solutions for each identified problem will deplete resources, reducing an SMEs innovative capacity. Of course, it should be noted that the exploratory nature of arm's length problem-solving means novel/valuable solutions and opportunities may manifest in the study of even the most peripheral problems, furthermore, it is posited that in the case of problem-solving, developing the capability through the process, is potentially of greater strategic value than the novel solution itself. Proposition 3b is moderately supported; Russell's aforementioned excerpt is the only participant who provides support for it.

Russell Renegade (Engineering Manager): *“ALR's somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But R&D budget doesn't always allow follow up on enquiries.”*

***Proposition 3b:*** *Innovation may be hindered by Arm's length relationships because exploratory problem-solving tends to be more resource intensive.*

## **5.3 Novel products, processes & services**

### **5.3.1 Collaborative Relations**

The findings chapter highlighted how collaborative relationships aided in the development and improvement of a variety of different types of innovation, including; new product and service development, new process and systems development, client system integration and finding new materials and technology. The following section attempts to explore the underlying forces, theories and concepts which explain the emergence of such innovation.

#### ***5.3.1.1 Delivered from sustained organizational learning***

The data revealed several instances of how collaborative activity resulted in the development of new products. Nigel (WH Smith), Mike (GS), Chris (Flanders), Kevin (Flanders) and Russell (Armour Core) all highlight examples of where product innovation occurred via collaborative activity, either through co-creation or close integration with existing client systems, for example:

Russell (area sales manager at Armour Core): *“95% of products came from (client) enquiries which were then jointly created.”*

Such findings are congruent with the majority of collaborative innovation literature (Pittaway et al, 2004; DePropris, 2002); Indarti and Postma, 2013) which highlight increased product innovation as a common byproduct of collaboration, SMEs are said to reap similar innovation benefits from such partnerships (Hite & Hesterly, 2001; Deeds and Hill, 1999). This indicates strong support for proposition 5a:

***Proposition 5a: Product innovation is likely to be facilitated by embedded ties.***

Ryan also highlighted how his firm adopted a process innovation from a partner, stating:

*Ryan ABBID (MD/Eng.): We're now trying to get into a different model, adopting a partner's model, based on their success. They make a very complex product, but maintain a lean, agile production facility where they can make relatively small batches of product very quickly. The competition is all Chinese manufactured, so we could go to the wholesale market, saying 'you don't have to buy a container full of these parts, it will take a week to get here, rather than 10 weeks on a boat'. You don't need to buy 1000, we're happy to give you 50 or 100 of that."*

The process presented above represents a leaner, more agile manufacturing process which would allow Ryan's firm ABBID, to provide quick shipments of small quantities of product, which was previously impossible because wholesale manufacturing in the industry was limited to China. If we review the rationale for adoption, based on the several of theories presented to explain imitative behavior, organizational learning arguably provides the best fit. ABBID is not attempting to imitate a competitor in a quest for legitimacy, which arguably rules out neo institutional explanations as outlined by Ordanini et al (2009). Instead, the imitation is much more calculated and based in a quest to learn how to compete more effectively. Therefore, moderate support for proposition 5b is provided by the emergent data as Ryan (ABBID) is the only participant to highlight service innovation occurring in a collaborative relationship:

***Proposition 5b:*** *Service innovation is likely to be facilitated by embedded ties.*

In similar example regarding process innovation, Kelso describes how collaboration induced organizational learning resulted in such internal organizational change, stating:

*Kelso Thor (Design Eng.): "What we do on one project, we try and carry over to another. We don't want to make the same mistake twice." We've implemented engineering change notes. To control all the change notes within designs...If we want to change revisions within notes or parts, we can take a note of that. We started using this on the CleanCO; many of our guys had experience using this at previous organizations. It was a big job and it would have been tricky to manage without it."*

On the surface, both these statements appear to indicate the SMEs are attempting to become more competitive and stand-out, rather than conform, which would favor an organizational learning perspective over neo-institutionalism. Such findings were expected and are congruent with contemporary SME literature previously reviewed (Kotabe, Martin & Domoto, 2003; Hartley & Choie, 1996. Feel & Harrison (2006) and Depropris (2002) also agree that collaboration with suppliers leads to process innovation, with Depropris (2002) acknowledging these tend to be incremental in nature. Organizational learning fuels product, service and process innovation, these are regarded as positives, as they are driven by a quest for efficiency and superior performance (Ordanini, Rubera & DeFillipi, 2008). Anecdotes by Ryan (ABBID), Chris (ABBID), Chris (Flanders), Kelso (Thor), Russell (Renegade), Craig (Thor) and Lucy (Equestrian) provide substantial support for proposition 5c.

***Proposition 5c: Process innovation may be facilitated by embedded ties.***

It should be noted that whilst several examples of collaboration induced process innovation occurred, the vast majority were considered by this study to be primarily driven by isomorphic pressures rather than a quest for increased effectiveness (DiMaggio & Powell, 1983).

### ***5.3.1.2 Isomorphic basis only***

The prior literature review identified several theories which help explain why firms imitate each other, this section attempts to explore the rational for instances of convergence between firms in-light of this research.

In the findings section it was discovered that Kelso (Thor), Russell (Renegade), Chris (Flanders), Chris (ABBID), PAM (VAC), Ryan (ABBID) and Lucy (Equestrian) all highlight examples of collaboration induced convergence in their firm's innovation processes. Chris Flanders highlighted several instances of the diffusion of a process innovation, in which a partner firm adopted Flanders' system. Chris elaborates, stating:

Chris Flanders (IT Manager) *“One of our customers didn't have a stock system, this came out of a conversation where the exec mentioned they were having problems with current stock. We presented them with a demo of what theirs could look like (an adaptation of their own) and we implemented it free of charge. “*

The literature presents several different explanations for this diffusion, Neo-Institutionalist theorists (DiMaggio & Powell, 1983) argues that coercive isomorphic pressures are in effect here, as Flanders subtly pushed their partner into conforming. This study primarily leans towards interpreting such innovative convergence as neo-institutional phenomena, rationalizing the diffusion of this administrative innovation based on subtle, coercive isomorphic pressures, which Chris from Flanders anecdote highlights as applying in various interactions. This phenomenon is also documented by Lucy, former MD of Equestrian Ltd who adopted a partner's quality systems. Intriguingly, Flanders' employees featured the largest networks of the sample, and Ordanini, Rubera & DeFillipi (2008) and Coleman (1996) highlight organizations are more likely to imitate the key organizations with their field. However, it is apparent that at least 2 of their partners were influenced by these isomorphic pressures (the universities) were not directly in their field, so these findings could give credence to the argument that collaborating with partners with large networks, even outside one's industry, could breed innovative homogeneity and lead to convergence in the innovation process. Such coercion was highlighted in the findings chapter, Pam in particular, highlights the implementation of a cooling system (process innovation) due to similar pressure placed on VAC by a large client. Pam highlights:

PAM VAC (MD): “[Partner] requested we implement a system to uniquely identify all our power coolers. They recommended some people, but we did it ourselves.”

In this instance, VAC is not converging with their partner firm, but rather with the wider manufacturing industry with which their client does business. Neo-institutional theory would not describe such behaviour as imitation, as the request was an ultimatum, and therefore whilst manufacturing efficiency was improved, such convergence may not be best explained via organizational learning theory either.

Russell described similar isomorphism in the innovation process, namely with the adoption of weld maps, which were specifically requested by a prior client and then adopted as best practice without being explicitly requested by clients. The participant described here and consequently labelled a process innovation, how such a procedure provides accountability by recording the date and time a weld was performed, and the name of the welder. This practice arguably represents the implementation of standard operating procedures (Berger, 1997; Hoerl, 1998). Russell stated that clients have different quality criteria, so some will request weld maps for their own quality assurance purposes, whilst others will not. Interestingly, when asked about weld maps he was coy about stressing their effectiveness, Russell said:

Russell Renegade (Engineering Manager): “Not everyone asks for this, but we’ve implemented our own standard template. It ‘could’ result in a better job.”

Such a perspective may be explained by the fact that, as an engineering manager, such accountability may be a hindrance and unpopular with his welders, but this is merely conjecture. However, it’s interesting that such an innovation was adopted without necessarily being convinced of its ability to produce a better standard product. But such

adoption is predicted by Galaskiewicz & Wasserman (1989), who argued collaborating firms begin to resemble one another particularly as trust grows.

However, unlike Galaskiewicz & Wasserman's (1989) assertion that imitation is at play, such adoption is perhaps best attributed to coercive and normative isomorphic pressures. Most likely, the partnership described above is merely serving to reinforce industry standards. Such a hypothesis is backed up by DiMaggio & Powell (1983) who cited that multiple forms of isomorphic pressure could be in effect simultaneously, a statement Mizruchi & Fein (1999) support, adding that such pressures can often be difficult to distinguish. The tentative nature of Russell's evaluation of this process innovation means attributing an organizational learning perspective may be inappropriate, because the driving force may not be an increase in the SME's competitive effectiveness. In a further example, Kelso (Thor) highlighted:

Kelso Thor (Design Engineer): *"CleanCO have a bar code, puts an id tag on every product we do. Gives history on every product, history, repair history etc. We've since adopted this on other projects since the CleanCO's initial request"*.

Here, Thor adhered to CleanCO's initial request, coercive isomorphic pressure and then continued to implement that same solution on other projects. Organizational learning scholars could postulate that such innovation represents learning, yet a formal evaluation process of alternative, perhaps superior solutions was not conducted; CleanCO's dictated solution was merely perpetuated, potentially foregoing superior alternatives in the process. Again, such mimetic behaviour could be considered as fuelled by a need to legitimise themselves as a firm, given they were simply following a tried and tested method. March (1991) argues forgoing exploration in favour of exploitation may generate short-term benefit, but is destructive in the long-term. Therefore, whilst isomorphic pressures may lead to more quick and efficient innovation, the benefits of such an approach may be short

lived, as opportunities for valuable novel innovation are missed due to SMEs imitating a limited number of sources (Ahuja & Lampert, 2001; Fleming, 2001).

Chris, electronics engineer at ABBID, highlighted a similar instance where a partner firm suggested they make amendments to one of their key processes to increase accuracy.

ABBID was open to improvement and amenable to change, this could possibly be related to their relatively young nature (only 10 years old) and small size (30 employees; £2 Million revenue/year). Whilst the SME was happy to adopt the solution and procedures provided as they resulted in a better/more accurate end result, neo-institutionalism may again argue this behaviour serves to legitimise the SME within its industry, to curry favour with current and future clients. Such findings are congruent with Galaskiewicz & Wasserman's (1989) findings that firms imitate organizations within their social networks, although their study primarily pertained to innovation creation activities, rather than organizational processes. Based on this analysis, it could be postulated that coercive and mimetic isomorphic pressures, induced by embedded relationships, may again have sabotaged the exploration of even more effective solutions by, instead, adopting the first marginally superior practice currently implemented by another firm(s). Proposition 1b is substantially supported by anecdotes from Chris (Flanders), Kelso (Thor), Russell (Renegade), Ryan (ABBID), Pam (VAC) and Lucy (Equestrian):

***Proposition 1b: Innovation may get hindered in strongly embedded relationships because isomorphic pressures lead to convergence in the innovation process.***

Embedded relationships are cited as effective conduits of rich information and knowledge (Uzzi, 1997) and are regarded of key strategic importance for innovation within management literature (Pittaway et al, 2004). Despite issues regarding the lack of novelty embodied within such innovation, analysis of the emergent interview data reviewed above reveals such ties do serve to introduce new to the organization products, processes and services. In particular, frequency and depth of interaction appears to facilitate co-operation on complex, often highly technical problems requiring on-going support. For example;

*Kevin Flanders (MD): “We’ve made the printed piece an integral part of the multi-channel marketing system, by making it interactive by being able to scan the [printed] product. [Shows an example] So when they see this...the end-users scan the code in the Layer app...immediately as they do that, they [Flanders' customer] can track the end-user's journey and then what they can do is follow up action....in the past our customer hasn't been able to measure the effectiveness of their printed marketing, now we can measure the effectiveness of printed publications...This couldn't happen in arm's length relationships because we then get involved with the customers data, with the customers designs, their IT, their web team...so it's all joint up and seamless...so the customer journey is a positive one...Layer developed this technology, we signed up to their licensing agreement, in effect, we are their customer”*

Here, Kevin outlines the co-ordination and complexity involved in embedding cutting-edge technology into their service offering and is adamant short-term or one-off transactions could not allow their customers to fully benefit and act on the analytics this augmented reality system helps generate. The dynamic nature of the service, intricate coordination and customization required to fully implement this service requires a close understanding of their customer's systems and continuous collaboration to fulfil, at least until the technology matures and is capable of automated marketing channel changes based on each client's unique data. These findings are supported by Johnsen, Phillips, Caldwell & Lewis

(2006) and Ylimäki (2014) who argue collaboration can be crucial for facilitating the development of increasingly complex products. Thence:

***Proposition 5e:** Innovation is facilitated in more collaborative relationships because they enable strong continuous coordination.*

Chris (Flanders), Kelso & PAM highlighted several instances whereby administrative and process innovations were diffused via collaborative engagements, these were highlighted as being subtly driven by coercive isomorphic pressures and the need for their partner firms to legitimize themselves in the face of environmental uncertainty. Russell documented an instance whereby coercive and normative forces, enabled by collaboration, drove the adoption of a process innovation.

Whilst the management literature has drawn upon Neo institutional theory to explain the diffusion of innovation in collaborative behaviour, the exact type and nature of such innovations has been underexplored. Collaboration induced coercive and mimetic isomorphic pressures appear to play a significant role in the diffusion of service administrative and process innovation. In the sole instance where mimetic isomorphism occurred in the data, by Ryan of ABBID, the copied firm felt it was exploited, whilst in many of the other instances, the source firm tended to be rather satisfied with lending a helping hand and inducing administrative or process change.

The logic behind such behavior remains intriguing, in Ryan's case, having copied and gone to market with their own version of ABBID's product, their client may be perceived as benefitting from first mover advantages, and being locked out of any potential long term

contract or equity share in the product could rightly leave them feeling exploited and, fundamentally, at a loss. However, when administrative and process innovations were copied, such activity, as highlighted in the findings section, took on a benevolent form, and were often encouraged by the innovation's originator (relative to the dyadic relationship). An argument could be put forward that whilst the product idea was stolen, ABBID were not manufacturing or marketing the artifact at the time, therefore were not being mimicked. Whilst the nature of the relationship (e.g. Client/supplier etc.) does not appear to have made much of a difference in such outcomes, the extent to which the diffused innovation represented a unique strategic/competitive value appears to. Therefore, one may be justified in asserting collaboration induced isomorphism is deemed acceptable by the source firm, provided such activity does not pertain to the diffusion of a core competence/capability. However, such potential downsides and ill feeling is demonstrated as being mitigated in the data, if a core competence is transferred to a partner operating in a different market, and thus, does not erode competitiveness.

### **5.3.2 Arm's Length Relations: New products & Markets**

This section will embed, compare and contrast this thesis' findings with the key sub-themes of innovation they refer to, acknowledging their contribution where appropriate. Particularly, themes regarding solutions, knowledge creation and product and service innovation are explored in more detail, concluding in a detailed, comparative framework of the innovative contribution of each form of relationship to SMEs.

#### *5.3.2.1 Delivered from transfer of explicit knowledge*

As highlighted in the findings chapter, 7 of the SMEs studied mentioned utilizing ALRs for knowledge sourcing purposes. PAM, Ron, Mark & Russell in particular were strong

proponents of the value provided, citing new product development, iterations to existing products and identifying new markets as key contributions of such ties. Detailed description of the informational benefits of arm's length relationships is relatively scarce within the literature, those that do make reference to such benefits suggest the key informational advantage of ALRs are that they act as conduits of new information and serve to insulate firms from external shocks (Uzzi, 1997; Beckman, Haunschild & Phillips (2004). A review of the literature provides markedly little evidence of their innovative potential and the 'new information' they provide is often 'fobbed off' as of little strategic value, as explicit knowledge cannot directly constitute a VRIM resource (Dyer & Singh, 1998). Studies that attempt to understand the part ALRs play in the innovation process are in the minority (see Aune & Gressetvold (2011) for an exception), often citing such ties as the conveyors of 'opportunities', a concept which is rarely embellished upon. This data provides further empirical evidence for the importance of arm's length ties in new market identification, product and process innovation, which some studies make reference to (Geneste, 2010; Geneste & Galvin, 2013), but rarely back up empirically.

#### **5.3.2.1.1 New products**

Russell, Mark, Pam & Ron all provided similar accounts of arm's length relationships sparking off new products, for example;

*Russell Renegade (Engineering Manager): "Another prospective customer approached us at a trade show. They were asking us about our weather tight doors, they were using a Chinese door that wasn't fit for purpose and they required a something a little more robust. So we sketched up a few designs, exchanged some emails, but the client lost interest. But this is an on-going product we sell, despite the fact that the initial customer who inquired about it never actually purchased it."*

Mark highlighted how *talking to everyone* and evaluating failed pitches resulted in the development of their multi-touch system, Pam cited customer complaints lead to the development of their sanitised water coolers and Ron highlighted how a one off conversation on a plane resulted in the production of a hot and cold washer. With the exception of Russell's anecdote, all such products represent radical product innovations, as they are more than simple improvements and iterations to existing designs. Cooper & Kleinschmidt (1987) argued that innovation and new product development were essential for enterprise survival and growth, moreover, Marsili & Salter (2005) argue that radical innovations offer the greatest performance opportunities; therefore, arm's length ties can significantly contribute to an SMEs success. Furthermore, if we appreciate that such explicit knowledge, which this thesis concedes is to some extent freely available (Dyer & Singh, 1998), can be incorporated into an SME's existing 'bundle of resources' (Chrisman & McMullen, 2004), then this may *at least* generate a short-term, first-mover advantage which entrepreneurial firms can exploit to formulate longer term, path dependent advantages (Mueller, 1997).

These findings are intriguing given that Indarti and Postma (2013) found that interaction quality, a sum of the depth of knowledge absorbed from numerous external ties and tie intensity (a sum of frequency of interaction) facilitated product innovation in SMEs rather than maintaining a diverse set of relationships. Whilst these findings do not directly contradict Indarti & Postma (2013) they do serve to strengthen the argument for SMEs utilizing arm's length relationships to fuel new and improved products. It should be noted that none of the participants' cited instances of arm's length relationships which aided the development of service innovations, either incremental or radical. Such findings may suggest arm's length ties are less likely to inform an SME's service provision; however, it is more likely that the decision to study manufacturing firms means such activity is less

likely to emerge in this data set. In which case, further research involving SMEs in service industries would be required to explore ALRs' influence on service innovation. That being said, it should be noted that several key instances of collaboration induced service innovation were highlighted by participants in regard to more embedded ties, e.g. Ryan's (ABBID) aforementioned anecdote regarding their adoption of a partner's agile product model.

#### **5.3.2.1.2 New markets & opportunities**

The following section deals with the opportunities arm's length relationships can provide those SMEs which engage with them; benefits highlighted within the data include increased exposure, sales and product integration.

The vast majority of management literature focuses on collaborative relationships and accepts that the propensity of these ties to contribute competitive advantage is far greater than arm's length relations (Dyer & Singh, 1998). However, some of the literature does reveal performance benefits of ALRs, or put more accurately, maintaining a diverse portfolio of embedded and arm's length ties (Uzzi, 1997). This has sparked recent interest in the innovative value of such ALRs, which this thesis attempts to complement, by exploring the nature of such 'opportunities' in more detail. PAM (MD at VAC) presents the most compelling arm's length induced opportunity of the entire sample, highlighting;

*PAM VAC (MD): "...We're doing a BBC documentary; following some PR that I did...that got some somebody to pitch in for PR for part of our business. It didn't go anywhere, so it was an arm's length relationship, but it turned out one of his clients had this opportunity to do this documentary, they declined, so he emailed us and now we have the opportunity to do this BBC documentary. Hopefully we'll get in front of, at least a million people and hopefully it'll spread the word about our chest freezers."*

Such an opportunity for exposure clearly has the potential to positively influence the SMEs short term, and long term performance; the nationwide documentary could result in a flood

of new sales and clients, sparking innovation off the back of increased revenues. However, contemporary resource-based theory would not highlight the arm's length tie that acted as the stimulus as of high strategic value, as the third party could have mentioned such an opportunity to anyone, and the fact the BBC was producing such a documentary was, arguably, not a secret (Dyer & Singh, 1998). Therefore, such explicit knowledge could have been transferred by any other means and was not unique to this one off relationship. Yet, historic precedence can be a source of competitive advantage (Barney, 1991), which can generate path dependence. RBV scholars would recognize this, yet highlight that such an opportunity would be highly difficult to plan for beforehand, thence its strategic value is reduced.

Whilst exploring the perceived innovative effectiveness of arm's length relationships, Russell highlighted that such ties were helpful in identifying new market opportunities, stating;

*Russell Renegade (Engineering Manager): "I'd say our arm's length relationships are somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But R&D budget doesn't always allow follow up on enquiries."*

Carter & Ram (2003) highlight that entry into markets can be an effective way for SME's to grow, in this manner, arm's length relationships can be of strategic importance and enhance chances of survival and performance. Such findings are congruent with the arguments of Daneels (2002) who highlighted that understanding the needs of customers in new markets is essential for successful entry into such markets and Lynn & Reich (1990) who demonstrated owner managers learned about 41% of diversification opportunities from someone else. These findings would support Hite & Hesterly's (2001) findings that

networking alliances are not the only means by which new market opportunities are identified (Soh, 2003).

Rosenbusch et al (2012) discovered that an innovative orientation was positively related to SME performance; however collaborative innovative projects often never reaped significant performance benefits, potentially due to coordination costs, increased complexity and poor terms of profit allocation. However, this data reveals incremental and radical product innovation do occur via arm's length transactions, and unlike collaboration induced innovations, may actually serve to increase SME performance as the resource investment in managing the relationship was relatively low. The anecdotes from Pam (VAC), Ron (VAC), Mark (Touchtech) and Russell (Renegade) provide substantial support for:

***Proposition 5d: Innovation is facilitated in ALRs because they are less resource intensive and lead to identification of new markets.***

Despite being conduits of novel ideas and technologies, facilitating organizational learning and presenting a relatively low maintenance means of innovating, arm's length relationships are impeded by their capacity to transfer rich, fine-grained knowledge over extended periods. In contrast to Kevin's (MD Flanders) prior mentioned rich description of the ongoing use of analytics and marketing redesign in embedded ties, Nigel highlights how collaboration is essential for some of their work and why arm's length relationships are not suitable for innovation in bespoke manufacturing:

Nigel Hall WHITE PLC (MD); *“Our process is inherently very collaborative, especially as a client may not fully understand what he wants to do. He may have a test tube, may have a variant of a vaccine...whatever it might be. He wants to get*

*into the manufacture of that...in whatever form, in whatever area is going to make him money...so what you do is, you then have to sit down with the customer and develop their business case and rationale for the project, then that allows us to extract from scientists the full picture of what this facility would be...”*

Arm’s length relationships do not appear to appear facilitate such bespoke product innovation; the bespoke nature of development requires constant interaction with the client over an extended period of time. Indeed, this is supported by a stream of work in the literature (Shamsuzzoha, Kyllönen & Helo, 2009; Johnsen, Phillips, Caldwell & Lewis, 2006; Ylimäki, 2014). Such a service offering is frequently occurring within the data and often represents added value activities which warrant a premium fee. By virtue of being bespoke, a tailored-solution represents a degree of novelty not accommodated by arm’s length relationships, thence; their ability to facilitate product innovation is hindered by their one-off nature. Such short time scales do not facilitate the development of a complex, bespoke artefact. Therefore it is proposed:

***Proposition 5f: Innovation is hindered in ALRs because their one-off nature impedes the development of complex and extremely bespoke products.***

#### ***5.3.2.2 Isomorphic basis only***

The findings chapter established that involvement with third parties could highlight the presence of isomorphic pressures in any networked activity. Whilst many participants, e.g. Julie, Mike, Nigel, all highlight examples of imitating certain innovative practices and commercialization approaches, only Lucy highlights an instance of such behaviour occurring in an arm’s length relationship:

*Lucy Equestrian (Former MD): “Test houses may, informally, offer solutions to problems because they’ve seen how other firms have done it. Possibly about meeting safety requirements. This isn’t really meant to happen and is an arm’s length relationship.”*

This sole instance of imitative behaviour is intriguing given that such behaviour was extremely common in more collaborative ties and presents two important questions; what motivates this behaviour and why is it less common in arm's length relations? The literature presents several rationales and theories to account for mimetic behaviour, two of which are discussed in detail in this thesis. Neo-Institutionalism argues firms become isomorphic in order to gain legitimacy in their respective fields (DiMaggio & Powell, 1983), by following a proven path they are conforming to the institutions of the field in an attempt to validate their position within it in the face of significant environmental uncertainty.

In contrast, organizational learning scholars explain imitation as a means of externalizing exploration in the face of outcome uncertainty, in the pursuit of learning how to better compete. By allowing others to invest into the experimentation and discovery process, imitating firms can capture the experience of other firms, whilst sacrificing a potentially insignificant, short-term first-mover advantage. This primarily occurs in the face of a multitude of potential solutions, some of which have ambiguous payoffs. The fact that such learning can occur without ties to the imitated organization, this could be via trade shows, books, conferences etc. (Huber, 1991) may be of particular relevance to this study. It should be noted that resource-based view scholars would likely label such imitation as a competitive shortcut driven by low linkage causal ambiguity (Wernerfelt, 1984; Barney, 1991). Imperfect imitability is a key characteristic of a bundle of resources that can confer a competitive advantage (Barney, 1991), and those organizations that do copy could be regarded as eroding the potential performance advantage of competitors.

Reviewing neo-institutional and organizational learning theory explanations for mimetic behavior, this particular instance appears to be best interpreted via an organizational

learning lens. Rather than bending to social pressures and attempting to legitimize themselves, Lucy's account appears to be more in-line with pragmatic, 'whatever works logic'. A simple analysis of the context reveals that multiple solutions were possible and yet here the MD has been presented with a tried and tested solution which presents a fairly unambiguous result. Furthermore, it could be interpreted that such a problem is unlikely to spark a significant process innovation, perhaps due to the unique or minor nature of the issue and therefore does not warrant the investment in further search and exploration activity. This analysis is congruent with Levinthal & March's (1993) arguments that firms learn of innovation strategies by imitating the successful strategies employed by those in their industry. The lack of social closeness between arm's length relationships may serve to spark more exploratory innovation processes and more novel innovation, as isomorphic pressures are reduced. Therefore, proposition 1c is substantially supported given that no instances of isomorphic pressures were cited as stemming from arm's length relationships.

***Proposition 1c:** Novel innovation may be more supported by arm's length relationships because of limited isomorphic pressures.*

Unlike in collaborative ties, no instances of arm's length induced isomorphism in business and manufacturing processes emerged from the interview data. Whilst this arguably serves to maintain diversity within industries, it could also be posited that arm's length relationships do not facilitate the critical review of SME processes which lead to organizational change and improvement. The social distance between such ties may explain why poor practices embedded within organizational routines and processes are not highlighted in arm's length relationships. Perhaps third parties are not given the opportunity to review organizational procedures and practices in sufficient detail, or the

one-off nature of ALRs may provide little incentive for them to dedicate the time required to explicitly identify and address such issues. Thus, inefficiencies within the innovation process and wider organizational activities may be allowed to perpetuate, leading to potentially inferior products and service offerings. Therefore, proposition 1d is substantially supported.

***Proposition 1d:** Innovation may be hindered by ALRs because they are likely to impede the efficient transfer of best practice.*

## **5.4 Knowledge Creation**

Powell et al (1996) highlighted that firm's network is increasingly becoming the central source of innovation and the combined contributions of numerous parties often result in major scientific and technical breakthroughs (Bougrain & Haudeville, 2002; Pittaway et al, 2004; Colombo et al, 2012). The following section discusses the processes via such knowledge creation emerges and how the resultant knowledge is utilized; comparisons are drawn between such phenomena in arm's length and more collaborative relationships.

### **5.4.1 Collaborative Relations**

#### ***5.4.1.1 Creating Repositories***

The following section reviews and analyses instances of knowledge repository creation within embedded relationships, such repositories were defined in the literature review as the artefacts within which relevant organizational knowledge is embedded and can be transferred (Argote and Ingram, 2000; Argote & Miron-Spektor, 2011; Argote, 2011). Such repositories can manifest in explicit information systems (Davenport, DeLong & Beers, 1998; Zack, 1999), tools (Kane & Alavi, 2007), task sequences (Darr et al, 1995,

same), organizational members Walsh & Ungson, 1991; in Argote & Miron-Spektor, 2011), routines and social networks (Walsh and Ungson, 1991; Argote and Ingram, 2000; in Argote 2011). In the following section, such knowledge repositories will be mapped against the distinct sub-categories outlined in the amended version of Hong et al's (2006) typology outlined in the literature review. At this point it should also be noted, that by virtue of establishing a relationship, arm's length relationships create knowledge repositories, given relationships, in general, also act as units within which knowledge of relevance to the firm can be embedded (Argote and Ingram, 2000; Argote & Miron-Spektor, 2011; Argote, 2011). This thesis also highlights that all discussed knowledge repositories are embedded and created within a higher order repository, namely the dyadic relationships in question (Walsh and Ungson, 1991; Gulati, 1999; Argote and Ingram, 2000).

For the sake of clarity, Figure 16 is presented as a complement to the ensuing written discussion, providing an overview of repository creation activity in both arm's length and collaborative relationships.

**Figure 16. Overview of the creation of knowledge repositories in arm's length and embedded relationships**

Relationship Type	Physical Artefacts	Canonical Documentation	Personal Experience	Social Interaction	Off the job training	Routines	<u>Not in use</u>
<i>Embedded Relations</i>	Yes	Yes	Yes	Yes	No	Yes	<i>Rare: Denounce IP ownership</i>
<i>Arm's Length Relationship</i>	Yes	No	Yes	Yes	No	No	<i>Budget constraints restrict pursuit of new markets and products</i>

*Based on Hong et al (2006)*

#### **5.4.1.1.1 In-use**

The following section attempts to identify and analyse the occurrence and nature of utilized knowledge repositories created within embedded relationships. The knowledge embedded in the respective artefact needs to be actively put to effective use, rather than being redundant, under-utilized or brokered in a knowledge accessing alliance (Grant & Baden-Fuller, 2004). Knowledge repositories in this thesis are organized into sub-categories, the majority of which are outlined by Hong et al (2006); these refer to physical artefacts, canonical documentation, personal experience, social interaction, off the job training and routines. Readers should note that routines were not part of Hong et al's (2006) initial framework, but the decision to extend the framework was taken after an extensive review of the literature.

##### **5.4.1.1.1.1. Social Interaction**

In their framework, Hong et al (2006) cite social interaction via storytelling, dialogue, coaching, can also represent a knowledge repository, given the nature of this study, social interaction is embedded within the majority of instances of knowledge creation and transfer discussed within this thesis. Chris provides a detailed account of such social interaction, having intense and detailed discussions to ensure the effective fulfilment of a printing job:

*Chris Flanders (IT Manager): "So...they have data...which tells them what their demand is. They rely on their suppliers within their supply chain who actually deliver these items that they need within their supply chain to make their products. They have their sales and build forecasts...so that's the data we need. So we need some really good integration, strong integration with their customers...so we end up working with our IT team and their IT team to make sure that's stitched together, seamlessly. So then we'll go through testing to make sure it's robust. And then what we have to do is interpret that data, so we'll work with the customer to help us work out what that data means. So then we can make really qualified decisions in the middle, around what we actually produce and what we pack. And then, on the back end, the other integration is...with the actual build of the line, what it is they're*

*building and in what sequence, to make sure we're delivering exactly what they need at the right time...so it's the right product, at the right place at the right time."*

The above anecdote details the intense customer interaction Flanders is required to engage in, in order to effectively execute the production and fulfillment of a set of printed materials. Embedded within these discussions are key knowledge flows from each party, vital for the successful fulfillment of an order. Instances of such discussions are embedded, both explicitly and implicitly, throughout interviewee accounts of their embedded relationships; this is congruent with academic literature which extensively acknowledges the propensity of collaborative relationships to facilitate such fine-grained discussions (Uzzi, 1997; Dyer & Singh, 1998).

#### ***5.4.1.1.2 Physical artefacts***

Collaborative relationships were often cited as creating physical artefacts, these often manifest in the form of products. Russell, Area Sales Manager for Armour Core, remarks on his firm's R&D philosophy and highlights a perspective shared by several of the SMEs sampled:

Russell Armour Core (Area Sales Manager): *"95% of products came from enquiries which were then jointly created. "*

This process is described in more detail by in an anecdote Design engineer Kelso provided, who describes how a herbicide free weeding unit, a machine that burns weeds, was jointly coordinated:

Kelso Thor (Design Engineer): *"Our customers will provide us with a brief. They are experts in their field, so initially we'll take on board what they say. But we will challenge their judgement if necessary. For example, they stipulated a flow rate of 12 litres a minute, we asked why, and they said because it always has been that way....It turned out that historically the type of burner they used required 12 litres of water a minute, so it wasn't anything about the volume of water required to burn weeds...we*

*have fortnightly meetings with [the client], and if we need more than that we can always phone them up, there's usually quite a lot of dialogue during the project...it's not like we get a brief and then 4 months later go back and deliver it."*

Physical artefacts such as these are considered knowledge repositories because knowledge of their operation and production can thus be drawn out through examination (Hong et al, 2006); this is in-keeping with the arguments of Lam (2000), who asserts that "*explicit knowledge can be logically generated by logical deduction and acquired by formal study*" (p.490). Instances such as these, describing the joint production of goods within embedded relationships were fairly commonplace within the data, although the scope did vary. This is congruent with mainstream academic literature (Tsai, 2009), which widely discusses the performance implications of collaborative product innovation with suppliers (Nieto and Santamaría, 2007; Sánchez and Pérez, 2003; Freel, 2003) and customers (Gupta et al., 2000, Fritsch and Lukas, 2001 and Brockhoff, 2003; vonHippel, 2010)

#### **5.4.1.1.1.3 Canonical documentation**

Canonical documentation, in the form of technical diagrams were identified as being born out of collaborative relationships, as Nigel explains in his account of the introduction of refined instrument diagrams:

*Nigel WHITE PLC (MD): "After our client saw our first deliverable and saw our diagrams they wanted us to change it. It took 3 weeks...Their people were physically working with us to upgrade our diagrams... We just realized the process & instrument diagram we were using was quite inferior. It didn't integrate diagrammatically, they broke theirs down into 'control values', they linked 1 drawing to another. They requested it."*

Instrument diagrams are often utilized by engineers to review the types of equipment, pipelines, and valves and instruments using distinct shapes, they are intended to show how process equipment is interconnected and indicates its controlling instruments. This

documentation represents standard operating procedures (Berger, 1997; Hoerl, 1998), which literature advocates as ensuring the effective management and maintenance of quality systems. Hong et al (2006) argued that such canonical documentation saves time by avoiding unnecessary meetings, by acting as a source of embedded knowledge. The ability of embedded ties to effectively manage both tacit and explicit knowledge is well documented within the literature (Dyer & Singh, 1997; Dhanaraj, Lyles, Steensma & Tihanyi, 2004); meaning instances of such activity were expected and are congruent with previous research.

#### ***5.4.1.1.1.4 Personal Experience***

An individual's personal experience is also considered a knowledge repository (Hong, et al, 2006), one in which skills, experiences and knowledge can be retained and shared.

Naturally, any given social interaction represents an experience, so analysis focuses on the occurrence of such instances which are intrinsically knowledge or skill building. Andy provides a description of his personal experience of collaboration:

*Andy TouchTech (Technical Director): "University collaboration is way too expensive. We end up doing it for them, explaining how things work, they get it wrong – we're paying money to educate them. University time scales can let us down. Often times the knowledge isn't retained, goes into a black box (the university do it). Quotations are often too high and the often don't result in anything tangible. It's a 'milking exercise'."*

This anecdote describes how collaboration develops knowledge repositories, in the form of a technical director's personal experience with managing relationships with universities.

Literature highlights how experience managing inter-firm relationships can generate 'alliance capabilities' and leader greater alliance success (Simonin, 1997; Barkema *et al.*, 1997; Kale & Singh, 2007). Evidence upon such experience being reflected upon to inform more informed partnerships in future are demonstrated by Pam (VAC):

Pam VAC (MD): “*Collaborations can work, but they need to have a long-term focus. It’s a marriage, ad compromise. Partnerships can be very messy and can get very tricky. They want all of the partner benefits, but will be the heavy handed supplier if it comes down to it. Informal partnerships will turn sour if our costs go up. “They say all these things, whilst beating you with a stick.”*”

These quotes provide empirical support for the ability of embedded ties to create personal experience, a repository within which relevant knowledge is embedded (Argote & Ingram, 2000), which informs organizational practices.

#### **5.4.1.1.1.5 Off the job training**

Instances of the creation of off-the job training activities involving collaborative partners were not identified within the data, although logic would dictate that such knowledge repositories could exist within the confines of an embedded tie, given the verb ‘creation’ could simply pertain to simple additions or iterations to a firm’s content, but these did not emerge from the data. The work of Krause *et al.* (2007) highlighted that some firms do engage in supplier development activity and that the training of supplier personnel and site visits, in particular were central for supplier improvement. The logic of investing in suppliers to begin with is done so in the expectation that the focal firm will have future dealings with that supplier and the benefits of such training will outweigh the costs (Buckley & Casson, 1976), in which case this represents an embedded tie as defined in this thesis. However, this does not explicitly imply ‘creation’, as would occur in the development of a bespoke training session based on some communication with a supplier, regarding their specific needs.

#### **5.4.1.1.1.6 Routines**

This sections aims to review the nature of organizational routines induced by an embedded relationship, as highlighted in the literature review a routine is defined as “*the forms, rules,*

*procedures, conventions, strategies, and technologies around which organizations are constructed and through which they operate” (Cyert & March, 1963 p.320), and can comprise both information systems (Davenport, De Long & Beers, 1998) and tools (Kane & Alavi, 2001).*

An analysis of emergent themes from the interview data reveals several instances of the development of such routines, for example:

*Russell Renegade (Engineering Manager): “The end user determines the quality of the product. For example, Engineering Business always use weld maps, so we need to do so when working with them...” We now implement weld maps as an almost standard service. Not everyone asks for this, but we’ve implemented our own standard template. It could result in a better job. If welders know it’s being recorded and tested, welders want to get it right the first time. They may be tempted to rush it a bit if they think it’s not being stringently recorded. They essentially provide accountability.”*

This anecdote highlights the creation and adoption of an organizational routine, induced by a request made in what a client describes as a collaborative relationship. This is one of several instances where-by such routines were generated as an outcome of an embedded relationship, however whilst the above anecdote highlights how such ties act as a catalyst to such knowledge repositories, the quote below documents the co-creation of such a routine:

*Chris ABBID (Electronics Engineer): “Firms might say ‘you could do this process this way’. For example, changing calculations to get more accurate XXX. Taking into account new things (“you should record this parameter as well”; you should note down who built it; who tested it”). Continent conducted a quality audit on us and stated, ‘your process should probably include these things’. We’ve since changed the processes and we adopted some of the quality procedures.”*

Here a new routine, or at least a significant iteration of an existing one, is created via close collaboration with an embedded tie. Synergies can be drawn from this sub-theme and others, such as knowledge creation and innovation transfer, which study the same

phenomena to draw different, yet complementary, conclusions. In this manner, the anecdote above represents an instance of combination knowledge creation (Nonaka, 1994), an identification of a problem (von Hippel & Tyre, 1995; Kohl & Depner's, 2010) and an instance of organizational learning (March, 1991). Both these routine knowledge repositories are cited as currently practiced by the participants, as are the majority of instances of such routines.

The literature on knowledge repositories also highlights that relationships themselves act as conduits for the retention and management of relevant firm knowledge (Argote & Ingram, 2000; Argote, 2011), however their embedded nature suggests the relationship was already pre-existing, therefore, continued dealings could, at best represent the transition of an arm's length *knowledge repository* into a more collaborative one, rather than their creation.

Several instances of information systems (IS) being created within, or induced by embedded relationships emerged from the data. The example below provides an account of the creation of an IS:

Chris IT Manager (Flanders): *“One of our customers didn't have a stock system, his came out of a conversation where the exec mentioned they were having problems with current stock. We presented them with a demo of what theirs could look like (an adaptation of their own) and we implemented it free of charge.”*

De Long & Beers (1998) would argue that this information system represents a structured internal knowledge repository, however it could also be conceptualised as a tool (Kane & Alavi, 2007). These both fall under the category of technology, which is one facet of routines more generally, as argued by Cyert & March (1963). These findings were generally expected, given the co-development of routines in embedded relationships has been established in previous research, with both Dyer & Singh (1998) & Gil & Marion

(2013) highlighting how such co-developed routines can lead to increased productivity and efficiency (Holloway & Parmigiani, 2014).

#### **5.4.1.1.2 Not in-use**

This section refers to knowledge repositories which are not currently being utilized by the focal firm; however the literature postulates un-utilized knowledge is not necessarily redundant (Grant & Baden-Fuller, 2004; Brusoni, Prencipe & Pavitt, 2001).

Explicit instances of such collaboration-induced, under-utilized knowledge repositories was fairly rare, however one participant does highlight a conscious strategy to under-utilize and give away such a repository:

*Craig Thor (Marketing Development Manager): “We conduct a lot of research about our partners early on, e.g. does their business model fit ours? We ask some very probing questions from the outset, which can take customers by surprise. It helps establish a much more honest approach from them once we get over that. We are also very direct about whether or not we can offer value to the customer. Or where they consider us to fit into their model. By handing over and claiming no ownership over IP it helps develop that trust.”*

Although it remains unclear how such intellectual property was stored, one could infer that details of the product were stored in the form of canonical documentation, product and design specifications, as well as ingrained in the tacit knowledge of the staff involved in the artefacts production, representing personal experience (Hong et al, 2006). It may be likely such knowledge is also embedded in a physical artefact, i.e. the product itself, but this is merely conjecture and was not documented in Craig’s account. The above example will be particularly intriguing to open innovation scholars (Chesbrough, 2003) who are currently struggling to manage the risks associated with the paradigm. Here, Thor is commissioned to design and develop products for another firm to sell, a practice known as ‘white labelling’. This represents an inside-out, pecuniary mode of open innovation

(Dahlander & Gann, 2010). To encourage clients to do business with them, Thor is relinquishing full IP rights to the emergent knowledge and technology developed within the collaborative relationship. Thereby, they are handing over and under-utilizing an existing knowledge repository they've developed in collaboration with another firm.

#### **5.4.1.1.3 Summary**

This section has reviewed the creation of knowledge repositories, following application of the adapted framework of Hong et al (2006). Instances of the creation and occurrences of physical artefacts, canonical documentation, personal experience, social interaction and routines were all identified within the data as manifesting in embedded relationships, as predicted by the literature (Grant, 1996; Reagans & McEvily, 2003; Hong et al, 2006; Tsai, 2009). However, no references to off-the job training emerged from the data. This thesis concedes the provision and development of such training is perfectly plausible within embedded ties and states there is no theoretical impediment preventing this phenomenon, in fact it is highlighted prior literature (Krause et al, 2007). Instances of the creation of such repositories simply were not identified in this data set, may have emerged in further interviews.

On a deeper level it's apparent that the knowledge embedded in collaboration-induced knowledge repositories is introspective in nature, often reviewing and critiquing the internal processes of both parties, or the nature of the relationship itself. As such, these repositories serve as a basis for process innovation and the adoption of best practice, thus it is proposed:

***Proposition 6a:*** *Innovation is facilitated by more collaborative relationships because the knowledge repositories created are embedded with relational and internally-orientated knowledge.*

Despite acting as a platform for the continuous evolution of organizational processes, services and routines, the data highlights a lack of externally-orientated data being transferred from the knowledge repositories generated in collaborative relationships. Market demand conditions and customer problems beyond the remit of the dyadic relationships studied are discussed within such ties; therefore opportunities from disparate markets are not identified therein. This presents a problem as externally orientated knowledge sparks the pursuit of new markets, novel solutions and, ultimately, new product development. These findings are congruent with the work of Uzzi (1997), who highlighted firms who maintain an unbalanced portfolio of primarily collaborative relationships can become insulated from external knowledge existing beyond the boundaries of their network.

***Proposition 6b:*** *Innovation is hindered in collaborative relationships because created knowledge repositories have an internal knowledge orientation.*

#### ***5.4.1.2 Knowledge Creation Processes***

This section attempts to analyze and embed emergent data relating to the means by which knowledge is created during the manufacturing SME's more embedded relationships, these will be analysed against the extended SECI framework referenced in the literature review chapter (Nonaka, 1991; 1994; Nonaka and Toyama, 2003; Gourlay, 2006; Desouza & Awazu, 2006).

The emergent data provided several accounts of how knowledge was created within collaborative engagements, the modes in which these occurred are reviewed below.

#### 5.4.1.2.1 Socialization

Socialization refers to the process of “*creating tacit knowledge through shared experience*”

Nonaka (1994, p.19). Below, Chris outlines how, through a process of observation and discussion, his team of engineers learned how to set up a motor controller:

Chris ABBID (Electronics Engineer): “*We knew we were going to get the motor controllers from them...so we approached them saying ‘this is what we need’, and after they supplied it we needed help setting them up. So they came in and went through it all, but also they talked us through what they were doing with us...it wasn’t an informal training session...it was more buddying-up. We had two of their guys and two of our guys, they were the ones doing it and we would be watching so we could do it in future.*”

This anecdote illustrates *socialization* under the SECI framework; it is arguably the dominant mode practiced within SMEs (Desouza & Awazu, 2006) and refers to the creation of rich, fine-grained, tacit knowledge. Such an analysis is underpinned by the close working relationships of both SMEs whilst attempting to develop this online catalogue of supply manuals to Jaguar/Land Rover’s customers. Emphasis is placed on how engineers ‘observed’ their supplier’s engineers solve a problem, which resonates with the idea of observing and imitating a ‘master craftsman’ in Nonaka’s (1994) explanation of socialization. It is acknowledged that various different forms of knowledge creation are in effect here, e.g. combination during the process of ‘talking’, but for the sake of clarity, only one process is focused upon here. The ability of embedded firms to transfer such fine-grained, tacit knowledge is highlighted in Uzzi’s (1997) seminal work and in regard to the SME context, the value proposition and service offering of Flanders meant co-creation and close systems integration with clients was core to their business. Instances of socialization processes were identified throughout the data by variety of participants, Nigel (WHITE PLC), Craig, Kelso (Thor), Lucy (Equestrian), Chris (ABBID) and Chris (Flanders) all highlight instances of the socialization mode of knowledge creation within their embedded

relationships, this was in contrast to arm's length relations, where no empirical evidence of such a phenomena was found.

#### **5.4.1.2.2 Externalization**

Externalization modes of knowledge creation were highlighted as occurring within embedded relationships, this procedure of converting tacit into explicit knowledge is documented by one of the participants below:

*Kelso Thor (Design Engineer): "Some companies have supplied us with inconsistent and inaccurate information about how they operate. So the product they've supplied us with has been substandard. On one of the HITRV (check) units, locking units for a rotating handle. We designed it around it to what we thought were their tolerances, but we later had to revise this because we were given incorrect information by our supplier."*

In the above example, Kelso (Thor) highlights how a client articulated their tacit knowledge so it "can be shared by others" (Nonaka, 2003 p.5). Here, *the client* is drawing upon their existing tacit knowledge regarding the nature of their operations, which is then communicated via explicit knowledge. This process of externalization, articulating their tacit knowledge into a comprehensible manner, represents a unique mode of knowledge creation (Nonaka, 1994). It is not clear in this example whether such explicit knowledge was communicated verbally or via documentation, likely it was some combination of the two. Whilst there were not many rich examples of externalization occurring within embedded relationships, short references to such processes were fairly common place, with Simon (WHITE PLC), Andrew (TouchTech) and Kelso (Thor) all providing similar instances of such knowledge creation activity. On reflection, this may partly be due to the fact that knowledge creation activity was not an explicit focus within the interview questions, had it been more instances of externalization in embedded relationships will likely have emerged from the majority of SMEs explored. These findings were generally

expected, as much of the inter-firm knowledge literature highlights the strength of collaborative ties to create, retain and transfer knowledge across a multitude of dimensions (Easterby-Smith, Lyles & Tsang (2008); Van Wijk, Jansen & Lyles (2008)).

#### **5.4.1.2.3 Combination**

The combination form of knowledge creation refers to merging or combining two or more sets of explicit knowledge together, possibly through a process of re-contextualization, sorting, categorizing or adding to it (Nonaka, 1994). As highlighted in the literature review chapter, these are often stipulated as occurring during social interactions, in the form of meetings and phone calls. Chris provides an anecdote highlighting the occurrence of such a knowledge creation process within an embedded supplier relationship, below;

*Chris ABBID (Electronics Engineer): Firms might say 'you could do this process this way'. For example, changing calculations to get more accurate readings. Taking into account new things ("you should record this parameter as well"; you should note down who built it; who tested it"). Continental conducted a quality audit on us and stated, 'your process should probably include these things'. We've since changed the processes and we adopted some of the quality procedures.*

Several examples of combination knowledge creation activity emerged from the data; in the above example, Chris (ABBID) highlights how a client critically reviewed their testing procedures. Here, *the client* is drawing upon their existing tacit knowledge, combined with knowledge of the focal SME's unique systems to provide feedback on a process. This thesis has examined the transfer of products, services, processes and practices between firms, via a combination of face-to-face meetings, joint-working, emails and phone conversations. These mediums of knowledge transfer, and social interaction (Nonaka, 1994), are all highlighted within the literature as occurring within embedded relationships (Petison & Johri, 2008) and thus were expected by the researcher.

This section concludes by stating that several explicit examples of *combination* emerged from the data, which is supportive of the majority of research on inter-firm relationships.

#### 5.4.1.2.4 Internalization

Internalization describes the process of turning explicit knowledge into tacit knowledge (Nonaka, 1994), and is similar to our conventional conceptualisation of learning and are often the basis for new routines (Nonaka & Toyama, 2003). Several partial instances of process change were highlighted as being induced by explicit knowledge transfer between embedded ties; one participant provides a highly detailed narrative of such collaboration induced learning:

Kelso Thor (Design Engineer): *“What we do on one project, we try and carry over to another. We don’t want to make the same mistake twice.” We’ve implemented engineering change notes. To control all the change notes within designs...If we want to change revisions within notes or parts, we can take a note of that. We started using this on the CleanCO; many of our guys had experience using this at previous organizations. It was a big job and it would have been tricky to manage without it...SOPS (Standard Operating Procedures), originates with CleanCO. We knew this was going to run for a few years, so it was an opportunity to integrate things we couldn’t implement on smaller projects. This was carried forward after this project, as we already had set up the infra-structure from there... We’ve adopted structured billing material, which WeedingTech requested. I’d like to think, and we probably will implement these on larger projects... CleanCO have a bar code, puts an id tag on every product we do. Gives history on every product, history, repair history etc. We’ve since adopted this on other projects since the CleanCOs initial request...They wanted it because their products are in the field for quite a long time. We adopted it because we’d done quite a lot of upfront effort implementing, and it could benefit other projects.”*

The anecdote above details instances of both learning *from* partners, i.e. by adopting their client’s bar code procedure and *induced* by partners. For example, engineering change notes were first integrated on a particularly large project to manage the assignment and were then embedded into their future procedures. The difference here is that in the latter example, the converted explicit knowledge was not transfer by the client. Rich, detailed

examples of such behaviour were also noted by Russell (Renegade), Craig (Thor), Ryan (ABBID), and Simon (WHITE PLC). However, Nonaka and Toyama (2003) note how internalization requires the application of new knowledge, repetition and a process of reflection. Therefore, a combination of reading, training sessions (Hong et al, 2006) and simulations or experiments can all facilitate such internalization, but a holistic example of the entire process, which explicitly highlights reflection, is difficult to capture within the data. It must therefore be inferred, by virtue of a new routine being created. Internalization, as described by Nonaka and Toyama (2003), arguably can occur during social interaction, as it is not conceptualized as an individual experience (Kemmis, 1985; Høyrup, 2004; Reynolds & Vince, 2004). The establishment of such collaboration induced routines is highlighted by the extract above, leading the researcher to infer that social interaction is facilitating reflection and therefore internalization knowledge creation activity.

Deeper analysis of the nature of interaction occurring between the actors at the socialization, externalization, combination and internalization stages of the SECI framework highlights how focused interaction between actors aids deep, context-specific knowledge creation, generated by close mental and physical proximity. Furthermore, significant overlaps in partner's knowledge facilitate increased absorption of external knowledge sourced from those partners (Cohen & Levinthal, 1990); this aids the efficient implementation of a partner's knowledge, resulting in the swift adoption, implementation and refinement of new and existing internal processes. Therefore, emergent data provide strong support for the following;

***Proposition 7a: Innovation is facilitated in collaborative relationships because the interaction between SECI modes can be deliberated in a more focused manner.***

The nature of the socialization, externalization, combination and internalization knowledge creation processes emerging from the data also reveals their bounded nature in embedded relationships. Firms engaged in knowledge creation within embedded ties are restricted in their capacity to draw from knowledge sources outside the dyadic relationship. In the examples explored above, these processes tended to result in incremental process and product improvement and innovation, however, a lack of novel knowledge sourced from outside either firm's existing network means significant overlaps in knowledge are expected, which whilst facilitating learning (Cohen & Levinthal, 1990), impede radical innovation. Therefore, emergent data provide strong support for;

***Proposition 7b:*** *Innovation may impede in collaborative relationships because knowledge creation is set within strong boundaries.*

#### ***5.4.1.3 Summary***

This section has reviewed the nature of knowledge creation in embedded relationships. In regards to knowledge creation processes outlined by the SECI model (Nonaka, 1994), rich accounts of socialisation, externalization, combination and internalization modes of knowledge creation emerged from the data. With regard to internalization, two types were distinguished, 'learning' induced by embedded relationships and 'learning' from *partners*. In the latter example, the partner is communicating its own knowledge through a process of externalization. Both of these two modes directly facilitate the reflection required for internalization as proposed by Nonaka (1994). The analysis of the findings is somewhat congruent with the literature, which appreciates the ability of collaborative relationships to manage multi-dimensional forms of knowledge (Easterby-Smith, Lyles & Tsang (2008); Van Wijk, Jansen & Lyles (2008). Furthermore, sporadic instances of the multi-stage SECI cycle, or spiral (Nonaka, 1994), were also acknowledged, whereby externalization

processes induced combination and internalization, although this was difficult to fully capture given the nature of participant responses. It was not surprising that rich, detailed instances of internalization knowledge creation processes emerged, given the aforementioned ability of embedded ties to manage knowledge, relative to arm's length relationships (Grant, 1996; Dyer & Singh, 1998). However, this may be partially contentious due to the conceptualization of internalization, and the fact it must contain some degree of reflection which some may consider being, at least partially, an internal process. However, it has already been established that reflection is not solely an individual process (Kemmis, 1985; Høyrup, 2004; Reynolds & Vince, 2004), and that the social interaction within embedded ties facilitates a substantial part of such reflection.

## **5.4.2 Arm's Length Relations**

### ***5.4.2.1 Creating Repositories***

The following section explores knowledge repositories created in arm's length relationships, as before, these are organized via the types of knowledge repositories outlined by Hong et al (2006). Furthermore, these are distinguished between those repositories actively used and those which are not, or are under-utilized. It's worth noting that social interaction as a form of knowledge repository can pertain to dialogue, storytelling and coaching (Hong et al, 2006). Relationships by default, involve some form of social interaction, therefore it can be postulated that a knowledge repository is often created when an arm's length transaction occurs.

### 5.4.2.1.1 In-use

#### 5.4.2.1.1.1 Physical artefacts (e.g. product samples)

Hong et al (2006) highlighted that physical artefacts, such as product samples, quality control charts and notice boards displaying production reports represented physical artefacts able to convey ‘encoded knowledge’. The analysis revealed that products were created in arm’s length relationships, such as in the example below:

Russell Renegade (Engineering Manager): *“Another prospective customer approached us at a trade show. They were asking us about our weather tight doors, they were using a Chinese door that wasn’t fit –for purpose and they required a something a little more robust. So we sketched up a few designs, exchanged some emails, but the client lost interest. But this is an ongoing product we sell, despite the fact that the initial customer who inquired about it never actually purchased it.”*

In this example, a physical artefact has been developed within an arm’s length relationship, with a prospective customer providing both the initial idea and some initial input in the design stage. This artefact represents a source whereby encoded knowledge can be stored and extracted Hong et al (2006). It should be noted that the data only pertains to the *creation* of the repository, and not how it is utilized by the organization.

#### 5.4.2.1.1.2 Canonical documentation (e.g. technical instructions, operations manuals, reports)

Canonical documentation refers to well codified actions to be taken in given scenarios, and can represent technical instructions, operations manuals and written reports (Hong et al, 2006). Examples of the transfer of such knowledge repositories were highlighted as occurring in arm’s length relationships, for example:

Chris Flanders (IT Manager): *“These are often just price based and take the form of online auctions which we bid for. It’s a negative on their part sometimes, as we can’t communicate to them that bidding for an extra 2000 orders will only cost a few hundred pounds more, but will often be cheaper for them in the long run.”*

However, this is not an example of knowledge repository creation, merely its transfer and utilization within such a tie. The literature predicts that such highly codified materials should easily be transferred via arm's length exchanges (Grant, 1996; Dyer & Singh, 1998), which is supported by the above anecdote, however, no explicit empirical examples of the creation of canonical documentation forms of knowledge repositories were identified in the transcripts.

#### **5.4.2.1.1.3 Social Interaction**

Knowledge transfer and knowledge creation within arm's length relationships have already been discussed at great length within this thesis, however, the *creation* or *establishment* of contact with third parties acting in knowledge repository roles presents an interesting area for analysis. The anecdote below documents an instance of such a phenomenon:

Kelso Thor: *"At the start of [a] project we won't necessarily have a lot of in-house knowledge on it. We'll probably contact a number of different suppliers. We'll ask a lot of questions to figure out what we need to know, and also figure out whose helpful and who's not."*

This extract highlights the creation of both transient and relatively fixed knowledge repositories. Here, arm's length transactions with potential suppliers are utilized to draw out relevant project knowledge. The interviewee continues;

Kelso Thor (Design Engineer): *"... We needed a tank to contain the water, we eventually purchased an off-the-shelf one, but we initially we integrated with a rotational moulding supplier to get our own made. Initially they gave us a lot of help on the type of wall thickness, material, internal baffles, requirements for rotational moulding (design constraints). We learnt that from this supplier. You can quite quickly learn what you need to know if you are dealing with a specialist in their field. Just by asking the right questions, making them aware of the gaps in our knowledge and our concerns. We were quite open and honest and didn't pretend to know people's businesses."*

Here, Kelso outlines an example of how meetings and discussions with potential suppliers are being utilized as knowledge repositories. In this example, social interaction is used as a means to *test* the respective effectiveness of suppliers, and on this basis a repository could be maintained if deemed adequate, or else it could be abandoned. These instances of the creation of network knowledge repositories were almost quintessential to the concept of arm's length relationships, as almost all instances of such ties represented a knowledge repository of one form or another and embedded ties often pertained to the *utilization* of such repositories, whilst the former ties were *created* not merely accessed.

#### ***5.4.2.1.1.4 Personal experience***

Personal experience is also a form of knowledge repository, one which can be utilized to share knowledge techniques and skills (Hong et al, 2006). Arm's length relationships can act as a conduit to aid firms in accessing such repositories, i.e. facilitating such experiences, as Pam goes onto explain:

Pam VAC (MD): *“Just from having a conversation about some of our equipment, we've got the opportunity to gain a new contract. Of course, you have to get the balance right; you can't spend 40% of your time seeking out these opportunities. I would say, I do about a day a fortnight.”*

Reflecting on this experience, she continues;

Pam VAC (MD): *“...the more people who know you, know what you're about, the more opportunity you have of people thinking about you, going 'hey, I think they might be good at that'”.*

Pam is talking from personal experience created via a process of engaging in arm's length relations, and reflecting on those experiences. In this example, analysis reveals that

knowledge is created within the remit of such a tie, in the form of experience. This should prompt a re-consideration of the work of Lechner & Dowling (2003), who stated knowledge creation isn't a significant phenomenon in arm's length relationships. These findings are reinforced by the forthcoming SECI analysis later on in this chapter. This model widely accepted as outlining the core modes of knowledge creation, these combined findings offer a strong contribution to contemporary thoughts on networked knowledge creation.

#### ***5.4.2.1.1.5 Off the job training***

Instances of the creation of off the job training within arm's length ties did not emerge from the interview data. This does not rule out the possibility that they occur, in fact within the spirit of Hong et al's (2006) definition of this knowledge repository (\*bear in mind the subsidiary context meant such activity was stipulated as 'originating from HQ') they most certainly do occur in practice. An example of this would be a private firm offering team building coaching, in lieu of a lengthy initial contract or prior relations with the staff, such a service would initially constitute an arm's length relationship. Furthermore, there is no logical impediment to the focal firm requesting specific additions or amendments to these sessions, thus representing a form of creation. However, such a phenomenon was not identified within the interview data.

#### ***5.4.2.1.1.6 Routines***

Compared to embedded ties, arm's length relationships were not highlighted as inducing the creation of any organizational routines, as changes were not highlighted as recurring, nor were these practices embedded into formal or informal procedures (Cyert & March, 1963; Levitt & March, 1988). It is conceivable that third party auditors could offer suggestions which result in the creation of new or improved routines, as there are instances

of such outcomes emerging from sporadic client audits (representing embedded relationships) in the data; however, no instances of such activity emerged from interviews with the participants. The lack of instances detailing arm's length ties sparking the creation of new organizational routines may be due to a flaw in the questioning technique, given that even the purchase of an 'off the shelf' software package can, by sheer virtue of its use generate new organizational routines. Alternatively, their short-term nature may restrict the development of significant procedures or IT systems. However, this finding remains intriguing as no short task sequences or simple tools were acknowledged as being created either, given the relative ease of their transfer this seems odd, given that by our definition, arm's length relationships can span workshops, training session and other transient, yet interactive engagements.

#### **5.4.2.1.2 Not in-use**

Emergent interview data pertaining to accessing knowledge repositories within arm's length relationships highlights an exploratory approach, whereby several units are drawn upon and aggregated to inform an emerging strategy. Such repositories are generally in the form of relations with external actors, citing product problems, product/service ideas and presenting new opportunities and markets.

The data identified that relatively few of these product and service ideas are explicitly carried through and implemented. One participant elucidated on how financial limitations restricted his organization's ability to capitalise on such repositories:

*Russell Renegade (Engineering Manager): "Arm's length relationships are somewhat effective at supporting or augmenting innovation, aiding in the identification of new markets and viable products. But R&D budget doesn't always allow follow up on enquiries."*

In a further example, an interviewee highlights how they draw knowledge out of their arm's length ties with suppliers, but explains how the evolution of projects can render this knowledge redundant:

*Kelso Thor (Design Engineer): "We needed a tank to contain the water, we eventually purchased an off-the-shelf one, but we initially we integrated with a rotational moulding supplier to get our own made. Initially they gave us a lot of help on the type of wall thickness, material, internal baffles, requirements for rotational moulding (design constraints). We learnt that from this supplier. You can quite quickly learn what you need to know if you are dealing with a specialist in their field. Just by asking the right questions, making them aware of the gaps in our knowledge and our concerns. We were quite open and honest and didn't pretend to know people's businesses."*

Whilst explicit examples of such redundant, or under-utilized network knowledge repositories did not emerge frequently in the data, 'off the cuff' remarks embedded throughout the interviews highlight a relatively high redundancy rate in such arm's length knowledge repositories. No other forms of knowledge repositories, labelled 'not in-use' for example routines, IT systems etc., emerged from the data set.

#### **5.4.2.1.3 Summary**

To review, based on the analysis of knowledge repositories (Hong et al, 2006) arm's length relationships were identified as facilitating the creation of several in-use units, including; physical artefacts, personal experience and social interaction. Furthermore, it was identified that some of these repositories remain under-utilized due to budgetary constraints preventing the pursuit of new markets and product ideas. Perhaps the most interesting finding is that arm's length relations can have significant input in idea generation and the development of new products, this has significant implications for innovation research. Finally, canonical documentation, off the job training and routines

were not highlighted as being created in ALRs. Of these, the lack of evidence supporting the co-development of canonical documentation is the most intriguing; given even short term interactions are cited in the literature as facilitating the management of explicit knowledge (Uzzi, 1997; Dyer & Singh, 1998). Contrary to more collaborative ties, analysis of the interview data reveals that the knowledge repositories created with arm's length relationships are conduits of externally-oriented knowledge, i.e. they convey information regarding product faults, alternative products for existing products, new markets to explore and new product ideas. Whilst the degree to which the ties within this dyadic relationship jointly explore the issue is negligible, due to inefficiencies in the knowledge creation process within such relationships (this is explored in the following section), such knowledge is nevertheless novel and stimulates innovation which often is not resource intensive, since adapting an existing product to a new context is not as taxing as creating a completely new artefact. As highlighted by Russell. Therefore, emergent data support the following:

***Proposition 8a:*** *Innovation is facilitated by ALRs because the knowledge repositories are embedded with externally-orientated knowledge, which acts as a basis for the efficient exploration of new products and markets.*

Despite their ability to confer new knowledge from beyond an SME's network, often the new products or markets identified within arm's length relationships are individually explored and pursued by the focal firm, although the third party may act as a sounding board, such as in Russell's anecdote. In fact, whilst such distant relationships can be effective critics of existing off-the-shelf products, the limited closeness often restricts the degree to which third parties can critique and evaluate organizational processes. This is evidenced by the fact that no instance of this behavior was identified within the interview

data, despite the emergence of several such examples in the study of collaborative relationships. This is unfortunate; given the suggestions emerging from such a review could act as a catalyst to more radical, novel process innovation which does not merely serve to perpetuate industry standards. Again, it is predicted that rigid solutions would not be suggested from the third party, and an SME would be required to be pro-active in designing and implementing a resolution based on this new knowledge. However, such a resource investment may be warranted to develop unique capabilities and path dependent advantages.

***Proposition 8b:*** *Innovation is hindered by ALRs because the knowledge repositories created lack relational and internally-orientated knowledge.*

#### **5.4.2.2 Knowledge Creation Processes**

Knowledge creation in arm's length relationships is a disputed phenomenon (Lechner & Dowling, 2003), this section analyses the occurrence and nature of knowledge creation processes induced by arm's length relations utilizing the SECI model discussed throughout this thesis (Nonaka, 1991; 1994; Nonaka and Toyama, 2003; Gourlay, 2006; Desouza & Awazu, 2006).

##### **5.4.2.2.1: Socialization**

No explicit instances of the knowledge conversion mode dubbed, socialisation (Nonaka, 1994) were identified during the analysis of the interview data. This was expected, as Nonaka & Toyama (2003) highlighted such a knowledge creation process to occur through “shared experiences in day-to-day social interaction” (p.4) and develop “close interaction over time” (p.5). Of course, tacit and explicit knowledge, much like arm's length and

embedded ties, are said to exist on a continuum (Contractor & Lorange, 2002; Nonaka & Toyama, 2003) and thus there will always be an element of degree. This thesis defines an arm's length relationship as one "with limited social closeness or familiarity between actors, devoid of commitment and resource investment, with no expectation of future transactions on either side". Therefore, an arm's length transaction can still represent a fairly long-lasting encounter, arguably enough to posit some form of socialization, although this is heavily disputed by Rice & Rice (2005). It should be noted here that Nonaka (1994) and Nonaka & Toyama (2003) do not provide concrete clarification on what "over time" means. This is not a moot point based in rhetoric and the selective adoption of definitions, for if all four outlined modes of knowledge conversion (Nonaka, 1994) do occur within arm's length relationships, the proclivity of such ties to foster knowledge creation without substantial resource investment or commitment represents a significant development to both practitioners and academics. Overcoming the challenges of collaboration and the resource strain it presents is a core contemporary issue for SMEs (Colombo et al, 2012). Appreciating that there are degrees of socialisation, varying degrees of tacit knowledge could conceivably be created within arm's length ties, as manifested in the form of a one-off workshop or training day. Given the complexity of the knowledge/activity involved (Funke, 1991); such an arrangement could represent 'close interaction over time'. Of course, this is not based in any empirical data; therefore such an argument is not supported by the interviews. Therefore, whilst this section concludes with no evidence of the socialization form of knowledge creation, there is a logical argument which alludes to the possibility of arm's length-induced socialization, if only to a small degree.

#### **5.4.2.2.2: Externalization**

Externalization, as a mode of knowledge creation, refers to the conversion of tacit knowledge into explicit knowledge (Nonaka, 1994), Nonaka & Toyama (2003) claim that dialogue is an effective means by which tacit knowledge is *articulated* or *translated*. The below anecdote provides an example of an arm's length-induced anecdote of such a form of knowledge creation:

Chris Flanders (IT Manager): *"We use an open system called EPICORE, it has an online community based in forums, Google groups, LinkedIn etc., we go through and post online when we've found a solution to a problem...we try to help other people out."*

Nonaka & Toyama's (2003, p.5) definition of the externalization process highlights its occurrence when *"tacit knowledge is made explicit so that it can be shared by others to become the basis of new knowledge such as concepts, images, and written documents"*. Here, Chris provides an account of where Flanders has solved a problem (created knowledge) via socialisation, i.e. *"sharing and creating knowledge through direct experience"* (Nonaka & Toyama, 2003, p.5), and externalized such knowledge via an online forum, in exactly the spiral sequence Nonaka (1994) and Nonaka & Toyama (2003) outline. Lechner & Dowling (2003) conceptualise this as knowledge acquisition, or transfer, but externalization is a knowledge creation process in its own right, as Nonaka (1994) proposed 4 modes by which *"existing knowledge can be "converted" into new knowledge"* (p.5).

#### **5.4.2.2.3: Combination**

Nonaka (1994) described combination as the process of combining different sets of explicit knowledge, often in a social setting, and then converted into new knowledge by virtue of

re-contextualization, adding to or categorizing or sorting the knowledge. Citing an instance of this, one participant remarks:

Russell Renegade (Engineering Manager): “...*Another prospective customer approached us at a trade show. They were asking us about our weather tight doors, they were using a Chinese door that wasn't fit for purpose and they required a something a little more robust. So we sketched up a few designs, exchanged some emails, but the client lost interest. But this is an ongoing product we sell, despite the fact that the initial customer who inquired about it never actually purchased it.*”

Here, Russell highlights an instance of a *combination* knowledge creation process (Nonaka, 1994); explicit knowledge is being shared between an engineering manager and potential client in a social situation, i.e. a tradeshow meeting. Explicit knowledge was communicated here, by the engineering manager, via exhibits, verbal communication, flyers and other showcase PR material, to a prospective client. The latter then communicated a market opportunity or problem via verbal language, representing explicit knowledge. The literature acknowledges that arm's length relations can transfer explicit knowledge (Dyer & Singh, 1998); however, Lechner & Dowling (2003) assert weak ties primarily facilitate knowledge *acquisition* (Granovetter, 1973). Indeed, knowledge has been acquired, but it's this assimilation into a new context that represents a form of combination knowledge creation as defined by Nonaka (1994).

#### **5.4.2.2.4: Internalization**

Nonaka (1994) likens internalization to the traditional conceptualization of *learning*, where explicit knowledge is absorbed and the converted into tacit knowledge, much like a pianist reading and learning a piece of sheet music. Nonaka (1991, p.99) observed that “*as explicit knowledge is shared throughout the organization, other employees begin to internalize it – that is, they use it to broaden, extend, and reframe their own tacit knowledge*”. Reviewing Russell's anecdote above, we find that upon receiving this explicit knowledge, in the

combination process, his team went back and “*sketched up a few designs*”, integrating this new information into a re-framed artefact. Here, internalization is inducing such knowledge creation, but in contrast to combination and externalization modes, the entire internalization process has not occurred *within* the relationship per se. Much like in embedded ties, it is argued within the literature that reflection can occur through social interaction (Kemmis, 1985; Høyrup, 2004; Reynolds & Vince, 2004). This would insinuate that arm’s length relationships do stimulate reflection and facilitate internalization.

#### **5.4.2.2.5 Summary**

A SECI analysis of knowledge creation occurring within arm’s length relationships reveals externalization, combination and internalization processes are in-effect in such ties, these were most likely to occur given they are described as emerging from discursive consciousness (Nonaka & Toyama, 2003). In contrast, socialization processes did not emerge within the data.

In contrast to knowledge creation induced by embedded ties, that arm’s length oriented SECI processes that are identified within the data, namely externalization, combination and internalization mechanisms are boundless in nature. These practices transcend an organization’s existing network and open the SMEs up to new knowledge, potentially free from the biases of existing ties or the industry. Whilst these mechanisms may simply serve as low-cost means of sourcing a pre-existing solution to a problem, such as in the Chris’ example, it may generate a new product by applying existing technology and ideas to a novel context.

***Proposition 9a:*** *Innovation may be supported in ALRs because knowledge boundaries are not rigid.*

Despite the boundary spanning benefits of knowledge creation activity in arm's length relationships, arm's length transactions are limited in their extent to facilitate all stages of the SECI process, as alluded to by Rice & Rice (2005). Furthermore, weak interaction between actors within ALRs can require SMEs to design products and engage in process refinement by themselves, either because the third party lacks the capacity to be of technical assistance, or due to the social and geographic distance between them. This internally-orientated, often exploratory approach to innovation is arguably inefficient and time-consuming.

***Proposition 9b:*** *Innovation may be hindered in ALRs because of weak interaction between knowledge creation entities.*

#### ***5.4.2.3 Overview***

This section has applied Nonaka's SECI (1994) framework of knowledge creation modes to the emergent data obtained from the interviews, Figure 17, positioned at the end of this chapter, presents a tabulated overview of analysis. The analysis highlights instances of externalization, combination and internalization knowledge creation processes induced by, and occurring in arm's length relationships. Such findings contribute to Lechner & Dowling's (2003) relatively limited conceptualization of knowledge creation in arm's length relations.

A distinction is made between explicit and tacit knowledge creation, born out of discursive and practical consciousness respectively (Nonaka & Toyama, 2003). Nonaka (1994) highlights the latter may render itself to codification and more effective transfer, but it is still knowledge created in a process of conversion. In contrast, embedded relationships are highlighted as facilitating socialization, externalization, combination and internalization modes of knowledge transfer, whilst such findings were expected given the ability of more collaborative inter-firm relationships to facilitate rich, fine grained knowledge (Uzzi, 1997; Dyer & Singh, 1998), it is noted that the incident utilized to report the socialization concept could logically have stemmed from a one-off encounter. It has been argued that reflection, a key dimension of internalization (Nonaka & Toyama, 2003; Nonaka (1994), can be a social experience (Kemmis, 1985; Høyrup, 2004; Reynolds & Vince, 2004), and this is support by the evidence emerging from the interview data that supports this.

In regard to the creation of knowledge repositories, which were analysed using an adapted version of Hong et al's (2006) typology, see Figure 16 for a tabulated review of analysis (presented earlier in this chapter), the data highlighted arm's length relationships facilitate the creation of in-use knowledge repositories in the form of; physical artefacts, personal experiences and social interaction. Instances of such relationships sparking the creation of canonical documentation, off the job training, routines, tools or IT systems were not identified within the analysis. This is interesting, considering such ties could span training days/events, workshops and other fairly cooperative engagements with external actors, which are highlighted as capable of generating such knowledge repositories (Igartua et al, 2010). Furthermore, it is commonly assumed within the literature that even arm's length ties can facilitate the transfer of explicit, codified knowledge such as those embedded within canonical documentation such as technical specs and reports and briefs (Grant, 1996;

Uzzi, 1997), however, there were no explicit references within the data that such documentation was subsequently amended or created within the remit of an ALR.

In contrast, collaborative relationships documented several instances of the creation of in-use knowledge repositories, in the form of relationships, physical artefacts, canonical documentation, personal experience, social interaction and routines, manifested by new and refined processes and computerized information systems (Davenport, De Long & Beers, 1998). Instances of knowledge repository creation were distinguished by those which involved co-creation, i.e. were jointly created in an embedded relationship, and those which were induced by collaboration but were actually created internally by the focal firm. Given the typology of knowledge repositories used in this study was primarily developed, and based on a study of organizational learning in subsidiaries (Hong et al, 2006); this analysis is relatively unsurprising, even in the context of dyadic inter-firm relations. Unlike in Hong et al's (2006) study, no instances of the creation of 'off-the job training sessions' emerged from the data, although it is believed this was simply due to the circumstances of the participant's studied. Finally, in one instance, it emerged that knowledge repositories, labelled not in-use, created within the context of such embedded ties were actually under-utilized as deliberate sales strategy to overcome potential client's reservations about engaging in a coupled open innovation strategy. This may represent a promising avenue for future studies to explore, given the fields current focus on overcoming IP allocation issues (Grandstrand & Holgersson, 2014).

**Figure 17. Overview of comparative SECI analyses of arm’s length and embedded relationships**

<b>Relationship Type</b>	<b>Socialization</b>	<b>Externalization</b>	<b>Combination</b>	<b>Internalization</b>
<i>Embedded Relations</i>	Yes	Yes	Yes	Yes
<i>Arm’s Length Relationship</i>	No	Yes	Yes	Yes

*Based on Nonaka (1994)*

Whilst externalization and combination processes were identified as occurring *within* the arm’s length interaction, much of the internalization process emerged after the event. Furthermore, socialization processes, highlighted as the most dominant form of knowledge creation in SMEs were not identified within the data as occurring in arm’s length relationships, this finding is relatively consistent with contemporary academic thought on the matter (Dyer & Singh, 1998; Uzzi, 1997), although the author suspects and provides a rationale for why this may be possible. If we contrast this analysis with our conclusions of knowledge creation processes induced by embedded relationships, a clear distinction can be made between the two.

Whilst rich, detailed examples of externalization, combination and internalization knowledge creation processes emerged from participant responses regarding arm’s length ties, analysis reveals less explicit accounts of combination occurring within embedded relationships. In contrast, explicit instances of socialization, highlighted by contemporary literature as the dominant mode of knowledge creation in SMEs (Desouza & Awazu 2006), did not emerge in discussions of arm’s length relationships. Changing the nature of the

interview questions and strategy of inquiry, explicit accounts of these two under-reported knowledge creation modes may have emerged had research design been altered, and arguments were provided over the likely existence of both these modes, despite limited detailed and explicit empirical evidence. Regardless, this section has uncovered that knowledge creation can and does occur within arm's length relationships, perhaps even more frequently, given the brief and high number of such exchanges, this runs counter to the findings of Lechner & Dowling's (2003), who downplayed the proficiency of such ties to create knowledge.

**Table 10. Summary of propositions**

<i>Theme</i>	<i>Proposition</i>
<b>Problems</b>	<p><b>Proposition 1a:</b> <i>Innovation will be facilitated in strongly embedded relationships because they are conduits of tested, efficient solutions.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.1.2 - 'Solutions to Identified Problems'</i> <i>Pages 187-189</i></p>
	<p><b>Proposition 1b:</b> <i>Innovation may get hindered in strongly embedded relationships because isomorphic pressures lead to convergence in the innovation process.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.1.2 - 'Isomorphic Basis Only'</i> <i>Pages 199-206</i></p>

	<p><b>Proposition 1c:</b> <i>Novel innovation may be more supported by arm's length relationships because of limited isomorphic pressures.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.2.2 'Isomorphic Basis Only'</i></p> <p><i>Pages 212-215</i></p>
	<p><b>Proposition 1d:</b> <i>Innovation may be hindered by ALRs because they are likely to impede the efficient transfer of best practice.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.2.2 'Isomorphic Basis Only'</i></p> <p><i>Pages 212-215</i></p>
	<p><b>Proposition 1e:</b> <i>Innovation may be hindered by collaboration because problem identification prompts firm convergence.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.2.1.1 - 'Identification of Problems'</i></p> <p><i>Pages 185-187</i></p>
	<p><b>Proposition 2a:</b> <i>Innovation may be supported by more collaborative relationships because they are more likely to identify commonly occurring problems in the innovation process.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.1.1 - 'Identification of Problems'</i></p> <p><i>Pages 185-187</i></p>

	<p><b>Proposition 2b:</b> <i>Innovation may be supported by ALRs because problems identified are likely to help orientate broader innovation strategy.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.2.1 - 'Identifying a Problem'</i></p> <p><i>Pages 190-192</i></p>
	<p><b>Proposition 3a:</b> <i>Innovation may be hindered by ALRs because SMEs lack the resources to effectively explore and evaluate often ambiguous problems.</i></p> <p><b>Moderate Support</b></p> <p><i>Evidenced in section 5.2.2.1 - 'Identifying a Problem'</i></p> <p><i>Pages 190-192</i></p>
	<p><b>Proposition 3b:</b> <i>Innovation may be hindered by arm's length relationships because exploratory problem-solving tends to be more resource intensive.</i></p> <p><b>Moderate Support</b></p> <p><i>Evidenced in section 5.2.2.2 - 'Solution to Identified Problem'</i></p> <p><i>Pages 192-196</i></p>
	<p><b>Proposition 4a:</b> <i>Innovation may be supported by ALRS because problem-solving is exploratory and solutions novel in nature.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.2.2 - 'Solution to Identified Problem'</i></p> <p><i>Pages 192-196</i></p>

	<p><b>Proposition 4b:</b> <i>Innovation is likely to be supported by ALRS because problem-solving activity facilitates greater organizational learning and internal problem-solving capabilities.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.2.2 - ‘Solution to Identified Problem’</i></p> <p><i>Pages 192-196</i></p>
	<p><b>Proposition 4c:</b> <i>Innovation may be hindered in more embedded relationships because solutions represent “pre-packaged”, consensus recommendations, breed over-reliance and reduce SME’s internal problem-solving capabilities.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.2.1.2 - ‘Solutions to Identified Problems’</i></p> <p><i>Pages 187-189</i></p>
<p><b>Product/Process/Service Innovation</b></p>	<p><b>Proposition 5a:</b> <i>Product innovation is likely to be facilitated by embedded ties.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.1.1 Delivered from sustained organizational learning</i></p> <p><i>Pages 197-199</i></p>
	<p><b>Proposition 5b:</b> <i>Service innovation is likely to be facilitated by embedded ties.</i></p> <p><b>Moderate Support</b></p> <p><i>Evidenced in section 5.3.1.1 - ‘Delivered from Sustained Organizational Learning’</i></p>

	<p><i>Pages 197-199</i></p>
	<p><b><i>Proposition 5c:</i></b> <i>Process innovation may be facilitated by embedded ties.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.1.1 - ‘Delivered from Sustained Organizational Learning’</i></p> <p><i>Pages 197-199</i></p>
	<p><b><i>Proposition 5d:</i></b> <i>Innovation is facilitated in ALRs because they are less resource intensive and lead to identification of new markets.</i></p> <p><b>Substantial Support</b></p> <p><i>Evidenced in section 5.3.2.1.2 - ‘New Markets &amp; Opportunities’</i></p> <p><i>Pages 209-212</i></p>
	<p><b><i>Proposition 5e:</i></b> <i>Innovation is facilitated in more collaborative relationships because they enable strong continuous coordination.</i></p> <p><b>Emerges Via Abduction</b></p> <p><i>Evidenced in section 5.3.1.2 - ‘Isomorphic Basis Only’</i></p> <p><i>Pages 199-206</i></p>
	<p><b><i>Proposition 5f:</i></b> <i>Innovation is hindered in ALRs because their one-off nature impedes the development of complex and extremely bespoke products.</i></p> <p><b>Emerges Via Abduction</b></p> <p><i>Evidenced in section 5.3.2.1.2 - ‘New Markets &amp; Opportunities’</i></p> <p><i>Pages 209-212</i></p>

<p><b>Knowledge Creation</b></p>	<p><b>Proposition 6a:</b> <i>Innovation is facilitated by more collaborative relationships because the knowledge repositories created are embedded with relational and internally-orientated knowledge, which act as a basis for process and service development and review.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.1.1 ‘Creating Repositories’</i></p> <p><i>Pages 215-226</i></p>
	<p><b>Proposition 6b:</b> <i>Innovation is hindered in collaborative relationships because created knowledge repositories have an internal knowledge orientation.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.1.1 ‘Creating Repositories’</i></p> <p><i>Pages 215-226</i></p>
	<p><b>Proposition 7a:</b> <i>Innovation is facilitated in collaborative relationships because the interaction between SECI modes can be deliberated in a more focused manner.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.1.2.4 ‘Internalization’</i></p> <p><i>Pages 230-232</i></p>
	<p><b>Proposition 7b:</b> <i>Innovation may impede in collaborative relationships because knowledge creation is set within strong boundaries.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.1.2.4 ‘Internalization’</i></p>

	<p>Pages 230-232</p>
	<p><b>Proposition 8a:</b> <i>Innovation is facilitated by ALRs because the knowledge repositories are embedded with externally-orientated knowledge, which acts as a basis for the efficient exploration of new products and markets.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.2.1 ‘Creating Repositories’</i></p> <p>Pages 233-246</p>
	<p><b>Proposition 8b:</b> <i>Innovation is hindered by ALRs because the knowledge repositories created lack relational and internally-orientated knowledge.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.2.1 ‘Creating Repositories’</i></p> <p>Pages 233-246</p>
	<p><b>Proposition 9a:</b> <i>Innovation may be supported in ALRs because knowledge boundaries are not rigid.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.2.2 ‘Knowledge Creation Processes’</i></p> <p>Pages 241-246</p>
	<p><b>Proposition 9b:</b> <i>Innovation may be hindered in ALRs because of weak interaction between knowledge creation entities.</i></p> <p><b>Emerged Via Abduction</b></p> <p><i>Evidenced in section 5.4.2.2 ‘Knowledge Creation Processes’</i></p> <p>Pages 241-246</p>

**Table 10. (Continued)**

## **5.5 Relationships Between Themes**

### **5.5.1 Introduction**

The prior analysis section outlined the key themes emerging from the data in light of academic work in the area; the data was organized into three themes:

- Knowledge creation
- Problem-Solving
- Innovative outputs

These themes will now be critically discussed, exploring how these concepts are interlinked, concluding in the presentation of this thesis' conceptual framework. All the thematic links drawn out of the following discussion are presented diagrammatically in Figures 18 and 19.

### **5.5.2 Knowledge Creation**

#### ***5.5.2.1 Knowledge Repositories***

Knowledge repositories were cited throughout the emergent data as being created within both arm's length and embedded relationships, these spanned physical artefacts, personal experience, social interaction, canonical documentation and routines (the latter two were only documented as occurring in collaborative ties). Instances of isomorphic pressures were highlighted in the development of canonical documentation, routines and tools within collaborative relationships. Moreover, in such instances these repositories often manifest in the form of prescribed solutions to problems which had been identified by the focal or client organization.

In contrast, physical artefacts created within the remit of arm's length relationships were cited as a result of exploratory problem-solving that were linked to organizational learning.

Personal experience and social interaction were also the catalysts to organizational learning, generated in combination knowledge creation processes within these arm's length relationships.

#### ***5.5.2.2 Knowledge Creation Processes***

Knowledge creation processes were analysed as occurring in both arm's length and embedded relationships using the SECI framework (Nonaka, 1994). Whilst instances of socialization, externalization, combination and internalization processes were identified as occurring within the remit of embedded relationships, only the latter three processes were highlighted as occurring in arm's length relationships. Socialization and combination processes within or induced by embedded ties were highlighted as generating solutions to problems both previously identified and those discovered within the remit of the collaborative activity. Social interaction acted as a repository for socialization, combination and internalization knowledge creation processes.

Furthermore, innovation delivered via organizational learning was only *primarily* highlighted as occurring during the socialization within embedded ties, whilst externalization and combination processes were linked to such organizational learning-induced innovation in arm's length relationships. Instances of arm's length relationship-induced knowledge creation manifest in externalization, combination and internalization resulted in the creation of solutions. Externalization processes were prescriptive in nature, whilst combination and internalization knowledge creation processes resulted in both the identification of problems and sparked the exploratory problem-solving activity which resulted in their resolution. Combination and internalization processes drew upon social interaction repositories and were attributed to the development of organizational learning, given the exploratory nature and novel nature of the solutions identified.

### **5.5.3 Problem-Solving**

#### ***5.6.3.1 Problem Identification***

Problems were identified within the remit of both embedded and arm's length relationships, however their nature in-relation to the other themes and sub-themes emerging from the analysis were markedly different. Problem identification within embedded ties was often born out of combination knowledge creation activities and pertained to the revision of existing routines. When problems were identified within embedded ties, these were highlighted as diagnosis problems (Jonassen, 2000) and partner firms were generally quick to offer prescriptive solutions to the problems. In contrast, arm's length relations also identified problems; however these tended to be linguistic in nature (Quin, Johnson & Johnson, 1995) and pertained to broader issues regarding market gaps and product faults, rather than internal processes. Interestingly, when ALRs identified such problems, the third party often did not have a readily available solution at hand, therefore; such practices were not laden with coercive isomorphic pressures such as in embedded relationships. On the contrary, they sparked exploratory problem-solving strategies which resulted in increased organizational learning and more novel solutions. In both embedded and arm's length relations, problem identification emerged from combination knowledge creation processes, although whilst the former involved the creation and refinement of routines, the latter was more focused on sparking the development of physical artefacts and pursuit of new markets.

#### ***5.5.3.2 Solutions***

As discussed in the prior section, solutions and problem-solving activities were often prescriptive and set within rigid boundaries in more embedded relationships. Coercive and mimetic isomorphic pressures are highlighted as breeding innovative convergence,

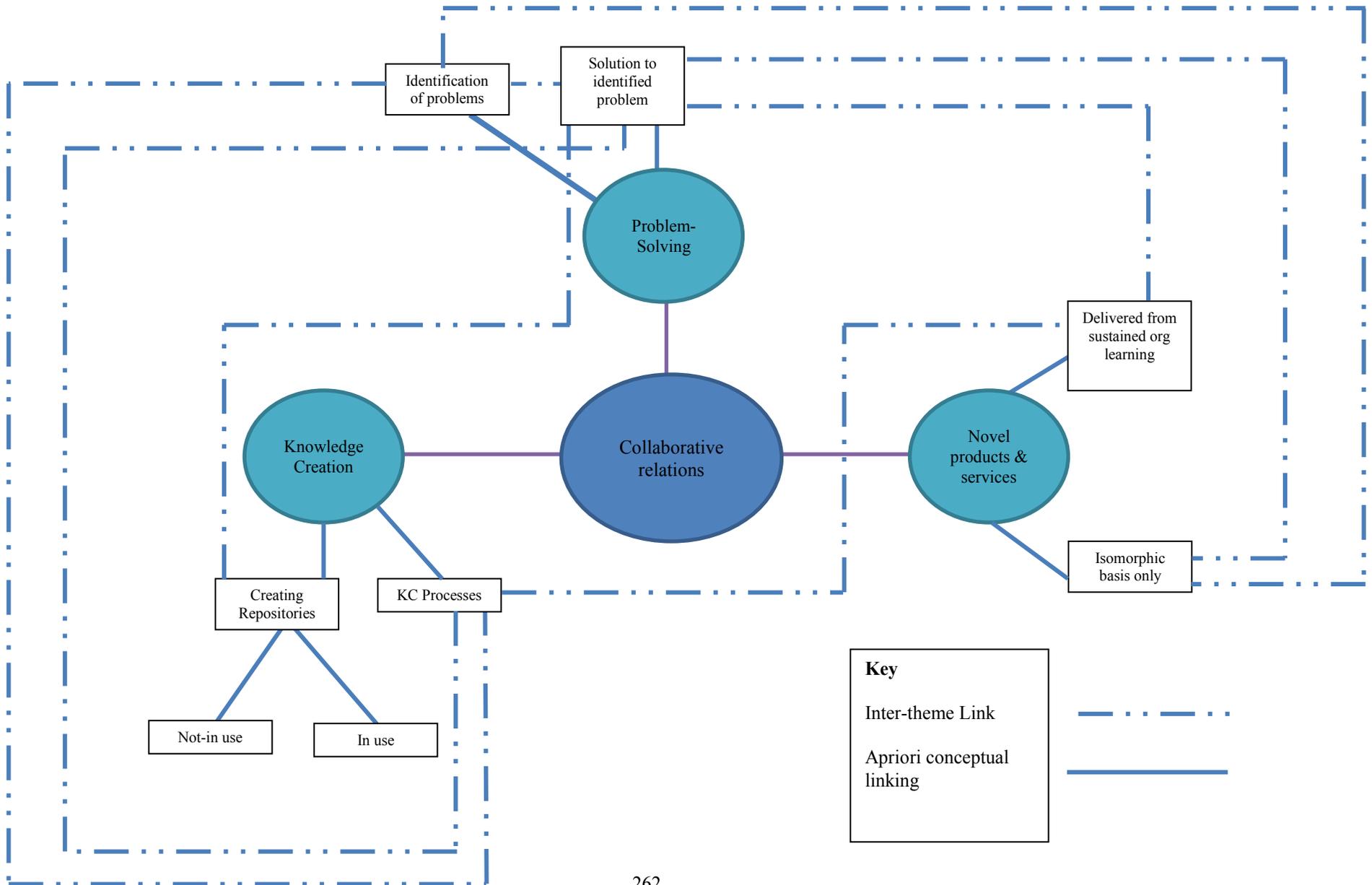
particularly within organizational processes and routines. Identified problems were soon accompanied by readily available, tried and tested solutions which mitigated any resource intensive, exploratory problem-solving activity. Whilst such problem-solving was inherently very efficient, it is argued such practices breed over reliance on partners and a genuine erosion of problem-solving capabilities. By contrast, arm's length relationships sparked exploratory problem-solving activity whereby third parties identified problems which had not been solved, prompting the development of novel solutions. Whilst the short-term ties may have sparked the initial problem-solving activity, such a process is considered as primarily driven by the focal SMEs, leading to greater organizational learning and the development of increased innovative, problem -solving capabilities. Whilst solutions derived from embedded ties usually represented knowledge repositories under the 'routine heading', which includes IT systems and tools, tangible arm's length-induced solutions generally resulted in the creation of physical artefacts.

#### **5.5.4 Innovation Outcomes**

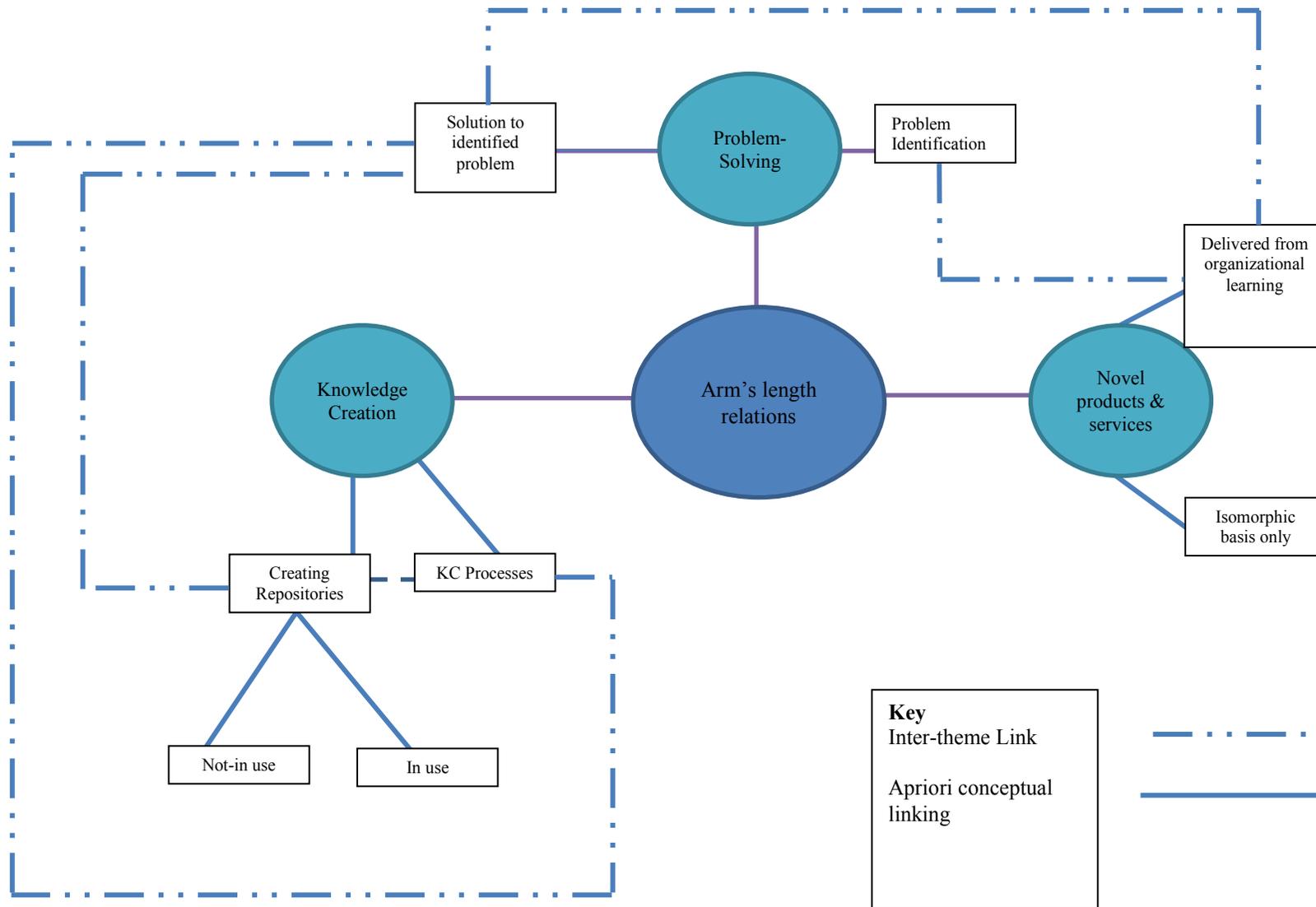
There are some strong correlations between the type of innovation-induced and the form of knowledge repository created within a dyadic relationship. For example, product innovations also represented physical artefacts and process and service innovations represented new routine knowledge repositories. Combination knowledge creation strategies engaged in in arm's length relationships often sparked the initial stages of product innovation and new market discovery, whilst combination and internalization often sparked process and service innovation within more collaborative ties. In contrast, socialization, the most commonly occurring knowledge creation processes purportedly occurring within SME relationships, generally only facilitated incremental innovation within processes. Furthermore, in regard to the theoretical principles driving such innovation, new processes induced by embedded ties were driven more heavily by

isomorphic pressures than arm's length relationships, which were in turn prone to induce product innovation via a process of exploratory problem-solving and organizational learning. Analysis appears to indicate that the products generated from arm's length interactions represent more radical innovations than the processes emerging from embedded ties, which appear to be more iterative and incremental in nature. Furthermore, iterative isomorphism induced process innovations tended to manifest in the creation of routine knowledge repositories; whilst more radical product innovation spurred from organizational learning in arm's length transaction were a result of the development of physical artefact knowledge repositories

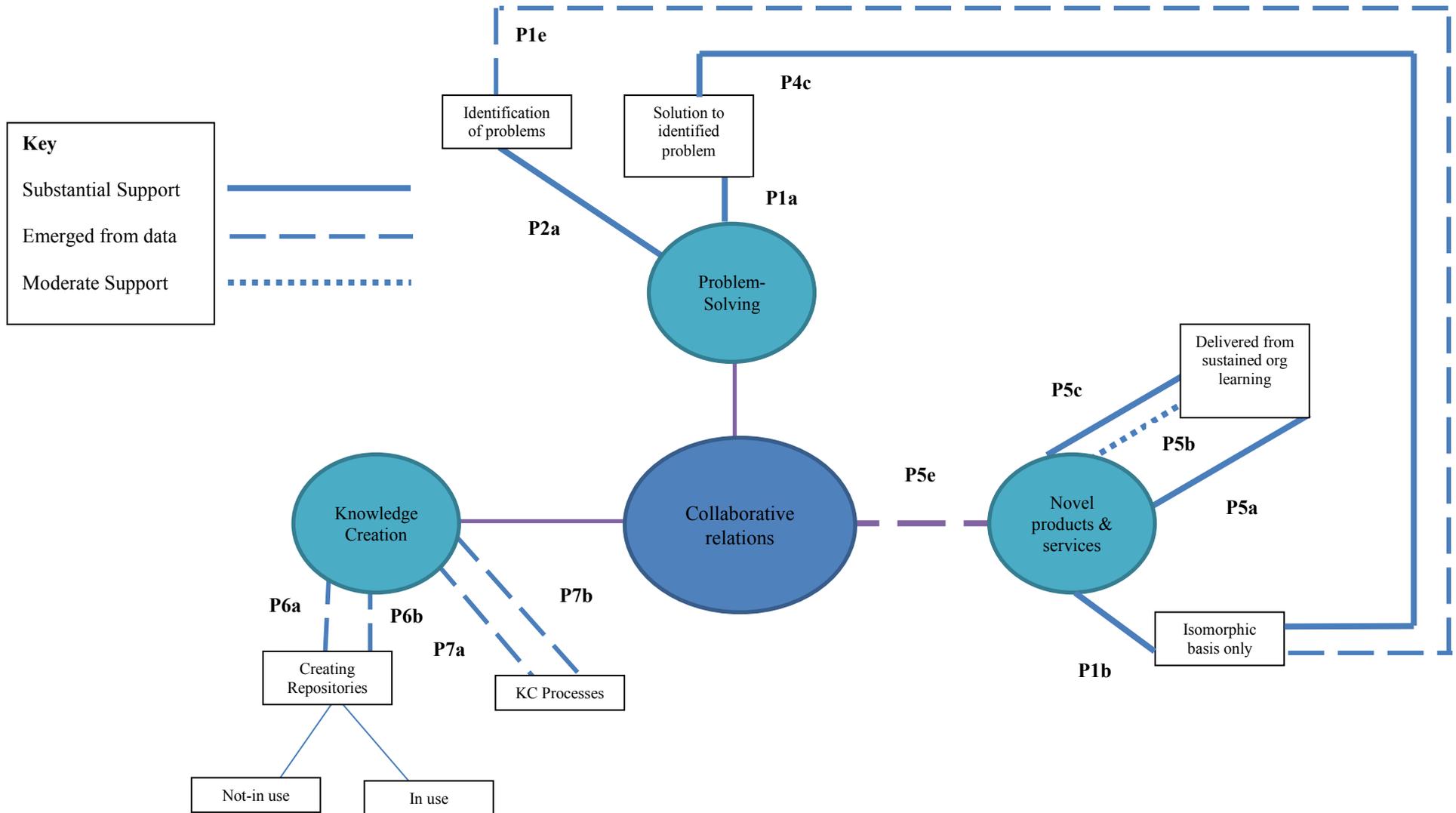
**Figure 18. Thematic Relations in Embedded Relationships**



**Figure 19. Thematic Relations with Arm's Length Relationships**



**Figure 20. Collaboration Innovation Proposition Map**





## **5.6 Theoretical Contribution**

This thesis explores the process whereby SMEs innovate within dyadic relationships. The comparative format investigates the innovation process in relatively short-term, socially distant (arm's length relationships) and longer term, collaborative relationships. This thesis contributes to networked innovation research by proposing a framework mapping out the innovation processes of manufacturing SMEs engaging in collaborative and arm's length relationships. Specifically, the model highlights how arm's length relationships are more likely to 'spark' exploratory, internally managed quests for solutions which aid the development of problem-solving capabilities. Furthermore, the resultant solutions may epitomise radical, new to the world innovations, rather than consensus industry ideas. Finally, this thesis sheds light on the nature of knowledge creation within arm's length relationships and describes how externalization, combination and internalization processes help generate innovative outputs.

Collaborative relationships are identified as primarily facilitating process and service innovation; as such ties help identify procedural inefficiencies and can provide efficient, tested solutions to such problems, often driven by isomorphic pressures (DiMaggio & Powell, 1983). Although instances of collaboration-induced product innovation also emerged from the data, usually bespoke products, these were generated through a more exploratory, approach more effectively rationalized through an organizational learning lens (March, 1991). Such collaboration-induced process innovation are postulated as stimulating convergence as the problem-solving process impedes more radical innovation by focusing on 'common' problems and perpetuating existing procedures. A specific theoretical contribution of this thesis lies in providing empirical support for a rather prescriptive problem identification process in embedded relationships, which serves to perpetuate accepted solutions to common

processes, which were formulated a priori. Thus, via the presence of coercive isomorphic pressures, such collaboration-induced SME process innovations serve to breed homogeneity within networks and the wider industry. Furthermore, in-line with Perry-Smith & Shalley's (2003) arguments, it is postulated that such activity breeds over-reliance on partners and reduces an SME's ability to manage problem-solving autonomously.

In contrast, arm's length relationships are highlighted as primarily facilitating product innovation and new market identification; as knowledge creation and problem solving activity in such ties are exploratory, draw from diverse knowledge bases and more radical in nature due to their focus on 'new' problems. Arm's length-induced innovation was said to aid the development of internal problem-solving capabilities and driven by organizational learning, rather than isomorphism. However, problems identified by arm's length ties are often under explored due to resource limitations, and the exploratory nature of finding a solution is postulated as being resource intensive.

This thesis also makes contributions with respect to well established knowledge creation frameworks regarding arm's length-induced innovation process in SMEs. Firstly, knowledge creation in arm's length relationships is identified as being delivered via externalization, combination and internalization processes, which both serve in the development of new product development and new market identification, secondly, empirical support is provided to highlight how such innovation is informed by a problem-solving process which is both exploratory and novel in nature, conceptualized via organizational learning theory.

## **5.7 Contribution to Practice**

Although the primary objective of this doctoral study is to provide an academic contribution to knowledge, the researcher feels the UK government and managers can draw actionable conclusions from this study.

The UK government is a strong advocate of sparking SME growth through collaboration (BIS, 2014; Innovate UK; 2015); frequently encouraging small to medium sized firms to get involved in innovation and knowledge centres (IKCs) and partner up with large organizations. However, many of the major contemporary reports and on SME innovation provide little information on the drawbacks and risks of such endeavours, arguably touting collaboration as somewhat of a panacea for future growth (Innovate UK; 2015; BIS, 2014; BIS, 2015). This study can help government supported organizations such as IKCs and the Department of Business Innovation & Skills provide more balanced and detailed guidance regarding collaboration and relationship management for their specific needs. For example, new manufacturing firms struggling with implementing and adhering to standard operating procedures may benefit from close collaboration with a more established firms, whilst resource-strapped SMEs may benefit from engaging in exhibitions and tradeshow in an effort to identify new applications and markets for existing product lines. Furthermore, greater emphasis could be placed on communicating the risks of strong collaboration, including pressures to conform to consensus practices which stifle innovation in the long-term.

Similarly, managers would benefit from adopting a much broader conceptualisation of external relationships combined with more strategic relationship management. Firstly, managers should reflect on this study's initial insights that their position in the organizational hierarchy may insulate them from small, yet potentially important details that could help orientate strategy. For example, the initial contributions of socially distant or one-off interactions may be too small for them to observe, thus managers need to consider how important small details can permeate through the organizational hierarchy. Indeed, the executive level staff sampled rarely acknowledged the benefits of arm's length interactions, which suggests they need to be mindful their bird's eye-view does not cause them to

underestimate the effects of less directly observable phenomena. Finally, managers and engineering staff may wish to re-evaluate their apparent bias towards technical innovation. An investigation into their SME's historic innovative performance should serve to confirm whether technical innovation generates superior performance within their organization compared to non-technical innovation.

## **5.8 Conclusion**

This analysis chapter has built upon the findings in the prior section and attempted to embed the emergent themes into the wider management literature. Two comparative frameworks mapping out and consolidating the key themes and propositions emerging from this analysis are provided in Figure 20 and Figure 21. The following discussion section will draw upon this analysis and framework to highlight the importance of these findings in light of contemporary management research, and highlight their broader implications for the field.

## **Chapter 6: Conclusion**

The aim of this exploratory study has been to compare how the innovation process differs in arm's length and collaborative relationships in the SME context. Specific emphasis has been placed on exploring the nature of innovation in arm's length relationships, embedded ties have been considered to offer a meaningful contrast. The following chapter provides a review of the rationale for the study, aims and objectives, before highlighting the limitations of this study and areas for future research.

### **6.1 Aims & Objectives**

*What is the process by which SMEs innovate in collaborative and arm's length relationships?*

Specifically, this research explores the drivers of innovation, knowledge creation and problem-solving processes in arm's length and embedded ties. In fulfilment of this aim, the following objectives were proposed:

1. To explore how the nature of problem-solving differs within arm's length and collaborative relationships.
2. To explore how knowledge is created within arm's length and collaborative relationships.
3. To explore the unique drivers of innovation in arm's length and collaborative relationships, and review their effect on SMEs' innovative outputs and capabilities.

## **6.2 Rationale for study**

The prior literature review chapter documented the strategic importance of inter-firm relationships in contemporary strategy research. As core capabilities, resource-based theories and innovation became of key importance to researchers (Leonard-Barton, 1992; Penrose, 1959; Barney, 1991, Pittaway et al, 2004), a stream of seminal studies partially inspired by Granovetter's (1985) work on embeddedness began to orientate academic theory and discussion towards relatively enduring collaborative relationships (Uzzi, 1997; Dyer & Singh, 1998, Lavie, 2006). In contrast, socially distant, arm's length relationships were conceptualised as of little strategic value, relics of a bygone era focusing on short-term costs. This was evidenced by many studies' conceptualization of such ties largely in terms of their narrow information and short-term economic value (Larson, 1992; Uzzi, 1997; Dyer & Singh, 1998; Gulati, 1995). However, a significant focus on collaboration in the innovation process and strategists' quest for resource portfolios that fit the VRIN model has led to calls to address the significant challenges managing inter-firm relationships presented (Della & Aria, 2014), especially in the SME context (Colombo et al, 2012).

A review of government reports and documentation (Innovate UK, 2015; BIS, 2011; 2014) highlighted that the British government were advocating the establishment of embedded relationships to spark growth. Furthermore, whilst the reports encouraged businesses to collaborate, there was little discussion regarding the challenges such inter-firm relationships present or the high failure rates attributed to them. This study attempts to offset these issues by presenting a more balanced empirical study of innovation in both collaborative and arm's length relationships. Arm's length relationships require little resource commitment, minimum dependence on suppliers and feature lower risk of exploitation (Dyer & Singh, 1998), given SMEs often lack resources and are vulnerable to exploitation the study of such ties could present an intriguing new avenue for networked innovation strategy in the small to medium

sized business context. This research builds upon similar work by Lechner & Dowling (2003), Partanen, Chetty & Rajala's (2011) and Geneste & Galvin (2013) which set out to discuss the deeper knowledge and innovation implications of arm's length relationships. By exploring how problem-solving and knowledge creation occurs and differs within collaborative and arm's length relationships, and their respective drivers, this research sought to reveal the nuances, strengths and weaknesses associated with each approach, serving to inform more efficient SME networked innovation strategy.

### **6.3 Summary**

This section summarises the key findings of this research project by relating them to the specific objective they were informed by. All the objectives were developed to fulfil a wider aim of exploring the networked innovation process of SMEs and to identify how this differs in collaborative and arm's length relationships. The fulfilment of this wider aim was addressed in the prior theoretical contribution section.

1. To explore how the nature of problem-solving differs within arm's length and collaborative relationships.

Problem-solving was conceptualised in the analysis and discussion section as a two-step process of problem identification and arriving at a solution. In embedded relationships problem-solving activities primarily related to incremental process innovation. The analysis revealed these partner firms, often customers, would highlight flaws or potential areas for improvement within the focal SME's routines or processes. Furthermore, a solution to these processes was often swiftly provided, as these were in correspondence with the client firm's quality control criteria or best practice. Solutions were generally quick and relatively simple

to implement as the focal SME would benefit from the experience of their partner. In contrast, problem-identification in arm's length relationships primarily related to gaps in the market or product faults. These often stemmed from a general grievance the party had failed to find an adequate solution for. This form of arm's length-induced problem identification may not always have been followed up by the focal SME due to resource limitations, but would spur a more exploratory process in order to find an adequate solution. Thence, this procedure tended to facilitate more radical product innovation. All forms of networked problem-solving were highlighted as combination knowledge creation processes.

2. To explore how knowledge is created within arm's length and collaborative relationships.

Nonaka's (1994) SECI framework of organizational knowledge creation was used to analyse how arm's length and embedded relationships facilitated the creation of knowledge in SMEs. Embedded relationships were found to support socialization, externalization, combination and internalization modes of knowledge creation. Solutions to new and pre-existing problems were identified via socialization and combination processes in such ties. In contrast, arm's length relationships were only cited as supporting externalization, combination and internalization modes of knowledge creation, although this highlights new knowledge can be created in such ties. Both these forms of knowledge creation were highlighted as generating solutions in arm's length relationships, which were generally highly novel given the exploratory problem-solving process. Embedded relationships were identified as facilitating the creation of physical artefacts, canonical documentation, personal experience social interaction and routines, this in contrast to arm's length ties which only served to create physical artefacts, personal experience and social interaction forms of knowledge repository.

These findings build upon the work of Lechner & Dowling (2003) by identifying that knowledge creation does occur within arm's length relationships, identifying the types of knowledge generated and the process thereof.

3. To explore the unique drivers of innovation in arm's length and collaborative relationships, and review their effect on SMEs' innovative outputs and capabilities.

Whilst organizational learning was identified as driving innovation in both arm's length and collaborative relationships, the latter also highlighted isomorphic pressures as driving problem-solving, process and product development. Arm's length relationships tended to facilitate the identification of new markets and new product development; these were driven by an exploratory search process which resulted in the development of more novel solutions and more radical innovation. Although many avenues were left underexplored due to resource limitations, finding new markets to sell existing products to arguably presented an efficient and cost effective way to increase sales. In contrast, collaborative process innovation was identified as featuring significant isomorphic pressures which pressed SMEs to adopt similar process to their partners. These could often represent best practice and 'tried and tested' solutions which could be quickly implemented with the help of an experienced partner, but the rigid boundaries of such relationships meant that significant novel process innovation did not emerge. Instead, coercive and mimetic isomorphic pressures prompted partnering SMEs to adopt the organizational routines and copy product and service ideas of their partners. It is argued these solutions may be quick and efficient to implement, but do not spark the long-term performance benefits attributed to more radical innovation.

This thesis has outlined how innovation occurs in arm's length relationships in contrast to embedded ties. By highlighting the nuanced nature by which ALRs facilitate problem-solving, knowledge creation and specific innovative outputs and capabilities, future research can begin developing more sustainable networked innovation strategies that do not place undue burdens on vulnerable SMEs. In an attempt to address the challenges of networked SME innovation, this thesis has developed a theoretical basis researchers and practitioners can use to devise more nuanced collaboration strategies which utilize the inherent strengths of both arm's length and embedded ties to meet specific innovation goals.

#### **6.4 Limitations & Further Work**

The cross-industry nature of research made it infeasible to develop a strong understanding of the intricate workings and nuances of each individual industry. Furthermore, it was outside of the scope of this thesis to dedicate significant time to drawing out distinctions between respondents operating in those industries. However, efforts have been made to distinguish between participants operating in different size SMEs and those which offer services and products, and those that focus on standardized over bespoke products. Further research could study how the nature of innovation in collaborative and arm's length relationships differs between different sectors of manufacturing, e.g. food, industrial engineering, chemicals etc.

The exploratory, qualitative nature of this study also means these findings cannot be generalized outside the sample. The key findings provide interesting possibilities which require further empirical research to more rigorously establish. Furthermore, the small sample size would suggest larger scale quantitative research is required to establish whether the knowledge creation, problem solving and innovation patterns established in this thesis are reflective of large numbers of manufacturing SMEs operating throughout the UK. For example, a larger scale study may identify that arm's length relationships do facilitate the

creation of canonical documentation, or that such ties can also inform the refinement of new and existing organizational process.

Furthermore, it should be noted that only 2-3 members of staff were interviewed per SME. Therefore, this data does not provide a rigorous account of the innovation process of any single SME, case study or multiple case study research would be required for this. Such studies could highlight the extent to which firm characteristics such as an SME's network centrality influences the manner in which they innovate in networks.

Most participants were forwarded the transcripts of their interviews via email; this was done to ensure they accurately reflected participants' accounts. However, this was not possible in one case as they were unavailable to provide an email address. In this specific context, access to the participant was secured via the MD of Flanders and it would have been ethically unsound to forward another person's interview transcript to their superior. Furthermore, whilst 8 participants highlighted they had no problems with transcripts, the other 12 did not reply. This lack of engagement could represent apathy for the research project on behalf of participants. Such apathy could arguably highlight a lack of transparency within the analysis process (Fossey, Harvey, McDermott & Davidson, 2002), given the participants had limited input in the analysis of data. However, this research would maintain it is strongly in adherence with all other quality criteria Fossey, Harvey, McDermott & Davidson (2002) outline for qualitative research, and that all efforts have been made to provide a detailed and transparent description of the research methodology.

The cross-sectional nature of this research means accounts of innovation activity may potentially be bias towards projects and undertakings the participants were currently/recently engaged with. Whilst many participants' accounts were retrospective, a follow up study could more effectively explore how experiences of innovation changed over time. For example,

perhaps specific forms of knowledge creation processes and repositories are likely to emerge at different stages of project and product development cycles. Such findings could help extend theory beyond relatively simplistic arguments that arm's length relationships are most effective at the initial, exploratory phase of a research project whilst engagement with a smaller number of collaborative ties becomes paramount during exploitation/implementation as a project matures.

This research project concedes that whilst the SECI model of knowledge creation proposed by Nonaka (1991; 1994) has been widely adopted by organizational scholars, the framework is not perfect. SECI has been cited as failing to acknowledge that tacit and explicit knowledge exist on a continuum, which suggests there are shades of grey as one moves to the centre of the 'scale'. Given that two modes of knowledge creation deal with the interaction between tacit and explicit knowledge, i.e. externalization and internalization, this theoretical point is not accounted for in Nonaka's model. Future work could investigate knowledge creation in different forms of inter-firm relationships using a different model, perhaps drawing upon the work of Zhang, MacPherson & Jones (2006).

Future work could possibly look into the implications of Lavie's (2006) extended resource-based view on family firms. Some of this study's emerging data was congruent with established literature highlighting the secular nature of family firms, in this case Vac. Yet, much like Vac, family firms have been identified as out-performing their non-family counterparts. Future studies could attempt to explain how such superior performance occurs in family businesses that are more adverse to collaboration, which Lavie (2006) highlights is core to developing a competitive advantage. Such a study could explore whether there are mitigating factors which are more important to superior performance than collaboration, particularly in mature industries where standardization mitigates the need for intense collaboration. The results of such a study could provide a solution to managing the hazards of

inter-firm relationships which, as previously highlighted, is a key contemporary issue in strategic management.

Further research projects could also investigate the impact network centrality has on the behaviour of dominant firms within relationships. The initial findings of this thesis alluded to the possibility that such displays of dominance, and their subsequent effects on SME innovation, may be more prone to occur in relationships with small to medium sized enterprises that boast a relatively modest or scarce network of ties. Further to my initial call for research, comparing family businesses to non-family businesses may provide the perfect platform to investigate this phenomenon due to the secular nature of the former.

With regard to isomorphism, this study has already demonstrated that collaboration can exert isomorphic pressures on SMEs which can lead to convergence in administrative, process and service innovation. A quantitative study could be conducted to test whether such a phenomenon is in effect on a larger scale, outside the parameters of this study. Such a study may help identify the mitigating factors which influence collaboration induced isomorphism in the innovation process, and highlight characteristics which make both mimetic and coercive isomorphism more likely.

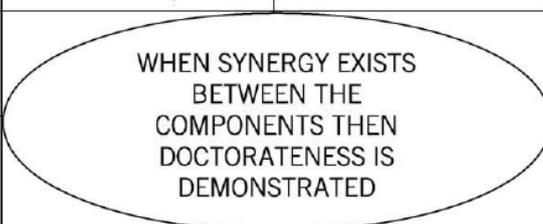
Finally, whilst investigating the field of networked innovation, it has become apparent that there are synergies and similarities between this topic and open innovation (Chesbrough, 2003). However, during the analysis process a clear and explicit framework did not exist to adequately distinguish instances of collaborative innovation from more specific, open innovation practices. This researcher believes such conceptual fuzziness is indicative of a failure of the open innovation field to effectively set itself apart from the broader discipline of networked innovation, authors such as Chesbrough & Borgers (2013) have attempted to do

this, namely by re-iterating the need to have exploiting external knowledge and paths to market either explicitly or implicitly stated in a business model, however, such a recommendation is equally vague. A thorough literature review is required which serves to distinguish these two similar fields, ideally whilst proposing a clear and transparent framework which aids researchers in clearly determining whether a given phenomenon could be consider open innovation, or whether it's merely an instance networked innovation more broadly. This research may serve to offset the trend of researchers ascribing the term open innovation to any collaborative behaviour with a knowledge/innovation component.

### 6.5 Reflexivity & Doctorateness

This final section reflects on and evaluates the overall quality of this thesis; it does so by referencing Trafford & Leshem’s (2008) 12 elements of Doctorateness (Fig. 22). Successful displays of all 12 of these elements are said to demonstrate a level of synergy and coherence which should lead readers to “conclude that your thesis demonstrates Doctorateness” (Trafford & Leshem, 2008, p.38).

**Figure 22. Components of Doctorateness**

Contribution to knowledge	Stated gap in knowledge →	Explicit research questions	Conceptual framework
Conceptual conclusions			Explicit research design
Research questions answered			Appropriate methodology
Cogent argument throughout	Full engagement with theory	Clear/precise presentation	'Correct' data collection

*Source: Trafford & Leshem (2008)*

Each of these elements will be reviewed in light of the research project undertaken; this serves to act as both a critical evaluation of the piece and a more in-depth summary of the written thesis.

### **6.5.1 Stated Gap**

This research proposed that innovation in arm's length relationships has been under-researched, and argued that scholar's did not appreciate the respective differences between innovation in ALRs and collaborative relationships in sufficient detail. The gap was first considered during initial conversations with the supervision team, it was then validated by a substantial keyword search using the Web of Science and Google Scholar databases. The process involved utilizing numerous combination of keywords and their synonyms to identify relevant literature, e.g. weak ties AND SECI, weak ties AND knowledge rep\*, arm's length relations\* AND SECI etc. The prevalence of core capabilities and resource based perspectives and the popularity of several seminal papers (Granovetter, 1985; Uzzi, 1997) lead scholar's gradual focus on collaborative relationships whilst arm's length ties were usually quickly dismissed in networked innovation discussions due to their limited strategic value (Dyer & Singh, 1998). This thesis would argue that the dominance of these theoretical perspectives has led to this gap in the literature, and concerns regarding their innovative value have prevented many researchers from addressing the issue.

### **6.5.2 Explicit Research Questions**

This research project explored three research objectives:

1. To explore how the nature of problem-solving differs within arm's length and collaborative relationships.

2. To explore how knowledge is created within arm's length and collaborative relationships.
  
3. To explore the unique drivers of innovation in arm's length and collaborative relationships, and review their effect on SMEs' innovative outputs and capabilities.

These research questions were partially based on the literature and its conceptualisation of innovation in an attempt to breakdown the innovation process into more observable chunks. However, these were gradually changed and refined upon analysis of the data, for example; knowledge creation emerged as a concept from the data, thence why there were know 'explicit' questions regarding the SECI process in the interviews (Nonaka, 1994). Therefore, these specific objectives were partially chosen as they provided a clear account of parts of the innovation process, but the emergent data also supported their inclusion. These objectives then informed the structure of the literature review, analysis and discussion and final conclusions.

### **6.5.3 Conceptual Framework**

A detailed outline of how the conceptual framework was devised can be found on page 117 in the methodology chapter. A rich discussion of the final framework can be found on page 257.

### **6.5.4 Explicit Research Design**

Initially, a post-positivist quantitative survey was considered to address the research question and objectives. However, upon close consideration of the research context and literature it was decided that a qualitative, exploratory study was required to fully understand the subtle and nuanced nature of specific inter-firm relationships and how these led to innovation. This was partially to provide a more detailed account of networked innovation in arm's length and

collaborative relationships than extant post-positivist literature concerned with finding the optimum balance of weak and strong ties. On reflection, it was considered that the contributions of ALRs to the innovation process may be less obvious to participants by definition and these could be captured to a greater extent in rich participant accounts. Furthermore, social constructionism's belief that understanding is created through social interaction presented a philosophical synergy with this study of networked innovation.

### **6.5.5 Appropriate Methodology**

An extensive account of the philosophical underpinnings and research methodology is provided in the methodology chapter; this includes an account of the various approaches considered, access and ethical issues and detailed breakdown of the research questions were devised.

### **6.5.6 Correct Data Collection**

Although the core concepts outlined in the conceptual framework, e.g. problem-solving, innovation drivers and innovation outputs, were derived from the literature this research ultimately let the data inform the theories utilized to explain participants' reflections. The central aim of this research has been to explore the innovation process in relationships of high trust and closeness, as there was a lack of understanding thereof. A quantitative survey would have required the curtailing of discussion to specific theories, and arguably the literature is not mature enough to forgo a process of exploration. Furthermore, participant observation could have been used, however as discussed in the methodology this would restrict discussion to a very limited period of time, whereas interviews could explore a large range of participant experiences retrospectively. Whilst several minor problems in the interview process were highlighted in the methodology chapter, none ultimately presented significant challenges. On reflection, perhaps a quantitative survey could have been utilized to collect the data; however

the researcher was wary that some quantitative studies investigating arm's length relationships have experienced difficulties in loading the concept (Geneste, 2010). However, the decision to apply the SECI framework was made upon thematic analysis of the interview data, therefore pursuing a quantitative research design would have resulted in markedly different theoretical contributions.

#### **6.5.7 Clear & Precise Presentation**

This research adheres to Northumbria University's strict doctoral thesis guidelines. Every effort has been made to ensure arguments are concise, expressed in both written and diagrammatic form and key terminology is defined and re-iterated where appropriate.

#### **5.5.8 Engagement with Theory**

This research draws from a substantial theoretical base in discussing the literature and analysing the interview findings. Apart from discussing detailed mechanisms such as how arm's length and collaborative relationships create knowledge with reference to Nonaka's (1994) SECI framework, or how organizational learning and neo-institutional theories can be attributed to problem-solving activity and innovative outputs in such relationships (March, 1991; DiMaggio & Powell, 1983), this research also draws broader strategic implications with reference to the resource based theory underpinning it (Lavie, 2006). Furthermore, these concepts and theories are challenged critiqued within this thesis. For example, the SECI model's contentious conceptualization of explicit and tacit knowledge as dichotomous concepts is discussed, in addition to the challenges of applying the model to interview data, the nuances of organizational learning and isomorphism theories are discussed in light of their contrasting rationalizations for mimetic behaviour, and even contemporary network-based resource theory is challenged to explain the superior performance of notoriously secular firms.

### **6.5.9 Coherent Argument**

The central argument in this thesis is that arm's length relationships are of greater strategic value to innovating SMEs than current literature acknowledges, and that innovation therein is distinct from collaborative relationships. ALRs help identify problems, facilitate externalization, combination and internalization knowledge creation modes, aid in the identification of new markets and support radical product innovation. Furthermore, the underlying processes are exploratory in nature, which whilst resource intensive, facilitate more novel innovation. Finally, these arm's length relationships require less time and resources for SMEs, firms that are often already stretched, to manage. SMEs are also less likely to suffer from liabilities of collaboration in arm's length ties, such as relationship failure, opportunism and dependence on partners.

### **6.5.10 Research Questions Answered**

These have been answered adequately at the beginning of this chapter for the sake of clarity.

### **6.5.11 Conceptual Conclusions**

These have been discussed extensively, a consolidated account can be found on page 257.

### **6.5.12 Contribution to Knowledge**

Significant contributions to theory and practice are discussed on page 266.

## 7.0 List of References

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## **Appendices**

**Appendix 1: Evaluation of test & instrument**

**Appendix 2: Interview Sheet & Questions**

**Appendix 3: Informed Participant Consent Forms**

**Appendix 4: Research Organization Informed Consent Form**

**Appendix 5: Ethical Issues Form**

## **Appendix 1**

### **Evaluation of test & instrument**

#### **Clarity of questions**

Clarity of the questions appeared fine, although I may have adjusted the phrasing to facilitate a more conversational tone.

#### **Fit of questions**

Centrality questions may not have elicited the desired response.

#### **Suitability of participants**

Engineers were very insightful, marketing managers interviews were longer but contained less helpful information.

#### **Do they understand the terminology?**

They appeared to understand the terminology, although I must be sure to differentiate between a relationship with a 3<sup>rd</sup> party and organizational sub-unit.

### **Pilot Method**

**Sample method:** Criterion sampling was used. Certain type of organizations with a specific job role.

**Recruitment method:** Snowball & self-selection

Participants were forwarded a sheet with the research questions on prior to the interview to allow them to orientate themselves for the discussion. The sheet featured a definition of arm's length relationship (possibly also use one for collaborative relationship), to ensure participants were comfortable with the term.

**Quick Analysis (provided in additional document)**

<b>Question</b>	<b>Q1</b>	<b>Q2</b>	<b>Q3</b>	<b>Q4</b>	<b>Q5</b>	<b>Q6</b>	<b>Q7</b>	<b>Q8</b>	<b>Q9</b>
<b>Participant</b>									
<b>1</b>									
<b>2</b>									
<b>3</b>									
<b>4</b>									
<b>5</b>									
<b>6</b>									

## Appendix 2

### Interview Sheet & Questions

#### **The effectiveness of collaborative and non-collaborative modes of idea sharing for SME innovation**

##### Questions

How do SMEs perceive the relative innovation potential of collaborative and non-collaborative relationships?

What are the characteristics of collaboration induced isomorphism within the innovation process?

What impact does collaborative relationship-based network position have on innovation within SMEs?

##### **Definitions: Arm's length/non-collaborative relationships**

An arm's length relationship is defined here as a socially distant, impersonal relationship where future transactions are not necessarily expected, e.g. an infrequent customer, a one-off enquiry, chance, one-off meeting at a conference etc. Such relationships are typically unsolicited, and often chance encounters.

##### Examples of ALR knowledge transfer:

*A prospective client places an inquiry asking whether your products can be used for a new purpose or market.*

*A one-off or irregular customer provides constructive criticism of your product, i.e. "you'd sell more if you made the packaging more appealing".*

*A chance encounter with an engineer at a conference leads you to attempt a novel solution to an existing problem.*

### **Research Q1: Collaborative & Non-Collaborative Relationships**

1. To what extent are you able to obtain information and knowledge regarding your business from arm's length ties, relative to your more collaborative partners?
2. How effective have arm's length relationships been in terms supporting or augmenting your propensity to innovate?
3. How significant have such benefits from arm's length relationships been relative to those from collaborative ties?
4. Did your company's treatment or attitude towards these arm's length partner(s) change as a result of you obtaining valuable knowledge? If so how?

### **Research Q2: Collaboration & Isomorphism**

5. Since collaborating with a partner, have you recognised a change in any of your business processes or commercialisation techniques?
6. Would you say you and your partners' business processes have become similar as time has gone on? If so, in what way?
7. Have you ever chosen to adopt a partner's strategy or one of their processes? If so, explain what you adopted and why?
8. If not, have you ever thought of the possibility? If so, why didn't you go ahead with that idea?

### **Research Q3: Innovation & Centrality**

9. Which organizations provide your firm with new knowledge or expertise when your company is seeking advice outside your organization?
10. Who comes to you for new knowledge or expertise?
11. In your view, how dominant is your firm in these relationships?
12. How does the relative dominance in these relationships affect your ability to innovate?
13. Are there any other players outside of this set who have consequences for knowledge flows relevant to your firm? If so, Please explain.

## Appendix 3

### Informed Participant Consent Forms



#### Newcastle Business School Informed Consent Form for research participants

Title of Study	Transferring ideas as part of the innovation process: collaborative and non-collaborative approaches in SMEs
Person(s) conducting the research	Ed Cottam
Programme of study	PhD
Address of the researcher for correspondence	Newcastle Business School Northumbria University City Campus East Newcastle Upon Tyne NE1 8ST
Telephone	07772173591
E-mail	Ed.cottam@northumbria.ac.uk
Description of the broad nature of the research	To directly compare collaborative and non collaborative activities in idea sharing in SMEs
Description of the involvement expected of participants including the broad nature of questions to be answered or events to be observed or activities to be undertaken, and the expected time commitment	<p>The expected involvement of research participants is as follows:</p> <ul style="list-style-type: none"> <li>- Initial semi-structured interview (approximately 1 hour).</li> <li>- Online structured questionnaire.</li> </ul> <p>The interviews will be used to collect data regarding the nature of the sample organizations' relationships with other firms. Specifically, the questions will explore the degree of collaboration and knowledge transfer within these relationships, and their subsequent innovative output.</p> <p>The semi-structured interviews will focus on the degree of collaboration inherent in different inter-firm relations, and seek to identify the subsequent knowledge transfer and innovation outcomes that result from them.</p> <p>In addition, the questions will seek to identify the</p>

	<p>relative position of each firm interviewed within its network (i.e. whether they are located centrally or on the periphery of their network of ties). Organizations will also be asked whether any of their innovation activity has begun to gradually resemble that of its partners. Finally, organizations will be asked to provide details about what prompted them to collaborate with their current partners.</p> <p>These interviews will also inform the creation of a draft questionnaire, which will be administered to a sample of senior managers and engineers working in UK-based SMEs.</p> <p>The intention will be to record interviews with a digital voice recorder and transcribe. However, if individuals are not willing to allow a digital recorder to be used, detailed notes of the interview will be recorder (as an alternative solution to record interview proceedings).</p> <p>Anonymity will be assured by coding the names of the participants, the organizations and people that they name during the interview in the transcripts.</p> <p>Participants will be invited to review transcripts <i>of their own interview</i>. When such a request is made, the transcripts will be emailed back to the participants for reviewing and agreement. Participants are free to make any amendments, deletions or additions to the transcripts.</p> <p>Confidentiality will be maintained in terms of storing data securely on a computer and ensuring hard copies of transcripts and field notes are stored in a locked cupboard.</p> <p>All data will be stored securely either electronically on the computer or in hard copy version in a locked cupboard. As part of the data analysis process, hard copies of the anonymised transcripts (raw data) may be given to the doctoral supervision team and a small number of other research participants to review to ensure that the researcher's analysis has resonance. Hard copies will be returned to the researcher and will not remain in the possession of the research participants.</p> <p>Data will be used and reproduced in a variety of research publications.</p>
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Information obtained in this study, including this consent form, will be kept strictly confidential (i.e. will not be passed to others) and anonymous (i.e. individuals and organisations will not be identified *unless this is expressly excluded in the details given above*).

Data obtained through this research may be reproduced and published in a variety of forms and for a variety of audiences related to the broad nature of the research detailed above. It will not be used for purposes other than those outlined above without your permission.

Participation is entirely voluntary and participants may withdraw at any time.

By signing this consent form, you are indicating that you fully understand the above information and agree to participate in this study on the basis of the above information.

Participant's signature

Date

Student's signature

Date

Please keep one copy of this form for your own records

## Appendix 4

### Research Organization Informed Consent Form

#### RESEARCH ORGANISATION INFORMED CONSENT FORM

Newcastle Business School  
University of Northumbria

Completion of this form is required whenever research is being undertaken by NBS staff or students within any organisation. This applies to research that is carried out on the premises, or is about an organisation, or members of that organisation or its customers, as specifically targeted as subjects of research.

The researcher must supply an explanation to inform the organisation of the purpose of the study, who is carrying out the study, and who will eventually have access to the results. In particular issues of anonymity and avenues of dissemination and publications of the findings should be brought to the organisations' attention.

Researcher's Name: Ed Cottam

Student ID No. (if applicable): N/A

Researcher's Statement:

The aim of this study is to compare idea sharing between firms in collaborative (e.g. joint ventures) and non-collaborative (e.g. one-off or socially distant) relationships. My research aims to compare collaborative & non-collaborative modes of knowledge transfer, in terms of implications for firm performance & innovation. Furthermore, this research has several secondary objectives. These are;

- To identify whether unintended inter-firm knowledge leaks act as a catalyst to the formation of inter-organizational relationships.
- To identify whether the innovation process is influenced by a firm's position within its wider network.
- To identify whether collaboration leads the partners' innovation processes to become similar.

Interviews will be conducted by Ed Cottam, a graduate tutor and PhD student at Northumbria University.

Anonymity will be assured by coding the names of the participants, the organizations and people that they name during the interview in the transcripts.

Participants will be invited to review their own interview transcripts. When such a request is made, the transcripts will be adapted.

Data will be used and reproduced in a variety of research publications. Therefore, the results will be accessible to students and academics.

Any organisation manager or representative who is empowered to give consent may do so here:

Name: \_\_\_\_\_

Position/Title: \_\_\_\_\_

Organisation Name: \_\_\_\_\_

Location: \_\_\_\_\_

Anonymity must be offered to the organisation if it does not wish to be identified in the research report. Confidentiality is more complex and cannot extend to the markers of student work or the reviewers of staff work, but can apply to the published outcomes. If confidentiality is required, what form applies?

- No confidentiality required
- Masking of organisation name in research report
- No publication of the research results without specific organisational consent
- Other by agreement as specified by addendum

Signature: \_\_\_\_\_ Date: \_\_\_\_\_

This form can be signed via email if the accompanying email is attached with the signer's personal email address included. The form cannot be completed by phone, rather should be handled via post.

## Appendix 5

### Ethical Issues Form



Newcastle Business School

Staff Research and Consultancy  
Ethical Issues Form (Sep 09)

Staff Name:	Ed Cottam
Portfolio Area:	SMIB
Title of Research / Consultancy Project:	Transferring ideas as part of the innovation process: collaborative and non-collaborative approaches in SMEs
Please categorise your research as: <ul style="list-style-type: none"> <li>• Learning &amp; Pedagogical</li> <li>• Discipline based</li> <li>• Contribution to practice</li> <li>• A multiple of the above</li> </ul>	Discipline based
How does this research fit in with the NBS ADP? – Which area of excellence from the ADP does the research address? – i.e: <ul style="list-style-type: none"> <li>• Business &amp; Management Practice</li> <li>• Leadership &amp; Management Development</li> <li>• International Business</li> </ul>	Business & Management practice
Start Date of Research / Consultancy project:	June 2012

	Comments
Brief description of the proposed research methods including, in particular, whether human subjects will be involved and how.	Human subjects (Managers, senior engineers etc) will participate in semi structured interviews, followed by a structured online questionnaire.  A sample of management and senior engineering staff will be invited to participate in the research study.

Ethical issues that may arise (if none, state “None” and give reasons)	<p>The research does not involve children or vulnerable adults.</p> <p>All data collected will be anonymised, and stored securely. This will ensure that the data will not be attributable to either individuals, or the organizations they work for.</p>
<i>How will the ethical issues be addressed? (if none state n/a)</i>	<p>Individual consent forms detailing the nature of the research, approximate time commitments of the participants will be obtained from the individual to allow interviews to be conducted within their area of expertise. A copy of the individual consent form will be provided for their own records.</p> <p>All data obtained will be anonymised (and coded). Originations and or people named during the data collection will also be omitted or referred to generically (via code). Electronic forms of the raw data will be securely stored on the computer and hard copies will be locked in a secure cupboard.</p> <p>As part of the data analysis process, hard copies of the anonymised transcripts may be given the supervision team. A select group of research participants will also be asked review the data analysis pertaining to their own interview to ensure that the researcher’s analysis has resonance. Hard copies will be returned to the researcher and will not remain in the possession of the research participants. Note that research participants will only be asked to review the transcript that refers to their own interview session, and will not have access to the interview data of others.</p>
<p><i>Has informed consent of research participants been considered?</i></p> <p>If appropriate, has an informed consent form been completed?</p>	<p>Informed consent has been considered and will be implemented with all research participants that are interviewed. See draft attachment.</p>
<p><i>Has organisational consent been considered?</i></p> <p>If appropriate, has an organisational consent form been completed?</p>	<p>Organizational consent has been considered and will be implemented with all organizations that are interviewed. See draft attachment. See attached draft.</p>

**Please tick to confirm acceptance that it is your responsibility to store and destroy the data appropriately. ✓**

Staff Signature (indicating that the research will be conducted in conformity with the above and agreeing that any significant change in the research project will be notified and a further “Ethical Issues Form” submitted.

**Date:** 09/07/2013 **Staff Signature:** T.Cottam

**Line Manager:**

I confirm that I have read this form and I believe the proposed research will not breach University policies.

**Date:**..... **Signature**.....

**The appropriate completion of this form is a critical component of the University Policy on Ethical Issues in Research and Consultancy. If further advice is required, please contact the School Ethics Sub Committee through the Academic Support Office in the first instance.**