

**Business Clustering in New Zealand: The Creation of
Competitiveness in a Regional Cluster and the Influences of
Intermediaries on the Cluster Competitiveness**

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Abstract

This research examines how competitiveness is created in the New Zealand AgBio cluster. It also adds to an understanding of how the cluster operates in a regional environment, the Waikato region. A business clustering model becomes an important part of economic development strategies for many regions in New Zealand. As a small open economy in which companies engage in competition globally, business clusters are still being seen as key by policymakers. This collaborative-competitive approach is particularly important to the New Zealand economy in which the majority of companies are small and medium-sized and are more likely to depend on clusters and intermediaries. Many studies of clusters related to the creation of competitiveness have been made at different levels of analysis, but little research has been done on the collective contribution of the nature of business environment, innovation, and knowledge to an understanding of the cluster competitiveness. There has also been a paucity of research to examine how knowledge is created and dispersed through the clusters by the action of intermediaries. At the meso level and micro level, the two-level research is informed by Porter's Diamond model, Regional Systems of Innovation, and Nonaka's Spiral model. It adopts mixed methods design, the embedded mixed-method case study involving a combination of qualitative and quantitative methods. Data collection is conducted through semi-structured interviews with 18 interviewees representing 19 cluster members and CIS-style survey completed by 13 respondents from 14 companies. The participants to the interviews and survey represent nearly 40 per cent and about 29 per cent of the cluster members respectively. The participants are CEOs, business owners, directors, and managers. Overall, the AgBio cluster is deemed a competitive cluster. The meso-level factors of the region contribute to the cluster competitiveness. At the micro level, the innovativeness of the cluster members adds further to the competitiveness. This research also identifies the importance of micro-dynamics affecting the cluster, the influence of the intermediaries on the cluster competitiveness through knowledge creation, transfer, and implementation. At the meso and micro levels, this research adds to the literature by combining the different theoretical approaches. This two-level theoretical foundation provides a more complete picture of the competitiveness creation, as well as the cluster operations. It also provides new insights on the applicability of the Diamond model at the regional level, as well as that of the Spiral model at the inter-organisational level.

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Attestation of Authorship

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

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Chapter One:

Introduction

1.1. Background

A cluster is a critical mass of geographically inter-related organisations in one location, including firms, customers, suppliers, and private and public institutions, universities, and brokers or consultants (Rooney, Hearn & Ninan, 2005; Roelandt & den Hertog, 1999). In New Zealand, a business clustering model becomes an important part of economic development strategies for many regions (Brimblecombe, 2005). As a small open economy in which companies engage in competition globally, business clusters are still being seen by policymakers as key. This collaborative-competitive approach is particularly important to the New Zealand economy, which is challenged by the lack of critical mass, small domestic market, and distance from key markets (Toland & Yoong, 2017; Scott-Kennel, 2013). Furthermore, the majority of companies are small and medium-sized (Ministry of Business, Innovation & Employment, 2017; Ministry of Economic Development, 2011; Chetty & Stangl, 2010; Agndal & Chetty, 2007; Brimblecombe, 2005; Ministry of Business, Innovation & Employment, 2013). Research shows that these companies are more likely to depend on clusters (Perry, 2007b; Palakshappa & Gordon, 2007) and intermediaries (Bharati & Chaudhury, 2010; Brown & Lockett, 2004; Weber & Schnell, 2003; Shohet & Prevezer, 1996; Bessant & Rush, 1995; Seaton & Cordey-Hayes, 1992).

Successful clusters are competitive clusters (Clarkson, Fink & Kraus, 2007), which contribute to regional growth (Lagendijk & Charles, 1999) and national competitiveness (Porter, 1998a; Chen, Tzeng & Tarn, 2004). In this regard, policy-driven attempts to develop clusters have largely been based on the pursuit of competitiveness instead of attempting to replicate exemplar clusters observed abroad (Porter, 1998b; Prats, Guia & Molina, 2008). Nevertheless, development strategies designed to promote business clustering in New Zealand are misled by the belief that resulted outcomes correspond to those of the exemplar clusters (Perry, 2004). Furthermore, in New Zealand, “business clusters are more of an aspiration than an existing reality” (Perry, 2007a, p. 1). Therefore, this research examines how competitiveness is created in clusters, using a New Zealand example, and the influences of intermediaries on the cluster competitiveness. Research findings serve to inform policy makers on areas that may require policy intervention important for the cluster competitiveness and for regional and national growth by providing new insights into the operation of clusters in New Zealand, as well as adding to our understanding of how competitiveness is created in the clusters.

Past research identifies different aspects influencing competitiveness. In this regard, competitiveness of clusters depends on competitiveness of regions in which they are based (Lechner & Leyronas, 2012). The clusters are, therefore, the product of environments (Perry, 2004) that support a rapid accumulation of resources and skills (Porter, 1998a; Porter, 1990). Within the clusters, innovation is also a key ingredient for the creation of competitiveness (Ştefan, Olteanu & Constantin, 2018; Prats et al., 2008; Mason, Castleman & Parker, 2008; Shao, Chen & Cheng, 2008; Eraydin & Armatli-Köroğlu, 2007; Mohannak, 2007; Haga, 2005; Eraydin & Armatli-Köroğlu, 2005; Zhu & Tann, 2005; Simmie, 2004; Jin, Hewitt-Dundas & Thompson, 2004; Park, 2003; Padmore & Gibson, 1998; Frybourg, 1997). Furthermore, the ability of companies to create and acquire new knowledge and learn continuously constitutes the competitiveness (Zack, 1999; Sharkie, 2003, Asheim & Coenen, 2005; Dyer & Nobeoka, 2000).

Many aspects related to the creation of competitiveness have been made from different levels of analysis, but little research has been done on the collective contribution of business environment, knowledge, and innovation to the understanding of competitiveness of clusters. At the micro level, there has also been a paucity of research to examine how knowledge is created and dispersed through the clusters by the action of intermediaries. Therefore, this research adds to the literature by combining the three different but related theoretical perspectives to examine how competitiveness is created in clusters, which also adds to an understanding of how clusters operates in the New Zealand environment. The combination of different theoretical mechanisms renders a better understanding to phenomena (Greve, 2009). In this regard, this research acknowledges the importance of regional meso-level factors, which influence the cluster competitiveness and that of micro-dynamics, whose interaction affects the clusters.

At the meso level and micro level, the two-level theoretical foundation for this research is informed by Porter's Diamond model (Porter, 1998a, 2000), Regional Systems of Innovation (Peters, 2006), and Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). The study falls within the interpretivist perspective as an umbrella paradigm and adopts mixed methods design – the embedded mixed-method case study involving a combination of qualitative and quantitative methods to produce a greater depth of understanding. The case study is on the AgBio cluster located in the

Waikato region. Data collection is conducted through semi-structured interviews and Community Innovation Survey (CIS)-style survey, as well as from secondary sources.

1.2. Research gaps and questions

An examination of the extant literature shows that there is a considerable number of studies on New Zealand-based clusters. The majority of these studies adopt a case study approach and collect data through qualitative methods such as interviews and secondary sources including reports, while others use a quantitative approach for data analysis. Nevertheless, research on the New Zealand-based clusters is dwarfed by that carried out overseas. In this regard, although business clusters are deemed to be significant contributors to growth, they do not appear to receive an equal attention, particularly from domestic scholars, to engage in the research on this topic. For instance, Perry (2004) identifies 26 clusters throughout New Zealand, but there is a lack of studies on each of these clusters.

Overall, this research identifies a range of key research areas. First, at the meso level, Perry (2004) argues that clusters are the product of environments, which support a rapid accumulation of resources and skills (Porter, 1998a; Porter, 1990). For this reason, Lechner and Leyronas (2012) stress that competitiveness of these clusters depends on competitiveness of regions in which they are based. In this regard, Porter's Diamond model can be used to capture the quality of business environments at particular locations (Ketels, 2006). The Diamond model was originally established to assess the competitiveness of nations, but it can also be used to evaluate that of regions, cities, and agglomerations such as clusters (Clarkson et al., 2007). In particular, the Diamond model allows researchers to identify specific sources of or conditions promoting the competitiveness (Porter, 1990; Clark & Guy, 1998). As a result, it becomes a well-known model among researchers on clusters (Teigland & Lindqvist, 2007). While Chetty (2004) adopts Porter's Diamond model to assess the business environment in the research on the New Zealand boat-building cluster, there is a limited number of New Zealand studies on the competitiveness of locations in relation to the competitiveness of clusters, using the Diamond model.

Second, there has been innovation-related research in New Zealand, which generally involves the influence of inter-organisational relationships and collaborations on

innovation among and between small cluster members and external companies, for instance, through international linkages (Gerke, 2016; Pavlovich & Akoorie, 2010; Lindsay, 2005; Buerkler, 2013). For example, Chetty and Stangl (2010) study the influence of networks on internationalisation and innovation among small and medium-sized enterprises (SMEs) in New Zealand. Likewise, Buerkler (2013) investigates a government's support for and its active involvement in innovation platforms that promote collaborations on innovation among stakeholders in a cluster including companies and education and research institutes. Third, past New Zealand research on clusters generally involves small companies and the influence of the clusters and inter-organisational relationships and collaborations on their success. These studies put emphasis on information and knowledge sharing through networks among and between cluster members and external companies and organisations both nationally and internationally (Brown et al., 2010; Gerke, 2016; Wilson & Appiah-Kubi, 2002; Pavlovich & Akoorie, 2010; Toland & Yoong, 2005).

Besides the business environment, innovation, and knowledge, researchers on New Zealand clusters also examine how the companies deal with issues related to internationalisation and their relationships with foreign affiliates or partners (Chetty & Campbell-Hunt, 2003; Chetty & Stangl, 2010; Chetty & Holm, 2000; Palakshappa & Gordon, 2007; Scott-Kennel, 2007; Sadler & Chetty, 2001). While past literature includes studies related to the development, promotion, and evolution of New Zealand clusters (Simpson & Bretherton, 2004; Chetty, 2004; Lindsay, 2005; Dana & Winstone, 2008), key components of cluster success are examined by Fraser and Kelly (2010) and Buerkler (2013). Furthermore, among the research on business clustering in New Zealand, Toland and Yoong (2005), Gray (2002), Brimblecombe (2005), and Buerkler (2013) highlight government policies and initiatives aiming to promote the business clustering and networking.

Although many aspects of clusters related to the creation of competitiveness have been made from different levels of analysis, an examination of the extant literature on international and national business clusters reveals that little research has been done on the collective contribution of the nature of business environment, innovation, and knowledge to an understanding of the competitiveness of clusters. Greve (2009, p. 20) suggests that “studying different theoretical mechanisms jointly gives better understanding of the phenomena and can suggest theoretical reformulations through

integrating the best-supported parts of each theory and discarding unsupported parts”. Likewise, although cluster studies can be carried out at three levels of analysis: micro, meso, and macro (Roelandt & den Hertog, 1999), Klein and Kozlowski (2000, p. 211) suggest that “multilevel research is—at its best—complex, rigorous, and able to capture much of the nested complexity of real organizational life”.

Furthermore, while New Zealand cluster researchers acknowledge the importance of information and knowledge sharing within the clusters and through networks, there is a lack of study on the influence of intermediaries on knowledge creation and dispersion. Therefore, at the micro level, there has also been a paucity of research to examine how knowledge is created and dispersed through the clusters by the action of the intermediaries.

Owing to the gaps identified above, this research proposes to add to the literature by combining different theoretical approaches to answer the following questions:

Question 1: How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?

Question 2: How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?

1.3. Rationale and significance of the study

Successful clusters are competitive clusters (Clarkson et al., 2007), undertaking continuous innovation and learning, that influence regional growth (Legendijk & Charles, 1999). The competitiveness of these clusters also contributes to national competitiveness (Porter, 1998a; Chen, Tzeng & Tarn, 2004). For this reason, cluster initiatives should aim to achieve the competitiveness (Porter, 1998b). The existent literature is founded on a variety of theoretical perspectives to explain the cluster competitiveness. On the one hand, competitive clusters depend on competitiveness of regions in which they are based (Lechner & Leyronas, 2012), and the clusters are, therefore, the product of environments (Perry, 2004) that support a rapid accumulation of resources and skills and pressure

companies to improve (Porter, 1998a; Porter, 1990). On the other hand, Shibata, Kajikawa, Takeda and Matsushima (2008) claim that competitiveness also depends on the ability to apply new technology and science quickly and efficiently to answer market needs. Companies, therefore, cannot afford not to undertake innovation in the competitive environment of today (Jin et al., 2004).

As a result, innovation, as agreed by different scholars including Porter (1998b; Porter & Ketels, 2003), is the key ingredient for competitiveness (Ştefan et al., 2018; Prats et al., 2008; Mason et al., 2008; Shao et al., 2008; Eraydin & Armatli-Köroğlu, 2007; Mohannak, 2007; Haga, 2005; Eraydin & Armatli-Köroğlu, 2005; Zhu & Tann, 2005; Simmie, 2004; Jin et al., 2004; Park, 2003; Padmore & Gibson, 1998; Frybourg, 1997). It is, however, not the only factor, although being an important one (Padmore & Gibson, 1998). In this regard, knowledge is also seen as an important source of competitiveness (Gurrieri, 2008; Tödtling, Lehner & Tripl, 2006; Malmberg & Power, 2005; Asheim & Coenen, 2005; Maskell & Lorenzen, 2004). The ability of companies to codify, create, and acquire new knowledge and learn continuously, along with knowledge dissemination, constitutes their competitiveness (Zack, 1999; Dewhurst & Navarro, 2004; Asheim & Coenen, 2005; Dyer & Nobeoka, 2000). Owing to the lack of studies being done on their collective contribution, this research adds to the literature, to combine the three different theoretical approaches to examine how competitiveness is created in a New Zealand cluster, the AgBio cluster.

Although holding the key to economic growth, in New Zealand, “business clusters are more of an aspiration than an existing reality” (Perry, 2007a, p. 1). In this regard, this research may raise further awareness among New Zealand companies of benefits of clusters. It may also help promote the AgBio cluster domestically and internationally and resulting in a more reputable cluster. According to Dana and Winstone (2008), a reputable cluster identity attracts major companies and organisations that, in turn, contribute further to the location and local community, for instance, through employment, financial investment, infrastructure, and research. These new entrants also help spawn local related and supporting industries and subsequently build critical mass, a key component of cluster success.

This research may have policy implications that help promote the sustainable competitiveness of business cluster. It serves to inform policy makers on areas that may

require policy intervention important for the competitiveness of clusters and for regional and national growth by providing new insights into the operation of clusters in New Zealand, as well as adding to our understanding of how competitiveness is created in clusters. Furthermore, Giuliani and Bell (2005, p. 47) claim that “most analyses of the relationship between spatial clustering and the technological learning of firms have emphasised the influence of the former on the latter”. In this regard, this multi-level research also emphasises on the influence of cluster members and intermediaries on the cluster competitiveness, as opposed to cluster studies highlighted by Giuliani and Bell (2005). The following chapter discusses a literature review, to provide a foundation of knowledge on subjects related to inter-organisational networks, business clusters, and intermediaries.

Chapter Two:

Literature Review

2.1. Introduction

According to Drummond and Snowball (2019), the competitiveness of regions influences the growth of clusters. Regions may possess advantageous regional factors including infrastructure, transportation, locational attractiveness, influences of neighbouring regions, as well as potential for networking and collaboration. On the other hand, clusters also influence regional growth and national competitiveness (Porter, 1998a; Lagendijk & Charles, 1999; Matveev, Trubetskaya, Lunin, Rousek & Kopnov, 2016; Ştefan, Olteanu & Constantin, 2018). In this regard, the concept of clusters has gained attention among those including scholars who advocate for regional and national economic growth (Slaper & Zheng, 2018; Ştefan et al., 2018; Kobzeva, Gribov, Snigireva & Raevskaya, 2017). Similarly, intermediaries also influence policies leading to regional and cluster development and competitiveness (Baxter & Tyler, 2006). Therefore, a profound understanding of the clusters and intermediaries requires a literature review of relevant past research. This chapter seeks to provide a more comprehensive understanding of theories related to the two. The following sections review the relevant literature.

2.2. Transaction costs

As resource can be allocated by two different institutions: market and firm (Pitelis, 1993), Dietrich (1994) recognises that it was Ronald Coase, generally acknowledged as the founder of transaction cost theory, who highlighted the costs of using the market price mechanism. In this regard, transaction costs of using the price mechanism include costs associated with discovering relative prices and the right people to deal with (Coase, 1960; Pitelis, 1993; Dietrich, 1994; Spulber, 2009, 2007). For instance, the costs of commodities, to a buyer, include actual dollars paid plus efforts to obtain relevant information and search for the best offers, to assess product quality, as well as to protect and enforce property rights. To a seller, the costs comprise not reduce the actual dollars received due to his selling efforts (Stubkjær, Frank & Zevenbergen, 2007) including sale and marketing costs as well as back-office processes such as invoicing and billings (Spulber, 2009, 2007; Stubkjær et al., 2007).

Transaction costs also include contract costs (Coase, 1960; Pitelis, 1993; Dietrich, 1994; Spulber, 2009, 2007). In this regard, Williamson (1975, 1985) divides ex-ante and ex-

post transaction costs, arising prior to and after a transaction respectively. The former includes costs of drafting, negotiating, and safeguarding a contract whereas the latter are enforcement costs (Vitikainen, 2007; Dietrich, 1994). North (1990) claims that the enforcement costs and measurement costs associated with measuring valuable attributes of goods and services being exchanged contribute further to the costliness of the transaction (Stubkjær et al., 2007; Vitikainen, 2007). Furthermore, the contract can be difficult to draft and monitor and, therefore, requires a technical or professional expertise (Lampel, 2004). For this reason, a long-term contract requires extra costs such as forecasting and contract specifications, which consequently lead to inevitable problems (Coase, 1960; Pitelis, 1993; Dietrich, 1994; Spulber, 2009, 2007).

As a result, firms emerge as mechanisms through which transaction costs can be reduced (Coase, 1937; Dietrich, 1994; Pitelis, 1993). This is a result of relatively fewer numbers of contracts for transactions carried out within the firms (Pitelis, 1993). In this regard, it is more economical to manage frequent transactions within firms, as repetitive contracts require the higher costs of dealing via markets. However, these transactions also entail internal bureaucratic costs including those to determine what, when, and how to produce (Vitikainen, 2007). Therefore, it can be inversely argued that the internal costs embedded in the firms are the reason why markets exist (Alchian & Demsetz, 1972; Dietrich, 1994). For this reason, the relative magnitude of market transaction costs compared with that of internal costs determines what is carried out within the firms and what in the open markets (Vitikainen, 2007). Despite of their differences, both forms of institutions are, however, complementary rather than substitutable. As markets cannot produce, they have no function and do not exist without firms (Dietrich, 1994). Likewise, the firms are motivated by and require markets to sell their produce.

The existence of transaction costs and contracting problems are contingent on bounded rationality, opportunism, and asset specificity. The first argument suggests that people have limited abilities to process or use available information (Williamson, 1975, 1985). They are inevitably challenged by incomplete information and uncertainty (Dietrich, 1994). Consequently, it is costly and dauntingly difficult to create a complete contract (Vitikainen, 2007). Second, insufficient information may lead to opportunistic actions (North, 1990; Vitikainen, 2007) – ‘self-interest seeking with guile’ (Williamson, 1985, p. 47). It implies that people are dishonest and behave opportunistically by acting in self-interest, attempting to gain advantage over others, and breaking agreements (Vitikainen,

2007). Third, asset specificity also contributes to transaction costs and contracting problems. It is a degree to which physical and human capitals are specifically locked into a particular usage or trading relationship that cannot be easily transferred and deployed for alternative activities (Williamson, 1975, 1985; Dietrich, 1994; Vitikainen, 2007). As opportunism can be expected under this condition (Vitikainen, 2007), safeguards are, therefore, needed to control such behaviour (Vitikainen, 2007; Dietrich, 1994).

In relation to the above arguments, trust, as one of the key ingredients to all transactions (Hartman, Sifonis & Kador, 2000), eliminates opportunism and consequently reduces transaction costs (McCann, 2003). With trust in place, there are fewer concerns about the need to monitor trustee's performances or behaviours (Cook & Gerbasi, 2006). In this regard, it helps reduce transaction costs associated with search and information costs as well as contracts, monitoring and sanctioning costs (Cook & Gerbasi, 2006; Mandelli, 2004; Levi, 2000; Creed & Miles, 1996; Hill, 1990). In contrast, distrust and a lack of trust contribute to costliness of transactions (Levi, Moe & Buckley, 2004; Levi, 2000). They incite uncooperative behaviours and lead to conflictual relationships (Levi, 2000) making collective undertakings more difficult (Cook & Gerbasi, 2006; Lampel, 2004). An understanding of transaction costs is vital for examining the actions of intermediaries within clusters.

2.3. Inter-organisational networks

Prior to the upsurge in literature on inter-firm or inter-organisational relationships in the 1980s, markets and hierarchies were considered to be the only stable forms of interactions. Inter-organisational relationships were, on the other hand, viewed as relatively unstable and only a temporary characteristic of firm behaviours (Roijakkers & Hagedoorn, 2007). Nevertheless, Todeva (2006) argues that isolated markets and hierarchical mechanisms are no longer sufficient to establish business controls over transactions, especially with the advent of globalisation. Globalisation makes firms become increasingly dependent on business partners and develop trust-based relationships or networks, to deal with more intensive competition (Bachmann, 2006). Networks are, unlike markets and hierarchies that are respectively governed by contracts for one-shot transactions and vertical chains, a governance structure that relies on collaboration among different firms and organisations that maintain durable yet flexible relationships (Smith-Doerr, 2006).

This strategic collaboration enables firms to access complementary skills, technologies, knowledge, and markets, to enhance learning capabilities, to shorten innovation cycles, to respond effectively to technological change, and to share risks (Powell, 1996; Roijakkers & Hagedoorn, 2007). It allows thicker and freer information to be shared within inter-organisational networks than markets and hierarchies (Zucker, Darby, Brewer & Peng, 1996; Grabher, 1993). As a result, firms are able to achieve mutual gains, acquire greater benefits than working independently (Roijakkers & Hagedoorn, 2007), and become more competitive (Bachmann, 2006). Furthermore, the networks facilitate knowledge creation – a source of innovation (Kodama, 2005), promote knowledge diffusion, knowledge transfer, and learning and, consequently, contribute to their success and competitiveness (Takeda, Kajikawa, Sakata & Matsushima, 2008; Breschi & Malerba, 2001). For Grandori and Soda (1995) and den Hartog (2003), communication is a cost-effective mechanism that helps establish the networks and maintain a long-term collaboration (Grandori & Soda, 1995; den Hartog, 2003). It explains an innovative advantage of the networks compared with other forms of governance structures such as markets or hierarchies (Kesting, 2008).

According to Roijakkers and Hagedoorn (2007) and Bachmann (2006), trust is basic and a prerequisite for effective and efficient inter-organisational networks. It is a critical element for understanding the nature of networks and their success (Portales, Ricart i Costa & Rosanas, 1998; Meyer & Alvarez, 1998; Smith-Doerr, 2006; Roijakkers & Hagedoorn, 2007). It is a main mechanism governing collaborations, reinforcing mutual learning (Lütz, 1997; Creed & Miles, 1996; Grandori & Soda, 1995), and fostering knowledge transfer (Meyer & Alvarez, 1998) that contribute to competitiveness (Huosong, Kuanqi & Shuqin, 2003). In this regard, trust fosters cooperative behaviours (Mishra, 1996), assures reciprocity of information exchange (Burt, 1992), and sustains durability of collaborations (Smith-Doerr, 2006). Furthermore, it eliminates a fear of being exploited and increases communication of undistorted information (Mishra, 1996).

Levi et al. (2004) argue that long-term relationships founded in inter-organisational networks build trust relations and contribute to a credible alteration of interests of distrusted parties. Such relationships allow firms to rely relatively less on formal legal governance mechanisms including contracts (Ring, 1997). Likewise, Cox and Mowatt (2004) and Nooteboom (2003) argue that network characteristics such as long-term relationships and information sharing as well as communication are important

components for trust building. These mutually beneficial interactions enable networked firms to reach a common understanding and, in turn, develop trust further (Lütz, 1997; Williamson, 1971). For Burt and Knez (1996), trust is produced through repeated interactions and, therefore, makes future collaboration more likely. Nooteboom (2003) similarly argues that a provision of appropriate and truthful information by the firms in a timely fashion is a manifestation of openness and honesty that, consequently, deepens trust in the networks.

2.4. Significance of business clusters

As inter-organisational networks and business clusters share similar characteristics, a clear distinction between the two is lacking. However, a key difference is that companies in the networks predominantly cooperate (Todeva, 2006) whereas those in the clusters engage in both collaborative and competitive relationships (Todeva, 2006; Roelandt & den Hertog, 1999). The interplay between the collaboration and competition is the key feature of functional clusters (Porter, 1998a; Dana & Winstone, 2008). In this regard, the collaboration among the cluster members leads to an exchange of information and knowledge, trade linkages, and innovation (Porter, 1998a, 1998b; OECD, 1999; Toland & Yoong, 2005; Dana & Winstone, 2008). Gerke (2016) and Toland and Yoong (2005) similarly claim that inter-organisational relationships and collaborations are important mechanisms for information and knowledge transfer leading to innovation among the cluster members. Likewise, competition is also known for its influence on the cluster competitiveness (Scott-Kennel, 2007). For instance, the interaction between collaboration and competition enables the Waipara wine cluster, New Zealand, to consistently produce high-quality wines (Dana & Winstone, 2008).

The original concept of the clustering can be traced to Marshall's localised economies. Based on a Marshallian approach, there are three fundamental reasons behind business clustering: the presence of specialised workers, rapid flow of knowledge between companies, and existence of service providers and suppliers providing specialised inputs (Todeva, 2006). Subsequently, Porter's cluster theory identifies four key elements of a cluster: core companies, supporting companies, social infrastructure, and physical infrastructure. While the core companies display distinctive characteristics unique to a local region and form a critical core of the cluster, the supporting companies of a related and supporting industry develop close links with and add value to the core companies.

For instance, accountants, lawyers, designers, banks, and suppliers may constitute cluster supporting companies. The function of organisations forming the social infrastructure of the clusters is mainly to facilitate the coordination of the core and supporting companies that otherwise remain fragmented. It includes local government, educational institutions, industry associations, and professional bodies. Likewise, the physical infrastructure encompasses facilities such as ports that assist with, for instance, transportation (Porter, 1998a, 1998b; Porter, 1996; Porter, 1994; Porter, 1990; Pavlovich & Akoorie, 2005).

While policy aiming to promote clusters demands a precise and clear definition of a cluster, in practice, an agreement over the definition remains lacking and difficult (Perry, 2004; Fraser & Kelly, 2010). Nevertheless, Porter (1998a, p. 199) emphasises that “a cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities”. It is a critical mass of inter-related organisations, such as firms, suppliers, government institutions, and universities, in one location (Rooney et al., 2005), usually in a small geographic location (Fraser & Kelly, 2010). They also include customers, sub-contractors, public and private research institutes, brokers and consultants (Roelandt & den Hertog, 1999), technical service providers, and regulatory bodies (Porter, 1998a; OECD, 1999).

Business clustering becomes a key contributor to economic growth (Di Guardo & Galvagno, 2005; OECD, 1999) and a dominant structure for competitiveness (Brown, McNaughton & Bell, 2010; Rooney et al., 2005; OECD, 1999; Porter, 1998a, 1998b). In this regard, clusters facilitate inter-organisational (Rooney et al., 2005) and informal relationships among their members (Zaheer & George, 2004). For instance, the success of companies in Silicon Valley is influenced by informal relations between employees, competitors, customers, and suppliers through conventions, seminars, trade fairs, and other social events (Dahl & Pedersen, 2004; Saxenian, 1994). Likewise, the clusters allow face-to-face interactions (McCann & Shefer, 2005; Malmberg & Maskell, 2002), promote trust (Faulconbridge, 2007; Horaguchi, 2008; Zaheer & George, 2004), and help reduce transaction costs (Rouvinen & Ylä-Anttila, 1999). Furthermore, the business clustering approach serves as an institution facilitating learning and provide a framework to transform information into knowledge (Steiner & Ploder, 2008).

Although the advent of Information and Communication Technology (ICT) may diminish the relevance of proximity and an increasing search for knowledge through global linkages, business clusters remain essential to competitiveness (Guerrieri & Pietrobelli, 2004; Zaheer & Manrakhan, 2001). On the one hand, geographical distance limits the scale and range of communication and makes an exchange of information and knowledge harder and costlier. On the other hand, an institutionally rich location of the clusters enables information related to new knowledge and technologies to diffuse more rapidly and completely (Zaheer & George, 2004). In this regard, the clusters allow a better flow and an easier exchange of information (Rooney et al., 2005; Toland & Yoong, 2005). They enable a quick and direct learning and acquisition of information and knowledge at minor or no costs (Rosenfeld, 1997; Zaheer & George, 2004; Toland & Yoong, 2005; Maskell, Bathelt & Malmberg, 2006).

In relation to ICT, to Pavlovich and Akoorie (2010) claim that the co-location or geographic proximity that facilitates inter-organisational relationships allows the transfer of information and knowledge with more ease (Pavlovich & Akoorie, 2010). Likewise, Fraser and Kelly (2010) claim that the co-location or proximity contributes to the development of 'buzz' within clusters, a major contributor to the cluster success and growth (Fraser & Kelly, 2010). Although ICT is juxtaposed with business clustering, Toland and Yoong (2017, 2005) argue that tangible ICT-based networks and intangible social networks formed by the clusters are both critical to the developments of regions. These networks become an important tool used to improve the flow of knowledge. In this regard, there is an interdependent relationship between the two networks, while the former does not replace but complement the latter.

The significance of clusters is evidenced in the Waipara wine cluster of New Zealand. This cluster facilitates learning and sharing of information, knowledge, and experience related to viticulture, for example, through educational seminars or conferences and social events (Dana & Winstone, 2008). Likewise, Gerke (2016) identifies inter-organisational relationships as important mechanisms for information and knowledge transfer among the members of the Auckland sailing cluster in New Zealand and the Victorian surfing cluster in Australia. The interconnectedness results in information and knowledge flow among the cluster members, professional experts, universities, and research institutes (Gerke, 2016). Furthermore, the clusters also facilitate the sharing of tacit knowledge (McCann & Shefer, 2005), a source of competitiveness (Gurrieri, 2008). Besides

innovation, they improve performance and increase productivity of the cluster members (Porter, 1998a, 1998b). In this regard, Maré and Graham (2013, 2010, 2009) and Maré and Timmins (2007, 2006) claim that companies locating in high density areas are relatively more productive than those in less dense locations.

Besides increased opportunities for networking and collaborations, clusters have spillover effects on other industries within regions. They help create employment, raise incomes, and contribute to regional economies (Drummond & Snowball, 2019). Furthermore, the clusters promote a locational or regional identity, a key source of competitiveness. A reputable regional identity attracts major companies and organisations into the regions. These companies and organisations contribute further to the location and local community, for instance, through employment, financial investment, infrastructure, and research (Dana & Winstone, 2008), as well as by spawning related and supporting industries (Dana & Winstone, 2008; Porter, 1998a, 1998b).

In this regard, the new entrants help build critical mass that makes possible a cost-sharing practice, to drive down costs and to fund, for instance, costly marketing initiatives to further promote the regions. In turn, the regional identity further promotes the clusters nationally and internationally, indirectly leading to the development of an international identity and internationalisation of cluster members. Along with the economic benefits brought about by the regional identity, the clusters also help develop a community spirit, promoting social interactions and making the regions better places to live in (Dana & Winstone, 2008). Owing to these significant contributions, regions without clusters risk falling behind in terms of economic development and competitiveness (Matveev et al., 2016; Zastupov, Streltsov, Tatarskikh, Poluyanov & Murtazova, 2016).

2.5. Business clusters in New Zealand context

As a small developed open economy, New Zealand is particularly challenged by the lack of critical mass, small domestic market, and distance from key markets. The implication of these constraints is associated with the lack of financial capital for international and development activities and high transport costs (Toland & Yoong, 2017; Scott-Kennel, 2013). On the other hand, the majority of New Zealand companies are small and medium-sized. Businesses employing 20 or fewer people constitute 97 per cent of all companies (Ministry of Business, Innovation & Employment, 2017; Ministry of Economic

Development, 2011; Chetty & Stangl, 2010; Agndal & Chetty, 2007; Brimblecombe, 2005; Ministry of Business, Innovation & Employment, 2013). In this regard, scarcity of financial resource is particularly a challenge for them (Sadeghi, Rose & Chetty, 2018; Chetty, Karami & Martín, 2018; Partanen, Chetty & Rajala, 2014; Kaivanto & Stoneman, 2007; Palakshappa & Gordon, 2007; Canepa & Stoneman, 2008, 2005; Rutashobya & Jaensson, 2004). Furthermore, the small companies are greatly hindered in their ability to invest in information and internal technological competencies (Clark & Guy, 1998).

With limited information and knowledge, as well as research and innovation capabilities (Partanen et al., 2014; Teixeira, Santos & Brochado, 2008; Steiner & Ploder, 2008), small companies need to actively search for new sources of knowledge, to develop knowledge networks (Teixeira et al., 2008). Nevertheless, they are less likely to build extensive personal and inter-organisational relationships with, for instance, universities or research institutions (Bharati & Chaudhury, 2010; Clark & Guy, 1998). Besides the networking capability, these companies lack reputation, credibility or legitimacy (Partanen et al., 2014). Similarly, newly-established companies suffer from limited resources, knowledge, and legitimacy, status, proven performance records, as well as well-established inter-organisational networks. These companies subsequently lag in capability to adequately search and identify new opportunities, owing to their limited external contacts together with high search costs (Zhang & Li, 2010).

Owing to the small domestic market, small New Zealand companies may seek opportunities to grow or expanse overseas (Leppäaho, Chetty & Dimitratos, 2018; Chetty, Ojala & Leppäaho, 2015; Casey & Hamilton, 2014; Agndal & Chetty, 2007). A rapid globalisation is, however, of an enormous pressure for these companies. On the one hand, with limited resources for foreign market expansion (Chetty et al., 2018; Agndal & Chetty, 2007; Chetty & Campbell-Hunt, 2003; Chetty & Holm, 2000), the companies are prone to bankruptcy (Salman, von Friedrichs & Shukur, 2011). On the other hand, they lack management and marketing skills, technical know-how, experience and knowledge about export procedures and foreign markets (Sadeghi et al., 2018; Chetty et al., 2018; Rutashobya & Jaensson, 2004).

Compared to larger establishments, small companies lack potential in global markets (Stanton & Stanton, 2011) and experience related to internationalisation (Sadeghi et al., 2018; Chetty et al., 2018; Scott-Kennel, 2013; Rutashobya & Jaensson, 2004). These

companies lack capabilities to capitalise on opportunities and respond to threats (Palakshappa & Gordon, 2007) and are more likely to encounter with uncertainty in internationalisation efforts (Chetty et al., 2018). Furthermore, they are more vulnerable to cultural differences, once engaged in the markets overseas (Tihanyi, Griffith & Russell, 2005). As a result, they tend to be wary of psychological and geographical distances (Chen & Ku, 2002; Rutashobya & Jaensson, 2004) and risk-averse (Bitzenis & Marangos, 2008; Eapen & Krishnan, 2009). They are also less able to engage directly in globalisation (Dana & Winstone, 2008). Regardless of size, in relation to internationalisation, New Zealand companies view Foreign Direct Investment (FDI) as resource intensive and expensive operations with a high level of risks and uncertainties (Scott-Kennel, 2013).

With all the weaknesses discussed earlier, networks are of crucial importance in the success of small companies to internationalise (Chetty et al., 2018; Scott-Kennel & von Batenburg, 2012; Mejri & Umemoto, 2010; Anderson & Boocock, 2002; Chetty & Holm, 2000). Such inter-organisational relationships are especially deemed important for small science and technology-based companies (Partanen et al., 2014). In this regard, networking helps overcome their weaknesses (Chetty et al., 2018; Scott-Kennel & von Batenburg, 2012; Mejri & Umemoto, 2010; Anderson & Boocock, 2002; Chetty & Holm, 2000). For instance, the networks compensate for the lack of international experience (Leppäaho et al., 2018), as well as allow access to opportunities presented in overseas markets (Chetty et al., 2018) and to needed resources and technologies (Chetty et al., 2018). Likewise, Bharati and Chaudhury (2010) stress the importance of social interactions through which the small companies are able to acquire new knowledge, skills, and technologies.

According to Perry (2007b) and Palakshappa and Gordon (2007), small companies are more likely to depend on clusters to build inter-organisational relationships or networks. These companies extensively rely on the clusters and their networks to build on existing strengths but also to compensate for weaknesses such as the lack of research and innovation capabilities (Palakshappa & Gordon, 2007; Gray, 2002). This business clustering helps the companies build scale and critical mass and to achieve commercial gains through the success of existing cluster members (Gray, 2002), as well as improve and expand their competences and competitiveness (Macpherson, Jones, Zhang & Wilson, 2003; Akoorie & Scott-Kennel, 1999). Likewise, companies that extensively rely

on intellectual capital also benefit from the clusters in which information and knowledge are more readily available (Zaheer & Manrakhan, 2001).

Furthermore, the business clustering approach affords small New Zealand companies both financial and human capital, to enter and succeed in new markets (Gray, 2002). Likewise, Palakshappa and Gordon (2007) assert that this approach to networking helps the companies tackle resource constraints, access skills and knowledge, accelerate technological advancement, and build and maintain competitiveness in both local and global marketplaces. In this regard, it helps overcome barriers to foreign markets, accelerate a process of internationalisation (Chen & Chen, 1998), and minimise disadvantages such as psychological distance (Rutashobya & Jaensson, 2004). Brown et al. (2010) similarly emphasise that the clusters are sources of information and referrals helping access markets overseas. For instance, the memberships in the Wellington Creative cluster allow its small cluster members win big museum contracts in Singapore (Gray, 2002). According to Palakshappa and Gordon (2007) and Dana and Winstone (2008), the small New Zealand market further increases the tendency for local companies, especially those small in size, to rely on clusters to access overseas markets. The next section discusses further studies on New Zealand clusters.

2.5.1. New Zealand cluster studies

As discussed earlier, a business clustering approach is particularly important to New Zealand, with a small open economy in which the majority of companies are small and medium-sized. The significant contribution of business clusters to the New Zealand economy influences this research, which aims to examine how competitiveness is created in clusters using a New Zealand example. In this regard, the research on this topic requires a review of past literature on New Zealand clusters. This section details business clustering policies and initiatives; internalisation; inter-organisational relationships and collaborations; cluster development, promotion, and evolution; key components of cluster success; and shortcomings of New Zealand clusters.

2.5.1.1. Business clustering policies and initiatives

According to Brimblecombe (2005), a business clustering model becomes an important part of economic development strategies for many regions in New Zealand. The clustering

brings about strong local or regional economies with a global reach (Gray, 2002). In this regard, policy makers tend to advocate initiatives that promote inter-organisational relationships and collaborations and business clusters, to stimulate economic growth and international competitiveness (Palakshappa & Gordon, 2007; Akoorie & Scott-Kennel, 1999). Such initiatives aim to encourage small and medium-sized companies to form clusters, allowing an increase in capabilities to compete in overseas markets. This involves cooperating on international competition and, at the same time, competing domestically (Akoorie & Scott-Kennel, 1999).

In New Zealand, Toland and Yoong (2005) identify cluster-related government initiatives including those set up by New Zealand Trade and Enterprise (NZTE) aiming to facilitate the development of business clusters having potential for significant growth as well as to provide guidance and financial assistance to regions with strategies for sustainable economic growth. Although business clustering is a relatively new concept in New Zealand compared to, for instance, the European counterpart (Chetty, 2004; Gray, 2002), the proactive approach adopted by the government and local economic development agencies probably places New Zealand among leading countries that understand and develop local business clusters. Local economic development agencies have established around 80 per cent of New Zealand clusters (Gray, 2002).

As discussed earlier, New Zealand clusters generally consist of small companies (Brimblecombe, 2005), which are more likely to rely on clusters (Perry, 2007b; Palakshappa & Gordon, 2007). In this regard, Brimblecombe (2005) highlights strategies for Tertiary Education Organisations (TEOs) to support and mentor very small New Zealand companies identified as a great potential to add more value to existing New Zealand clusters. The strategies are based on models used by Institutes of Technology and Polytechnics (ITPs), in the area of business and information technology mainly in the Wellington region. Paying a particular attention to the undergraduate level, ITPs incorporate within their Applied Information Technology degrees industry projects, bridging between academia and the business world (Brimblecombe, 2005).

According to Brimblecombe (2005), the undergraduate projects facilitate school-to-work transition giving students relevant work experience for employment through internships. Furthermore, the undergraduate projects also provide opportunities to test the commercial viability of goods or service developed. On the other hand, the project allows the

companies to build capacity and capability with no or little monetary costs, as grant schemes may be available for expenses. Overall, Brimblecombe (2005) claims that the models used by ITPs significantly influence the success of the very small companies and the New Zealand clusters, in terms of support and knowledge sharing (Brimblecombe, 2005).

Likewise, Gray (2002) reviews Wellington Regional Economic Development Agency (WREDA), which primarily focuses on business clustering since 1997. Funded by four local councils, WREDA is actively involved in facilitating and building commercial success hitherto for 11 clusters based in the Wellington region, one of which involves approximately 500 companies regionwide. Subsequently, the cluster members, through the support of WREDA and particularly business clustering such as the Creative cluster and the Earthquake cluster, have so far secured offshore projects worth more than NZ\$10 million and expected work equivalent in value to several hundred million dollars coming out of their clusters (Gray, 2002).

At a regional level, Buerkler (2013) reviews the Agrobiotech Innovation Academy (AIA), an experimental initiative set up in 2007, with NZ\$1 million of funding from the Tertiary Education Commission of NZ (TEC). The AIA initiative involves a range of stakeholders: five companies – one large Multinational Corporation (MNC), three medium-sized companies, one small company from the agro-tech industry, two universities, one technical college, and one public agro-research laboratory. The initiative aims to promote and further strengthen an agro-tech and biotech industry cluster in the Waikato region, to foster closer inter-organisational relationships and collaborations among the stakeholders through a joint innovation platform. Nevertheless, the two-year innovation project concluded in 2009 without achieving tangible results.

Despite government efforts, “business clusters are more of an aspiration than an existing reality” in New Zealand (Perry, 2007a, p. 1). In this regard, Perry (2004) claims that policy designed to promote business clustering in New Zealand is misled by the belief that resulted outcomes correspond to those of exemplar clusters. The latter requires a substantial and sustained public expenditure over a period of time, along with distinctive market and industry conditions. As “clusters are a product of their environment” (Perry, 2004, p. 99), the aim is, therefore, to customise the policy based on characteristics of eligible clusters, instead of conforming to those of exemplar clusters. Furthermore, the

New Zealand business clustering policy lacks statistical criteria in determining cluster eligibility allowing comparatively weak groups to be identified as clusters. Although there appears to be justification to raise an entry level for assistance, this approach is, however, challenged by policy dilemma as it may lower participation among small companies and undermine the main purpose of cluster promotion, to promote regional economic growth (Perry, 2004). Besides the policy intervention, the promotion of local business clusters also requires an understanding among participants that this form of collaboration is relatively effective for business development compared with other alternative forms (Perry, 2007a, 2007b, 2004).

2.5.1.2. *Internationalisation*

Based on a historiographic case study approach, Chetty and Campbell-Hunt (2003) identify ways small to medium-sized companies in a small isolated economy, New Zealand, deal with issues related to internationalisation. Data were collected through two phases of semi-structured interviews with the total of 12 companies, with all interviewees during phase one and with four out of the twelve during phase two, and secondary sources such as documentary evidence provided by the companies. Chetty and Campbell-Hunt (2003) found that internationalisation, being sudden and requires a very large scale of change, is a daunting task for the companies under study. The rapid internationalisation potentially leads to their destabilisation, as it places an enormous pressure on resources and creates managerial challenges (Chetty & Campbell-Hunt, 2003).

In this regard, while identifying management skill as a key component of cluster success, Fraser and Kelly (2010) stress the lack of this capability among companies within a New Zealand ICT cluster, an impediment to the economic growth. Therefore, Chetty and Campbell-Hunt (2003) argue that business networks are the only feasible mechanism for the success of the internationalisation endeavour under these conditions. Inter-organisational relationships and collaborations allows the companies in the small economy like New Zealand to obtain needed resources including information and knowledge related to overseas markets and technology and to develop successful distribution networks in those markets (Chetty & Campbell-Hunt, 2003). Likewise, besides the business networks, local academic linkages with education and research institutes help address difficulties associated with skill shortages and training requirements (Fraser & Kelly, 2010).

According to Van den Bulcke and Verbeke (2001), linkages between domestic companies and foreign affiliates play an important role in economic development, particularly in a small economy. The linkages potentially benefit the former through spillovers of new skills, knowledge, technologies, and capabilities (Scott-Kennel, 2007). Likewise, Fraser and Kelly (2010) identify the linkages as global pipelines, a key component of cluster success, which connect clusters to overseas hot spots. The global pipelines provide access to new knowledge unavailable locally, as well as the means to speed up the process of transforming technological innovation into competitive goods and service. In this regard, Scott-Kennel (2007) investigates relations between New Zealand domestic companies and foreign affiliates. The study classifies seven clusters of affiliates, using cluster analysis, based on firm-level data collected through questionnaires from companies operated in New Zealand – 25 per cent or more foreign ownership. Scott-Kennel (2007) finds that the clusters with the most potential for positive spillovers have a higher likelihood of close working relationships, ongoing collaborative activities, for instance, joint-development, and reciprocal resource transfer. On the other hand, the cluster forming very few networks of linkages has the least spillover potential. In line with Porter (1998a, 1998b), Scott-Kennel (2007) also claims that geographic proximity together with the availability and competency of local suppliers increase the likelihood of inter-organisational linkages and local sourcing, while competition influences competitiveness.

Similar to Scott-Kennel (2007), Palakshappa and Gordon (2007) examine six collaborative relationships between New Zealand small companies and international partners, based on the case study approach. Using data obtained through in-depth interviews, questionnaires, and a secondary source. The study finds that the small companies, despite the tendency to rely on networks and clusters, do not realise intended benefits of the relationships and collaborations, knowledge and skill acquisition. In this regard, the companies do not intend or show receptivity to learn through the collaborative relationships. As a result, the lack of intention or receptivity to capitalise on opportunities to develop new skills and competencies hinders knowledge transfer from the international partners. Therefore, Palakshappa and Gordon (2007) stress that government initiatives aiming to promote knowledge and skill acquisition may instead focus on promoting the relationships among New Zealand companies. Furthermore, the potential for knowledge transfer may increase further with the collaborating companies possessing heterogeneous skills and competencies, compared with those homogeneously sharing similar strengths and weaknesses.

In relation to internationalisation, Sadler and Chetty (2001) investigate the effects of network relationships established by New Zealand small to medium-sized companies, identified as exporters, in their pre-export stage. Based a statistical analysis of data collected through a postal survey, the study finds that the inter-organisational relationships between the companies under study and their customers, the customers' customers, their suppliers influence an entry into overseas markets, a decision for overseas market selection including those not considered to be export destinations earlier. With limited knowledge and resources, the pre-export relationships with these key network actors provide distinct competitiveness. The relationships render foreign market knowledge needed for internationalisation, to better equip for export debuts and to overcome barriers to exporting.

2.5.1.3. Inter-organisational relationships and collaborations

Brown et al. (2010) investigate externalities in the Christchurch electronics cluster, New Zealand, using data obtained through in-depth interviews and structured questionnaires with founders or managing directors of 23 cluster members. Based on a statistical cluster analysis, Brown et al. (2010) find that about 40 per cent of the cluster members benefit from active externalities, although all experience passive externalities. Besides co-locations, inter-organisational relationships and collaborations are prerequisites for active externalities, while the latter simply occurs due to the co-location without the effort on the part of the cluster members to realise opportunities of clustering and public intervention. A pool of skilled workforce of a region is an example of passive externalities. Furthermore, the investigation shows that the cluster members experiencing active externalities, which capitalise on cluster resources for growth and export opportunities, are typically smaller in size with limited resources and relatively less export intense, compared with larger and export intense cluster members. Therefore, cluster development agencies, both organised by the cluster and those formed in partnership between the cluster and government, play an important role in identifying and coordinating actions to satisfy specific needs of the small cluster members (Brown et al., 2010).

Based on a case study approach, Gerke (2016) analyses the influence of inter-organisational relationships on product innovation among cluster members in the Auckland sailing cluster in New Zealand and the Victorian surfing cluster in Australia.

Data are collected through semi-structured interviews and observations as well as from a secondary, archival data including market and industry studies, strategic planning documents, and newsletters. The study identifies, besides customers and internal resources, inter-organisational relationships as important mechanisms for information and knowledge transfer leading to innovation among the members of both clusters. The interconnectedness results in information and knowledge flow between the cluster members and from professional experts as well as universities and research institutes (Gerke, 2016).

Wilson and Appiah-Kubi (2002) examine the use of networks – social, vertical, and horizontal networks among 65 New Zealand-based high-technology companies to access external resources, in relation to their age and growth. This quantitative study confirms that the companies under study leverage the external resources through the above networks and, therefore, highlights their importance to the growth and competitiveness of the companies. More specifically, an active engagement in the horizontal or competitor-based networks, inter-organisational relationships and collaborations with competitors, leads to high sales and profit growth. In relation to age, the study highlights the importance of the social and vertical networks at the early stages of development, in terms of sales and profits, as younger companies exhibit a higher profit growth initially, with the use of these linkages. Nevertheless, with the same type of networks, older companies experience relatively lower profit growth compared to the younger companies and, compared with other older companies employing no networks or the competitor-based horizontal networks. In this regard, Wilson and Appiah-Kubi (2002) stress competitors as potential collaborating partners and important resources, in pursuit of growth and competitiveness.

Based on Porter's cluster theory, Pavlovich and Akoorie (2005) examine a profile of a seafood cluster within the Nelson-Marlborough region. As discussed earlier, Porter's framework identifies four key elements of a cluster including core companies, supporting companies, social infrastructure, and physical infrastructure. Using data collected through postal questionnaires, the study presents a snapshot of components within the cluster with graphs. The cluster profile consists of production activities, years of operation, ownership structure, employment details, and revenues. Furthermore, Pavlovich and Akoorie (2005) carries out a cluster mapping, to reveal relevant companies and organisations identified in Porter's framework and to provide a visual representation of their linkages and

interactions. In this regard, the cluster mapping helps identify gaps in and strengthen value chain of the Nelson-Marlborough seafood cluster.

A further study on the Nelson-Marlborough seafood cluster carried out by Pavlovich and Akoorie (2010) explores the influence of innovation, developed through collaborations between companies and organisations identified in Porter's framework, on the New Zealand fishery industry. Based on a single exploratory case study, this extended study collects data through interviews with 14 CEOs and secondary sources including local industry and official statistical sources. Pavlovich and Akoorie (2010) find that collaborations among core companies within the cluster is relatively less complex, motivated by a short-term profit maximisation, which primarily focus on small technical innovation such as improved IT systems to find fish. On the other hand, multi-sector collaborations involving public-private partnerships between the core companies and social infrastructure significantly influence, besides revenues, the long-term sustainability of the industry. Furthermore, the multi-sector collaborations potentially open new opportunities for the development of new industries (Pavlovich & Akoorie, 2010).

2.5.1.4. Cluster development, promotion, and evolution

Based on a case study approach, Simpson and Bretherton (2004) examine collaborations among small companies in the Matakana Wine Trail cluster and Matakana Coast cluster in New Zealand to establish a regional image and branding. Using data collected through semi-structured interviews, the study finds that the clustering approach significantly benefits the cluster members. In this regard, it is a mechanism for synergistic collaborations and information and knowledge sharing, as well as for combating limitations, creating the sense of belonging within the wine community, and promoting the local region. Nevertheless, Simpson and Bretherton (2004) identify some difficulties hampering the collaborations. For instance, there is a lack of consensus or agreement among the stakeholders, between business people and hobbyists. Likewise, an ineffective internal communication is another challenge that slows down decision making processes. For this reason, besides a coordinated business plan, the development of a functional and attractive wine tourism in Matakana requires a strengthened leadership capacity within the clusters (Simpson & Bretherton, 2004).

Furthermore, Simpson and Bretherton (2004) stress that the cluster members sometimes regard new entrants as a competitive threat, which may subsequently hamper the potential for cluster expansion. In this regard, besides core cluster members, Dana and Winstone (2008) claim that to advance from an embryonic phase into a highly-developed wine cluster, there is a need to open memberships to companies from related and supporting industries particularly tourism, chemical companies and those specialised in bottling and corking, as well as universities, education institutes, research centres, and government agencies. The new entrants significantly contribute to the cluster competitiveness. They help build critical mass that makes possible a cost-sharing practice within the cluster, for example, driving down costs associated with shipping, visit by international wine writers, and discounted group tour for foreign tourists. As a result, the cluster expansion, through new entrants, helps develop a regional identity and, subsequently, a possible development of an international identity (Dana & Winstone, 2008).

Another research into the New Zealand wine industry involves a case analysis based on the Waipara wine cluster in the South Island. Using data are collected through nine in-depth qualitative interviews, Dana and Winstone (2008) examine the cluster in relation to formation, evolution, and operation. Instead of internationalisation, the desire to develop a regional identity of Waipara distinctive from that of Christchurch is the primary motivator for the cluster formation. The regional identify, the key source of competitiveness, helps promote the cluster to the closest and domestic markets in Christchurch and nationwide respectively. In turn, this domestic strategy indirectly influences the development of an international identity and internationalisation, for instance, through the marketing function by enticing foreign tourists and distributors to the Waipara wineries. The formation of the Waipara wine cluster is also the result of the need to share information, knowledge, and experience particularly in viticulture, for improving the quality of wines, as well as to build critical mass for funding, for instance, costly marketing functions. Furthermore, the cluster is formed to develop a community spirit that promotes social interactions and makes the Waipara region a better place to live in (Dana & Winstone, 2008).

The Waipara wine cluster formerly operated as two distinct entities: production function for growers and marketing for producers. Subsequently, with the aim to promote competitiveness through brand identity, the cluster adopted a holistic approach after the formalisation in 2004, tying the two functions to one another. Furthermore, to advance

into a highly-developed cluster, there is also a plan to open memberships to companies from related and supporting industries particularly tourism, chemical companies and those specialised in bottling and corking, as well as universities, education institutes, research centres, and government agencies. In this regard, the new entrants make possible a cost-sharing practice within the cluster, to drive down costs associated with shipping, visits by international wine writers, and discounted group tour for foreign tourists (Dana & Winstone, 2008).

Nevertheless, the Waipara wine cluster currently remains at an embryonic phase, with merely two distinct core members: growers and producers. Despite the lack of more diverse cluster members, Dana and Winstone (2008) emphasise that collaboration and competition are both evidenced within the cluster, a characteristic of a functional cluster. On the one hand, the cluster members are highly cooperative for economic reasons but also for social reasons, to build inter-personal and organisational relationships through, for instance, social events, and subsequently to share information, knowledge, and experience particularly in viticulture. On the other hand, there are elements of competition oriented towards performance, to consistently produce high-quality wines, and establishing distributor relationships and sales (Dana & Winstone, 2008).

Another research into the cluster evolution and competitiveness development involves a single embedded case study carried out by Chetty (2004), based on the boat-building cluster in a small isolated economy like New Zealand, using Porter's Diamond model. Data are obtained through semi-structured interviews with 21 respondents: 10 core companies and 11 supporting institutions of the cluster. Secondary data includes those gathered through seminars and a conference on clusters and industry meetings together with archival sources such as reports, brochures, newspaper papers, magazines, promotional videos, and television documentaries. While claiming that not every Porter's determinant contributes to the cluster competitiveness, Chetty (2004) identifies additional determining factors unspecified by the model: the desire for internationalisation and the role of entrepreneurial leaders. In contrast to the existing literature, the study inversely claims that internationalisation influences the cluster development. The process of internationalisation encourages specialisation and differentiation and inspires inter-organisational relationships and collaborations among the cluster members, to succeed in overseas markets. Furthermore, Chetty (2004) confirms the important role of entrepreneurial leaders, catalysts for the cluster development, along with supporting

institutions or facilitators. In this regard, the supporting institutions facilitate the further evolution of the boat-building cluster, beyond its organic-growth stage.

Similar to the study carried out by Chetty (2004), Lindsay (2005) uses a case study approach to explore the development of the New Zealand boat building cluster, drawing on complexity and particularly coevolutionary theories. While the complexity theory views the dynamics of organisational development and change as complex adaptive processes, key to the coevolutionary approach of cluster evolution is the continuous exposure of cluster members to new external knowledge. Data are obtained through semi-structured interviews together with unstructured informal interviews, as well as from secondary sources including industry and government reports, academic and trade journals, magazines, and newspapers. Lindsay (2005) finds that the boat building cluster exhibits the characteristics of a complementary cluster, a diverse cluster encompassing members across a wide range of value chains. The diversity of the cluster members provides opportunities for collaboration and ensures continuous flows and creation of new knowledge. In this regard, Perry (2007a, pp. 1-2) claims that “the heterogeneity of business populations is an influence on the ability to turn latent groups into functioning clusters”.

Furthermore, Lindsay (2005) stresses the importance of the synergistic relationships between the cluster members and external companies or organisations, as rich sources of new knowledge and innovation. For instance, international linkages attract new entrants with different business focuses and, as a result, further increase the level of diversity and extend the potential for knowledge creation and innovation within the cluster. In this regard, the continual acquisition of knowledge through the external sources allows a sustained high level of performance among the cluster members and contributes to the effectiveness and success of the cluster. In relation to the external knowledge acquisition, Lindsay (2005) also highlights the important role of the Executive Director of the boat building cluster, as an information provider and a bridge, in facilitating access or linkages to global sources of knowledge.

2.5.1.5. Key components of cluster success

Based on a review of literature on clusters, Fraser and Kelly (2010) identify critical success factors in ICT clusters, particularly those of New Zealand. First, the study

emphasises the importance of large pillar companies and key agents presented in the clusters, social networks and local company linkages, global pipelines, and regional specialisation. The large pillar companies, central to the cluster development, help spawn new start-ups and related and supporting companies, which subsequently result in the cluster expansion. Likewise, Chetty et al. (2018) emphasise the importance of facilitating communication and collaboration between small companies and large multinational enterprises. While the small companies lack reputation, credibility or legitimacy, the linkage allows them to use the latter's reputation, to boost their credibility and to gain access to large markets (Stuart, 2000; Partanen et al., 2014; Chetty et al., 2018).

Furthermore, the key agents, typically from the large pillar companies or organisations including education and research institutes, are involved in a range of activities related to consultation and advice, education, mentoring business owners, starting up new ventures, and venture capital funds (Fraser & Kelly, 2010; Bathelt, Malmberg & Maskell, 2004). These key agents share similar roles to those of intermediaries (Baxter & Tyler, 2006; Howells, 2006; Weber & Schnell, 2003), as well as of Knowledge Intensive Business Services (KIBS) (Smedlund, 2006; Smedlund & Toivonen, 2007).

Along with social networks and local company linkages, global pipelines connecting clusters to hot spots overseas are important to the cluster success. The global pipelines render access to new knowledge unavailable regionally and nationally, as well as provide the means to speed up the process of transforming technological innovation into competitive goods and service (Fraser & Kelly, 2010). Likewise, disconnected companies are also able to indirectly benefit from the global pipelines, being in the same clusters to the globally-connected cluster members (Fraser & Kelly, 2010; Bathelt, Malmberg & Maskell, 2004). Furthermore, while the regional specialisation enables a local or central government to precisely determine an appropriate cluster development for a particular region or location, it also creates differentiation and a demand for specialised goods and service specific to that region. The regional specialisation also contributes to the international expansion of New Zealand cluster members, particularly into a niche market. In this regard, owing to the small size of local market, Fraser and Kelly (2010) identify the international expansion as one of the key success factors for the New Zealand ICT clusters, to achieve economies of scale and scope.

Together with the critical success factors discussed above, Fraser and Kelly (2010) describe local demand, local academic linkages, local workforce, and venture capital as the key components of successful clusters. These components are also found in Porter's Diamond model, particularly demand conditions and factor conditions, which determine whether a particular location provides an environment allowing local companies to successfully compete (Porter, 1998a; Clark & Guy, 1998). For instance, sophisticated local demand stimulates innovation and helps translate into commercial success. It also influences the success of cluster members in global markets, particularly of those based in a geographic distant location like New Zealand. In this regard, the sophisticated local demand represents the characteristics of mature clusters. Furthermore, the presence of and, more importantly, the close working relationships between local education institutes such as universities and cluster members also influence the success of the clusters. Subsequently, the local academic linkages lead to the development of a highly skilled local workforce, which contributes further to the cluster success (Fraser & Kelly, 2010).

In relation to the competency of local workforce discussed above, management as well as commercialisation skills possessed by personnel of cluster members also influence the cluster success. In this regard, Fraser and Kelly (2010) outline the lack of the above skillset within the New Zealand ICT sector, as an impediment to the economic growth. For this reason, the local academic linkages help address difficulties associated with skill shortages and training requirements. Furthermore, owing to the importance of the local academic linkages as well as social networks and local company linkages, there is a need for clustering policies and initiatives, for instance, those that facilitate networking among the cluster members and help connect them with education and research institutes (Fraser & Kelly, 2010). Nevertheless, small companies, in particular, lack capability to develop extensive personal and inter-organisational relationships with, for instance, universities or research institutes (Bharati & Chaudhury, 2010; Clark & Guy, 1998). Therefore, they, to a great extent, rely on clusters (Perry, 2007b), as well as intermediaries for networking (Weber & Schnell, 2003; Shohet & Prevezer, 1996).

Overall, the synergistic combination of all the key elements of cluster success discussed above enables clusters to form, grow, and adapt in dynamic markets (Fraser & Kelly, 2010). In this regard, an adaptive capability is of great importance for the cluster survivability (Allen, 2001; Lindsay, 2005). In particular, it results in the development of buzz within the clusters, a major contributor to the cluster success and growth, created by

co-location and face-to-face interactions. Buzz benefits the clusters and their members, enabling a continuous diffusion of information and knowledge and new knowledge creation (Fraser & Kelly, 2010; Bathelt et al., 2004). Likewise, the concentration of these success factors in a geographic region provides a basis for innovation and R&D and, therefore, a continued success of the clusters both nationally and internationally. As a result, the cluster success, through the combination of the success factors, attracts new entrants, venture capital, and highly skilled workforce into the region (Fraser & Kelly, 2010).

Similar to Fraser and Kelly (2010), based on a case study of the Agrobiotech Innovation Academy (AIA), Buerkler (2013) investigates critical success factors influencing the successfulness of collaborations among its stakeholders: companies and education and research institutes. Using data collected through ten semi-structured interviews with senior managers, the study identifies four key conditions or criteria for successful collaborations. In this regard, effective collaborations require sufficient common interests based on shared vision and objectives of as well as sufficient trust between the stakeholders. For this reason, contradictory objectives may hamper the collaborations on innovation and contribute to the shortcoming of the AIA initiative. For instance, the primary motive of the agro-tech companies was to search for joint product innovation whereas the public agro-research laboratory identified the initiative as competition for government financial support. Furthermore, together with sufficient common interests and trust, complementary and appropriate human and financial resources are also prerequisites for joint learning and developments (Buerkler, 2013).

Perry (2005) examines four clusters in the New Zealand timber industry to determine key attributes of a sustainable cluster. Data are obtained through structured and semi-structured interviews with business managers of organisations linked to the clusters. The study finds that a sustainable participation or membership and intra-cluster business relationships, for instance, between suppliers and customers influence the cluster success. The contributing factors to the success also include the mix of enterprise types within the clusters and the support of facilitators (Perry, 2005). These facilitators act as business support providers and information gatekeepers, with linkages to local economic development agencies supporting the cluster formation (Perry, 2005; Perry, 2007a). The findings are based on the clusters under study, which are grouped into three types, from the most to the least successful: a balanced cluster (Southern Wood Council), an

unbalanced cluster (Northland Wood Processing), and unconnected clusters (Hawke's Bay and East Coast). Within the balanced cluster, all members are active participants, both New Zealand and foreign-owned enterprises. These companies offer the cluster continued support and are actively involved in a variety of significant projects and ongoing programmes of activities. For instance, Southern Wood Council has the highest proportion of members seeking to exert an influence on the cluster operations. While having sustainable participation and a comparatively high density of intra-cluster business relationships, there is an overwhelm support for the status quo, scepticism about new entrants and cluster diversification (Perry, 2005; Perry, 2007a).

On the other hand, Northland Wood Processing involves two large operations: a comparatively passive cluster member, a relatively self-contained branch of a corporate and a leading or dominant cluster member, an independently-owned saw mills whose success benefits smaller cluster members. Nevertheless, the overreliance on a single large company makes the cluster vulnerable to a change in the commitment of the saw mill (Perry, 2005; Perry, 2007a). Furthermore, large companies may lack willingness to support clusters made up of small cluster members (Perry, 2007b). Similar to Southern Wood Council, the unbalanced cluster has a comparatively high density of business relationships among the members but second in the level of participation. It also shares similar preferences concerning new entrants and diversification. Likewise, Hawke's Bay and East Coast are also dominated by leading companies with many small cluster members. Nevertheless, these dominant companies do not generate the same benefits to their clusters in a similar fashion compared with that in the unbalanced cluster. While the lack of cluster progress can be attributed to the inability of the leading cluster members to attract new entrants, the absence of intra-cluster business relationships is also a critical constraint. For instance, the business relationships within these clusters are limited to one supplier of timber. Furthermore, compared with the successful clusters, Hawke's Bay and East Coast are disproportionately dominated by inactive members (Perry, 2005; Perry, 2007a).

2.5.1.6. *Shortcomings of New Zealand clusters*

Reviewing 25 business clusters in New Zealand through interviews with facilitators and managers, Perry (2004) identifies six shortcomings where these clusters fall short of the ideal. First, the ability to integrate different parts of a value chain is one of the key

strengths of a cluster (Perry, 2007b). This is frequently not evident within the New Zealand clusters, particularly those in the timber industry and health industry. These clusters are typically limited to companies operated at the same stage of production. Second, conditions for membership are also evident among the clusters in the forestry, education, and electronics sectors. The restriction on memberships is generally the result of existing cluster members being sceptical about the contributions of new entrants to the common areas of interest and regarding them as a competitive threat (Perry, 2004; Simpson & Bretherton, 2004). This is evident in a number of New Zealand clusters, including the Matakana Wine Trail cluster, the Matakana Coast cluster (Simpson & Bretherton, 2004), the Southern Wood Council cluster, and the Northland Wood Processing cluster (Perry, 2005; Perry, 2007a), where an unwillingness to grant new membership may subsequently hamper the potential for cluster expansion (Simpson & Bretherton, 2004). Third, while there is a need to include membership nationwide due to a small economy, the participation of particularly small and medium-sized enterprises may be of concern, owing travel distances. This is evident in the Canterbury and Nelson Nutraceuticals cluster and the earthquake engineering in Wellington, which both include members from outside their respective regions (Perry, 2004).

For these reasons, business clusters may not significantly contribute to New Zealand long-term competitiveness and economic growth, owing to the absence of large urban size. These drawbacks are, however, offset by a well-educated labour force and a low level of population, which acts as a catalyst for more intensive inter-personal relationships (McCann, 2003). Likewise, Perry (2007a) argues that personal familiarity tends to pre-exist in a small community. In this regard, strong inter-personal and inter-organisational networks are important for a transmission of tacit information and knowledge (McCann, 2003). Tacit knowledge, in turn, is a source of competitiveness to the clusters and member companies (Gurrieri, 2008). Therefore, McCann (2003) stresses the importance of developing a sound policy that encourages the inter-personal and inter-organisational networks across New Zealand and beyond the national borders.

Fourth, within the New Zealand clusters under study, there is a tendency to excessively rely on coordinating services of facilitators for inter-organisational cooperation and resource sharing such as exhibition space and marketing materials. Although it is deemed a drawback by Perry (2004), Baxter and Tyler (2006), however, stress that the facilitators influence cluster development and regional competitiveness. Fifth, although clusters

enable small companies to combine resources and marketing efforts to export, Perry (2004) claims that there is also a need for leaders to help ensure an agreement over marketing strategies, reduce uncertainty associated with investments in markets overseas, and boost the chances of success in exporting activities. For instance, membership from the largest New Zealand engineering consultancy company in the Earthquake Engineering cluster helps other small members enter overseas markets. This leading company needs the expertise of the small cluster members to deliver their projects. On the other hand, the collaboration among small companies in the Creative Capital cluster does not produce a desirable outcome, with the absence of a leading company (Perry, 2004).

In this regard, Simpson and Bretherton (2004) similarly stress that the development of a functional and attractive wine tourism in Matakana requires a strengthened leadership capacity within the Matakana Wine Trail cluster and Matakana Coast cluster. Likewise, while Chetty (2004) confirms the important role of leaders as catalysts for the development of the New Zealand boat-building cluster, Perry (2005) and Perry (2007a) find that the presence of a leading or dominant company within the Northland Wood Processing cluster benefits smaller cluster members. The arguments on the importance of leading or dominant companies are in line with that of Fraser and Kelly (2010), which identify large pillar companies as the key success attribute of ICT clusters, particularly those in New Zealand. Last, a geographical distribution of clusters in New Zealand is a by-product of promotional efforts, instead of the potential for business development. For instance, there are fewer Auckland-based clusters compared to other regions even if the former accounts for about a third of the New Zealand economy (Perry, 2004).

2.6. Intermediaries

Inter-organisational networks among cluster members are the key feature of business clustering. Within networks, intermediaries may contribute further to the effectiveness of networking and competitiveness of clusters through their action, to facilitate among the cluster members. While intermediaries comprise individual actors and institutions, in the context of this study, they are referred to as the latter. This section aims to provide a better understanding of specific roles of the intermediaries within the clusters. It begins with discussion on strength of ties and structural holes, to provide a background of intermediation and followed by discussion on significance of intermediaries.

2.6.1. Strength of ties and structural holes

According to Todeva (2006), ties or relationships between inter-dependent actors are one of key aspects influencing a performance of inter-organisational networks. In this regard, Granovetter (1973) emphasises the importance of strength of ties within networks and identifies strong and weak ties. In relation to the latter, strong ties require a greater time commitment and more frequent interactions leading to stronger sentiments of friendship and more similarities. Consequently, information passing through strong ties tends to concentrate within particular cliques causing an overall fragmentation in a community (Granovetter, 1973). For Grabher (1993), strong ties or personal ties to a mere few core or large customers prevent firms from moving to more promising markets. Furthermore, being driven by groupthink, strong ties prevent constructive conflicts and strategic debates that, as a result, limit innovation opportunities. For instance, German supplier firms in the Ruhr region relied extensively on strong ties that led to their downfall at the end of the 1970s (Grabher, 1993).

On the other hand, Granovetter (1973) places greater importance on weak ties, which are more likely to connect members from different groups. In this regard, only weak ties can be local bridges through which information flows between contacts of different individuals. They create more efficient and shorter paths for diffusion of information and innovation that can traverse a greater distance and reach a larger number of people (Granovetter, 1973) and go beyond a narrow clique (Grabher, 1993). Therefore, weak ties offer greater access to new information from different sources compared with strong ties (Granovetter, 1973; Grabher, 1993; Smith-Doerr, 2006). For instance, workers who move between jobs and networks build bridges of weak ties of personal contacts such as old college friends and former colleagues or even employers. People who are linked by these personal contacts gain access to different sources of information and are not restricted to those in their own networks or cliques (Granovetter, 1973).

According to Burt (1992), weak ties are closely related to his argument about structural holes. Structural holes are gaps between non-redundant contacts that are separated either directly or indirectly. Unlike redundant contacts leading to same opportunities and people, the non-redundant contacts provide additive instead of overlapping network benefits. Therefore, optimised networks that are both efficient and effective are made up of non-redundant rather than redundant contacts. Furthermore, the presence of primary

contracts is relatively more beneficial than secondary contacts. Non-redundant primary contacts are ports of access to indirectly-connected groups of many secondary contacts beyond that, as a result, expand a diversity of the networks. Larger and more diverse networks of non-redundant contacts allow more exposures earlier to valuable information and more referrals to different people for future opportunities. Burt (1992) refers this to information benefits of bridging structural holes.

2.6.2. Significance of intermediaries

According to Burt (1992), bridging structural holes in networks yield benefits including control benefits, which render an advantage to certain players in their relations. These players emerge from negotiations successfully as the 'tertius gaudens' (Burt, 1992, p. 30) – the third party that benefits and profits from disunion of others by entering a structural hole separating them and broker their relationships (Burt, 1992; Smith-Doerr, 2006). The tertius act as influential bystanders helping resolve conflicting demands and move information between contacts. The tertius is able to identify an advantage in bringing together those who are willing to negotiate but not doing so directly without them. Although the tertius can be non-profit players that bring together disconnected contacts to build value in networks, having control and information benefits allow them to generate profits from mediating between others (Burt, 1992). In this regard, the argument on structural holes can be linked to the concept of intermediaries.

Intermediaries act as independent actors and a central point of contact (Haga, 2009) allowing them to maintain extensive networking relationships with a large number of organisations in clusters (Zhang & Li, 2010; Todeva, 2006; McEvily & Zaheer, 1999). They are able to help establish relationships bridging disconnected parties (Verona et al., 2006; Howells, 2006; Hansen, 2002), increase their communication (Weber and Schnell, 2003), address common concerns (Baxter & Tyler, 2006), and mediate differences (Baxter & Tyler, 2006). They are characterised by their weak ties to others and, therefore, more likely to possess and pass on non-redundant information (Hansen, 2002). Furthermore, the intermediaries assist firms in innovation (Baxter & Tyler, 2006; Hilaire-Perez & Verna, 2006; Nooteboom, 2002) and facilitate diffusion of information and knowledge (Baxter & Tyler, 2006; Todeva, 2006). They also help combine knowledge of inter-related firms (Howells, 2006) and facilitate tacit knowledge sharing (Haldin-Herrgard, 2000; Yakhlef, 2005; Smedlund & Toivonen, 2007). In this regard, Smedlund

(2006, p. 210) refers to an intermediary as “an organisation that functions in the midst of the users and producers of knowledge”.

Furthermore, intermediaries help reduce contract (Nooteboom, 2002) and information costs (Spulber, 2009) influencing the level of costs of transactions (North, 1990), minimise search costs (Spulber, 2009; Feller, Finnegan, Hayes & O’Reilly, 2009; Hartman et al., 2000), build trust (Ipe, Raghu & Vinze, 2010; Nooteboom, 2002; Bailey & Bakos, 1997), prevent opportunistic behaviour (Janssen & Sol, 2000; Bailey & Bakos, 1997), and consequently drive down transaction costs (Spulber, 2009; Feller et al., 2009; Nooteboom, 2002; Hartman et al., 2000). They also support new entries into a region (Baxter & Tyler, 2006). As a result, intermediaries are capable of influencing policies leading to a development of clusters and regional development and competitiveness (Baxter & Tyler, 2006), and contribute to economic development more broadly (Weber & Schnell, 2003). As a result, intermediaries help sustain the competitiveness of firms (Zhang & Li, 2010; McEvily & Zaheer, 1999), influence policies leading to a development of clusters and regions (Baxter & Tyler, 2006), and contribute to economic development more broadly (Weber & Schnell, 2003).

Baxter and Tyler (2006) identify three generations of intermediaries. The first-generation is centres embedded in research institutions and universities such as Technology Transfer Offices (TTO). The second-generation operates as autonomous organisations including non-profit institutions (NGOs). The third-generation encompasses institutions acting as brokers bridging academics and companies. These intermediaries establish strong partnerships with universities to carry out regional economic development. They also help maximise productive interactions such as informal relationships among entrepreneurs, investors, and researchers, to foster R&D and innovation. Science parks are an example of the third-generation intermediaries (Baxter & Tyler, 2006), which establish formal relationships with universities and research institutions (Quintas, Wield & Massey, 1992). The parks provide supports for research-based commercial activities and academic-industry linkages. They bridge a gap between academics and private sectors and enable the former to commercialise research and raise funds from the latter (Quintas et al., 1992). For instance, their missions include helping manage technology licensing for university patents and acting as agents when universities seek grants, as well as to get research from a lab to a market (Baxter & Tyler, 2006).

Furthermore, as property-based initiatives (Quintas et al., 1992), science parks assist embryo high-tech companies to develop in a protected or secured environment, during the early and vulnerable stage (Seaton & Cordey-Hayes, 1992). As a result, being a key instrument facilitating scientific knowledge that leads to innovation, companies may, therefore, prefer to locate within the science parks to access research results, academic expertise, and advanced technologies (Quintas et al., 1992). Besides the three generation intermediaries identified by Baxter and Tyler (2006), organisations undertaking intermediating roles include consulting firms, licensing lawyers, and semi-public organisations (Lichtenthaler & Ernst, 2008b; Morgan & Crawford, 1996; Bessant & Rush, 1995). Likewise, Knowledge Intensive Business Services (KIBS) can also serve as intermediaries to help with knowledge implementation in clusters (Smedlund, 2006; Smedlund & Toivonen, 2007).

Nevertheless, intermediaries encompass a broad range of different entities with numerous and diverse roles (Howells, 2006), which can be performed by different organisations (Weber & Schnell, 2003). As a result, dissimilarities exist between the intermediaries in types and areas of expertise (Mortara, Thomson, Moore, Armara, Kerr, Phaal & Probert, 2010; Forstner, 2004). There is also no clear distinction between and consensus in defining them (Lichtenthaler & Ernst, 2008b; Howells, 2006). Therefore, it is not simple to identify their precise functions as these organisations may not exclusively focus on intermediating roles (Smedlund, 2006; Howells, 2006) and unconsciously operate as the intermediaries (Smedlund, 2006). Likewise, for Nooteboom (2002, p. 205), “there is a range of actors who could possibly play these roles, and not all roles have to be played by a single actor”. Furthermore, Howells (2006) highlights different terminologies for the intermediaries, which have been used by different researchers, including information intermediaries or infomediaries, intermediary firms, brokers, mediators, third parties, and bridgers.

Owing to the lack of financial resources (Rutashobya & Jaensson, 2004; Kaivanto & Stoneman, 2007; Canepa & Stoneman, 2008, 2005), small companies are greatly hindered in their ability to invest in information, internal technological competencies, and networking (Clark & Guy, 1998). They are consequently less likely to develop extensive personal and inter-organisational relationships with, for instance, universities or research institutions (Bharati & Chaudhury, 2010; Clark & Guy, 1998). While the small companies are more likely to depend on clusters for networking (Perry, 2007b; Palakshappa &

Gordon, 2007), they, for similar reasons, rely on intermediaries (Weber & Schnell, 2003; Shohet & Prevezer, 1996). These companies particularly depend on intermediaries for consultancy services, assistance, and advice (Bharati & Chaudhury, 2010; Brown & Lockett, 2004; Bessant & Rush, 1995), as well as to offset the lack of capabilities (Bessant & Rush, 1995).

Furthermore, small companies require intermediaries' technical expertise to obtain technologies from leading-edge organisations (Seaton & Cordey-Hayes, 1992) or to develop appropriate technological solutions (Bharati & Chaudhury, 2010; Brown & Lockett, 2004). In New Zealand, the majority of companies are small and medium-sized (Ministry of Business, Innovation & Employment, 2017; Ministry of Economic Development, 2011; Chetty & Stangl, 2010; Agndal & Chetty, 2007; Brimblecombe, 2005; Ministry of Business, Innovation & Employment, 2013). The statistic indicates a demand for intermediaries to help facilitate small companies in New Zealand. Likewise, companies with limited internal competencies are more likely to make use of external support or intermediaries (Lichtenthaler & Ernst, 2008b; Shohet & Prevezer, 1996; Bessant & Rush, 1995). On the other hand, companies possessing strong internal competencies may directly contact with and acquire information from other companies or organisations through their inter-organisational networks (Lichtenthaler & Ernst, 2008a; Hislop, 2002; Gulati, 1999). Such networks also provide a feasible way for these companies to deal with the rapid pace of globalisation (Chetty & Campbell-Hunt, 2003).

For instance, through their local and global networks, the companies are able to overcome barriers to internationalisation and identify opportunities for exports (Chetty & Campbell-Hunt, 2003; Sadler & Chetty, 2001; Chetty & Holm, 2000). Brown et al. (2010) similarly argue that companies can utilise resources from their networks and clusters to grow and increase overseas sales. In this regard, those with strong internal competencies and well-established networks may not require intermediaries and be able to avoid fees paid for their services (Brown et al., 2010; Lichtenthaler & Ernst, 2008b). Nevertheless, direct relationships, without intermediaries as an indirect means of inter-firm coordination (Ebers & Grandori, 1997), can be high maintenance in terms of time and costs and may distract from core business interests (Hansen, 2002). Therefore, the intermediaries may be used as complementary resources to the internal competencies and inter-organisational networks (Lichtenthaler & Ernst, 2008a, 2008b; Lichtenthaler, 2005; Verona, Prandelli & Sawhney, 2006; Spulber, 1999).

According to Dahl and Pedersen (2004) and Saxenian (1994) the success of companies in Silicon Valley is influenced by informal relationships between employees, competitors, customers, and suppliers, through conventions, seminars, trade fairs, and other social activities. Likewise, Dana and Winstone (2008) emphasise the importance of educational seminars or conferences and social events to learning and sharing of information, knowledge, and experience related to viticulture within the Waipara wine cluster of New Zealand. In this regard, Smedlund (2006) highlights the role of intermediaries to provide forums through which companies interact and share knowledge. Nevertheless, Perry (1996) stresses that although the intermediaries help sponsor events or forums that promote relationship, they may be of limited direct assistance to develop networks. For instance, the events or forums tend to become arenas for marketing, instead of networking, as attendees solely focus on identifying potential customers. Therefore, smaller or more personal groups may be a more effective mechanism for network development than large open forums (Perry, 1996).

Based on the literature review discussed earlier in this chapter, this research identifies two research questions:

Question 1: How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?

Question 2: How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?

The next chapter discusses a theoretical framework that helps answer the above research questions. At the meso level and micro level, this two-level theoretical foundation is informed by Porter's Diamond model, Community Innovation Survey (CIS), and Nonaka's Spiral model.

Chapter Three:

Theoretical Framework

3.1. Introduction

This section proposes the theoretical approaches to answer the research questions. First competitiveness is examined. According to Turok (2004, p. 1070), “competitiveness is not really an end in itself, more an indication of the drivers and dynamics of economic success”. Nevertheless, Ketels (2006, p. 116) stresses that “the definition of a conceptual term such as competitiveness is never true or false in an absolute sense but its appropriateness can be judged for a specific research or policy question”. In this regard, competitiveness is an evolutionary concept (Cho & Moon, 2000; Clark & Guy, 1998), which is complex and can be used in different ways and contexts (Turok, 2004). As a result, arguments about this concept may remain inconclusive and a consensus of definition is still lacking (Ketels, 2006; Moon & Cho, 2000). On the one hand, the productivity-based definition of competitiveness describes productivity as the important determining factor of prosperity that a particular location can achieve and, subsequently, gains competitiveness. On the other hand, the market share-based definition associates competitiveness with the ability to export to overseas markets and achieve a favourable external balance (Ketels, 2006). Furthermore, a traditional approach put emphasis on comparative costs of production whereas recent studies consistently stress the important of non-price factors (Clark & Guy, 1998).

This research adds to the literature by combining three different but related theoretical perspectives to examine how competitiveness is created in clusters using a New Zealand example. In this regard, it mainly views non-price factors as contributing factors to the cluster competitiveness. This chapter begins with a broad discussion of a theoretical foundation for this research. Subsequently, it details other theoretical perspectives adopted by this research: regional business environment, National and Regional Systems of Innovation, and Regional Knowledge System.

3.2. Theoretical foundation for research

According to Greve (2009), a combination of different theoretical mechanisms renders a better understanding to phenomena. Therefore, to present a more comprehensive account of how competitiveness is created in clusters, this research incorporates a combination of three theoretical approaches related to the regional business environment, Regional

Systems of Innovation (RSI) – the related concept based on the National Systems of Innovation (NSI) (Peters, 2006, p. 21; Lundvall, 1992, 2007; Roelandt & den Hertog, 1999), and Regional Knowledge System (Smedlund, 2006). The three theoretical approaches constitute a theoretical foundation of this research, which consists of meso level and micro level. At the meso level, competitiveness of the clusters depends on competitiveness of regions in which they are based (Lechner & Leyronas, 2012). In this regard, the clusters are a product of environments (Perry, 2004) that support a rapid accumulation of resources and skills (Porter, 1998a; Porter, 1990).

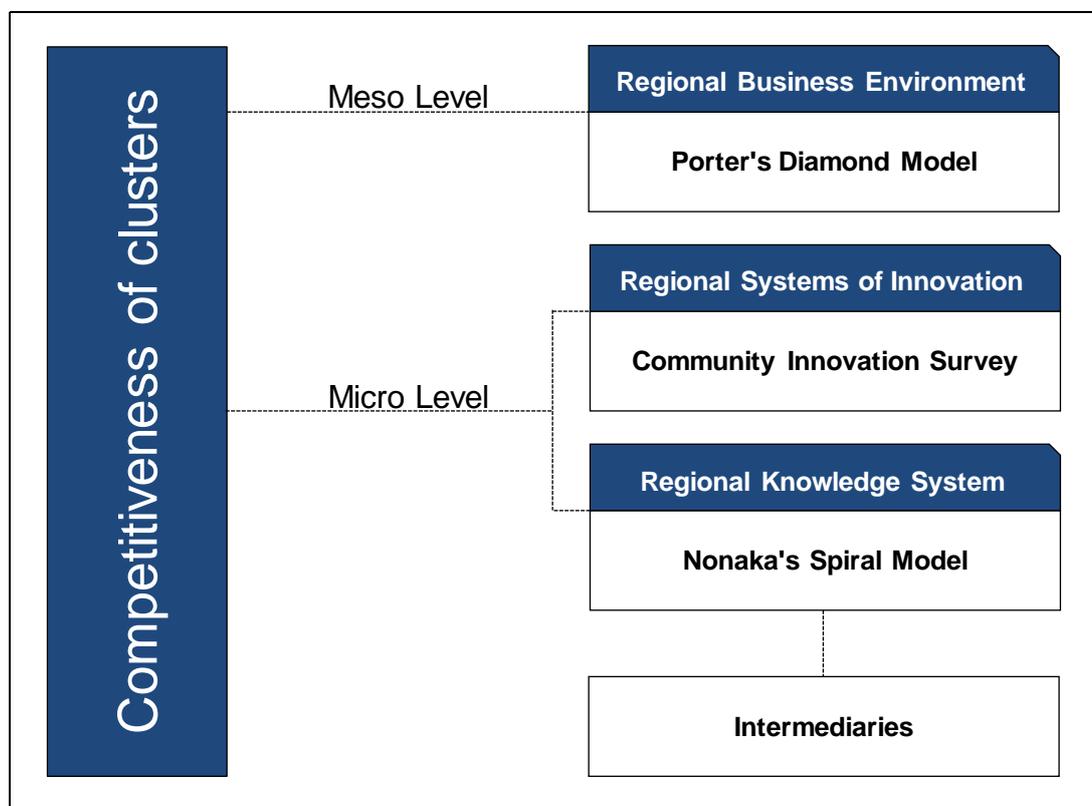


Figure 1: Two-level theoretical foundation

Source: Own creation

At the micro level, within the clusters, innovation is also one of the key ingredients for the competitiveness (Ştefan et al., 2018; Prats et al., 2008; Mason, Castleman & Parker, 2008; Shao, Chen & Cheng, 2008; Eraydin & Armatli-Köroğlu, 2007; Mohannak, 2007; Haga, 2005; Eraydin & Armatli-Köroğlu, 2005; Zhu & Tann, 2005; Simmie, 2004; Jin, Hewitt-Dundas & Thompson, 2004; Park, 2003; Padmore & Gibson, 1998; Frybourg,

1997). The RSI allows an understanding of innovativeness of cluster members (Peters, 2006, p. 21; Lundvall, 1992, 2007; Roelandt & den Hertog, 1999). Furthermore, the ability of companies to create and acquire new knowledge and learn continuously constitutes their competitiveness (Zack, 1999; Sharkie, 2003, Asheim & Coenen, 2005; Dyer & Nobeoka, 2000). In this regard, the emphasis of Regional Knowledge System is on knowledge as a source of competitiveness Smedlund, 2006; Smedlund & Toivonen, 2007).

In particular, the three theoretical approaches informing the two-level theoretical foundation are Porter's Diamond model (Porter, 1998a, 2000), the Community Innovation Survey (CIS) (Smith, 2005; Inzelt, 2003), and Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). First, the Diamond model explains the significance of location to competitiveness of clusters, which according to Rooney, Hearn and Ninan (2005) and Roelandt and den Hertog (1999), a critical mass of geographically inter-related organisations in one location, including companies, customers, suppliers, and private and public institutions, universities, and brokers and consultants. Second, the CIS gives insights into innovation systems and enables development of more effective ways to support competitiveness (Smith, 2005; Inzelt, 2003). Third, the Spiral model allows a more comprehensive understanding of the process of knowledge creation (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998).

In conjunction with the Spiral model, the theoretical foundation incorporates the extant literature on intermediaries, to examine how knowledge is created and dispersed through the cluster by the action of intermediaries. For instance, Smedlund (2006, p. 210) refers an intermediary to "an organisation that functions in the midst of the users and producers of knowledge". Figure 1 depicts the levels of analysis at meso and micro levels and the theories used to access and describe the cluster competitiveness from a regional perspective, as competitiveness is, in many cases, "regional and is developed through local" (Wood & Cook, 2003, p. 311). The following sections detail other components of the two-level theoretical foundation adopted by this research.

3.2.1. Regional business environment

A cluster is a critical mass of geographically inter-related organisations in one location, including firms, customers, suppliers, and private and public institutions, universities, and

brokers and consultants (Rooney, Hearn & Ninan, 2005; Roelandt & den Hertog, 1999). This indicates the relevance of geographical location in influencing competitiveness of the cluster. In this regard, the purpose of this section is to review a relevant theoretical approach: Porter's Diamond model, which helps explain the significance of location to cluster competitiveness. It begins with discussion on Porter's Diamond model followed by criticisms of the model. Subsequently, this section ends with rationale for the Diamond model.

3.2.1.1. Porter's Diamond model

According to Porter (1998b, p. 78), "what happens inside companies is important, but clusters reveal that the immediate business environment outside companies plays a vital role as well". Likewise, Gray (2002, p. 20) claims that "clustering is about nurturing the environment to enable companies to develop. And that applies whether that environment be...the regional environment (which provides the workers, the raw materials, the R&D and the innovation and informal networks)". In this regard, the nature of business environment influences competitiveness (Porter, 1990; Di Guardo & Galvagno, 2005), when it supports and allows a rapid accumulation of resources and skills, pressures them to innovate, and presents ongoing and insightful information useful for innovation (Porter, 1998a). Therefore, clusters are the product of environments (Perry, 2004) and "the more effectively that clusters and their environments are understood, the greater the potential for improved economic and social outcomes for the geographic regions concerned" (Lindsay, 2005, p. 93).

For Huang and Xue (2012), competitiveness can be derived by examining the environment of location where firms reside. In this regard, Porter's Diamond model can be used to capture the quality of business environments at particular locations. Furthermore, with a very long list of different factors that individually influence competitiveness, it is a challenge for policy makers to identify those important for improving the competitiveness in a particular situation (Ketels, 2006). For this reason, the Diamond model allows researchers to identify specific sources of or conditions promoting competitiveness (Porter, 1990; Clark & Guy, 1998) and serves to inform those responsible such as policy makers to improve the competitiveness (Ketels, 2006; Clarkson et al., 2007).

As a result, Porter's Diamond model is generally a very well-accepted model for policy making (Gugler & Brunner, 2007; Jacobs & De Jong, 1992), while his arguments on clusters have considerable influence on government policies around the world (Perry, 1999; Clancy, O'Malley, O'Connell & Egeraat 2001; Lundequist & Power 2002; Athiyaman & Parkan, 2008). Likewise, Teigland and Lindqvist (2007) argue that Porter's Diamond is a well-known model among researchers on clusters. This model was originally established to assess the competitiveness of nations, but it can be equally used to evaluate that of regions, cities, and agglomerations such as clusters (Clarkson et al., 2007). The Diamond model is the first multi-level theory, which realistically links nations, industries, and firms (Peng, 2011; Grant, 1991).

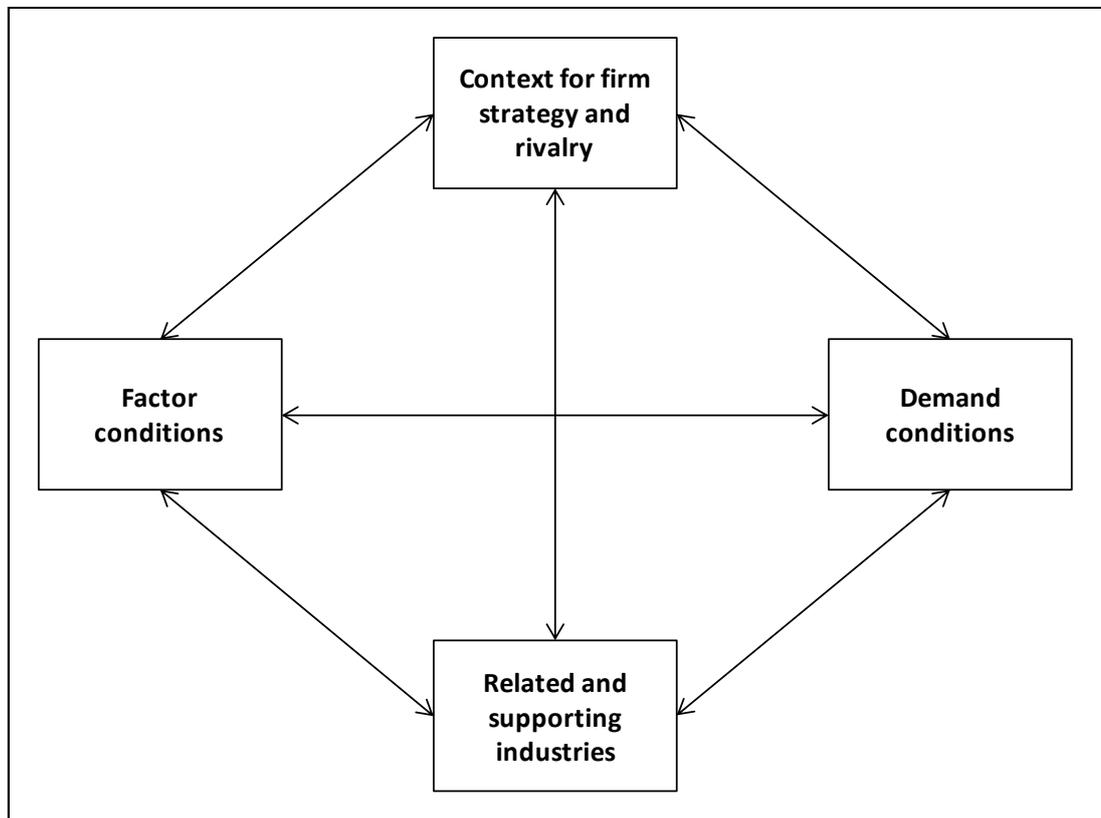


Figure 2: Porter's Diamond model

Source: (Porter, 1998a, 2000)

Porter's Diamond model presents four broad determinants that form an environment promoting a cluster of competitive industries and firms (Porter, 1998a). They determine whether a particular location provides an environment that allows firms to successfully

compete (Clark & Guy, 1998). These determinants are factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry. Government and chance are two external factors (Porter, 1998a, 2000; Crocombe, Enright & Porter, 1991) but not a central focus of the model (Gugler & Brunner, 2007; Jin & Moon, 2006; Davies & Ellis, 2000). Figure 2 depicts Porter's Diamond model. The four determinants of the Diamond model offer firms incentives but also pressure them to improve and innovate (Crocombe et al., 1991; Clark & Guy, 1998). For Porter and Ketels (2003, p. 27), "clusters constitute one facet of the diamond, but they are best seen as a manifestation of the interaction of all the diamond's elements". In this regard, they individually and collectively, as a system, provide a framework to explaining and understanding innovative capabilities, competitiveness, and roles of clusters for economic development (Porter, 1998a, 2000).

First, factor conditions include capital, infrastructure, labour, land, and natural resources. They can be divided into basic and advanced factors. The former consists of climate, natural resources, and semi-skilled or unskilled labour, while the latter comprises a scientific and technological base, skilled labour, and pool of venture capital. Nations can acquire the basic factors through a passive inheritance or moderate investments but need ongoing investments, for instance, in leading research institutes, universities, and physical and human capital to attain the advanced factors. In this regard, an inheritance of selective weaknesses in the basic factor such as high land, capital, and energy costs, a lack of local raw materials, and labour shortages incite factor creation and innovation. As a result, the advanced factors are relatively more important for competitiveness (Porter, 1998a; Crocombe et al., 1991). A shortage of natural resources and labour after World War II motivated Japan and Switzerland to respectively pioneer just-in-time production and upgrade their labour productivity (Porter, 1998a).

Second, demand conditions represent sophisticated and demanding local customers and unusual local demands (Porter, 1998a; Crocombe et al., 1991). These customers pressure companies to improve. This involves product improvement and innovation, to move from low quality goods and services and to focus product differentiation (Porter, 1998c). Likewise, they pressure on these companies to respond to specific needs or meet high standards, based on circumstances and local values, and therefore to innovate. For instance, many Japanese lives in small homes. This circumstance of demand pressures Japanese firms to pioneer compact air-conditioners, which are now globally accepted. In

this regard, local demand generates demand for domestic products abroad (Porter, 1998a; Crocombe et al., 1991).

Likewise, Chetty and Campbell-Hunt (2003) argue that a hostile domestic environment is a catalyst for companies, especially those categorised as small to medium size in a small isolated economy such as New Zealand, to speed up internationalisation. Third, related and supporting industries include capable locally-based suppliers and competitive related industries. Close working relationships with them enable companies of downstream industries to readily access components, machineries, information, and ideas that lead to innovation. These relationships are facilitated by close geographic proximity and are mutually beneficial especially when the companies act as demanding buyers influencing suppliers to innovate. Furthermore, the proximity, in turn, facilitates communication, scientific collaboration, joint development, flow of information and knowledge, and exchange of ideas, knowledge, and innovations (Porter, 1998a).

The last determinant, firm strategy, structure, and rivalry, is concerned with a circumstance and context of nations that determine a way through which firms are created, organised, and managed. For this reason, there is no universal managerial system, and specific management practices and organisational structures of an industry that characterise its competitiveness. For instance, German firms tend to be hierarchical in organisation and management. The management system of these firms is highly disciplined and works well in engineering and technological industries producing complicated products and machineries. In addition, context of social norms, rules such as intellectual property, tax system, stability of political and macroeconomic environments, and incentives of locations influence their competitiveness through an increase in investments in, for instance, R&D, market development, training, and fixed assets (Porter, 1998a).

Furthermore, success of local companies attracts new entrants leading to a high geographical concentration of locally-based rivalry and, therefore, more intense competition. The competition strengthens competitiveness of their industries and renders them more competitive globally (Porter, 1998a). It also has a significant positive effect on net employment growth (Maré, 2005). Strong locally-based rivalry puts pressure on firms to lower costs, upgrade products and production processes as well as workforces, develop specialised technologies, and seek global markets. It also pressures institutions

including universities, research centres, and training providers to adapt to specific needs of the competing companies. The local rivalry subsequently spawns related and supporting industries and leads to an upgrade of local demand. For instance, intense local rivalries among Italian furniture and shoe firms raise an expectation of sophisticated buyers. Likewise, locally-based rivalries among Japanese firms producing machine tools, semiconductors, audio equipment, and cameras contribute to their leading global positions (Porter, 1998a).

3.2.1.2. Criticisms of Porter's Diamond model

There have been criticisms on Porter's Diamond model regarding its exclusive focus on home-base markets and a lack an explicit incorporation of multinational activities such as Multinational Enterprises and Foreign Direct Investment (Dörrenbächer & Wortmann, 1991; Bellak & Weiss, 1993; Dunning, 1993; Moon & Lee, 2004; Bowen Jr & Leinbach, 2006; Kim, 2006; Lagrosen, 2007; Sardy & Fetscherin, 2009; Liu & Hsu, 2009). As an unbalanced Diamond exists when one of its determinants is weaker than the others, "MNEs can compensate for weaknesses by operating across countries that are strong in different dimensions" (Eden, 2009, p. 3). They are the key to globalisation and usually reside at the hub of a cluster (Lee & Rugman, 2009; Rugman, 2005; Rugman & Verbeke, 2004). Furthermore, the Diamond model is a less applicable model for developing or small economies including Canada and New Zealand (Kim, 2006). These countries are export-dependent and less likely to achieve economies of scale or build up 'broad and deep clusters' (Grunsven & Egeraat, 1999, p. 146).

As a result, there is a need to extend Porter's Diamond model (Rugman, 1991; Bellak & Weiss, 1993; Rugman & Verbeke, 1993; Rugman & D'Cruz, 1993; Waheeduzzaman & Ryans, 1996; Moon, Rugman, & Verbeke, 1998; Davies & Ellis, 2000; Paliwoda, 2001; Rugman & Verbeke, 2003; Rugman, 2005; Rugman & Oh, 2008; Rugman, 2008; Wyk, 2010). As an extension to Porter's Diamond model, the Double Diamond model explicitly includes government as an important determinant of competitiveness rather than an exogenous parameter (Moon et al., 1998; Sardy & Fetscherin, 2009). In their study bases on the Double Diamond model, Moon et al. (1998) highlight the important role of the Korean government to reduce red tape and provide a favourable environment for both inward and outward FDI. Furthermore, the Korean government also strives to expand

global demand, create science parks by bringing together private firms, research institutes and universities, and privatise or merge state-run firms (Moon et al., 1998).

Competitiveness of nations and abilities of firms to achieve sustainability, higher profits, and growth depend on both domestic and global determinants (Rugman, 1992; Rugman & D'Cruz, 1993; Moon et al., 1998; Cho, Moon & Kim, 2008). For instance, Korean and Singaporean firms target resources and markets in both domestic and global environments (Moon et al., 1998). Therefore, the Double Diamond model explicitly incorporates activities of MNEs and FDI compared with Porter's Diamond model. It is also more comprehensive for analysing the global competitiveness of developing or small-open economies (Moon et al., 1998; Cho et al., 2008). In this regard, Rugman and Verbeke (1993) and Chang (1997) stress the need for small-open economies including New Zealand to assess larger global markets for capital, labour, raw materials, and technologies (Moon et al., 1998). A strong competition in those markets also helps offset a lack of domestic competition in New Zealand (Cartwright, 1993; Rugman & Verbeke, 1993). Likewise, competitiveness of clusters in Mexico (Hodgetts, 1993; Davies & Ellis, 2000) and Canada (Rugman, 1995) is a result of their abilities to draw on the U.S. Diamond.

Based on the Double Diamond model, small-open economies gain competitiveness through a dynamic interaction of their home-based Diamonds with those of the triad nations: the U.S., Japan, and the European Union (Brewer & Sherriff, 2007; Chandrashekhara, 2006; Waheeduzzaman & Ryans, 1996; Grein & Craig, 1996; Rugman & Verbeke, 1993). Likewise, Rugman (2005) and Lee and Rugman (2009) claim that the largest 500 MNEs that account for approximately 90 per cent of the world's FDI are present in the three major trading and investment blocks: North America, Asia-Pacific, and Europe. These blocks also accommodate about 80 per cent of the world's total FDI. According to Rugman and D'Cruz (1993), using the Double Diamond model to explain the competitiveness of a small economy involves setting its home-base Diamond against that of a relevant triad. While Canada, Mexico, Latin American, and most Caribbean countries set their home-based Diamonds against the U.S. Diamond, European countries including Finland and Poland set theirs against the European Union Diamond. Furthermore, most of Asia-Pacific countries including New Zealand set their home-based Diamonds against that of Japan (Rugman & D'Cruz, 1993). Nevertheless, there appears

to be ambiguity in defining the triad among the above studies whether as nations or regional blocks.

It is argued that even the world's dominant economies draw resources from foreign Diamonds (Bowen Jr & Leinbach, 2006). For Kim (2006), countries draw on Diamonds of the triad as well as non-triad nations especially those in East-Asia (Ostry, 1998). Therefore, Moon et al. (1998) stress that the Double Diamond model does not fit well for all small-open economies as they draw on Diamonds of both triad and non-triad nations. Nevertheless, linking a home-based Diamond with multiple Diamonds creates structural problems and difficulties in appreciating each of them (Kim, 2006; Cho, Moon & Kim, 2009). Kim (2006, p. 126) argues that "handling each of the multiple Diamonds is certainly not an efficient way of analysing national competitiveness". As a result, the Double Diamond model lacks a clear explanation as to which of the foreign Diamonds contributes more to the competitiveness of nations (Bowen Jr & Leinbach, 2006). This leads to a further extension to Porter's Diamond model – the Generalised Double Diamond model. This later model generalises all non-home-based Diamonds into one single foreign Diamond. It subsequently incorporates the home-based and foreign Diamonds into a single framework. As a result, studies are able to assess the competitiveness of nations by analysing the home-base Diamond and considering the triad as well as non-triad Diamonds (Kim, 2006).

3.2.1.3. *Rationale for Porter's Diamond model*

Although the Double Diamond model and Generalised Double Diamond model are more explicit on multinational activities, this research relies on Porter's Diamond model as a framework to study the competitiveness of a targeted cluster for the following reasons: First, Porter (1990) anticipated that Korea would achieve an advanced economic status in the next decade but was less optimistic about the Singaporean economy. By the 1980s, the Korean economy fully reached an investment-driven stage. The government and firms limited the role of foreign MNEs, established indigenous industries, and focused on aggressive investments in, for instance, capital and research. The Korean development is mainly based on local firms, which leads to a fierce domestic rivalry. The firms rapidly achieve in-house technological capabilities and develop international marketing channels and brand names. On the other hand, the Singaporean economy remains factor driven,

which mainly builds on foreign MNEs for development. As a result, Singapore is still a production base for the MNEs rather than a real home base (Porter, 1990).

In contrast, Moon et al. (1998) claimed that Korea was instead less successful than Singapore, based on the Generalised Double Diamond model. However, in less than a decade later, Korea successfully joined the OECD in December 1996 (Ley & Poret, 1997; Kwack, 1998; Ulgado & Lee, 1998; Ho, 2006; OECD, 2013) and became a full member in October 1997 (Wilson, 2000), while Singapore has remained a non-member (OECD, 2013; Wilson, 2000). The correct prediction by Porter (1990) indicates that the Diamond model is a better analytical tool for assessing the competitiveness of some small-open economies such as Korea and Singapore. Second, clusters in New Zealand are generally made up of small firms (Brimblecombe, 2005), which extensively rely on local networks to overcome barriers to foreign markets, accelerate a process of internationalisation (Chen & Chen, 1998), and minimise disadvantages such as psychological distance (Rutashobya & Jaensson, 2004). Therefore, a global competitiveness of these clusters may require a greater emphasis on the home-base compared with the foreign Diamond.

Third, based on the Diamond model, the most effective global strategies rest mainly on locational advantage that requires geographic proximity (Porter, 1998a; Moon et al., 1998). For this reason, scholars have increasingly paid attention to the importance of geographic proximity as it reinforces relationships between firms (Ivarsson, 2002; Martin & Sunley, 2006; Porter, 1998a). Last, Moon et al. (1998) compare Porter's Diamond model with the Generalised Double Diamond models at a macro level rather than the level of an individual industry. Therefore, the criticism on the former model may only hold at the macro level. Furthermore, the Double Diamond and the Generalised Double Diamond models require setting the home-based Diamond against a relevant triad Diamond or that of a larger economy (Kim, 2006). These settings are justifiably applicable for a study at the macro or national level, for instance, the New Zealand economy as a whole. However, this research instead aims to study a local New Zealand-based cluster.

3.2.2. National and Regional Systems of Innovation

A profound understanding of a relevant theoretical approach is of paramount importance, to further understand innovation. In this regard, this research put emphasis on National/Regional Systems of Innovation for explaining innovativeness of cluster

members. Galli and Teubal (1997, p. 345) define National Systems of Innovation (NSI) as “the set of organisations, institutions, and linkages for the generation, diffusion, and application of scientific and technological knowledge, operating in a specific country”. Dynamics, system characteristics, and inter-dependencies founded on this concept are similar to those in clusters, which are interpreted as reduced-scale NSI (Roelandt & den Hertog, 1999). For Edquist (2005) and Roelandt and den Hertog (1999), the NSI is increasingly used as a conceptual framework by innovation researchers and policy makers to study innovation-related topics, for instance, to understand differences in innovative performance among economies and to develop effective ways of supporting innovation activities. It includes firms, suppliers, customers, competitors, universities, and government agencies. Their interactions result in the creation of new technology, knowledge, and science (Peters, 2006; Edquist, 2005). However, the NSI definition varies depending on focus and level of analysis (Lundvall, 1992, 2007; Roelandt & den Hertog, 1999). In this regard, Peters (2006) identifies another related concept based on the NSI – the Regional Systems of Innovation (RSI), which is defined as “the localised network of actors and institutions in the public and private sectors whose activities and interactions generate, import, modify and diffuse new technologies” (Peters, 2006, p. 21).

3.2.2.1. *Community Innovation Survey*

Although, there are different approaches and methodologies seeking to measure innovation behaviour and activities (Inzelt, 2003), the recent survey-based indicator – the Community Innovation Survey (CIS), has produced new insights into innovation systems (Smith, 2005). The CIS contributes to an analysis of the dynamics of technological change. It also enables policy makers to develop more effective ways to support competitiveness and productivity in economies and maximise industrial development potential (Inzelt, 2003). In this regard, Smith (2005) argues that the CIS data can be used for within-sector micro studies and for cross-country macro comparison. Nevertheless, it appears to be more suitable for the former studies. According to Smith (2005), a rapid growth of literature using the CIS falls into three broad categories: descriptive overviews of data results at the national level, analytical studies sponsored by the European Commission, and econometric or statistical studies of innovation.

First, the first category of studies consists of tables and charts accompanied by commentary, which provide robust results emerged from data and are generally written

for policy makers (Smith, 2005). Similar to the first group of studies, the analytical studies sponsored by the European Commission are descriptive but lengthier and cover different European countries and various sectors in Europe. Third, econometric or statistical studies of innovation primarily use secondary CIS data of member countries of the European Union (Smith, 2005). These studies include the comparison of innovation across industries in a member country in European Union (Mairesse & Mohnen, 2001) and across European countries (Mairesse & Mohnen, 2001; Mohnen, Mairesse & Dagenais, 2003), innovation performance and innovation patterns across Europe (Hinloopen, 2003; Nascia & Perani, 2002), relationship between innovation and employment (Evangelista & Savona, 2002), and impact of financial constraints on innovation activities (Canepa & Stoneman, 2008) and diffusion of innovation in European countries (Battisti & Stoneman, 2010; Battisti, Canepa & Stoneman, 2009; Battisti, Hollenstein, Stoneman & Woerter, 2007). Nevertheless, the use of readily available CIS data may encounter with some limitations including the omitting of micro firms having fewer than ten employees (Frenz & Prevezer, 2012).

Examining the existent literature shows that clusters have been heavily studied, while the nature of business environment, knowledge, and innovation as the sources of competitiveness have been widely accepted. For instance, different studies on clusters have used Porter's Diamond model to determine their competitiveness in terms of strengths and weaknesses (Albors, 2002; Benito, Berger de la Forest & Shum, 2003; Teigland & Lindqvist, 2007; Allen & Potiowsky, 2008; Campaniaris, Hayes, Jeffrey & Murray, 2011) and ability to improve, innovate, and upgrade (Birkinshaw & Hood, 2000), explain and gain insights into a domestic success and failures in exporting activities (Maxoulis, Charalampous & Kalogirou, 2007), and identify promotional strategies to sustain the competitiveness of clusters (Flowers & Easterling, 2006). Furthermore, knowledge is the basis of competition and, therefore, the ability of firms to create and acquire new knowledge and learn continuously constitutes their competitiveness (Zack, 1999; Grant, 1996; Dyer & Nobeoka, 2000). It is means to gain competitiveness (Asheim & Coenen, 2005). Sharkie (2003) similarly argues that one of important requirements for developing sustainable competitiveness is to create sufficient knowledge.

According to Haga (2005, p. 362) "an economy or viable business environment with competitive enterprises cannot exist without innovation". Therefore, within a cluster, innovation is also the key driver for the creation of competitiveness (Simmie, 2004; Park,

2003; Padmore & Gibson, 1998; Frybourg, 1997). For Prats et al. (2008), it is not possible to achieve competitiveness without innovation, since the latter is one of prerequisites for the former (Eraydin & Armatli-Köroğlu, 2005; Zhu & Tann, 2005). Firms need to engage in innovation activities, to sustain their competitiveness (Shao et al., 2008; Mohannak, 2007; Haga, 2005). In this regard, innovative firms outperform non-innovative firms (Jin et al., 2004). Likewise, Mason et al. (2008) argue that an innovative capability of firms is one of the most important competitive components for clusters. It provides the clusters competitive power in global markets (Eraydin & Armatli-Köroğlu, 2007).

3.2.3. Regional Knowledge System

Smedlund (2006) discusses the importance of ‘a regional knowledge system’ based on which knowledge, innovations, and ideas flow in networks of innovation, development, and production in a regional cluster. In this regard, Smedlund (2006) and Smedlund and Toivonen (2007) emphasise that knowledge creation is carried out in an innovation network that includes different organisations such as firms, institutions, and financial institutes. The innovation network creates new knowledge and brings about a continuous improvement to products, and production processes and methods. Furthermore, while knowledge transfer between firms is done in the development network through their horizontal relationships, they make use of existing knowledge in the production network via vertical relationships with other firms in the cluster. As a result, inter-organisational relationships between these firms in the networks generate innovations, innovative ideas, and knowledge (Smedlund, 2006; Smedlund & Toivonen, 2007), which is a source of lasting competitiveness in the presence of uncertainty (Nonaka, 1991, 2007).

Although there have been studies on the influence of organisational learning on competitiveness (Dyer & Nobeoka, 2000) and a large body of literature in management on the important of knowledge, topics related to knowledge creation and a process of managing it have received proportionally less attention (Nonaka, 1994). Di Guardo and Galvagno (2005) emphasise two approaches related to knowledge creation: the knowledge-based view and the network perspective. The first approach is exclusively concerned with individual firms creating knowledge internally using their own competencies. Nevertheless, they cannot rely solely on their experiences to sustain competitiveness. On the other hand, the network perspective views inter-organisational networks and clusters as instruments of knowledge creation and transfer (Di Guardo &

Galvagno, 2005). With the availability of a relatively greater amount of knowledge, Dyer and Nobeoka (2000) claim that the networks are a more effective means for knowledge generation, transfers, and re-combination. Furthermore, the networked firms are able to create knowledge with more ease, as they share the same local environment and meet repeatedly. Therefore, knowledge creation is mainly a local activity and takes place horizontally and vertically through interactions among different actors (Di Guardo & Galvagno, 2005).

3.2.3.1. *Nonaka's Spiral model*

Nonaka (1991, 1994, 2007) presents the spiral model of knowledge creation involving four modes of knowledge conversion: tacit-to-tacit, explicit-to-explicit, tacit-to-explicit, and explicit-to-tacit. Figure 3 depicts the processes of knowledge conversion. Although each mode is individually capable of creating knowledge, a dynamic interaction between all four trigger a continual cycle shifting from one mode to another allowing a more comprehensive knowledge creation from individual to organisational levels (Nonaka, 1991, 1994, 2007; Nonaka, Byosiere, Borucki & Konno, 1994; Nonaka & Konno, 1998; Harryson, 2002). Furthermore, the knowledge creation through the spiral process also reaches an inter-organisational level (Nonaka, 1994; Nonaka et al., 1994; Harryson, 2002). For this reason, the above two approaches of knowledge creation are related, despite the difference in the units of analysis (Dyer & Nobeoka, 2000). In this regard, it is feasible to apply the knowledge-based view to analyse a process of knowledge creation within inter-organisational networks (Di Guardo & Galvagno, 2005).

The first mode of the spiral model – ‘socialisation’ – deals with a conversion of tacit knowledge into tacit knowledge (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998; Harryson, 2002). For Nonaka and Konno (1998) and Harryson (2002), the tacit-to-tacit conversion can be achieved through shared experiences, individual interactions, and joint activities in which individuals are in the same environment and spend time together allowing them to understand one another’s feelings and thoughts. In this regard, a physical proximity that allows direct or face-to-face interactions facilitate the conversion and a transfer of tacit knowledge (Nonaka & Konno, 1998; Harryson, 2002). Apprenticeships provide a good example for socialisation where apprentices acquire tacit knowledge by observing, imitating, and practicing (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994;

Nonaka & Konno, 1998; Harryson, 2002). On-the-job training is another example of tacit-to-tacit knowledge conversion (Nonaka, 1994; Nonaka et al., 1994).

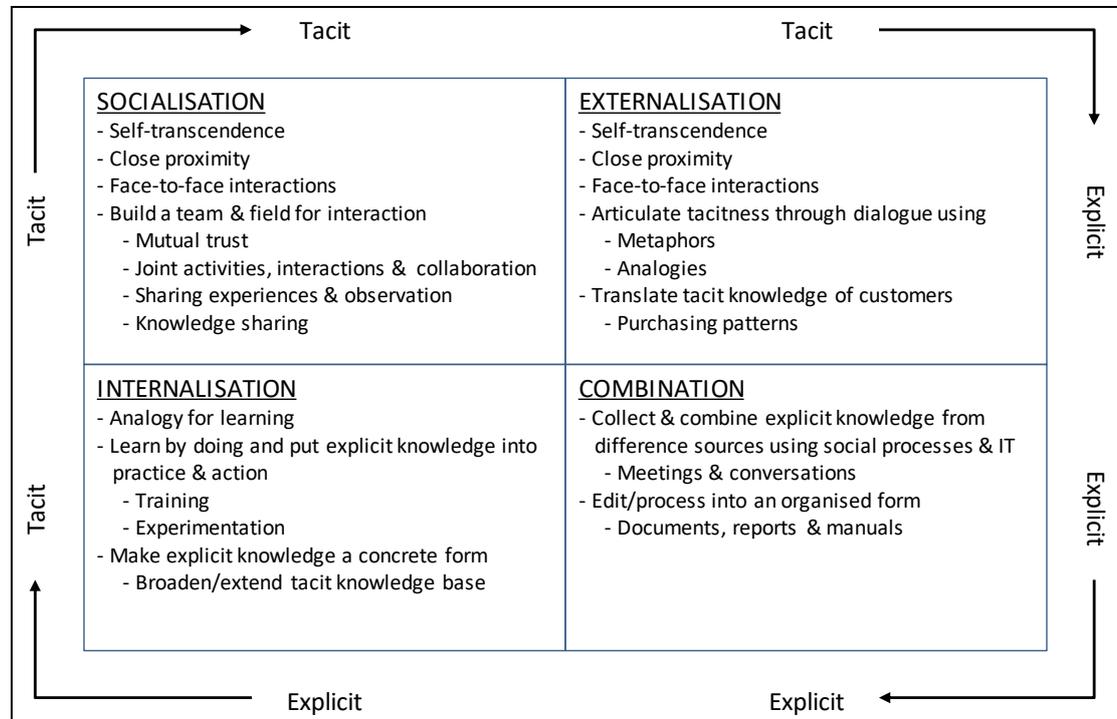


Figure 3: Nonaka's Spiral model

Source: (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998)

The socialisation mode usually begins with building a team and field for interaction among individuals (Nonaka, 1994; Nonaka et al., 1994; Harryson, 2002) within organisations and also beyond their boundaries allowing an extensive use of, for instance, suppliers and customers' knowledge (Nonaka, 1994). The team and field for interaction enable sharing of experiences, perspectives, and knowledge, as well as collaboration leading to creation of new concepts. Furthermore, they facilitate the development of mutual trust essential for shared experiences that, in turn, allow team members to create common perspectives and share their thinking processes and knowledge (Nonaka, 1994; Nonaka et al., 1994). For this reason, self-transcendence – “the self is freed to become a larger self that includes the tacit knowledge of the other” – is fundamental for socialisation (Nonaka & Konno, 1998, p. 42).

In this regard, knowledge sharing is fundamental for an effective knowledge creation, as allying with competing firms is no longer seen as a threat but an effective way to tackle uncertainty and a high cost of innovation or technological change (Lanza, 2005). Dyer and Nobeoka (2000) similarly argue that thriving networks depend on the ability to motivate member firms to participate and openly share their valuable knowledge. For instance, Toyota, being a core firm and an intermediary within a knowledge-sharing network, is able to achieve this by creating among its suppliers a strong network identity. The strong network identity gives rise to a shared purpose and a sense of belonging among Toyota's suppliers in a larger collective and, subsequently, motivates them to openly and unconsciously engage in knowledge sharing activities (Dyer & Nobeoka, 2000).

Although a strong network identity encourages firms to participate and openly share knowledge in a network, it, however, does not prohibit opportunistic behaviour such as hiding of valuable knowledge and free-riding. For this reason, Toyota establishes norm making knowledge of individual firms as a property of the network, with an exception to knowledge related to product designs and technologies direct competitors can exploit. To enforce this norm, Toyota requires a mutual sharing of knowledge among its suppliers and, in return, they receive free assistance, for example, from its consulting and problem-solving teams and full access to its operations and reservoir of knowledge. Nevertheless, Toyota may impose business sanctions by withdrawing business deals from suppliers that fail to reciprocate. As a result, the reward and punishment practices not only facilitate knowledge transfers but also minimise the free-riding problem (Dyer & Nobeoka, 2000).

The second mode of the spiral model – 'combination' – is involved with combining individuals' explicit knowledge and converting it into a more complete set of explicit knowledge (Nonaka, 1991, 1994 & 2007; Nonaka & Konno, 1998; Harryson, 2002). Bocquet and Mothe (2010) argue that competitiveness of clusters depends on re-combination of knowledge from firms through different efficient interactions. In this regard, the combination mode requires the use of exchange mechanisms such as meetings and conversations (Nonaka, 1994; Nonaka et al., 1994; Harryson, 2002). It can also be enhanced by IT-based collaborative environments including database, documentations, groupware, and online networks (Nonaka & Konno, 1998) and modern computer systems (Nonaka et al., 1994). This mode goes through three processes. The first process is involved in capturing or collecting explicit knowledge from different sources inside or outside firms and subsequently integrating or combining it. Second, knowledge is

disseminated among organisational members through a process of direct transfer using meetings or presentations. This knowledge needs to be edited or processed in a last step to make it more usable in a better-organised form of, for example, documents (Nonaka & Konno, 1998), manuals or workbooks, and financial reports (Nonaka, 1991, 2007). Nevertheless, a pure combination may be a mere interpretation of existing knowledge and does not result in new knowledge creation (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994).

The third and fourth modes of the spiral model: ‘externalisation’ and ‘internalisation’ view tacit and explicit knowledge as complementary components. Externalisation is a process of converting tacit knowledge into explicit knowledge for better shareability, while internalisation involves a reversed conversion from the latter into the former (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002). Similar to the socialisation mode, a close physical proximity allowing face-to-face interactions and self-transcendence facilitate the tacit-to-explicit knowledge conversion (Nonaka & Konno, 1998). Furthermore, the externalisation mode requires a series of meaningful dialogue using metaphors and analogies that enable individuals to articulate the tacitness of their experiences, perspectives, and knowledge (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002).

According to Nonaka, (1994, p. 21), a metaphor is defined as “two contradicting concepts incorporated in one word”. It enables linkages and comparisons of the two concepts that subsequently discern their contradictions or discrepancies. For instance, Honda uses a metaphor to bring together two remote ideas: an automobile as a machine and as a living mechanism. The discrepancy between the two ideas reveals a concept of an ideal car referred to as Tall Boy and ultimately Honda City (Nonaka, 1991, 2007). Nevertheless, the metaphor alone does not complete the process of tacit-to-explicit knowledge conversion. In this regard, an analogy helps harmonise and resolve the contradictions or discrepancies of the concepts incorporated into the metaphors, by highlighting their common attributes (Nonaka, 1991, 1994, 2007; Harryson, 2002).

For example, an aluminium beer can is a useful analogy for Canon to manufacture reliable but cheap and disposable drums for its personal mini-copiers. This analogy allows the Canon development team to explore how the two are alike and, as a result, discover a process technology to manufacture the low-cost aluminium drums (Nonaka, 1991, 2007).

For Nonaka (1994) and Harryson (2002), prototypes represent a way for the tacit-to-explicit knowledge conversion by making, for example, researchers' tacit knowledge more explicit to others. In this case, contradicting concepts include those between a conceptual design, customer requirements, and manufacturing requirements. The next step to resolve the contradictions is analogies to, for instance, other product concepts and emerging technologies or manufacturing processes (Nonaka, 1994; Harryson, 2002). Although metaphors and analogies are complementary, it is, however, hard to distinguish between the two (Nonaka, 1991, 2007).

Last, the internalisation mode of the spiral model involves an explicit-to-tacit knowledge conversion to turn concepts into a more concrete form of knowledge through different processes such as experimentation, exercises, learning by doing, training, and trial and error (Nonaka, 1994; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002). Therefore, internalisation is practically contingent on embodying knowledge into practice and action or on learning through active involvement, personal commitment, constant self-improvement, and participation in a field of action. Subsequently, explicit knowledge is shared and gradually translated into a different aspect of tacit knowledge (Nonaka & Konno, 1998; Nonaka, 1991, 1994, 2007; Nonaka et al., 1994). For instance, at an organisational level, employees use explicit knowledge shared throughout the firm to broaden and extend their own tacit knowledge base (Nonaka, 1991, 2007).

Besides creating and sharing knowledge, there is also a need to put it into implementation, to produce products and services efficiently (Smedlund, 2006). For O'Dell, Grayson and Essaiades (1998, p. 199), "implementation involves taking the plan off the paper and into the trenches. It's about turning knowledge into action". In this regard, Knowledge Intensive Business Services (KIBS) can serve as intermediaries to help with knowledge implementation (Smedlund, 2006; Smedlund & Toivonen, 2007). KIBS establish abundant contacts in inter-organisational networks, which allow them to hold an important position in knowledge processes within and between firms. As a result, KIBS become important sources and carriers of knowledge and are able to convey needed information and explicit knowledge in a timely fashion, transfer best practices involving tacit knowledge (Smedlund & Toivonen, 2007), and serve as sources and facilitators of innovation and innovation processes (Smedlund & Toivonen, 2007; Den Hertog, 2000).

KIBS include specialised firms that professionally provide a wide range of knowledge-based products and services such as IT, marketing and advertising, R&D, and training services as well as technical, legal, financial, and management consultancies (Smedlund & Toivonen, 2007; Den Hertog, 2000). For instance, KIBS supply clients with information related to regional structures founded on the four determinants of Porter's Diamond model. KIBS also help diagnose and clarify production-related problems and, subsequently, provide relevant advice as well as suggest and evaluate possible solutions (Smedlund & Toivonen, 2007). Nevertheless, although KIBS work for or on behalf of the clients to provide the above services (Smedlund & Toivonen, 2007), they also work with them and become co-producers of innovation (Den Hertog, 2000). The research methodology chapter outlines how this research design will incorporate these theoretical approaches to answer the research questions.

Chapter Four:

Research Methodology

4.1. Introduction

An important step to answer the research questions outlined in Chapter One (Research gaps and questions) involves a discussion of research methodology employed in this research. First, this chapter begins with a discussion of research design. Subsequently, it details theoretical foundation for research, methodological approach, research instruments, strategies for data analysis, trustworthiness in research, validity in research, generalisability, and ethical considerations.

4.2. Research design

The design of this study follows a philosophical foundation, as can be seen in Figure 4, that consists of four major elements: research paradigm, theoretical foundation, methodological approach, and methods of data collection (Creswell & Plano Clark, 2011; Crotty, 1998). This philosophical foundation provides a guideline influencing processes of conducting research studies (Creswell & Plano Clark, 2011).

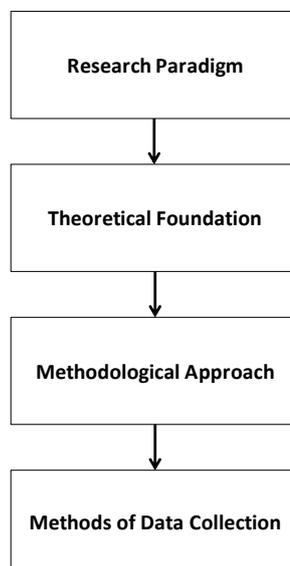


Figure 4: Research philosophical foundation

Sources: (Creswell & Plano Clark, 2011; Crotty, 1998)

4.2.1. Research paradigm

Studies within the social science sphere are dominated by two main theoretical perspectives: positivist and interpretivist (Taylor & Bogdan, 1998; Walliman & Baiche, 2001). On the one hand, the positivist asserts that society can be empirically analysed in the same manner as other scientific studies (Walliman & Baiche, 2001). This approach deals with causes of social phenomena and facts (Taylor & Bogdan, 1998), which undergo scientific verification such as testing of hypotheses (Walliman & Baiche, 2001; Teddlie & Tashakkori, 2009). As a result, the positivist rejects concepts that cannot be directly measured (Trochim & Donnelly, 2007). The positivistic perspective typically employs deductive reasoning or a top-down approach involving an argument beginning with general theories or statements that are subsequently narrowed down into more specific hypotheses for empirical testing. The testing leads to a confirmation or rejection of the original theories or statements (Hesse-Biber & Leavy, 2011; Teddlie & Tashakkori, 2009; Trochim & Donnelly, 2007; Walliman & Baiche, 2001; Mayan, 2001).

On the other hand, the interpretivist is interested in the meaning of subjective states of individual actors, their own perspectives about and experiences with social phenomena, and the comprehensive description of them. The interpretivist views the individuals' perception, beliefs, and what they say or do as an important reality (Taylor & Bogdan, 1998; Walliman & Baiche, 2001; Schram, 2006). It relies on inductive reasoning or a bottom-up approach working from specific observations and experiences and subsequently deriving broader generalisations or general conclusions purely based on observations (Walliman & Baiche, 2001; Mayan, 2001; Trochim & Donnelly, 2007; Hesse-Biber & Leavy, 2011; Maxwell, 2013). Inductive reasoning is relatively more exploratory and open-ended and involves discovering themes, patterns, and categories in data (Trochim & Donnelly, 2007). Furthermore, studies that adopt the inductive interpretivist approach are relatively more flexible in their research design and involve a small number of situations or samples (Maxwell, 2013).

Owing to their differences, studies that fall within these paradigms require different research methodologies and methods (Taylor & Bogdan, 1998; Thomas, 2003). For instance, positivism, being central to a conception of quantitative methodology, seeks causes and measurable facts through methods such as surveys that yield testable data for statistical analysis and puts emphasis on reliability and replicability in research (Taylor

& Bogdan, 1998). On the other hand, qualitative methodology is based on the interpretivist approach, which adopts methods including interviews and participant observations (Taylor & Bogdan, 1998; Marshall & Rossman, 1999; Schram, 2006; Maxwell, 2013) and emphasises meaningfulness or validity of studies (Taylor & Bogdan, 1998). Willis, Jost and Nilakanta (2007, p. 332), however, argue that “no particular paradigm can be taken for granted as the correct world view”. Neither research approach is superior to the other but rather more suited for different types of questions (Thomas, 2003). Therefore, the choice between the two depends on the nature of problems being addressed (Hesse-Biber & Leavy, 2011; Thomas, 2003; Mayan, 2001). For instance, quantitative research addresses causal questions whether variance in X causes variance in Y, while qualitative studies are interested in asking how X plays a role that causes Y (Maxwell, 2013).

According to Thomas (2003), a positivist may also use qualitative methods such as interviews whereas an interpretivist sometimes makes use of surveys as supplementary data. A combination of both methods creates synergy between them and provides a fuller understanding compared with single-method studies (Hesse-Biber & Leavy, 2011). For this reason, this research combines both qualitative and quantitative methods to produce a greater depth of understanding. However, it falls within the interpretivist perspective as an umbrella paradigm. As a result, a small sample size is appropriate for the research questions. Furthermore, the main interest of this research is to understand the meaning and comprehensive description of subjective perspectives and experiences of individuals belonging to firms and organisations within the AgBio cluster regarding its competitiveness and how intermediaries influence the cluster competitiveness.

4.2.2. Theoretical foundation for research

As discussed earlier in the first section of Chapter Three, this research adopts a theoretical foundation consisting of meso level and micro level. This two-level theoretical foundation incorporates a combination of three theoretical approaches related to the regional business environment, Regional Systems of Innovation (RSI) – the related concept based on the National Systems of Innovation (NSI) (Peters, 2006, p. 21; Lundvall, 1992, 2007; Roelandt & den Hertog, 1999), and Regional Knowledge System (Smedlund, 2006). In particular, the two-level theoretical foundation is informed by Porter’s Diamond model

(Porter, 1998a, 2000), the Community Innovation Survey (CIS) (Smith, 2005; Inzelt, 2003), and Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998).

First, the Diamond model explains the significance of location to competitiveness of clusters, which according to Rooney, Hearn and Ninan (2005) and Roelandt and den Hertog (1999), a critical mass of geographically inter-related organisations in one location, including companies, customers, suppliers, and private and public institutions, universities, and brokers and consultants. Second, the CIS gives insights into innovation systems and enables development of more effective ways to support competitiveness (Smith, 2005; Inzelt, 2003). Third, the Spiral model allows a more comprehensive understanding of the process of knowledge creation (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). In conjunction with the Spiral model, the theoretical foundation incorporates the extant literature on intermediaries, to examine how knowledge is created and dispersed through the cluster by the action of intermediaries (Refer to Figure 1).

4.2.3. Methodological approach

Maxwell (2013) claims that it is a common practice in qualitative research to use multiple methods for data collection in a single study. This strategy is generally known as mixed-method design, which has increasingly become popular over the past decade (Hesse-Biber & Leavy, 2011). The rationale for this design is that a single data set is insufficient to answer questions that require different types of data (Creswell & Plano Clark, 2011). Among other reasons, triangulation is the key to mixed-methods design that, through the use of different methods, produce more insightful, logical, and comprehensive results. It leads to an increase in validity of research. Complementarity and expansion are two other reasons for this design. While complementarity enables researchers to elaborate, enhance, illustrate, and clarify research results from different methods, expansion seeks to broaden a breadth of inquiry or phenomena. Moreover, expansion allows mixed-methods research to gain information about different phenomena allowing for a range of possible explanatory factors instead of strengthening a single conclusion about a phenomenon (Greene, Caracelli & Graham, 1989; Bryman, 2006; Creswell & Plano Clark, 2011; Hesse-Biber & Leavy, 2011; Maxwell, 2013).

Bryman (2006) and Creswell and Plano Clark (2011) identify other reasons for mixed-methods design. First, this design allows researchers to offset weaknesses of one method

with strengths of another. Second, it renders completeness of a study by allowing the researchers to draw together a more comprehensive account of the area of study. Third, the researchers are able to address different research questions in a single study. Fourth, qualitative research can be used to explain findings of quantitative research and vice versa. Fifth, the use of this design helps enhance credibility and integrity of research findings. Sixth, the researchers are able to use qualitative data to create hypotheses and subsequently test them using a quantitative approach within a single study. Last, mixed-methods design allows the use of one method to facilitate sampling of respondents or informants of another method (Bryman, 2006; Creswell & Plano Clark, 2011).

Creswell and Plano Clark (2011) identify six major mixed-methods designs: convergent parallel design, explanatory sequential design, exploratory sequential design, transformative design, and embedded design. While these designs serve different purposes depending on research problems, Teddlie and Tashakkori (2009) argue that a choice of an appropriate mixed-methods design is determined by the nature of research questions. To further extent, researchers may also have to generate their own design with flexibility and creativity through, for instance, a combination of the existing mixed-method designs, since there are specifically no perfect-fit designs for particular mixed-methods research studies (Teddlie & Tashakkori, 2009).

Among the mixed-methods designs mentioned above, the convergent parallel design and the embedded design are the two most appropriate for the research questions of this research, as they require different types of data. For Creswell and Plano Clark (2011), researchers adopting the convergent parallel design to collect equally important and complementarily qualitative and quantitative data on the same topic to compensate weaknesses of one method with strengths of the other. The data are collected separately but concurrently and analysed independently, based on their respective research designs. Initial results from both methods are directly compared, contrasted, and subsequently merged into an overall interpretation allowing the researchers to assess whether both sets of results diverge and converge from or related to each other. The merged results create a more complete understanding of a study purpose (Creswell & Plano Clark, 2011).

On the other hand, researchers using the embedded design are able to enhance an overall research design by combining qualitative and quantitative methods and embed within a larger design. In this regard, they collect one data set to provide a supportive and

supplementary role to another within, for instance, an embedded mixed-methods case study (Creswell & Plano Clark, 2011). The case study is a placeholder to collect both data sets to examine a case (Luck, Jackson & Usher, 2006; Creswell & Tashakkori, 2007; Creswell & Plano Clark, 2011). The next section discusses the case study approach in more detail. For Creswell and Plano Clark (2011), the difference between the convergent parallel and embedded designs is that research findings of the former are merged to create a better understanding of an overall result, while those of the latter can be interpreted separately as they have related but different purposes.

Therefore, mixed methods design is most well-suited for the research questions of this research. First, owing to the need for different research methods, this design makes possible a joint use of the Diamond model and the works accomplished by innovation and knowledge network theorists to assess the competitiveness of the AgBio cluster and the influence of intermediaries on its competitiveness. Second, the mixed-method approach offers an embedded design that allows the use of different types of data: qualitative data associated with the Diamond model, quantitative innovation data for examining the innovativeness of cluster members (OECD, 2005), and data gathered from secondary sources including reports and statistical sources. While this research employs the data for supporting and supplementing purposes, related findings associated with the cluster Diamond, innovative capabilities of member members, and the influence of intermediaries can be interpreted separately. Last, this design permits triangulation that increases validity and broadens the research inquiry. The breadth of the inquiry allows this study to draw together a more comprehensive account related to the cluster competitiveness. This results in more complete and an increase in validity, credibility, and integrity of research findings.

4.2.3.1. *Research techniques for cluster studies*

According to Wolfe and Gertler (2004) and Asheim, Cooke and Martin (2006), there is a lack of a universally-accepted methodology among studies on cluster dynamics, structure, and formation. In this regard, Roelandt and den Hertog (1999) argue that cluster methodologies differ in their use of research techniques. These research techniques include input-output analysis, graph analysis, and correspondence analysis. Input-output analysis and graph analysis focus on trade and network linkages, particularly relationships among heterogeneous actors in inter-organisational networks, making use of input-output

tables and innovation interaction matrices (Roelandt & den Hertog, 1999). For instance, Hauknes (1999) and DeBresson and Hu (1999) use input-output analysis innovation interaction matrices respectively to identify clusters.

On the other hand, the correspondence analysis including canonical correlation, factor analysis, multi-dimensional scaling, and principal components analysis is used to identify categories or groups of firms or industries that possess similar styles of innovation (Roelandt & den Hertog, 1999). Furthermore, qualitative case studies have been used by various countries including Denmark, Finland, Italy, Sweden, the Netherlands, and the U. S., which mainly use Porter's Diamond model as a framework to analyse competitiveness (Roelandt & den Hertog, 1999; Roelandt, den Hertog, van Sinderen & Van den Hove, 1999). Likewise, there have also been cluster studies in New Zealand that adopt the qualitative case study approach (Perry & Goldfinch, 1996; Chetty & Campbell-Hunt, 2003; Simpson & Bretherton, 2004; Chetty, 2004; Perry, 2007a, 2007b; Dana & Winstone, 2008).

4.2.3.2. Case study research technique

Yin (1994) argues that a case study methodology is a preferred research strategy to address 'how' questions, the type of questions being asked in this research. In this regard, a qualitative case study approach using focused interviews is best suited to study a diversity of regional-based innovation dynamics as well as roles of major actors and their relationships within clusters (Bramwell, Nelles & Wolfe, 2008). For Roelandt et al. (1999, p. 316), "case study material reveals detailed information about actors, behaviour and strategies within the cluster network". Furthermore, the case study approach provides more in-depth information, stimulates a debate about strengths and weaknesses of economies and clusters, highlights a role of institutions in facilitating innovation, and paves the way for cluster-specific policies (Roelandt & den Hertog, 1999). Likewise, Peneder (1999) claims that case studies are the most flexible approach to link phenomena related to clusters with policy recommendations. While being used as a placeholder for data collection (Luck et al., 2006; Creswell & Tashakkori, 2007; Creswell & Plano Clark, 2011), the opportunity to collect and use many different sources of data constitutes a major strength of a case study approach (Yin, 1994).

Compared with the other research techniques discussed above, the qualitative case study is best-suited to the purpose of this research, which focuses on the competitiveness of clusters. On the one hand, the appropriateness of the qualitative approach is mainly attributed to the nature of the theoretical foundation used to inform this study. Ketels (2006, p. 133) emphasises that Porter's Diamond model is based on "verbal descriptions and logical reasoning rather than the mathematical models which dominate the economic profession". Likewise, Regional Knowledge System and Spiral model are both founded on qualitative case studies (Smedlund, 2006; Nonaka et al., 1994). On the other hand, the other techniques have limitation in answering the research questions, which require the use of mixed-method design. Furthermore, studies based on these techniques mainly concentrate on trade and network linkages to identify clusters and on innovation styles, while the focus of this study is the competitiveness of clusters.

The case study chosen for this research is the AgBio cluster in the Waikato region of New Zealand. The cluster consists of end-product or service firms, suppliers, firms in related industries, financial institutions, and other institutions providing specialised services such as education, research, training, information, and technical support. Furthermore, intermediaries and KIBS whose roles influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation also present within the cluster. Overall, the AgBio cluster includes organisations with different aspects of business particularly in agricultural technology, food and beverage, R&D services, professional services, and ICT services (Waikato Innovation Park, 2013). The presence of the variety of companies and organisations with different focuses and expertise indicates the characteristics of active business clusters (Gray, 2002).

4.2.3.3. *Rationale for single case study*

As discussed earlier, the embedded mixed-method case study is appropriate for studies seeking to answer different questions that require different types of data. Unlike the convergent parallel design, research findings of the embedded design are not merged to create a better understanding of an overall result allowing them to be interpreted separately (Creswell & Plano Clark, 2011). For this reason, it is most well-suited for the research questions of this research, which adopts a single-case embedded case study involving "multiple levels of analysis within a single study" (Eisenhardt, 1989, p. 534). A rationale for the single-case study is that data from one instance is adequate to

accomplish the objectives of the case (Dul & Hak, 2008). Furthermore, the case is descriptive in nature as it uses reference theories or models to direct data collection and case description (Scholz & Tietje, 2002). In this regard, the theoretical foundation (Creswell & Plano Clark, 2011; Crotty, 1998) used to inform this study are Porter's Diamond model, Regional Systems of Innovation (Peters, 2006), and Regional Knowledge System (Smedlund, 2006) together with Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998).

Furthermore, the competitiveness of clusters can be defined by the competitiveness of other clusters abroad (Teigland & Lindqvist, 2007). For instance, a research method of competitiveness in the U.S. involves comparisons with the time span of several years (Czakó, 2003). Nevertheless, the relative competitiveness of clusters is more meaningful to compare nations with similar characteristics in terms of economic development and competition in similar industries, for instance, comparing the competitive position of Korea with Taiwan rather than with the U.S. (Moon & Cho, 2000). For this reason, this research does not seek to compare the AgBio cluster with other clusters in New Zealand or abroad, to determine its relative competitiveness. Such comparison may risk producing results that do not represent reality, as clusters in New Zealand are different in their characteristics including areas of specialisation, ages, number of members or size, involvement of public agencies, and membership fees (Perry, 2004). The comparison with a foreign cluster may also be less meaningful, owing to potential differences such as the nature of business environments in locations where they locate. Furthermore, the time span required to study relative competitiveness of clusters, as emphasised by Czakó (2003), is beyond the scope of this research.

4.2.4. Research instruments

As discussed earlier, this research adopts a two-level theoretical foundation, with the incorporation of three theoretical approaches related to the regional business environment, Regional Systems of Innovation (RSI) – the related concept based on the National Systems of Innovation (NSI) (Peters, 2006, p. 21; Lundvall, 1992, 2007; Roelandt & den Hertog, 1999), and Regional Knowledge System (Smedlund, 2006). This theoretical foundation is particularly informed by Porter's Diamond model (Porter, 1998a, 2000), the Community Innovation Survey (CIS) (Smith, 2005; Inzelt, 2003), and Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). This

research also utilises existing literature on intermediaries, to examine how knowledge is created and dispersed through the cluster by the action of intermediaries. In this regard, these theoretical approaches form a guideline for collection and analysis of data. They subsequently help answer the research questions: (1) how can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms; (2) how do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation.

Research question one requires qualitative data collected through semi-structured interviews, guided by Porter's Diamond model. Quantitative data gathered through CIS-style questionnaires and from secondary sources are also needed. For research question two, this research collects qualitative data through semi-structured interviews. The data collection is guided by Nonaka's Spiral model, together with the extant literature on intermediaries. The qualitative data for both research questions are collected through the interviews with the cluster members at Waikato Innovation Park. While the quantitative data are gathered through the questionnaire from the same interviewees, the aim is also to collect from those unable to participate in the interviews. This strategy potentially maximises the response rate for the survey. Overall, each of the three data sources individually addresses specific components of the research questions. They, nevertheless, collectively complement each other and provide comprehensive answers to these questions (Refer to Figure 5).

At the commencement of data collection, the Participant Information Sheets are mail out inviting potential participants to partake in the interviews and/or the questionnaire survey. Some of the respondents reply to the initial engagements and agree to participate. For Kasim and Al-Gahuri (2015), to gain a deeper understanding of a phenomena under study demands undivided commitment from researchers. In this regard, follow-up invitations are sent out to those unable to respond after ten working days through phone calls and e-mails. This follow-up process is carried out more than once with some respondents, owing to their busy schedules. The follow-ups result in further recruitment for this research. Besides the non-face-to-face invitations and follow-ups, this research also adopts a site-visit approach to recruit remaining respondents. While this strategy successfully allows further recruitment, other potential respondents decline the invitation. During the site visits, one potential respondent agrees to partake in the research but only the next few

months. Nevertheless, the data collection ends before the agreed time. Furthermore, with the completion of each interview, a questionnaire is handed to the interviewee aiming to ensure an overall high response rate. After finishing all the interviews, another round of follow-ups is carried out reminding those have not returned the questionnaires. The following sections detail theory-based interview protocols, pilot interviews, sampling and data saturation, semi-structured interviews, and CIS-style questionnaires.

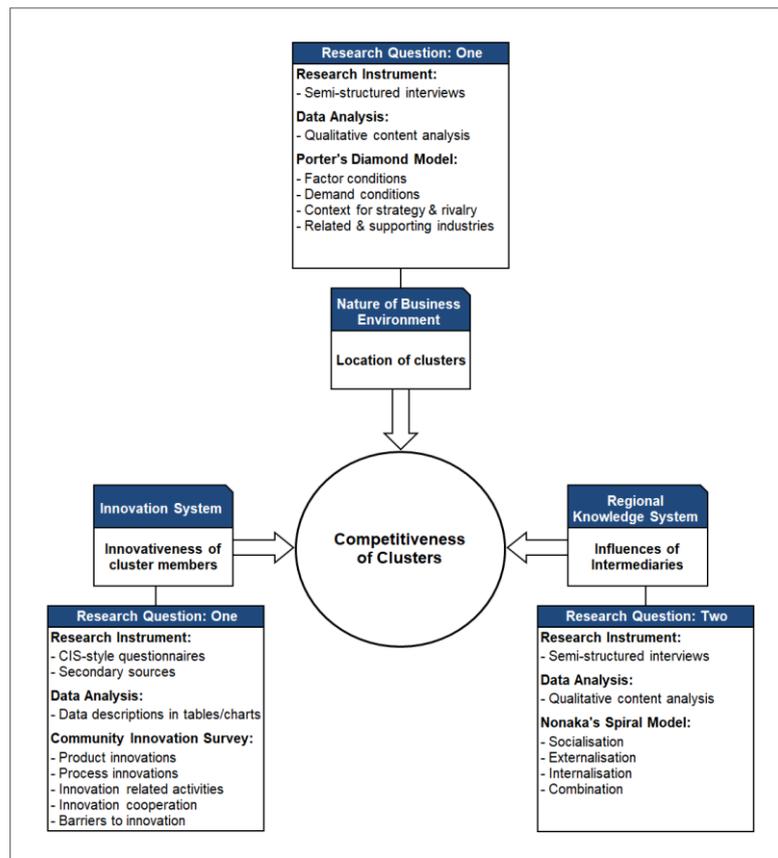


Figure 5: Research instruments

Source: Own creation

4.2.4.1. *Theory-based interview protocols*

According to Jacob and Furgerson (2012), an interview protocol is a procedural guide designed to direct qualitative researchers through an interview process, to elicit detailed and meaningful information from interviewees. The aim is to standardise data collection and to match specific questions to particular interviewees (Gugiu & Rodríguez-Campos,

2007). In this regard, the interview protocol ensures the collection of relevant data necessary for addressing research questions (Cheung & Boutté-Queen, 2010). Furthermore, it helps reduce the tendency of premature conclusion of the interview leading to incomplete data, redundancy, and disproportionate or excessive focus on specific information. As a result, the interview protocol maximises comprehensiveness of data (Gugiu & Rodríguez-Campos, 2007).

Besides a set of questions, an interview protocol also includes scripts helping with what to say prior to and at the conclusion of an interview and prompts to remind researchers information needed to be collected (Jacob & Furgerson, 2012). Likewise, Rabionet (2011) emphasises that the interview protocol comprises two main components: how interviewers introduce themselves to interviewees and what are questions being asked. The first component of the protocol helps the interviewers build rapport with the interviewees. It also includes a statement of confidentiality, consent, an option to withdraw from the research participation. The second component involves the development of interview questions accompanied by probes. In this regard, literature review of relevant past research is the best resources for developing the interview protocol (Rabionet, 2011).

This research develops a theory-based interview protocol with the guideline of studies by Jacob and Furgerson (2012). The interview protocol includes a table to gather details of interviews: company, interviewees, job title, location, and date/time. At the beginning, the protocol also introduces the aim of the research to the interviewees and relevant information about their companies. The latter acts as a reminder to the researcher about the participating companies and helps build rapport. With the aim to elicit detailed and meaningful information, this research employs open-ended questions, for instance, “Please give examples of how the workforce in Waikato meet the needs of your organisation?” In this regard, the interview questions are relatively broad, designed to allow for a free flow of information from the interviewees without unnecessary interruption with many small questions. Nevertheless, the interview protocol also includes probes and prompts for the main questions, to direct the interviewees through pre-specified elements have not answered and to keep the interviews on track.

The interview protocol of this research encompasses two different sets of questions guided by Porter’s Diamond model and Nonaka’s Spiral model respectively. The first set

of questions is designed around four broad themes, the four determinants of Porter's Diamond model. They form an environment promoting a cluster of competitive industries and companies (Porter, 1998a) and determine whether a particular location provides an environment that allows the companies to successfully compete (Clark & Guy, 1998). The determinants are factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry (Porter, 1998a, 2000; Crocombe et al., 1991). In this regard, the interview protocol seeks to assess the cluster competitiveness by examining the business environment of its location. On the other hand, the second set of interview questions is founded on the Spiral model of knowledge creation, which encompasses four modes of knowledge conversion: tacit-to-tacit, explicit-to-explicit, tacit-to-explicit, and explicit-to-tacit (Nonaka, 1991, 1994, 2007). With these questions, this research examines how knowledge is created and dispersed through the cluster by the action of intermediaries (Refer to Appendix E for the interview protocols).

4.2.4.2. Pilot interviews

According to Rabionet (2011), the quality of interview protocols demands refinement through seeking consultation, guidance, and feedback from experts. Their feedback, through pilot interviews, helps enhance the quality and reliability of the protocols (Castillo-Montoya, 2016; Jacob & Furgerson, 2012; Rabionet, 2011; Kvale & Brinkmann, 2009). Likewise, Burns and Grove (2009, 2001) and Kvale and Brinkmann (2009) stress that interviewing is a skill that requires practice. Therefore, Tod (2010) and Burns and Grove (2009, 2001) emphasise on the need for piloting interviews, prior to initiating actual interviews.

This gives researchers an opportunity to practice (Tod, 2010) and to become more familiar with the content of interviews (Burns & Grove, 2009, 20001). By the same token, they are also able to test and refine interview questions (Tod, 2010), to identify problems associated with the design of and the sequence of the questions as well as a procedure for recording responses, and to assess the validity and reliability (Burns & Grove, 2009, 20001). Furthermore, pilot interviews allow the researchers to better estimate a realistic time required to complete each interview (Castillo-Montoya, 2016; Burns & Grove, 2009, 20001) and to gain valuable experiences (Tod, 2010). As a result, they are able to make an improvement and become more confident in interviewing (Kvale & Brinkmann, 2009).

Therefore, this research pilots the interview protocol, to simulate the actual interviews. Four pilot interviews were carried out with directors, a manager, and a business analyst of the AUT University commercialisation arm and research centres. The interviews offer opportunities to test and refine the interview questions and their sequences, to improve note-taking and time-management skills, and to seek feedbacks. For instance, one of the interviewees made suggestions related to an alternative formulation of interview questions, a realistic time frame for each interview, and a procedure for recording responses. As a result, the piloting allows an improvement to be made to the interview protocol of this research.

4.2.4.3. *Sampling and data saturation*

Francis, Johnston, Robertson and Glidewell (2010) stress the importance of sample size in qualitative research, as an inappropriate use of sample size may become counter-productive and significantly influence research results. The use of samples smaller than needed does not allow researchers to claim having achieved informational redundancy (Fawcett & Garity, 2009; Sandelowski, 1995) and, therefore, the results may not be informative and transferable (Francis et al., 2010). On the other hand, overly large sample sizes and repetitive data may impede or render in-depth analysis very difficult (Roy, Zvonkovic, Goldberg, Sharp & LaRossa, 2015; Lareau, 2012; Fawcett & Garity, 2009; Sandelowski, 1995) and lengthier and also increases research fatigue (Wray et al., 2007). Furthermore, it is also hard to present results of studies with large samples (Lareau, 2012). For this reason, Wray et al. (2007) claim that qualitative research cannot be judged based on a paradigm of quantitative studies.

In this regard, data saturation, being frequently reported in qualitative research, becomes 'the gold standard' (Guest, Bunce & Johnson, 2006, p. 60) or criterion for ensuring the adequacy of purposive sample sizes for content validity and also the quality of data (Guest et al., 2006; Fawcett & Garity, 2009; Francis et al., 2010; Kerr, Nixon & Wild, 2010; Walker, 2012). It is a point during a data collection period at which no relevant or new information, but repetitions, may be obtained from additional participants and, as a result, no emergence of new themes or categories (Morse, 1995; Guest et al., 2006; Wray, Markovic & Manderson, 2007; Given, 2008; Fawcett & Garity, 2009; Francis et al., 2010; O'Reilly & Parker, 2013). Subsequently, researchers conclude the collection activity, as additional data are deemed redundant (Fawcett & Garity, 2009; Given, 2008).

Data saturation is contingent on a particular research method, a sampling strategy (Fawcett & Garity, 2009; Sandelowski, 1995), as well as a context or purpose of study (Fawcett & Garity, 2009; Given, 2008; Sandelowski, 1995). Therefore, Sandelowski (1995) asserts that different qualitative methods call for different sample sizes. For instance, phenomenological research includes approximately six participants whereas ethnographical and ground theory studies about 30 to 50 interviews and/or observations (Sandelowski, 1995). For Fawcett and Garity (2009), phenomenological studies may involve ten or fewer participants, while ground theory and ethnographical research are frequently conducted with 20 to 30 participants and 25 to 50 informants respectively. Furthermore, Given (2008) asserts that a sample size of 15 to 20 participants is deemed appropriate for saturation of themes or categories, to some qualitative researchers.

Regardless of these approximations, guidelines are virtually non-existent, to establish non-probabilistic sample sizes (Guest et al., 2006). Walker (2012), Francis et al. (2010) and (Morse, 1995) similarly stress the absence of a clear guideline or agreed method to determine data saturation. Therefore, ascertaining adequate sample sizes in qualitative research ultimately involves researchers' proclamation, judgement or justification, to decide at which point of data collection leads to diminishing return, whether new details contribute little to research results (Fawcett & Garity, 2009; Given, 2008; Morse, 1995). Furthermore, besides the own proclamation, the researchers determine data saturation by evaluating the comprehensiveness of their research results (Morse, 1995).

According to Francis et al. (2010), researchers may justify the claim of having achieved data saturation if using an appropriately diverse sample. Furthermore, in semi-structured interview-based studies with pre-established constructs or conceptual categories founded on existing theories, data saturation is evidenced by having content domains of those categories adequately populated. This subsequently results in content validity (Francis et al., 2010). Regarding to the pace of saturation, Morse (1995) claims that "the tighter and more restrictive the sample and the narrower and more clearly delineated the domain, the faster saturation will be achieved" (Morse, 1995, p. 148). For Given (2008) and Morse (1995), the researchers may also be able to reach more quickly when the sample is cohesive, all participants belong to the same demographic group. In this regard, the more similar the chosen participants, having common criteria or characteristics, the sooner data saturation is reached (Guest et al., 2006; Morse, 1995).

For Fawcett and Garity (2009), data saturation is attainable with a relatively small sample. In this regard, Guest et al. (2006) argue that qualitative research aiming to understand a shared belief, perceptions, or experiences among a relatively homogeneous group require smaller sample sizes than those seeking to assess differences between two or more distinct groups. Furthermore, Romney, Weller & Batchelder (1986) stress the sufficiency of having small sample sizes, to provide accurate and complete information within a particular cultural context, if participants have a high degree of expertise or knowledge about the domain of inquiry.

This research aims to recruit and collect data until reaching saturation. While the researcher's judgement contributes to the claim of having achieved that, it largely relies on the recommendations or strategies laid out by the various scholars regarding the justification for data saturation. First, this research is particularly based on judgement sampling. It involves an active selection of the most productive sample, which helps answer the research questions. With this strategy, a sample selection demands an effort from researchers to ensure that participants come from a range of different backgrounds (Marshall, 1996). According to Morse (1995), this non-probabilistic sample allows data saturation compared with a random sample, which may not be theoretically appropriate and produces poor informants. For this reason, this research draws a representative sample from the 48 population of the AgBio cluster based in the Waikato Innovation Park.

Second, owing the diversity of the cluster members, the sample chosen for this study is inherently diverse. As a result, the sample chosen covers all aspects of business that constitute the AgBio cluster: agricultural technology, food and beverage, R&D services, professional services, and ICT services. Furthermore, the size and scale of the cluster members vary from small and early stage firms to large and multinational corporations. Third, the sample of is also inherently cohesive, being drawn from the same demographic group based in Hamilton, the Waikato region. Fourth, the participants chosen for this study are from a single homogenous group, members of a single cluster – the AgBio cluster. Fifth, the participants are senior members or owners of their respective companies and, therefore, develop a high degree of expertise or knowledge about the domain of inquiry, the competitiveness of the AgBio cluster members. Sixth, owing to the small size of the cluster with merely 48 companies based within the Waikato Innovation Park, the sampling is subsequently tight, restrictive, and clearly delineated. Last, the semi-

structured interviews questions are guided by pre-established constructs or conceptual categories founded on existing theories – the Diamond model and the Spiral model. This helps ensure that the content domains of those categories are adequately populated and, subsequently, content validity (Refer to Figure 6-8).



Figure 6: The AgBio cluster by industries
(Waikato Innovation Park, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g)

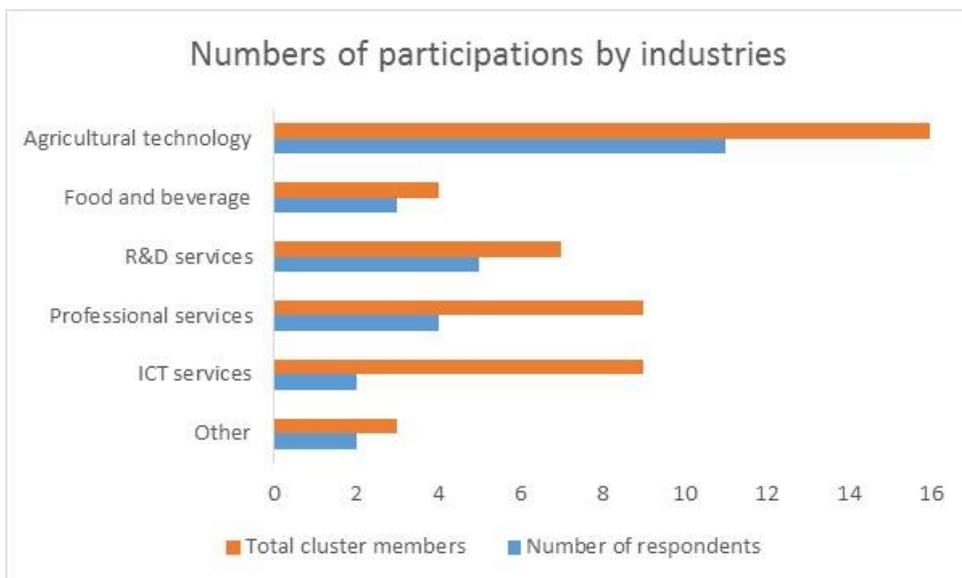


Figure 7: Numbers of participations by industries
(Waikato Innovation Park, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g)

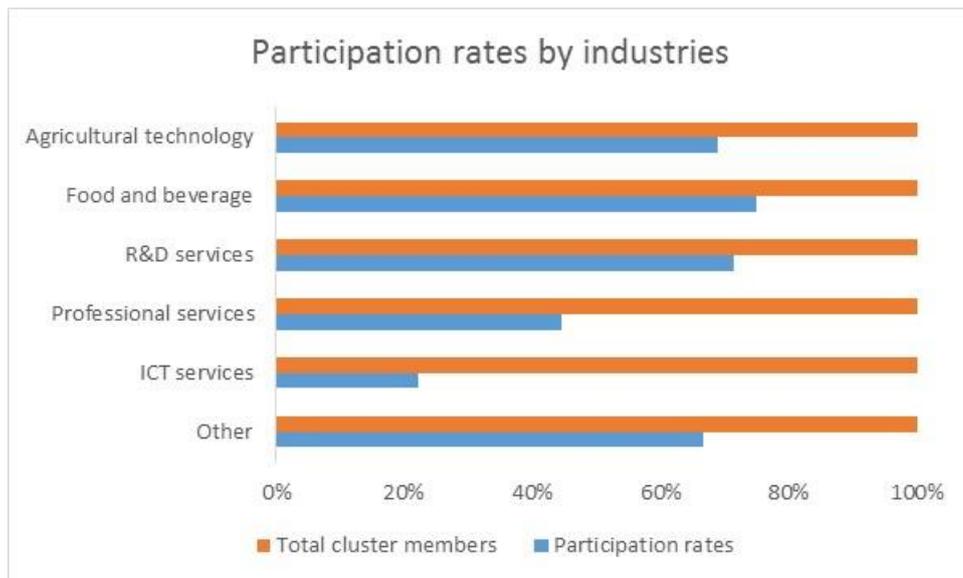


Figure 8: Participation rates by industries

(Waikato Innovation Park, 2016a, 2016b, 2016c, 2016d, 2016e, 2016f, 2016g)

4.2.4.4. *Semi-structured interviews*

According to Austrian (2000, p. 100), “interviews are a key tool in learning the specifics about the cluster operation and the interaction between the firms (i.e., the buyers and sellers), institutions (e.g., universities, research labs), and other supporting infrastructures (e.g., non-profit intermediaries) that make up the cluster”. They also allow researchers to collect valuable micro data related to cluster studies (Peneder, 1999). In this regard, this research seeks to interviews with a variety of the cluster members representing end-product or service companies, companies in related and supporting industries, and institutions providing services including education, research, training, information, and technical support. It targets the cluster members that engage in respective business activities and those that also perform intermediating roles. The objectives are to assess the quality of the regional business environment in which the cluster locates and to examine how knowledge is created and dispersed through the cluster by the action of intermediaries.

Relying on the approximation of sample sizes needed for data saturation recommended by previous scholars, this research, therefore, aims for 30 interviews with respondents at the management level. They include managers, directors, chief executive officers, or business owners. These respondents are selected based on their relevant knowledge of

subjects being examined, to obtain significant insights into how competitiveness is created in a cluster under study. Their contact details are obtained via secondary research for publicly available information such as trade directories and company websites. They are also identified through recommendations from those who already participated, as well as site visits to Waikato Innovation Park. After completing the data collection, 18 interviews were conducted with 18 respondents representing 19 cluster members. Based on the recommendations or strategies laid out by the various scholars together with the researcher's judgement, this research is able to justify the claim of having achieved data saturation.

With a rich and significant amount of data elicited, transcription is key, especially to those conducting interviews (Hesse-Biber & Leavy, 2006). For this reason, a permission is sought from a participant to record an interview with a digital recorder, prior to commencing each interview. The digitally-recorded interviews are subsequently transcribed for analysis. Refer to the subsequent section on strategies for data analysis for further details. The interviews are divided into two sections. First, regarding to research question one, all respondents are asked a series of questions structured into four determinants of Diamond model: factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry (Porter, 1990, 1998a, 1998b, 2000). The aim is to elicit detailed and meaningful data that help assess the quality of regional business environment. Government and chance are two external factors (Porter, 1998a, 2000; Crocombe, Enright & Porter, 1991) but not a central focus of the model (Gugler & Brunner, 2007; Jin & Moon, 2006; Davies & Ellis, 2000). Likewise, these external factors are not the focus of this research and, therefore, not incorporated into the interview protocols.

Second, interviews are carried out with six respondents representing seven cluster members classified as intermediaries and KIBS. These interviewees are Respondent A, Respondent M, Respondent R, Respondent N, Respondent E, and Respondent H. Informed by Nonaka's Spiral model, interview questions are structured into four categories: socialisation, combination, externalisation, and internalisation (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). The extant literature on intermediaries is also used as a basis for the interview questions. Subsequently, the interviews with these respondents produce data that allow an examination of how knowledge is created and dispersed through the cluster by the action of the intermediaries. Some of the respondents are also

asked a similar set of questions, to corroborate the role of the intermediaries in knowledge creation and dispersion as well as to determine how knowledge is created and dispersed within their companies without being facilitated by the third parties. They are Respondent I, Respondent O, Respondent L, Respondent P, Respondent B, and Respondent F.

Owing to distinctive business focuses of each cluster member, the respondents may be asked dissimilar or excluded from certain questions. Time constraint also influences numbers of questions or what being asked during the interviews, prioritising those most relevant to their business focuses. In relation to research question one, except for Respondent E, all the respondents are asked questions related to the four determinants of Diamond model. Nevertheless, certain questions are excluded from the interview protocols, owing to irrelevancy. For instance, Respondent R is only asked about factor conditions, as the other determinants are all irrelevant. For research question two, Respondent A is not asked questions related to the combination, as their company does not perform a role related to this mode of knowledge creation. Furthermore, in relation to the Spiral model, Respondent I, Respondent O, Respondent L, Respondent P, Respondent B, and Respondent F are only asked questions that are relevant to their business focuses. Likewise, this set of questions are not relevant to Respondent Q and, therefore, excluded from the interview.

Although the dissimilarity and exclusion of questions may undermine the element of consistency, asking non-relevant questions, however, is potentially counter-productive. With time constraint, it diverts the interviews from more important issues related to respective respondents. Furthermore, to a certain extent, non-consistency may be the result, as the interviews are carried out with a variety of heterogeneous cluster members ranging from small to large companies as well as government and education institutes.

4.2.4.5. *Innovation survey*

This research employs an innovation survey built around a pre-existing Community Innovation Survey (CIS) of the European Commission. This survey is based on a combination of the CIS3-CIS7. The aim is to collect information about innovation, during the three-year period between 1 April 2011 and 31 March 2014, that allows an examination of innovativeness of the cluster members at Waikato Innovation Park. This research, based on the CIS, defines innovation as new or significantly improved goods or

services and/or processes used to produce or supply all goods or services that the cluster members have introduced, regardless of their origin. These may be new to their businesses or new to the market. Innovation-related activities such as purely organisational or managerial changes are also deemed innovation. The innovation data collected complement data gathered through the semi-structured interviews, to help answer the research question one. According to OECD (2005), with responses to innovation questionnaires are always incomplete, they are designed to be as simple and short as possible and instructions and questions are clearly formulated, to obtain a satisfactory response rate.

The CIS-style questionnaires comprise of 19 questions classified into six sections. The first and second sections comprise questions related to product (good or services) innovation and process innovation respectively. These includes an introduction of new or significantly improved goods and/or services and methods, any involvement of third parties, and whether the innovations are new to the market and/or businesses. The first section also seeks to discover turnover from goods and/or services, which are new to the market and/or the businesses, significantly improved, and unchanged. The third section, concerning innovation-related activities, seeks information on major changes in new business practices for organising procedures, new methods of organising work responsibilities, decision making and external relationships with other businesses, and implementation of changes to marketing concepts or strategies. Within this section, the respondents are also asked about design activities, training, prototyping, internal and external R&D, and acquisition of advanced machinery, equipment, software, and intellectual property rights.

Furthermore, the section four of the questionnaires consist of questions asking the respondents about different sources of information and knowledge, in terms of their importance to innovation, as well as cooperation for innovation with other businesses, organisations or institutes. The fifth section focuses on the availability of financial and/or non-financial supports for innovation from the government and constraints on innovation. These include both cost and knowledge constraints, as well as the availability of previous innovations and the lack of demand. Last, the final section seeks general information related to geographic markets in which the cluster members sell their products (goods or services) and numbers of their employees (Refer to Appendix I for the CIS-style questionnaire).

This research targets the entire population of the AgBio cluster, as many of New Zealand clusters are relatively small in size in terms of membership (Perry, 2004). This is carried out through direct requests to the respondents, at the end of the semi-structured interviews. Further efforts are made through site visits to companies at Waikato Innovation Park, which do not partake in the interviews. Contacts of the non-participants are identified through secondary research for publicly available information such as trade directories and company websites, as well as the visits to their companies. As discussed earlier, the participants include managers, directors, CEOs, or business owners. At the management level, they are more likely to develop a greater relevant knowledge of subjects being examined, to obtain significant insights into innovativeness of the cluster members.

The questionnaires are handed out along with stamped envelopes for the respondents to mail back upon completion at a later date. After completing the data collection, 12 of the interviewees representing 13 cluster members agree to complete the questionnaires whereas another cluster member chooses to partake in the survey but not the interview. As a result, 13 respondents from 14 companies complete and return the questionnaires with the envelope provided. These constitute about 29 per cent of the cluster members based at the Park. The conclusion of the data collection process is the result of the lack of further participations rather than the researcher's judgement. While the response rate for the questionnaires is relatively lower than that for the semi-structure interviews, this research covers all the aspects of business representing the AgBio cluster that particularly include agricultural technology, food and beverage, R&D services, professional services, and ICT services. Furthermore, data generated by the questionnaires are complemented by innovation data produced by the Waikato Innovation Park. These secondary data are made available at the premises of the Park.

4.3. Analysis of interview data

According to White and Marsh (2006), Hsieh and Shannon (2005) and Spannagel, Gläser-Zikuda and Schroeder (2005), qualitative content analysis is a highly flexible research method, widely applied to a broad range of studies with varying objectives and goals. It is the most prevalent method for the analysis of qualitative documents (Bryman, 2004).

Falk, Brynhildsen and Ivarsson (2009), Spannagel et al. (2005) and Downe-Wamboldt (1992) assert that this approach provides a systematic means for making valid inferences from or for analysing verbal or written data, to describe specific phenomena under study. This involves a subjective interpretation (Hsieh & Shannon, 2005; Graneheim & Lundman, 2004) and demands an intensive examination, to classify a large volume of qualitative data into a more efficient number of categories representing similar meanings (Weber, 1990; Hsieh & Shannon, 2005; Moretti, van Vliet, Bensing, Deledda, Mazzi, Rimondini, Zimmermann & Fletcher, 2011).

Therefore, content analysis is primarily a data-coding operation (Berg, 2007) through which codes are applied to textual materials before being amenable to analysis (Berg, 2001). In this regard, coding allows organisation and management of a large volume of raw data (Richards, 2015; Silverman & Marvasti, 2008; Gibbs, 2007; Maxwell, 2005; Berg, 2001). The process involves fracturing and rearranging the data into different categories or themes (Maxwell, 2005). Passages exemplifying the same activities, explanation, ideas, or phenomena can be assigned to the same codes (Gibbs, 2007). Subsequently, the coding operation helps examine the data in a structured way (Gibbs, 2007) and form a list of codes (Gibbs, 2007; Maxwell, 2005) that allows a comparison between different ideas in the same category (Maxwell, 2005) and an understanding of patterns in the data (Richards, 2015; Silverman & Marvasti, 2008; Gibbs, 2007; Maxwell, 2005; Berg, 2001).

Hsieh and Shannon (2005) identify three distinct approaches of qualitative content analysis: conventional, directed, and summative (Refer to Figure 9). Conventional content analysis is appropriate when there is a limited amount of existing theories or relevant past research. Nevertheless, it renders direct information gained from research participants' unique perspectives without being subject to preconceived theoretical perspectives. On the other hand, directed content analysis approach relies on existing theories or research findings as guidance for developing a coding scheme (Hsieh & Shannon, 2005; Kohlbacher, 2006; Burla, Knierim, Barth, Liewald, Duetz & Abel, 2008). Researchers may develop additional codes and be able to revise and refine the initial coding scheme. In this regard, directed content analysis approach allows an efficient extension, enrichment, and refining of existing theories. In comparison, a coding operation associated with summative content analysis involves identification and quantification or counting of certain words in textual materials (Hsieh & Shannon, 2005).

Conventional and directed qualitative content analysis are respectively associated with inductive and deductive approaches (Hsieh & Shannon, 2005; Moretti et al., 2011). With the inductive approach, researchers derive concepts from data collected, without identifiable theories to guide a coding scheme (Elo & Kyngäs, 2008; Potter & Levine-Donnerstein, 1999). This involves open coding though which categories are freely generated and formulated from the data though the researchers' decisions and interpretation (Elo & Kyngäs, 2008; Elo, Kääriäinen, Kanste, Pölkki, Utriainen & Kyngäs, 2014). On the other hand, deductive content analysis relies on existing theories, models or relevant past research for structuring data analysis (Elo & Kyngäs, 2008; Spannagel et al., 2005; Mayring, 2000; Potter & Levine-Donnerstein, 1999).

Regardless of the approaches, qualitative content analysis deals with manifest and latent content in textual materials. The analysis of visible and obvious components is regarded as manifest content analysis, while the latent content analysis is associated with interpreting the underlying meanings of texts (Graneheim & Lundman, 2004; Potter & Levine-Donnerstein, 1999). Furthermore, qualitative content analysis also involves the choice between different techniques of coding: field coding and office coding (Sapsford & Jupp, 2006; United Nations, 2005; Bradburn, Sudman & Wansink, 2004; Oppenheim, 2001).

Field coding is concurrently carried out during the time of interviews (Sapsford & Jupp, 2006; Oppenheim, 2001) and, therefore, less practical technique, owing to the pressure created performing the two tasks at the same time (Bradburn et al., 2004). In contrast, researchers perform office coding after data collection, under more tranquil or controlled environments (Sapsford & Jupp, 2006; United Nations, 2005; Oppenheim, 2001). These environments allow uniform applications of coding procedures, more appropriate categories, modifications or re-coding, reliability checks, and coding consistency (United Nations, 2005; Oppenheim, 2001). Although the office-coding technique increases distance from data source, it is recommended over field-coding (United Nations, 2005).

This research applies the directed approach to qualitative content analysis, to examine the competitiveness of the cluster and the influences of intermediaries on the cluster competitiveness. In this regard, deductive qualitative content analysis is chosen for the analysis of the interview data, based on Porter's Diamond model and the works

accomplished by innovation and knowledge network theorists on Regional Systems of Innovation and Regional Knowledge System (Smedlund, 2006) together with Nonaka’s Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). This research primarily focuses on the analysis of manifest content in the data with the existing theories as guidance and adopts the office-coding technique for implementing a coding operation.

<i>Approaches to content analysis</i>	<i>Research starts with</i>	<i>Timing of defining codes/keywords</i>	<i>Source of codes/keywords</i>
Conventional approach	Observation	Codes identified during data analysis	Codes derived from data
Directed approach	Theory	Codes identified prior to & during data analysis	Codes derived from theories or relevant research findings
Summative approach	Keywords	Keywords identified prior to & during data analysis	Keywords derived from researchers' interest or literature review

Figure 9: Three approaches to qualitative content analysis

Source: (Hsieh & Shannon, 2005, p. 1286)

4.3.1. Phases of qualitative content analysis

According to Elo et al. (2014) and Elo and Kyngäs (2008), regardless of different approaches discussed earlier, qualitative content analysis undergoes three main phases: preparation, organising and reporting. First, at the preparation phase, transcription is key, especially to those conducting interviews (Hesse-Biber & Leavy, 2006). The preparation phase demands researchers to immerse in and make sense of data, to thoroughly read through them (Elo et al., 2014; Elo & Kyngäs, 2008; Graneheim & Lundman, 2004). The aim is to read and think about the data and write down notes and memos, to develop tentative ideas about them (Gibbs, 2007; Hesse-Biber & Leavy, 2006; Maxwell, 2005; Marshall & Rossman, 1999).

The next analytic step involves the selection of a unit of analysis (Elo et al., 2014; Elo & Kyngäs, 2008; Graneheim & Lundman, 2004; Guthrie, Petty, Yongvanich & Ricceri, 2004). The unit of analysis contains a segment of textual materials comprising one piece of information, episode, or idea (Schilling, 2006). It includes a word, sentence, paragraph, and a proportion of pages (Elo & Kyngäs, 2008; Unerman, 2000; Guthrie et al., 2004; Gray, Kouhy & Lavers, 1995). Nevertheless, “there are no established criteria when using content analysis for the size of a unit of analysis, neither the number of informants..., nor the number of pages based on the informants’ own written text or transcribed data”

(Bengtsson, 2016, p. 10). Therefore, the choice of an appropriate unit of analysis involves researchers' judgement (Schilling, 2006), deciding whether to analyse a textual material in its entirety or by dividing into smaller units (Bengtsson, 2016).

At the second phase of qualitative content analysis, researchers undertake a coding operation (Elo & Kyngäs, 2008; Elo et al., 2014), which involves selecting excerpts from data and transforming them into codes (Marvasti, 2004). Subsequently, the final phase involves reporting an analysing process and research findings in sufficient details allowing a clear understanding of how data analysis is carried out as well as strengths and limitations of research (Elo & Kyngäs, 2008; Elo et al., 2014). In this regard, the strategies for processing and analysing the data of this research are in accordance with the three analytic phases identified by Elo et al. (2014) and Elo and Kyngäs (2008), namely preparation, organising and reporting.

4.3.1.1. Preparation phase for interview data

This research aims to conduct interviews with managers, directors, CEOs, or business owners of the members of the AgBio cluster, which also include intermediaries and KIBS performing intermediating roles. The objectives of the interviews are to assess the quality of business environment in which the cluster locates and to identify the intermediaries and KIBS roles in knowledge creation, transfer, and implementation. The respondents are selected to represent end-product or service firms, firms in related and supporting industries, and other institutions providing different services including education, research, training, information, and technical support. At the conclusion of the data collection, with 18 interviews conducted with 18 respondents representing 19 cluster members, saturation and useful participation in the research was complete.

Despite the response rate, this research generates a large amount of data collected through the semi-structure interviews. In this regard, Berg (2001) and Grbich (2007) claim that content analysis is the most obvious approach for analysing interview data and a large amount of written documentation or textual information. This analytical method is a set of procedures for organising useful information from diverse and unstructured sources, which are difficult to combine and analyse (Silverman, 2006). It offers convenience in reducing a large set of data into organised pieces (Marvasti, 2004; Silverman, 2006) and

helps ascertain patterns and trends of words used as well as their relationships (Grbich, 2007).

Furthermore, Bengtsson (2016, p. 10) asserts that “there are no established criteria when using content analysis for...the number of informants or objects to study, nor the number of pages based on the informants’ own written text or transcribed data”. In this regard, although lower than the targeted rate, the response rate constitutes 60 per cent of the target respondents and about 45 per cent of the total population in the AgBio cluster. Furthermore, the interviews cover all the aspects of business representing the AgBio cluster: agricultural technology, food and beverage, R&D services, professional services, and ICT services. As a result, based on the recommendations or strategies laid out by the various scholars, as discussed earlier, together with the researcher’s judgement, this research is able to justify the claim of having achieved data saturation.

With a large amount of data for analysis, based on the standard set of qualitative analytic activities by Berg (2007), the digitally recorded interviews need to be converted into texts and, therefore, are transcribed by a professional transcriber. According to Silverman and Marvasti (2008), knowing one’s own data is essential for effective analysis (Silverman & Marvasti, 2008). For this reason, the next step is to immerse in and make sense of the interview data by thoroughly reading through the transcripts for several times, to become more familiar with the data. Subsequently, with a better understanding, the reading process is followed by the selection of a unit of analysis. Nevertheless, there remains some debate concerning the unit of analysis for content analysis (Gray et al., 1995; Milne & Adler, 1999), owing to a lack of its adequate descriptions (Elo et al., 2014). Furthermore, “there are no established criteria when using content analysis for the size of a unit of analysis” (Bengtsson, 2016, p. 10). Therefore, the choice of an appropriate unit of analysis involves researchers’ judgement (Schilling, 2006). For this reason, this research selects sentences as the basis for coding decision. Sentences, being a unit of analysis, render complete, meaningful, and reliable data for analysis (Guthrie et al., 2004; Milne & Adler, 1999).

4.3.1.2. Organising phase for interview data

According to Gibbs (2007), the technology has positively transformed data analysis in qualitative research. For instance, Qualitative Data Analysis Software (CAQDAS)

enables researchers to efficiently manage, organise, and keep records of all aspects of analysis such as codes, notes, and memos (Gibbs, 2007; Saldaña, 2009; Berg, 2001, 2007). For Weber (1990), software-aided content analysis allows search through and retrieval of relevant words and sentences in the texts. As a result, the use of computer software for content analysis becomes more common, helping reduce the costs of and some of the drudgery associated with coding a large volume of textual materials (Weber, 1990). Word processors and NVivo are two examples of CAQDAS (Berg, 2001, 2007; QSR International, 2015). While the latter offers more advanced and specific features useful for qualitative research, there are some similar features between the two programmes (Silverman & Marvasti, 2008).

Despite the benefits gained, there are also dangers associated with the software-aided content analysis (Gibbs, 2007; Weber, 1990). In this regard, Saldaña (2009) stresses that researchers may focus their mental energies more on the software than on data. Weber (1990) similarly highlights the increase in danger associated mindless content analysis. For instance, the software does not read and think, write meaningful texts, code, and interpret for the researchers (Saldaña, 2009; Gibbs, 2007). Therefore, despite the benefits of the software, the tasks associated with content analysis remain time-consuming and require the researchers' effort and skill, to produce valid and theoretically-interesting research results (Weber, 1990). Furthermore, Gibbs (2007) identifies the researchers' distant feeling from their data as another issue.

This research is primarily software-aided content analysis, using Microsoft Word and Microsoft Excel as tools to assist with the analysis of the interview data, coding. For instance, Microsoft Word enables the use of 'Insert Comment' function to highlight relevant passages, to use the sentences unit of analysis as the basis for coding decision. Morgan (1993, p. 115) asserts that "the difference in applying codes is that qualitative content analysts are much less likely than their quantitative counterparts to use search algorithms that apply codes automatically, preferring instead to rely on careful readings of the data" (Morgan, 1993, p. 115). For this reason, the use of Microsoft Word allows the researcher to immerse in and make sense of the interview data, to become more familiar with own data, while carrying out the thorough readings through the transcripts. Furthermore, it also keeps the researchers closer to the words of the interviewees.

After the selection of an appropriate software to aid the analysis, this research proceeds with a coding operation using office-coding technique, with the guidance of Porter's Diamond model and Nonaka's Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). By adopting the deductive approach to qualitative content analysis, it undertakes a task to develop a categorisation matrix by matching codes with the relevant theory-based categories. The categorisation matrix also includes sub-categories derived from the main categories, which together help explain the competitiveness of the region under study. Although the theories help shape and direct the coding task, this research also opens to relevant categories, sub-categories or codes, which are not pre-established but emerged from the interview data. In this regard, this research involves a certain degree of interpretation as the coding operation proceeds, as discussed by Graneheim and Lundman (2004).

The coding operation begins with 'First-Cycle coding' (Saldaña, 2009, p. 45) followed by 'Second-Cycle coding' (Saldaña, 2009, p. 149). In this regard, Elo et al. (2014, p. 6) claim that "if the deductive approach is used, double-coding often helps to assess the quality of categorization matrix". While the former is, taking place during the initial coding process, relatively simple and direct, the latter requires analytic skills. Nevertheless, the second-cycle coding provides an opportunity to reorganise and reconfigure, merge similar, reassess the utility of infrequent, and discard marginal and redundant codes during the first-cycle coding. The main goal of the second-cycle coding is to develop a smaller but more select and coherent list of codes (Saldaña, 2009).

4.3.1.3. *Competitiveness of the Waikato region*

The researcher undertakes a task as a coder to commence the first-cycle coding, which involves the development of categorisation matrix containing codes matched with the relevant theory-based categories and sub-categories. These categories are four broad determinants representing Porter's Diamond: factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry. These determinants form an environment promoting a cluster of competitive industries and firms (Porter, 1998a). They determine whether a particular location provides an environment that allows firms to successfully compete (Clark & Guy, 1998). In this regard, the determinants of the Diamond model individually and collectively, as a system,

provide a framework to explaining and understanding innovative capabilities, competitiveness, and roles of clusters for economic development (Porter, 1998a, 2000).

Factor conditions include capital, infrastructure, labour, land, natural resources, and climate. Factor conditions are divided into basic and advanced factors. The former consists of climate, natural resources, and semi-skilled or unskilled labour, while the latter comprises a scientific and technological base, skilled labour, and pool of venture capital. The basic factors can be acquired through a passive inheritance or moderate investments but need ongoing investments, for instance, in leading research institutes, universities, and physical and human capital to attain the advanced factors. In this regard, the advanced factors are relatively more important for competitiveness. Demand conditions represent sophisticated and demanding local customers and unusual local demands. They pressure firms to respond to specific needs or meet high standards, based on circumstances and local values, and therefore to innovate (Porter, 1998a; Crocombe et al., 1991).

Related and supporting industries include capable locally-based suppliers and competitive related industries. Close working relationships enable companies of downstream industries to readily access components, machineries, information, and ideas that lead to innovation. These relationships are facilitated by close geographic proximity and are mutually beneficial especially when the companies act as demanding buyers influencing suppliers to innovate. Furthermore, the proximity, in turn, facilitates communication, scientific collaboration, joint development, flow of information and knowledge, and exchange of ideas, knowledge, and innovations (Porter, 1998a). The last determinant is firm strategy, structure, and rivalry. Based on this determinant, success of local companies attracts new entrants leading to a high geographical concentration of locally-based rivalry and, therefore, more intense competition. The competition strengthens competitiveness of their industries and renders them more competitive globally. Strong locally-based rivalry puts pressure on firms to lower costs, upgrade products and production processes as well as workforces, develop specialised technologies, and seek global markets. It also pressures institutions including universities, research centres, and training providers to adapt to specific needs of the competing companies. The local rivalry subsequently spawns related and supporting industries and leads to an upgrade of local demand (Porter, 1998a).

Coding is carried out using the 'Insert Comment' function in Microsoft Word, to name relevant sentences in the transcript with codes that signify their meanings. At the completion of coding for each transcript, similar codes are grouped together and placed into tables in the Microsoft Excel, matching them with relevant theory-based sub-categories and categories. The categorisation matrix contains theory-based categories and sub-categories derived from four determinants representing Porter's Diamond, codes, applicable locations, respondents, excerpts, and respondents' attitudes. As the cluster members under study deal with both internal but mainly external businesses based within the Waikato region, throughout New Zealand, and overseas, the incorporation of applicable locations into the categorisation matrix indicates the presence of both inter-organisational and business relationships within the AgBio cluster and external relationships. While excerpts derived from the transcripts serve as evidence to support the codes and to ensure that the data accurately represent the respondents' voices, the respondents or the cluster members that the respondents represented are abbreviated to two or three letters. In this regard, the main objective is to show how many respondents or cluster members support the codes. The higher the number of respondents indicate the strengths of the arguments during data analysis. Furthermore, respondents' attitudes are based on the researcher subjective perceptions towards the strengths of competitiveness of the Waikato region. Respondents' attitudes are assigned with 'Positive', 'Mostly positive', 'Mixed', and 'Negative'. While 'Positive' represents the highest level of competitiveness, 'Negative' the absence of competitiveness.

The first category of the categorisation matrix, factor conditions, produces three sub-categories: (1) Physical capital, (2) Human capital, and (3) Financial capital. While Physical capital includes one sub-category, (1-a) Strengths of location, Human capital is made up of four sub-categories including (2-a) Strengths of local workforce, (2-b) Difficulties accessing skilled workforce, (2-c) Ramifications of shortage, and (2-d) Panaceas for shortage. The third sub-category, Financial capital, produces five sub-categories such as (3-a) Accessibility to private funding, (3-b) Accessibility to government assistance, (3-c) Recipe for success, (3-d) Ramifications of insufficient financial support, and (3-e) Room for improvement. Overall, the first category of the categorisation matrix produces 15 sub-categories matched to the Physical capital, Human capital, and Financial capital sub-categories. In total, they generate 77 codes out of the sub-categories.

The second category, demand conditions, of the categorisation matrix includes five sub-categories: (1) Differentiation, (2) Sophisticated and demanding customers, (3) Attitudes towards innovation, (4) Challenges dealing with demanding customers, and (5) Strategic approaches to demanding customers. While Differentiation generates 15 codes, Sophisticated and demanding customers includes 15 codes. Attitudes towards innovation has four codes and Challenges dealing with demanding customers contains three codes. Furthermore, there are seven codes attached to Strategic approaches to demanding customers. Overall the second category produces 44 codes out of the sub-categories.

Related and supporting industries, the third category of the categorisation matrix includes seven sub-categories: (1) Influences of proximity on competitiveness, (2) Influences of local related/supporting industries on competitiveness, (3) Local suppliers' differentiations, (4) External related and supporting companies, (5) Suppliers' target markets, (6) Being demanding customers, (7) Potential constraints created by local suppliers, and (8) Room for improvements. Influences of proximity on competitiveness and Influences of local related/supporting industries on competitiveness generate six codes and four codes respectively. Local suppliers' differentiations sub-category includes four codes, while External related and supporting companies has two codes. Suppliers' target markets produce one code and Being demanding customers has 10 codes. Furthermore, Potential constraints created by local suppliers include one code whereas Room for improvements generates three codes. In total Related and supporting industries produce 32 codes.

The last category of the categorisation matrix, Context for firm strategy and rivalry has six sub-categories: (1) Rivalries, (2) Nature of competition, (3) Competitive collaborations, (4) Attitudes towards new entrants, (5) Attitudes towards innovation, and (6) Strategies. While Rivalries include two codes, Nature of competition has four codes. Competitive collaborations and Attitudes towards new entrants generate three code and two codes respectively. Furthermore, Attitudes towards innovation produces two codes whereas Strategies includes seven codes. In total, the last category of the categorisation matrix generates 20 codes (Refer to Appendix F, G, and H).

4.3.1.4. Reporting phase for interview data

The final phase of qualitative content analysis, reporting phase, involves reporting the analysing process and research results in sufficient details allowing a clear understanding, regarding how data analysis is carried out as well as strengths and limitations of research (Elo & Kyngäs, 2008; Elo et al., 2014). In this regard, the following chapters of this research report research findings and discussion, which provide answers to the research questions on:

- How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?
- How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?

4.4. Descriptive analysis of survey data

Innovation surveys produce results that can be used for descriptive analysis, to describe statistical units concerning their innovativeness. While the results are taken without weighting, this form of analysis does not draw conclusions about target population or underlying survey. In this regard, generalisation of the results is impossible. Furthermore, unit non-response rate is not a major drawback (OECD, 2005). The analysis involves descriptive overviews of data results that consist of tables and charts and accompanied by commentary (Smith, 2005; Doloreux, 2004; Cooke & Schall, 2007). Therefore, with the low response rate, this research carries out a descriptive analysis of the innovation data, using a Spreadsheet Software namely Microsoft Excel to tabulate the data and to create charts and graphs. The analysis is carried out on: (1) product innovation; (2) process innovation; (3) innovation-related activities; (4) sources of information and co-operation for innovation; (5) constraints on innovation; and (6) general information about the businesses.

Statistics New Zealand (2010, 2008, 2007) provides a guide to analysing innovation data collected through questionnaires. This guide highlights limitations of the data, in terms of the level of accuracy. For instance, some estimation made by respondents, owing to the lack of record keeping in the form required for the questionnaires, undermines the accuracy. The guide also underlines the risk of comparing results between surveys from the current with those from the past periods. Such comparisons can be misleading, owing to possible changes to questions being asked. This means that the data from the different periods are directly incomparable. The descriptive analysis of the data is built around studies on innovation in New Zealand by Statistics New Zealand. The analysis does not involve comparison with past studies related to innovation of the cluster members, although the secondary data are used as a complement. Furthermore, owing to the low response rate, this research does not seek to compare innovation results based on business size, employment size of the cluster members. Such comparison further subdivides the respondents into different smaller groups.

4.5. Trustworthiness

Trustworthiness of qualitative content analysis addresses issues concerning credibility of research (Graneheim & Lundman, 2004; Elo & Kyngäs, 2008; Elo et al., 2014). First, to achieve credibility, researchers particularly pay attention to sampling strategies or the selection of participants. The participants with heterogeneous backgrounds contribute to a better understanding of the phenomena under study from different perspectives and experiences. Credibility of research also addresses issues concerning the selection of an appropriate unit of analysis and methods of data collection. In this regard, the amount of data generated are essential to credibility. Nevertheless, the amount of data for establishing credibility varies depending on the complexity of research and data quality (Graneheim & Lundman, 2004; Elo & Kyngäs, 2008; Elo et al., 2014).

Second, credibility of research deals with how well categories cover data, to ensure that there is no omission of relevant data. Showing representative excerpts or quotations from transcriptions helps tackle this issue (Graneheim & Lundman, 2004). Third, credibility requires time-consuming and tedious work, which involves frequent returns to the data, for instance, to ensure that an interpretation is in accordance with the data and whether certain aspects are corroborated by other interviewees (Pyett, 2003; Elo et al., 2014).

Furthermore, together with credibility, trustworthiness of qualitative content analysis also deals with transferability of research. Transferability is the extent to which research findings are transferable to other groups or settings. Transferability requires researchers to provide a distinct description of context and to clearly discuss characteristics of participants, methods of data collection, and procedures of analysis. Likewise, a rich and vigorous presentation of the research findings with the inclusion of appropriate excerpts or quotations help achieve transferability (Graneheim & Lundman, 2004).

Besides credibility and transferability, conformability also influences trustworthiness of research. Conformability is to avoid invention of interpretation or over-interpretation, making certain the accuracy of data in relation to information provided by interviewees. The aim is to ensure that research findings reflect the interviewees' voice rather than the researcher's perspectives or motivations (Elo et al., 2014). The use of excerpts or quotations from as many interviewees as possible together with appendices and tables are necessary for indicating trustworthiness, to show connections between the data and the results (Elo et al., 2014; Elo & Kyngäs, 2008; Graneheim & Lundman, 2004). In this regard, Elo and Kyngäs (2008, pp. 113-114) stress the importance of excerpts or quotations in qualitative content analysis, to help achieve trustworthiness: credibility, transferability, and conformability. "If qualitative data are compressed too much, the very point of maintaining the integrity of narrative materials during the analysis phase becomes lost. If the conclusions are merely summarised without including numerous supporting excerpts, the richness of the original data disappears" (Elo & Kyngäs, 2008, pp. 113-114).

This research aims to achieve a high degree of trustworthiness through credibility, transferability, and conformability. First, owing the heterogeneous nature of the AgBio cluster, the sample chosen is inherently diverse. In this regard, participants to this research covers all aspects of business that constitute the cluster: agricultural technology, food and beverage, R&D services, professional services, and ICT services. The heterogeneous backgrounds of the participants contribute to the research credibility. Second, this research provides a clear description of the participants' characteristics in terms of the aspects of business, as well as data collection methods and analysis procedures. Last, this research ensures that findings reflect the participants' voice and avoid invention of interpretation or over-interpretation. In this regard, it includes a rich and vigorous presentation of findings with relevant excerpts, graphs, and tables.

4.6. Validity

Maxwell (2013, p. 122) refers validity to “the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account”. Trochim and Donnelly (2007) similarly emphasise that validity represents the best available estimate of the truth of an inference, proposition, or conclusion. In this regard, validity requires research results to accurately reflect a phenomenon under study (Morse & Richards, 2002). Nevertheless, there is no final answer to validity in research studies (Guba & Lincoln, 2005). It is not completely guaranteed even with well-accepted procedures and methods that help increase credibility of interpretations and conclusions and rule out validity threats (Maxwell, 2013). The threats to validity can be made implausible with strategies such as triangulation (Maxwell, 2013; Willis et al., 2007). Triangulation has many meanings and comes in different forms (Willis et al., 2007).

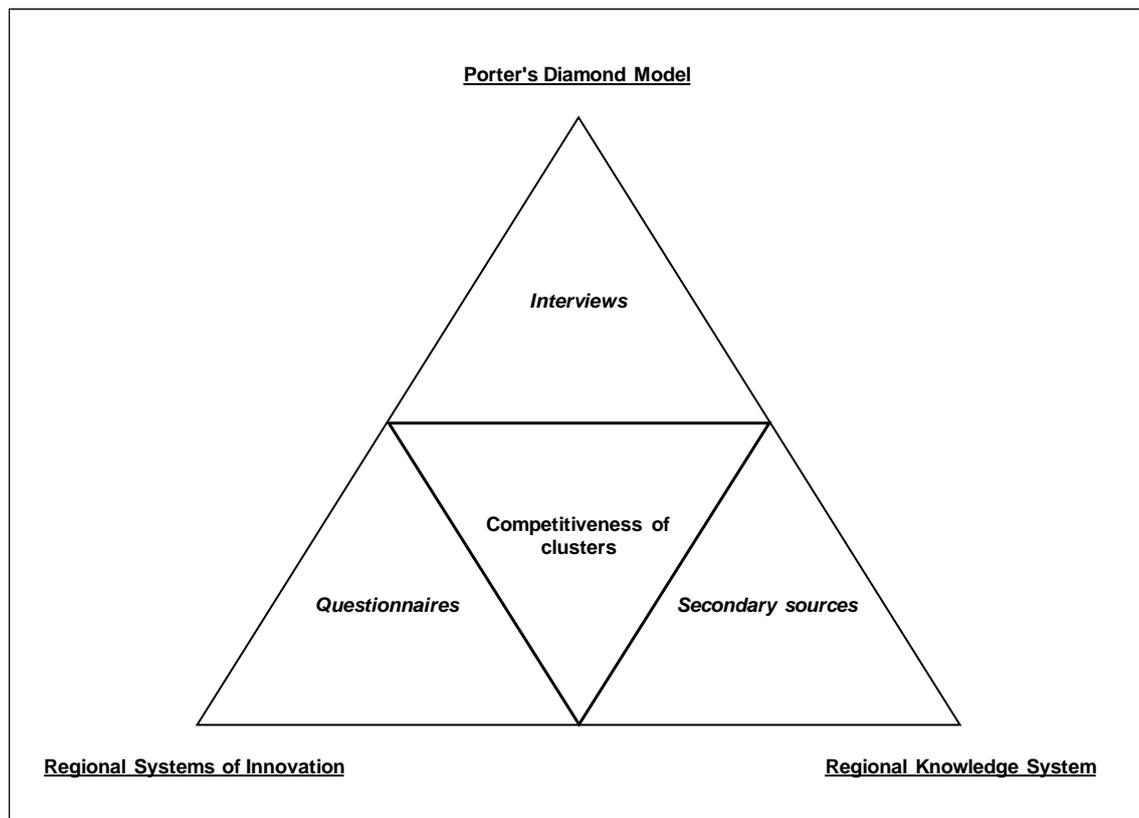


Figure 10: Theoretical and data triangulation

Sources: Own creation based on (Hesse-Biber & Leavy, 2011; Teddlie & Tashakkori, 2009; Willis et al., 2007)

For instance, methodological triangulation involves using qualitative and quantitative methods to assess a single problem. Weaknesses in one method are compensated by strengths of another. Similarly, data triangulation involves using a variety of data sources. On the other hand, theoretical triangulation uses multiple different theoretical perspectives to study the same phenomenon, which consequently leads to a fuller understanding of the phenomenon and enhances validity (Hesse-Biber & Leavy, 2011; Teddlie & Tashakkori, 2009; Willis et al., 2007). In this regard, this research adopts mixed methods design, the embedded mixed-method case study involving a combination of qualitative and quantitative methods. Besides methodological triangulation, the design of this research also allows theoretical and data triangulation that help enhance validity of the research (Refer to Figure 10).

4.7. Generalisation of research

While threats to validity can be counteracted with proper strategies, generalisability represents different issues to qualitative research. It is referring to “extending research results, conclusions, or other accounts that are based on a study of particular individuals, settings, times, or institutions to other individuals, settings, times, or institutions than those directly studied” (Maxwell, 2013, p. 136). Internal and external generalisability are two distinctive components of generalisations. The former concerns generalisations of research results or conclusions within a case, setting, or group under study and extend them to persons, events, settings, and times that are not represented in data collected or not interviewed or observed. On the contrary, external generalisability extends beyond the case, setting, or group. By these definitions, generalisability, particularly external generalisability, of qualitative research can be problematic as it involves a smaller sample size, or a single setting compared with quantitative studies. For this reason, qualitative researchers rarely make explicit generalisations about their studies (Maxwell, 2013).

Although there is a lack of consensus whether generalisations in qualitative studies are or are not realisable or even relevant, their concepts, research results, or conclusions can be applied or transferred to other cases having similar circumstances (Schram, 2006). Transferability, in this regard, is “the degree to which the results of qualitative research can be generalized or transferred to other contexts or settings” (Trochim & Donnelly, 2007, p. 149). The degree of transferability directly depends on similarity or fittingness

between the contexts, sending or originating and receiving contexts (Lincoln & Guba, 2000; Hesse-Biber & Leavy, 2011). For instance, transferability of a study on related behaviours towards binge drinking on college campuses to other cases is determined by a range of similarities such as campus policies towards drinking, campus size, drinking age, and geographical location (Hesse-Biber & Leavy, 2011).

Trochim and Donnelly (2007) highlight the proximal similarity model for improving generalisability based on which researchers think about generalisability contexts and determine which of those are similar or less similar to their studies. The researchers may come up with people who are alike to those in their studies and with people who are dissimilar. This enables them to generalise study results with more confidence to the people showing a greater degree of similarity or more proximately similar to their research. Besides people, they can also generalise the results to other places, times, and settings (Trochim & Donnelly, 2007). Nevertheless, transferability requires thick descriptions of or sufficient details about phenomenon under study allowing an informed judgement if conclusions from the sending context are applicable in the receiving context (Hesse-Biber & Leavy, 2011; Schram, 2006; Lincoln & Guba, 2000; Mayan, 2001). In this regard, thick descriptions, in a case study, from points of view of participants or interviewees allow an understanding of meanings from their perspectives (Hesse-Biber & Leavy, 2011). The need for such details justifies more lengthy qualitative studies compared with quantitative research (Willis, 2007).

Based on the proximal similarity model, this research, rather than generalising to a larger population (Trochim & Donnelly, 2007), aims to achieve transferability of research findings to other cases with similar circumstances. In this regard, it particularly seeks to generalise the findings to other places, settings, and people that are more proximately similar or display a great degree of similarity to this study. For instance, the more proximately similar places and settings are clusters locating either within the same region or other locations endowed with similar environments to the cluster under study. It is also crucial for intermediaries to be present in these clusters. Furthermore, they, being the receiving contexts, need to have people more similar to the respondents or interviewees in this research who, for instance, work for a similar size of firms and organisations. With these being considered, the proximal similarity model helps improve transferability of the research findings to other similar cases (Refer to Figure 11).

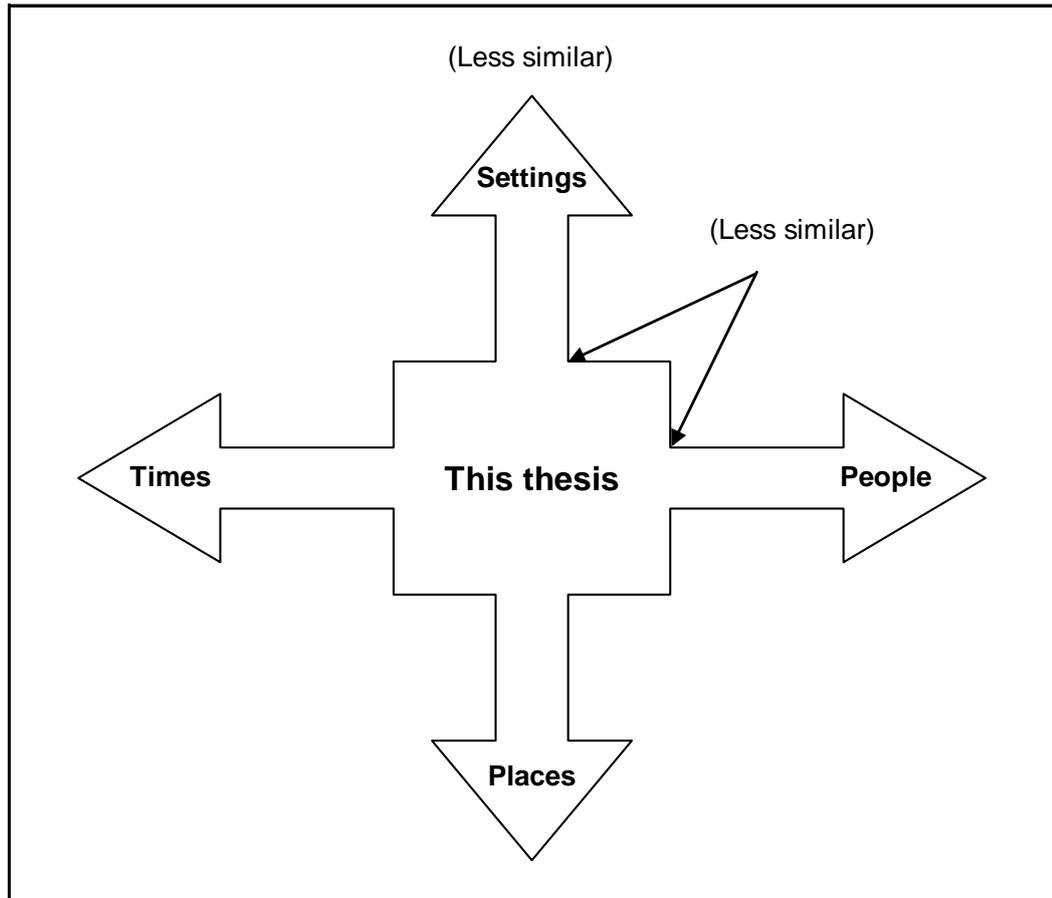


Figure 11: The proximal similarity model for generalisation

Source: (Trochim & Donnelly, 2007)

4.8. Ethical considerations

Although research helps increase knowledge, it can also be burdens to subjects under study. This implies that benefits of the research do not necessarily justify the burdens imposed on the subjects (Wilkinson, 2001). In this regard, researchers need to consider the importance of ethics, how they should treat research participants (Wilkinson, 2001; Bell & Nutt, 2002; Bell & Nutt, 2012). For instance, the researchers must respect the interests of the participants and their community, when conducting studies involving issues such as work, finances, access to government benefits, and education. On the one hand, topics related to these issues can directly affect lives and cause harm (Sieber, 2009). As harm potentially presents in any research involving human subjects (Van den Hoonard & Van den Hoonard, 2013), the researchers must assume responsibility for harmful issues affecting those partaking in the study (Tolich, 2016). While the absence of ethical

considerations may render the participants uncooperative (Sieber, 2009), it, on the other hand, may negatively affect the researchers and their studies, having research findings with limited usefulness. For this reason, the aim of the ethics in research is to create a win-win situation for both parties. The mutually beneficial relationship helps ensure candid responses, valid research results, constructive conclusions, and important and useful knowledge. This, from the researcher's perspective, requires planning and communication with as well as reduction of risks and creation of benefits for the participants (Sieber, 2009).

Darlington and Scott (2002) emphasise that ethical principles guiding research require the consideration of beneficence and duty of care. Likewise, Marshall and Rossman (2011), Kitchener and Kitchener (2009), Sieber (2009) and Murray and Dingwall (2001) identify the ethical principles including nonmaleficence/beneficence, respect for persons, and justice. The principle of nonmaleficence/beneficence involve minimising unnecessary risk, harm, or wrong but maximising good outcomes for research participants, humanity, and knowledge. Respect for persons is mainly concerned with an obligation to protect and treat autonomous and non-autonomous persons with respect, through the commitment to informed consent, and that they are not used as a means to an end. This involves the provision of information about aspects that may influence the participants' willingness to partake in the study. Furthermore, justice referring to as distributive justice is to ensure fairness or equalities, taking into consideration whom the study does and does not benefit (Marshall & Rossman, 2011; Kitchener & Kitchener, 2009; Sieber, 2009; Murray & Dingwall, 2001). The principle of justice forbids an unfair treatment for different participants based on their characteristics (Kitchener & Kitchener, 2009). Based on the ethical principles discussed above, Sieber (2009) distinguishes major aspects of ethical problem solving: (1) voluntary informed consent; (2) privacy, confidentiality, and anonymity; (3) risks and benefits of research; (4) special needs of vulnerable populations.

Prior to approaching and inviting potential participants to partake in this research – semi-structured interviews and questionnaires, the Application for Ethics (EA1) was submitted and approved by the Auckland University of Technology Ethics Committee (AUTEK) (Refer to Appendix A). The EA1 application thoroughly takes into account the major aspects related to the ethical considerations discussed above. Subsequently, the Participant Information Sheets are mail out to potential participants allowing them to

review and seek clarification about the research (Refer to Appendix B). The Information Sheet comprehensively explains different aspects including the purpose of the research, protection of privacy, non-financial costs of participations, research benefits, and possible discomforts and risks. The information helps clarify that this research does not include any deception and enables the participants to freely and autonomously make a decision that is not subject to pressure, coercion, and manipulation.

At the beginning of the interviews and/or before handing out the questionnaires, two paper-based Consent Forms are made available to the participants seeking their consent (Refer to Appendix C). This research does not involve groups such as those who are unable to give informed consent, children, legal minors, and people with a disability and vulnerability. In this regard, the participants are competent to give fully informed consent. The researcher and participants each obtain one signed Consent Form through which the latter acknowledge that they read and understand the information about this research via the Information Sheet received earlier. Furthermore, the participants understand that they can withdraw from the research prior to the completion of data collection if believed to be deceitful, harmful, or embarrassing. They are entitled to receiving a copy of the final report from this study, if requested. In this regard, they may be able to commend, amend, delete, and suggest additions. The participants are also informed and understand that notes are taken during the interviews and an audio recorder is used for transcription. A transcriber completes and signs the Confidentiality Agreement understanding and agreeing that the transcribed materials are confidential, can only be discussed with the researcher, and no copies are kept and accessed by third parties.

To protect the privacy and confidentiality, the participants in this research remain anonymous and not individually identified. Their consent is sought if it is deemed necessary to reveal the identifies. Any identifiable information related to them including the Consent Forms are not given to the third parties and, besides the researcher, only the research supervisors gain access to the data. The collected data are securely maintained and subsequently destroyed and will not be used in the future beyond the scope of this study. Furthermore, this research does not cause anxiety or psychological stress, harm, and negative consequences to the participants. To some extent, the participants may experience minor discomforts resulted from, for instance, participating in the interviews and/or questionnaires at an inconvenient time or due to busy schedules. Nevertheless, they are not at risk, as the research does not involve highly confidential topics, hazardous

substances, and experimentation on human and animals. It is, therefore, does not put the environment and lives of human and animals at risk. Likewise, it also does not put the researcher and the university at risk.

This research does not single out specific companies to exclude them from participation. As the aim is to examine the competitiveness of the AgBio cluster, the participants are exclusively the cluster members from the same demographic group based in Hamilton, the Waikato region. Although these companies are from a single homogenous group of one cluster, they are diverse and cover all aspects of business that constitute the AgBio cluster: agricultural technology, food and beverage, R&D services, professional services, and ICT services. The size and scale vary from small and early stage companies to large and multinational corporations. Therefore, this study ensures distributive justice, as it does not treat different cluster members unfairly based on their characteristics, for instance, sizes and areas of focus.

Chapter Five:

Research Findings on Cluster, Environment, and Innovativeness

5.1. Research findings on AgBio cluster

This research examines how competitiveness is created in clusters using a New Zealand example. A single embedded case study of the AgBio cluster in Hamilton, the Waikato region is chosen for this purpose. The AgBio cluster was established through Waikato Innovation Park when the latter received grants from Hamilton City Council, Ministry of Economic Development, and WEL Energy Trust between 2002 and 2003. The grants contribute to the construction of its core facilities building. The grants also help establish a technology commercialisation office and an incubator for technology businesses. As a result, this development plan for the Park was completed and subsequently opened in 2004 (Scoop, 2017; NZ Herald, 2018). Further grants from Hamilton City Council and Ministry of Economic Development in 2008 resulted in the construction of a second building and a spray dryer facility at the Park, which were completed in 2009 and 2012 respectively. In 2014, Callaghan Innovation invested NZ\$3 million to NZ Food Innovation Network to construct a third building for Tetra Pak. While the Park had received various grants throughout the years to develop the cluster, it continuously seeks investments for growth. For instance, in 2016, the Park sought a further investment to fund its master plan, to grow from NZ\$25 million to NZ\$180 million within a 20-year period (Scoop, 2017).

As the cluster continues to grow, during the data collection period, there are about 48 companies located within the Park premises. Nevertheless, the cluster also includes memberships based externally. Overall, the cluster members mainly consist of heterogeneous companies as well as private and public institutes specialised in different aspects of business particularly agricultural technology, food and beverage, R&D services, professional services, and ICT services (Waikato Innovation Park, 2013) (Refer to Figure 12). The presence of the variety of companies and organisations with different focuses and expertise indicates the characteristics of active business clusters (Gray, 2002). Although some of these companies are competitors, they may also work in partnership to achieve common goals. “We are the part of the New Zealand AgBio Cluster which is a group of companies within a particular industry who, though they may sometimes compete with each other, also work together co-operatively to deliver greater business advantages globally” (Dairy SolutionNZ Beef SolutionNZ, 2019, p. 13).

The AgBio cluster is managed by a team of Waikato Innovation Park, which includes Chief Executive Officer, infrastructure manager, senior administrator, event manager, operations manager, business development manager, and accountant (Waikato Innovation Park, 2019). Through this team, the cluster establishes inter-organisational relationships with many businesses, organisations, as well as research and education institutes such as the University of Waikato. In this regard, the role of the Park in promoting the inter-organisational relationships is discussed further in the subsequent section. For the purposes of this research, as the AgBio cluster is established and managed by the Park and the participated cluster members locate within its premises, the two are used interchangeably.

This section helps answer the research question one of this study: *“How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?”* The following section presents the findings on Waikato Innovation Park.



Figure 12: AgBio cluster

Source: Own creation

5.1.1. Waikato Innovation Park

As discussed earlier, Waikato Innovation Park was established with the help of Hamilton City Council through public and charitable funds. The funding is, however, not extended to assist the development of particular cluster members or to business projects. Regardless of the financial involvement of the council, the Park procures a great degree of autonomy with an independent board (Respondent A, personal communication, December 09, 2014; Respondent B, personal communication, May 18, 2015; Waikato Innovation Park, 2015a). According to Respondent B and Respondent C:

Excerpt 1: Respondent B

The local government assisted by helping to establish the Park. The City Council put up \$2 million of the \$6 million to establish the Park, and then the people who organised the Park brought in tenants and brought in government funding agencies and all that work was done by the group appointed by the Council to run the Park. So since the Park was established the City Council are the ultimate owners, but they have not participated in funding any projects..., the local government here does not assist us...I think that's the correct thing to do. You can provide a mechanism, but actually selecting and funding projects is a specialist occupation and not done by local politicians (Respondent B, personal communication, May 18, 2015).

Excerpt 2: Respondent C

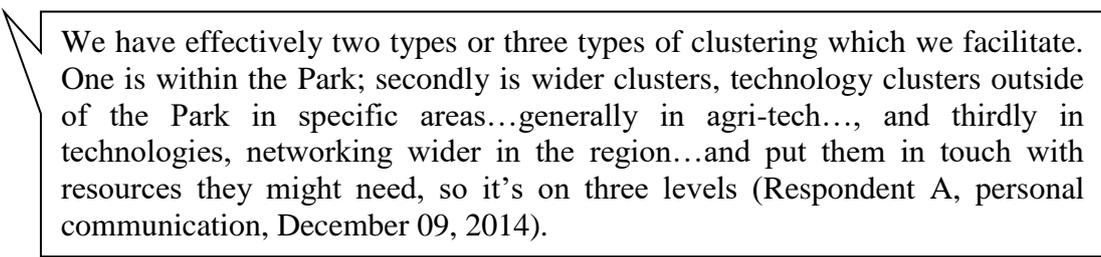
The Hamilton City Council put money in it. It was one of the major shareholders..., that was only to set up the Park, the facilities, the building cost and that sort of thing but no, no support for the companies in here actually (Respondent C, personal communication, March 11, 2015).

The purpose of establishing Waikato Innovation Park is to contribute to the regional and national economic development. In this regard, the Park undertakes a task to build an agriculture technology cluster informally known as the AgBio cluster (Respondent A, personal communication, December 09, 2014; Respondent B, personal communication, May 18, 2015; Waikato Innovation Park, 2015a). "It's very informal how it works. It's not over formal" (Respondent A, personal communication, December 09, 2014). Likewise, Respondent D claims that "it's very much an informal kind of email. They have a mailing list and things here. When they're running something they send it out...I mean

it's really I guess just being part of the kind of local business community” (Respondent D, personal communication, March 03, 2015).

Waikato Innovation Park adopts an open policy, extending its memberships to all establishments (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015a). These establishments have no financial obligation to become members of the cluster. “There wouldn't be any fees I don't think, no” (Respondent D, personal communication, March 03, 2015). In this regard, the Park intrinsically becomes a cluster of heterogeneous establishments (Waikato Innovation Park, 2013). Based on the 2014 survey carried out by the Park, the types of these cluster members are extremely variable (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). During the interview period, the Park is home to more than 40 cluster members. According to Respondent C, “there’s about 50 different companies here..., small and big ones..., and many have very different sorts of focuses” (Respondent C, personal communication, March 11, 2015). Nevertheless, there are also other members based outside the Park:

Excerpt 3: Respondent A



We have effectively two types or three types of clustering which we facilitate. One is within the Park; secondly is wider clusters, technology clusters outside of the Park in specific areas...generally in agri-tech..., and thirdly in technologies, networking wider in the region...and put them in touch with resources they might need, so it’s on three levels (Respondent A, personal communication, December 09, 2014).

Although the cluster members are diverse and vary in size and scale, from early stage companies to multinational corporations, they, however, share common interests including innovation and export (Waikato Innovation Park, 2015a). “The whole idea about this Park is growing likeminded business and growing together and growing each other” (Respondent M, personal communication, April 28, 2015). Furthermore, the diversity of the AgBio cluster also benefits the cluster members. For instance, Respondent E emphasises that:

Excerpt 4: Respondent E

One of the nice things about the Park is the fact that they decided not just to put technology companies in here, so every company needs legal advice...they need HR so it's good to have an HR company on site. So part of the clustering, whenever you're looking at commercialisation of technology you always have the scientific/technical and the commercial side of things...so it's good to be able to have some of the commercial side of things, the legal, the accounting, the HR, all those sorts of things that you need as a company. And so one of the things I like about this is they've got a lot of those services available within the Park, that you don't have to go into town to an HR company and that sort of thing...if I want to go and see the HR company I just walk over to the other building and it's easy, and they come and see me from time to time if they've got questions and that (Respondent E, personal communication, February 25, 2015).

5.1.1.1. *Contributions to locational strengths*

Waikato Innovation Park, a home to the cluster members, shares the locational strengths of Hamilton, the Waikato region – the centrality of the location, proximity to industry leaders, customers, and education institutes, as well as quick access to relevant service and assistance. It is in close proximity to AgResearch, New Zealand Food Innovation Network – FoodWaikato, Dairy NZ, NIWA, research institutions, and other innovation-driven commercial entities (Waikato Innovation Park, 2015a; Respondent M, personal communication, April 28, 2015). In this regard, the presence of the Park contributes further to the existing strengths of the region. According to Respondent F:

Excerpt 5: Respondent F

It's really its location is its biggest asset for the work we do..., location was the main reason because of Ruakura. That was why we were set up here and because we could get access to Innovation Park..., the location to Ruakura, to the AgResearch; location to Auckland; location to Hill Laboratories...; accessibility to Hamilton..., it's very, very well, very good for all the services that we need to do for our business. Hamilton pretty much has 99 per cent of everything we need, or one we've been using right there. It's next door..., Hill Laboratories, so that's very convenient...their accreditation..., that's our biggest thing. Their accreditation is the same as ours where it's internationally recognised..., and there are only two or three labs in New Zealand that have that accreditation...Hill is pretty big..., they analyse different types of area...they do the analysis of the samples that we collect, so we do treat the animals, sacrifice the animals, collect the samples. They do all the analysis of it so yeah, so they do the laboratory phase of the study (Respondent F, personal communication, March 26, 2015).

Furthermore, while Hamilton, the Waikato region develops a strong research and economic strengths in agriculture, with the presence of industry leaders such as AgResearch, DairyNZ, Tatua, and Fonterra (Waikato Innovation Park, 2015a), Waikato Innovation Park is also home to leading agricultural-based companies. For instance, Respondent C and Respondent B identify the leading agricultural-based cluster members based within the Park premises:

Excerpt 6: Respondent C

That one is the Tetra Pak building. Tetra Pak owns or occupies two floors, but they're just about starting their new, their own building. They're building their own building right next to that building, so...Tetra Pak is the company - at least the engineering division that is here, that builds the spray driers for Fonterra and so on and when they built the spray drier over here, Tetra Pak was heavily involved in it (Respondent C, personal communication, March 11, 2015).

Excerpt 7: Respondent B

With the Food Innovation Network. They have a dryer here and we may at some stage want to dry our juice down to a powder and that is a relatively new thing for the Park, and could be of interest to us. It's the only really small scale dryer that's available in New Zealand. Most of the dryers are great big things owned by the dairy industry and they don't want to know a small company like us...so it is generally for a small start-up company like ours, this is a good place to be (Respondent B, personal communication, May 18, 2015).

5.1.1.2. *Attractive amenities*

Although established with the financial support from Hamilton City Council, Waikato Innovation Park is financially self-sufficient, with incomes collected from lease of spaces, contracts, and services (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015a). In this regard, the Park is able to sustainably provide a dynamic business site with attractive and modern amenities, which also facilitate inter-organisational relationships and collaborations among the cluster members (Waikato Innovation Park, 2015a, 2015c). Regardless of the size of businesses, the cluster members enjoy a greenspace, a friendly environment, and high-tech IT services including a high-speed Internet connection and on-site IT specialists. With a range of leases, they are able to freely access common meeting rooms and reception, event facilities, and easy-parking

spaces at no cost. Furthermore, staff also benefits from being close to the neighbouring Ruakura Research Centre, which provides a social space and on-site sporting facilities and Melody Childcare Centre – a modern childcare facility (Waikato Innovation Park, 2015c). According to Respondent G:

Excerpt 8: Respondent G

We're based in the right environment to say we're here to meet your needs...it's a fantastic environment to work in; it's probably one of the best places I've worked in and I've worked all over the place. But this is probably the best environment that I've had, so you know..., this is the place that we want to be. It's the best environment for our staff...it's not only about the work. It's about the social aspect and what that means to our staff and how it makes our staff happy, and how that helps me with staff retention...so good parking, good places to eat, a good community for them to participate socially with...for our staff it's socially a good place to be...for me it's very important to be here, because it improves the wellbeing of the staff and allows better staff retention, which is why we're looking to build and expand our business by only moving 50 metres down the road, rather than going somewhere else...so like I said, I told you we've been in this building six years. There were only 40 engineers and now there are 170. They don't fit..., growing too fast...so we're going to build a building about 50 metres that way..., just next door here (Respondent G, personal communication, April 01, 2015).

Along with the attractive amenities, a popular on-site café – deVice. deVice is well-liked by many staff and visitors (Waikato Innovation Park, 2015c). “People come from a long, long way just to have coffee there and generally meet. Some of them don't even have businesses here at the Park” (Respondent M, personal communication, April 28, 2015). In this regard, Respondent H identifies one of the main strategies for promoting inter-organisational relationships and collaborations, relationships built through coffee:

Excerpt 9: Respondent H

The one that works best is coffee. You go and have coffee with people. And you discuss and have a chat and see what they're doing, talk about what you're doing and see if there are any opportunities. The more we do that, the more collaboration happens. It's really simple. So that's the primary method...if it's an organisation that's based at the Park or based nearby, AgResearch, DairyNZ, those sorts of places, then yes [deVice]. But there are other places that have got cafes, so we work with people in Dunedin, Christchurch, Wellington, Auckland and we just go to those places and between us and the other people we find a café (Respondent H, personal communication, May 13, 2015).

Likewise, Respondent F highlight the importance of having deVice at the Park, “the environment, so like having the cafe there...” (Respondent F, personal communication, March 26, 2015). As a result, the facilities contribute to greater networking opportunities, which benefit the existing cluster members and newly start-ups alike. According to Respondent I, Respondent C, and Respondent B:

Excerpt 10: Respondent I

Yeah, so why it works for me here is, so prior to shifting into this I sat in a different building. I like this because it’s a very good feel; it’s a very good office space. When I bring clients, whether they’re professional or farmers, they’re comfortable. We sit outside in a cafe, have the shared meeting rooms (Respondent I, personal communication, February 16, 2015).

Excerpt 11: Respondent C

The facilities like the cafeteria down is good as well..., there are always lots of things going on with the cafeteria downstairs, so it’s quite vibrant and...you often run into people - also from companies that are not necessarily in the Park, but from the Waikato...and...the reception, because as a small company I don’t have a reception...and it’s easy parking..., free parking so that’s important...so those sorts of things are good...and I much rather I’m here than say in downtown Hamilton, even though it probably would have been cheaper over there (Respondent C, personal communication, March 11, 2015).

Excerpt 12: Respondent B

It’s a whole range of facilities like this little meeting room; there are about six or seven meeting rooms in this building and of different sizes. And there’s good IT support and so I find it a very good place to work. I don’t know what - one of my business partners used to have a factory over in the north part of Hamilton, but you go there, you work in a room like this and you go away. There’s a cafeteria out here and you can meet people easily, so it is generally for a small start-up company like ours, this is a good place to be (Respondent B, personal communication, May 18, 2015).

Likewise, Respondent J stresses the importance of an innovative laboratory – the PC2 laboratory provided by the Park. The availability of the PC2 laboratory influences their decision to locate and remain at the premises:

Excerpt 13: Respondent J

Being in the Park - I mean it's a great place to be. It really is good..., a good place to work. It's a lovely building...it's a beautiful facility..., the facility here is really good. It's right up there...it's a pretty good lab...if it was just an office..., it wouldn't be so good...but having the lab is what pulls us here...that's the key reason that we've been based here, because obviously we need a high end lab..., a PC2 lab...this came with part of the Park, which is a high end kind of lab. So you have to have a PC2 lab to have containment facility, which is what we have...there's not that many PC2 labs elsewhere in Hamilton, not to the same standard so you can't just sort of move anywhere if you haven't got a PC2 lab...there's nowhere else in Hamilton that you would actually go to do that work...the equipment ourselves but it's just the building has to be a certain standard to get a PC2..., so it's the services of the building itself (Respondent J, personal communication, March 05, 2015).

As a result, the state-of-the-art facilities afford a more professional image and reputation, which allows the cluster members based within Waikato Innovation Park to showcase successes to respective stakeholders such as customers. In this regard, Respondent C claims that "I mean I could probably rent an office somewhere in the back of Ruakura Campus, but it's the profile of the building as well that certainly helps and gives a more professional image when you have clients over" (Respondent C, personal communication, March 11, 2015). Likewise, according to Respondent H and Respondent G:

Excerpt 14: Respondent H

Firstly there's a great cafe; secondly, from our perspective this is a good working space that our staff like working in and our customers like visiting, so that's helpful. The Park still carries some reputation, particularly for people who don't know us yet and haven't gone and talked to other people about us. They say oh, Waikato Innovation Park, yeah, I know where that is. It must be really innovative there because it's got Innovation in the name - and so they expect that we must be able to help (Respondent H, personal communication, May 13, 2015).

Excerpt 15: Respondent G

We're constantly networking - we network with our top 15 vendors. We network with all of our customers and obviously when we have international guests we're trying to build networks with them and when they're coming to New Zealand. And we enjoy bringing them here because it sets the right tone for our organisation. We're based in the right environment to say we're here to meet your needs..., it's the right environment to communicate to our customers (Respondent G, personal communication, April 01, 2015).

Nevertheless, despite the attractive amenities, Waikato Innovation Park is relatively cost-effective. For instance, Respondent G claims that “this is the place that we want to be..., the cost of being here is right...” (Respondent G, personal communication, April 01, 2015). Likewise, Respondent J stresses cost as one of the main factors influencing their company to locate and remain at the Park:

Excerpt 16: Respondent J

Being in the Park - I mean it's a great place to be. It really is good..., a good place to work...they're reasonably priced, which is always an advantage...I mean basically it's obviously cheaper for us to get this standard of lab quality and the services here...you can probably get something in Auckland, but it's probably twice the price...you know, like I think Auckland University has the building. They've set up the same kind of thing within the university, but their prices were almost double. So there would be no reason to move back to Auckland for that facility for those prices...so I could see a lot of companies coming to work in an environment like this, it would be especially scientific (Respondent J, personal communication, March 05, 2015).

5.1.1.3. Geographic proximity

Besides the efforts by Waikato Innovation Park to build trust and promote inter-organisational relationships and collaborations among the cluster members, their co-location within the Park premises further helps bolster the attempts and, subsequently leads to intra-cluster interactions and cooperation. In this regard, Respondent B emphasises that:

Excerpt 17: Respondent B

Well they do arrange presentations by companies here from time to time...it's always interesting to find out what other people are doing and in the early days I was aware in the first two years of about four direct collaborations between different companies, that arose because they were all co-located at the Park...it really helped us a great deal as I told you in the beginning in getting the company started...so it is generally for a small start-up company like ours, this is a good place to be...well...in the early days there was a company here called BioVittoria...their product comes from China and they grow their plants in China and process them there..., but there were certain similarities and we did some collaboration with them initially...on the initial learning of how to develop a food product...because we were both learning what to do...they were in the office next to us and we saw them on a daily basis for two years (Respondent B, personal communication, May 18, 2015).

In this regard, while co-location allows the cluster members to build relationships, collaborate, and share information and knowledge with more ease, it increases opportunities for future collaborations. For instance, Respondent I and Respondent K reveal that:

Excerpt 18: Respondent I

Yeah, so why it works for me here is...the people that I mix and mingle with through here understand the rural sector, so that makes it easier and you pick up some ideas. I haven't picked up business, but I think I will at some stage. It's also central for me moving around the countryside. I deal a lot with AgResearch, so that makes it simple to operate from here, and for me in the dairy scene, this is still the largest dairy market in New Zealand (Respondent I, personal communication, February 16, 2015).

Excerpt 19: Respondent K

Actually it's like this; there's a company next door to us and we're collaborating with them for some overseas business..., we do some collaboration. I mean the people who does our development are in this cluster. So we collaborate. We engage a few companies in here. I mean I wouldn't say we actually collaborate with anybody in this cluster but there are opportunities to. But to be honest we have too many things to do already..., it's a mix. I mean some of the companies in here we'd never collaborate with. Some we would but don't have time to. And some we are already collaborating with (Respondent K, personal communication, December 02, 2014).

Besides intra-cluster relationships among the cluster members, Waikato Innovation Park also creates opportunities for networking with external establishments with more ease. For instance, Respondent C claims that:

Excerpt 20: Respondent C

What it is a good place for here is for networking, because there's the cafeteria downstairs and you often run into people - also from companies that are not necessarily in the Park, but from the Waikato...because it's such a cluster if you want of sort of agriculture focussed companies, there's a lot of people from outside coming here as well. So it's not just you meet the people that are here, but also other companies and there are often meetings here. Companies that may not be here in the Park, they come here to have a meeting, so you run into people... (Respondent C, personal communication, March 11, 2015).

Furthermore, proximity among the cluster members allows access to highly competent related and supporting companies within Waikato Innovation Park for a variety of high-quality goods and services with more ease. It also facilitates intra-cluster business activities among the Park-based companies. For instance, Respondent D and Respondent F respectively emphasise that:

Excerpt 21: Respondent D

I mean we've been here a long time. We've been here more than 10 years and it suits us..., we lease the office space. It is handy. There's a lawyer right here on the premises, so when I need some legal advice or I need a solicitor to witness some contracts for me or something like that, then that's very useful. Like I say there's the NZTE guys there and there's the Park people themselves who we've done a little bit of kind of grant type work with..., we do have some contact, you know, some of our infrastructure comes from here, so there's like a Cloud company and an internet ISP type company that's based here. We've had a little bit of contact with them. We get our internet connection through them and we've been able to talk to them about backing up our local data and all that kind of stuff. Yeah, so it's on that kind of lower infrastructure type level we have (Respondent D, personal communication, March 03, 2015).

Excerpt 22: Respondent F

It's really its location is its biggest asset for the work we do..., location was the main reason because of Ruakura. That was why we were set up here and because we could get access to Innovation Park..., the location to Ruakura, to the AgResearch..., to Hill Laboratories...we've been using right there. It's next door...so that's very convenient...their accreditation..., that's our biggest thing. Their accreditation is the same as ours where it's internationally recognised..., so in certain studies we need that accreditation. And there are only two or three labs in New Zealand that have that accreditation...Hill is pretty big..., they analyse different types of area...they do the analysis of the samples that we collect, so we do treat the animals, sacrifice the animals, collect the samples. They do all the analysis of it so yeah, so they do the laboratory phase of the study...I think the first trial we put through those guys would have been about 2009...at the start quite a bit, but it varies just depending on the type of studies that we have come through. Sometimes you're very busy and some studies you need a lot of analytical; some studies you need none, so it's very study specific (Respondent F, personal communication, March 26, 2015).

In this regard, Respondent L states that, although being in Waikato Innovation Park may not, in itself, render competitiveness, their company is, however, able to regularly uses goods and services provided by other cluster members within the Park with more ease:

Excerpt 23: Respondent L

We're not getting any development work done by the Park, by anyone at the Park...so there's no distinct advantage with respect to new businesses at the Park; however we use SkyPoint just across the road. We've used Ardito Training who are based here, and we have and continue to use Hills Laboratories for some of our timber testing work (Respondent L, personal communication, March 12, 2015).

Likewise, for Respondent B, while relying on Auckland-based companies, their company also makes use of the service provided by the cluster members at Waikato Innovation Park:

Excerpt 24: Respondent B

Of course, being a food product the safety tests are very important. Again we don't do our own testing, but we do use Hill Laboratories and another agency called STS..., it's a Swiss company...based in Auckland...they are recognised companies for doing that type of testing (Respondent B, personal communication, May 18, 2015).

Besides engaging in business activities with other cluster members, Respondent G, whose company helps build the spray drying facility owned by Waikato Innovation Park, claims that proximity facilitates the business deal with the client:

Excerpt 25: Respondent G

So we built it...we designed it, developed it, engineered it..., and we're expanding it at the moment. So it's our technology, our design, our intellectual property but it was sold - it's been sold to Innovation Waikato Park, so the Park owns the physical assets, but the technology, the intellectual property is ours. If they want to do new products or new R&D, we walk across and we help them with the development of that with our people (Respondent G, personal communication, April 01, 2015).

Nevertheless, while companies may benefit from being in Waikato Innovation Park, Respondent I and Respondent J respectively claim that proximity to other cluster members is not the main contributing factor influencing their decisions to locate at the Park, as opposed to other locations within the Waikato region:

Excerpt 26: Respondent I

Yep, so we're here, enjoy these guys but it was really the Waikato, so being able to access AgResearch, to understand what DairyNZ are doing; they're probably the two - and the fact that your market here is still the largest dairy market in New Zealand (Respondent I, personal communication, February 16, 2015).

Excerpt 27: Respondent J

I mean obviously it's just convenient for us to be close to the university more than anything else. And that would have been one of the key things when we set up here, but within the Park it's not really a huge thing for us (Respondent J, personal communication, March 05, 2015).

Furthermore, the advent of Information and Communication Technology (ICT) may attenuate competitiveness brought about by the significance of proximity and, therefore, affords the cluster members a greater freedom in terms of locational choice. For instance, Respondent L and Respondent D respectively claim that:

Excerpt 28: Respondent L

So yeah, pretty much everything that IVS does is done out on the web, so while we have a server here in Hamilton it's only used for file storage. There's no accounting software in there. There's no software that we use that isn't sitting out there on the web...because most of our service is IT based..., you know a lot of the process and services are on the web and you've logged in and been given access rights, it's a lot more efficient and quick. And I don't need to be sitting in the relevant city..., I mean anything when it comes to IT, you don't need them here in Hamilton per se...so there's no distinct advantage with respect to new businesses at the Park...because we're not getting any development work done by the Park, by anyone at the Park (Respondent L, personal communication, March 12, 2015).

Excerpt 29: Respondent D

I mean my staff are the only reason that tie this company to this spot. If it was just me I could go and live in Turangi or Whangarei or Invercargill. It doesn't matter, as long as we've got an internet connection. I do a fair amount of travelling and all of our work from here we're working remotely for customers on the other side of the world, so it doesn't matter. In some respects, there's a good argument for us being in the U.S. You know, maybe it would be easier for us in the U.S., but we don't want to do that and I think we've got good people here and that's not going to change. So like I say, if I could convince seven people that we should all move to you know, the Gold Coast, then we could all move to the Gold Coast. It really doesn't make any difference that we're here (Respondent D, personal communication, March 03, 2015).

5.2. Research results on innovativeness of cluster members

This chapter presents results of the CIS-style questionnaires, during the three-year period between 1 April 2011 and 31 March 2014, as well as the secondary source made available at Waikato Innovation Park. The research results are, based on the questionnaires, presented around: product innovation; process innovation; innovation-related activities; sources of information and co-operation for innovation; constraints on innovation; and business growth in terms of employment size. This section helps answer the research question one of this study: “*How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?*” The following section reports the results on innovations undertaken by the cluster members within the AgBio cluster.

5.2.1. Innovations within cluster

This section presents results about innovations within the AgBio cluster (Refer to Figure 13-17 and Table 1-5 in Appendix J). The innovations encompass product (good or service) innovation, process innovation, and innovation-related activities such as organisational and managerial changes, as well as other activities discussed below. Results shows that the cluster members undertake product (good or service) innovation and process innovation. Among all the respondents, only 7.1 per cent did not introduce any product innovation. On the other hand, 57.1 per cent of the respondents introduced new or significantly improved goods whereas 71.4 new or significantly improved services.

These product innovators may introduce product innovation that are new to their market and/or only new to their businesses. In this regard, 57.1 per cent of the respondents had product innovation that new to the market and only new to the businesses respectively. While the introduction of innovation can be carried out in-house, companies may also choose to cooperate with or solely rely on others for innovation. Within the AgBio cluster, 57.1 per cent of the respondents mainly developed new or significantly improved products within their companies, while another 57.1 per cent cooperated with others. Only 7.1 per cent used the service provided by other companies or organisations to innovate.

Overall, the results show that the majority of the respondents were engaged in product innovation compared to non-innovators during that three-year period.

In 2014, Waikato Innovation Park carried out a survey with 34 companies located within the premises. Thirty-three of the companies participated in the survey, constituting about 97 per cent respond rate. Results show that 79 per cent of the surveyed cluster members reported a financial growth of 33 per cent on average, while one company experienced an enormous growth of 186 per cent in the same period. In terms of turnover, three of the companies had a turnover of NZ\$250,000 or less, while that of nine other companies was between NZ\$1 million and NZ\$3 million. The turnover of eleven companies was NZ\$3 million or more. The rest of the surveyed companies had between NZ\$250,000 and NZ\$3 million. In total, all companies located within the Park had a combined gross turnover of more than NZ\$188 million (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K).

In relation to turnover, the respondents' companies that introduced product innovation anticipate financial rewards from their investments, to increase sales. The extent of such rewards may, however, differ among these companies. In this regard, the survey divides the percentage of total turnover in 2014 from products into six groups: 0%, 1-10%, 11-20%, 21-30%, 31-40%, and 41-100%. The focus is on the turnover from goods and/or services that are new to market, only new to business, significantly improved but not new, and unchanged or only marginally modified. While all respondents complete this question, two choose not to answer and another questionnaire is incomplete, as the respondent only estimate the percentage of total turnover for products that are only new to business, within the range of 1 to 10 per cent.

First, results show that 54.5 per cent of the respondents identified as product innovators estimated between 41 and 100 per cent of total turnover were from goods and/or services that were unchanged or only marginally modified. Only 9.1 per cent reported the same range of turnover came from product innovation new to the market and only new to businesses respectively. Within the same range, 18.2 per cent of the product innovators estimated that their total turnover came from products that are significantly improved but not new. Second, none of the respondents reported between 31 and 40 per cent of their total turnover were from products that are new to market, only new to business, significantly improved but not new, and unchanged or only marginally modified. Third,

18.2 per cent of product innovators reported between 21 and 30 per cent of their total turnover were from goods and/or services that were significantly improved but not new but only 9.1 per cent reported from unchanged or only marginally modified products. While none reported turnover from those new to business, 9.1 per cent of the respondents estimated their total turnover were from products that are new to market.

Fourth, within the range of 11 to 20 per cent, 27.3, 36.4, and 18.2 per cent of the product innovators reported total turnover from products that are that are new to market, only new to business, and significantly improved but not new respectively. No respondent reported turnover from unchanged or only marginally modified products. Fifth, 16.7 per cent estimated that 1 to 10 percent of their turnover came from products, which are new to market, only new to business, significantly improved but not new, and unchanged or only marginally modified respectively. Last, 36.4 per cent of product innovators reported no turnover came from products that are new to market and only new to business respectively. Furthermore, 27.3 per cent and 18.2 percent claimed no turnover from significantly improved but not new and unchanged or only marginally modified products.

For process innovation, 50 per cent of the respondents were without new or significantly improved methods. Nevertheless, 35.7 per cent and 7.1 per cent of the respondents introduced new or significantly improved methods of manufacturing or producing goods or services and methods of logistics, delivery, or distribution respectively. Similar to production innovation, these methods may be new to the market and/or only new to their businesses. In this regard, 14.3 per cent of process innovators introduced the methods that are new to the market, while 35.7 per cent only new to business. While companies may carry out process innovation internally, cooperation with or solely relying on others to innovate are also viable. Among all the respondents, 21.4 per cent mainly developed process innovation by themselves and through cooperation with other businesses, organisations or institutes respectively. A mere 7.1 of the respondents solely relied on others for innovation. Overall, the results show that non-innovators had a slight majority compared to process innovators during that three-year period.

Besides product and process innovations, results show that, between 1 April 2011 and 31 March 2014, all the respondents engage in organisational and managerial changes and various other innovation-related activities. These activities, related to or supporting innovation, include design, training, prototyping, R&D as well as acquisitions of

machinery, equipment and/or software, and intellectual property rights. First, 42.9 per cent of the respondents made major changes in business practices for organising procedures, while 21.4 per cent methods of organising work responsibilities and decision making. Regarding marketing concepts or strategies, 35.7 per cent of the innovating respondents made a major change in this area. Furthermore, 50 per cent made a major change in methods of organising external relationships with other businesses, organisations or institutes.

In relation to other innovation-related activities, 50 percent of the respondents engaged in all forms of design for the development or implementation of new or improved products or processes, while 57.1 per cent in staff training specifically related to innovations. Among all the respondents, 42.9 per cent were involved in prototyping. Within their respective companies, 64.3 per cent of the innovating respondents undertook internal R&D, which helps increase knowledge for developing new and improved products and processes. Nevertheless, 50 per cent relied on external R&D performed by other businesses or by public or private research organisations or institutes. According to the 2014 survey carried out by Waikato Innovation Park with 33 tenants, 79 per cent of these surveyed cluster members were actively engaged in R&D of new goods and/or services (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). Furthermore, the survey results from this research show that 42.9 per cent of the respondents acquired advanced machinery, equipment, and computer software and hardware, while 14.3 per cent acquired intellectual property rights including patents, copyright, trademarks, and know-how. Information or knowledge is important to businesses that innovate. The following section presents results about sources of information the cluster members use for their innovations.

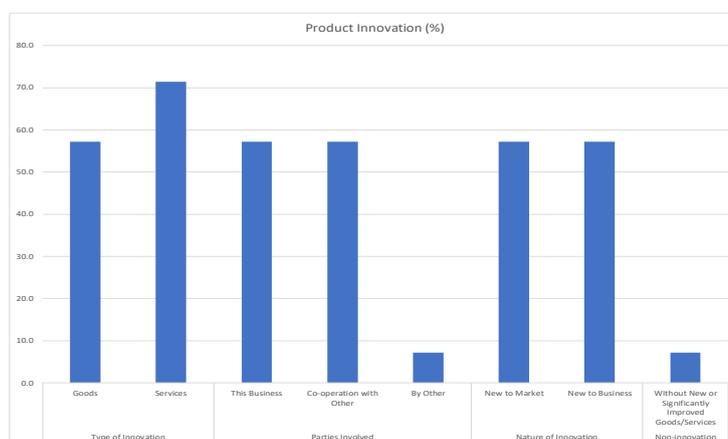


Figure 13: Product innovation (%)

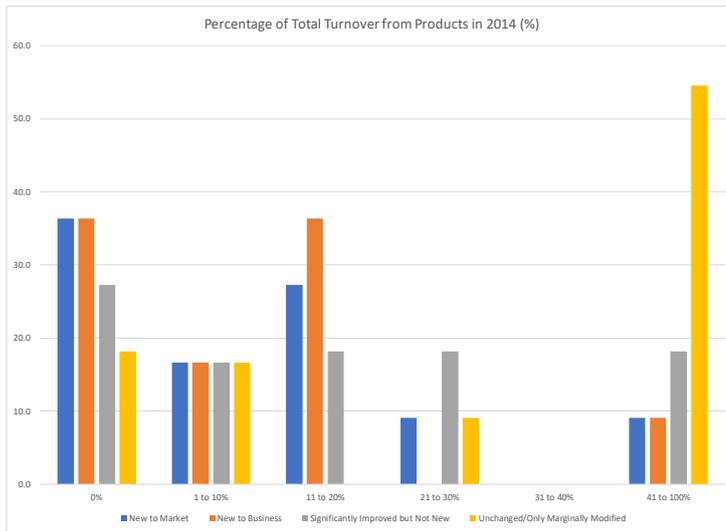


Figure 14: Percentage of total turnover from products in 2014 (%)

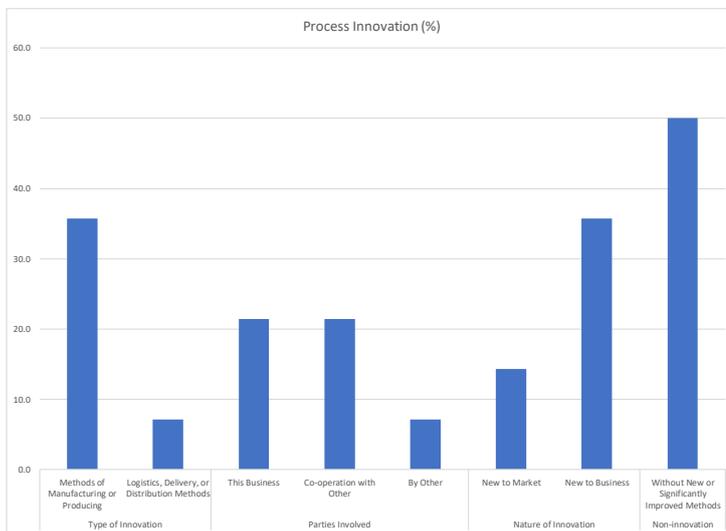


Figure 15: Process innovation (%)

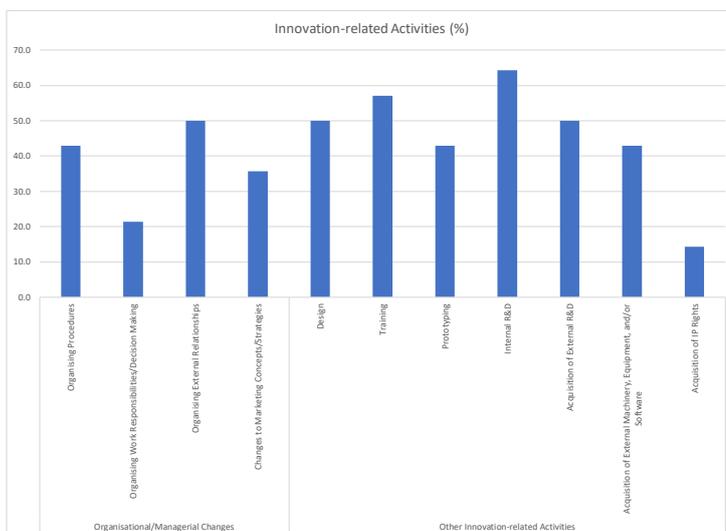


Figure 16: Innovation-related activities (%)

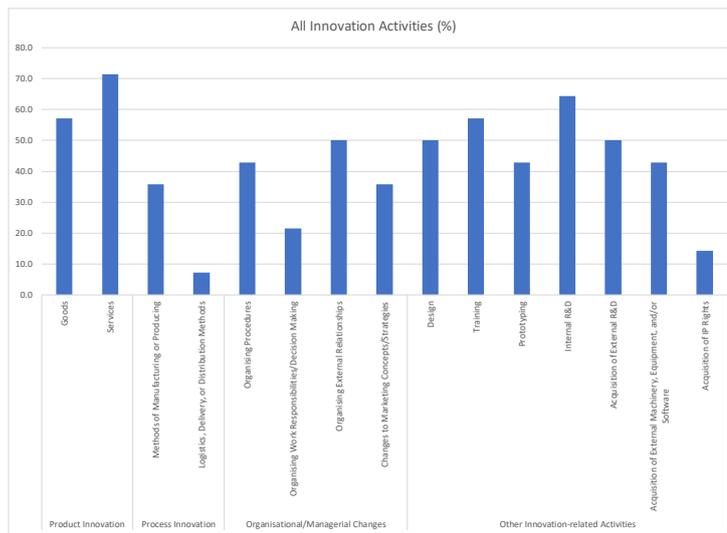


Figure 17: All innovation activities (%)

5.2.2. Sources of information for innovations

This section presents results about sources of information that the cluster members partaking in the survey found important for the purposes of innovation. These sources provide information or knowledge for new innovation projects or contributed to the completion of existing innovation projects. They encompass internal sources, market sources, and intermediaries, and also other sources such as forums of dialogues, conferences, trade fairs, exhibitions or other social activities or events. In relation to their importance, the survey divides the sources into ‘High’, ‘Medium’, ‘Low’, and ‘Not applicable’. While ‘High’ and ‘Medium’ depicts certain sources of information as the most important and moderately important to innovation respectively, ‘Low’ represents the least important. On the other hand, ‘Not applicable’ means irrelevancy. For the purpose of simplicity, this section only discusses results that the cluster members found to be the most important. Nevertheless, the other results on the degrees of importance to innovation can be seen in Figure 18 and Table 6 in Appendix J.

Results show that 71.4 per cent of the respondents ranked the internal source of information from within their businesses being most important for innovation. External information from clients or customers are deemed most important to 42.9 per cent of the respondents, followed by 21.4 per cent considering information from suppliers to be of greatest value. Only 14.3 per cent and 7.1 per cent considered businesses from related industries and competitors or other businesses from the same industry or market

respectively to be the most important sources. From intermediaries, government or public research institutes were ranked the most important sources to 21.4 per cent of the respondents, while universities or higher education institutes to 14.3 per cent. Other sources under intermediaries including science, industrial or innovation parks are equally deemed most important to 7.1 per cent of the respondents. No respondents found non-governmental or non-profit organisations and other professional or specialised knowledge-based businesses, organisations or institutes to be most important source for innovation. Furthermore, only 7.1 percent considered forums of dialogues, conferences, trade fairs, exhibitions or other social activities or events as the most important source.

Overall, the majority of the respondents use the internal sources of information from within their businesses for the purposes of innovation. This is followed by the external sources from customers and by intermediaries, particularly from government or public research institutes. Among the least used sources of information for innovation are science, industrial or innovation parks, as well as forums of dialogues, conferences, trade fairs, exhibitions or other social activities or events. Nevertheless, based on the 2014 survey carried out by Waikato Innovation Park with 33 tenants, 21 of these surveyed cluster members relied on and asked the Park to organise more networking events (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). Working in partnership is important to businesses that innovate. The following section presents results about cooperation for innovation among the cluster members.

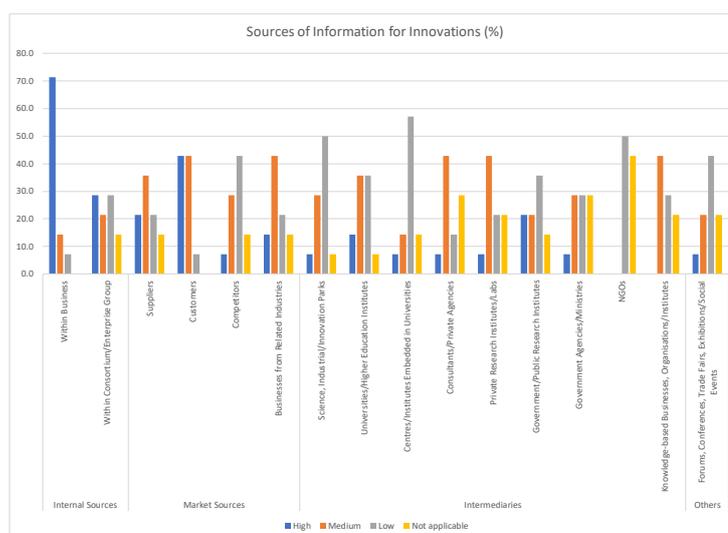


Figure 18: Sources of information for innovations (%)

5.2.3. Cooperation for innovation

According to the 2014 survey carried out by Waikato Innovation Park with 33 tenants, 12 of the surveyed cluster members actively worked with other companies located within the premises. Furthermore, 79 per cent of the surveyed cluster members actively engaged in exports of their goods and/or services. For instance, 25 per cent of the companies exported to Europe, followed by 23 per cent to Australia. The U.S. was the exporting destination to 15 per cent of the surveyed tenants whereas 6 per cent exported to China (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). While actively working in partnership within the cluster and exporting to overseas markets, the cluster members partaking in the CIS-style survey in this research also engage in collaboration for the purposes of innovation with their foreign counterparts, in addition to those located locally or regionally and throughout New Zealand.

This section reports types of cooperating partners and locations in which they are based. The partnership is grouped into internal, market, and intermediaries whereas their locations are local/regional, national, Australia, and others (Refer to Figure 19-20 and Table 7-8 in Appendix J). Results show that 71.4 per cent of the respondents engaged in innovation cooperation with other New Zealand-based businesses within their consortium or enterprise group. This is followed by 57.1 per cent that used the same type of cooperating partners based locally or regionally. While 14.3 per cent of the respondents used Australian-based businesses within their consortium or enterprise group, the same percentage had cooperative arrangements with this type of partners located worldwide.

Among cooperating partners in the market, customers located in New Zealand were reported as cooperating partners used by the majority of the respondents constituting 57.1 per cent, followed by local or regional suppliers, used by 42.9 per cent of the respondents. While 28.6 per cent of the respondents had cooperative arrangements for the purposes of innovation with customers located in Australia and worldwide, the same percentage of these innovating cluster members also used local or regional and national competitors and national businesses from related industries. None had cooperative arrangements with Australian-based suppliers, competitors located in Australia and worldwide, and with their local or regional and Australian-based businesses from related industries. On the intermediary side, 57.1 per cent of the respondents engaged in innovation cooperation

with national universities or higher education institutes, followed by science, industrial or innovation parks that constitute 42.9 per cent of these innovating cluster members.

Overall, most of cooperation for innovation were with cooperating partners located throughout New Zealand, with the majority of the respondents having cooperative arrangements with other New Zealand-based businesses within their consortium or enterprise group. This is followed by cooperating partners located locally or regionally, overseas, and in Australia. There are factors that hamper innovation or discourage businesses from undertaking innovation. The following section presents results about the factors hampering innovation of the cluster members.

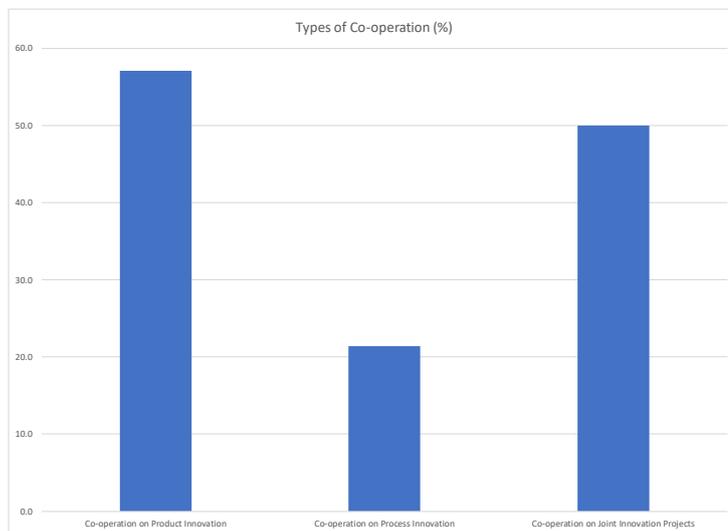


Figure 19: Types of co-operation on innovation (%)

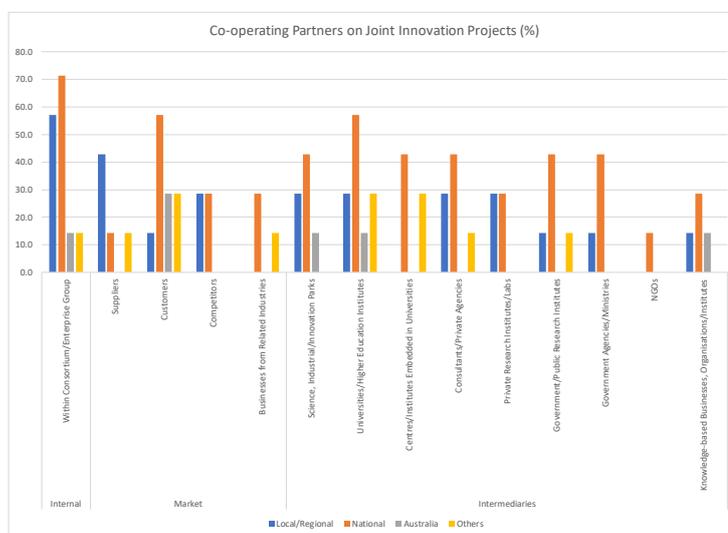


Figure 20: Co-operating partners on joint innovation projects (%)

5.2.4. Constraints on innovation

This section reports factors cited by the cluster members partaking in the survey that interfere with innovation or influence decision not to innovate. These hampering factors are categorised into cost factors, knowledge factors, and other factors. In relation to the degree of hampering, the survey divides the factors into 'High', 'Medium', 'Low', and 'Not applicable'. 'High' and 'Medium' depicts certain factors as the most hampering and moderately hampering to innovation respectively. While 'Low' represents the least hampering, 'Not applicable' means irrelevancy. For the purpose of simplicity, this section only discusses results that the cluster members found to be the most hampering factors. Nevertheless, the other results on the degrees of hampering to innovation can be seen in Figure 21-23 and Table 9-11 in Appendix J.

Results show that 28.6 per cent of the respondents cited the availability of finance to support innovation as the most hampering factor, followed by high direct innovation costs constituting 21.4 per cent of the cluster members partaking in the survey. While cost of finance was deemed the most hampering factor to 14.3 per cent of the respondents, only 7.1 per cent considered excessive perceived economic risks as hampering innovation to the highest degree. In relation to knowledge factors, lack of qualified personnel was the most hampering factor to 7.1 per cent of the respondents, while none saw lack of information on technology and market as the factors hampering innovation to the highest degree. Nevertheless, other factors found to be most hampering to 14.3 per cent of the respondents were previous innovations already available and no demand for or lack of customer responsiveness to innovative goods or services.

Overall, the majority of the respondents considered the cost factors to interfere with innovation or influence decision not to innovate, to the highest degree. This is followed by the availability of previous innovations and the lack of demand, and the lack of qualified personnel to carry out innovation. With these constraints on innovation, businesses may choose to abandon and suspend their innovation activities. In this regard, results show that 28.6 per cent of the respondents engaged in innovations that were abandoned or suspended before completion. Nevertheless, the majority of the cluster members partaking in the survey still had their innovations ongoing. They constitute 78.6 per cent of the respondents.

As discussed earlier, the cluster members participated in the survey largely found the cost factors, to the highest degree, to interfere with innovation or influence decision not to innovate. The government may, therefore, play an important role in mitigating this constraint and subsequently fostering innovation. In this regard, the respondents reported that their companies received public support (financial and/or non-financial) for innovation from the government. For instance, 50 per cent of the respondents received financial support from the central government whereas 14.3 per cent from the local or regional government, the Waikato region. Only 7.1 per cent of these cluster members received non-financial assistance from the central government, while the same percentage from the local or regional government. Overall, the majority of the respondents receiving public assistance were financially assisted by the central government. The following section presents results about business growth among the cluster members and the influence of Waikato Innovation Park on the growth.

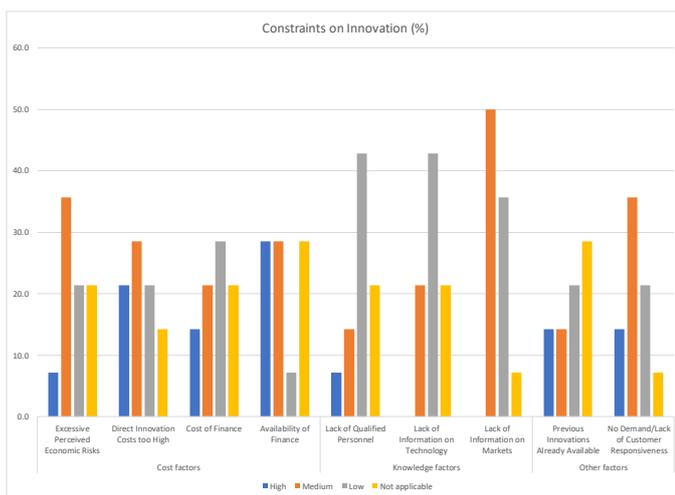


Figure 21: Constraints on innovation (%)

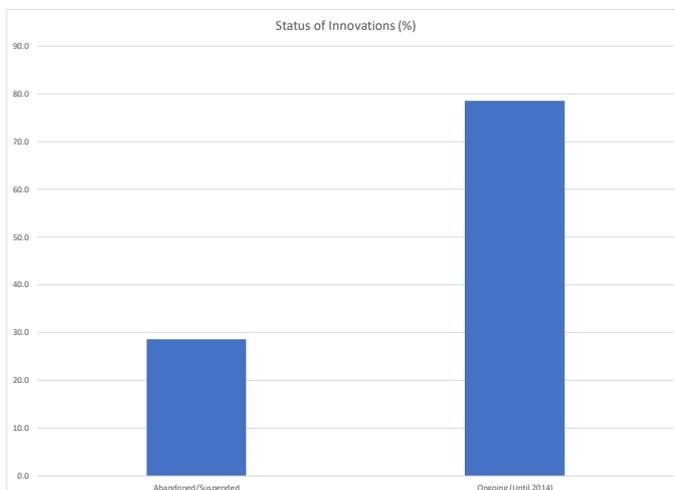


Figure 22: Status of innovations (%)

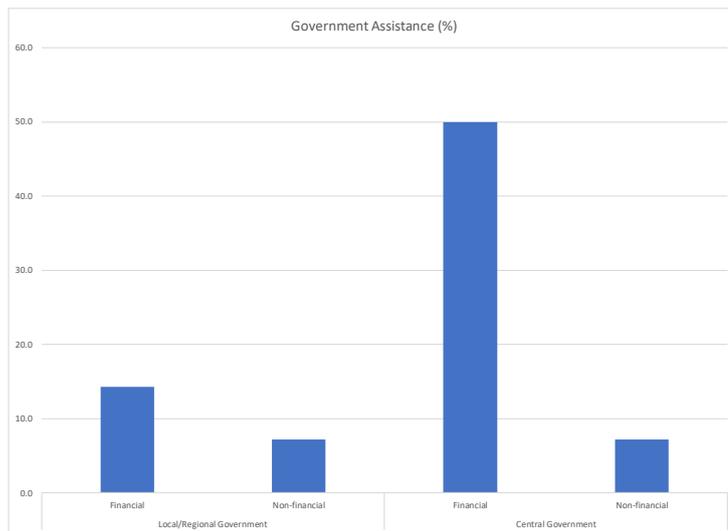


Figure 23: Government assistance (%)

5.2.5. Business growth

Besides innovation-related results, this chapter also reports business growth among the cluster members participating in the survey, in terms of their employment size. As discussed in Chapter Four, the AgBio cluster consists of merely 48 companies based within Waikato Innovation Park. These cluster members are largely small and medium-sized businesses but there is also a presence of large corporations. In this regard, the employment size of these companies was between 1 to 350 plus employees as in 2014. Based on the 2014 survey carried out by the Park with 33 tenants, these surveyed cluster members employed 1,183 staff, while 60 per cent had less than 10 full-time employees (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K).

According to the survey results of this research, the majority of the respondents reported an increase in the employment size, between 1 April 2011 and 31 March 2014. For instance, over the three-year period, the largest increase among these cluster members was at 300 per cent whereas only few of the companies remained stagnant in terms of employment size. Overall, there was an average increase of 78.3 per cent in the number of employees among the respondents (Refer to Figure 24 and Table 12 in Appendix J). Besides employment size, according to the 2014 survey carried out by the Park, the surveyed cluster members also experienced a financial growth. For instance, 79 per cent of these companies reported the financial growth of 33 per cent on average, while one

company experienced an enormous growth of 186 per cent in the same period (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K).

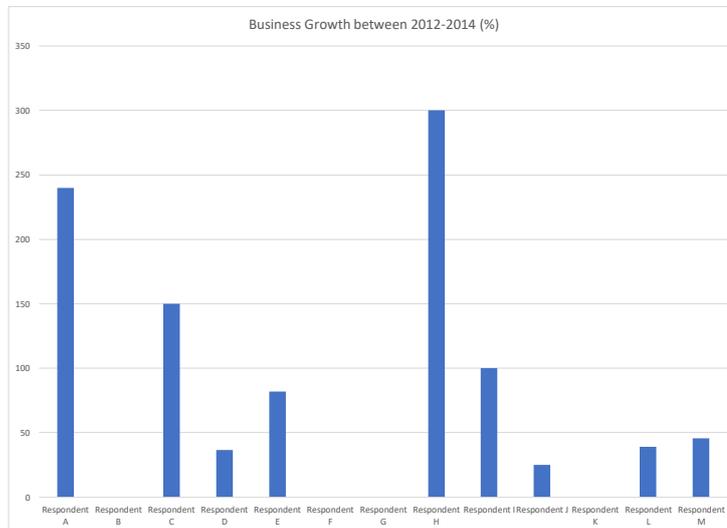


Figure 24: Business growth between 2012-2014 (%)

5.3. Research findings on regional competitiveness

According to Lechner and Leyronas (2012), cluster competitiveness depends on competitiveness of a location or region in which they are based. This chapter presents the findings on the competitiveness of Hamilton, the Waikato region, based on four determinants of Porter’s Diamond model. These determinants are factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry. Nevertheless, this research does not examine the influence of ‘Chance’, the external determinant of the Diamond model, on the regional competitiveness. This section helps answer the research question one of this study: *“How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?”* The analyse of the interview data allows categorisation of themes related to factor conditions into three main categories: physical capital, human capital, and financial capital. The following section presents the findings on physical capital of Hamilton, the Waikato region.

5.3.1. Factor conditions: Physical capital

The findings of this research indicate that the physical capital of Hamilton, the Waikato region include agricultural strengths, proximity to industry leaders, proximity to core customers, proximity to education institutes, and centrality of location. The following section presents the findings on the agricultural strengths of the region.

5.3.1.1. *Agricultural strengths*

The Waikato region, the location of the AgBio cluster, is endowed with strong research and economic strengths in agriculture (Waikato Innovation Park, 2015a). For instance, Respondent A claims that “this is a strong base of agri-technology and technology companies, and it’s because you’ve got AgResearch, you’ve got DairyNZ, you’ve got the university and you’ve got companies all around here. So there’s a big cluster around here...” (Respondent A, personal communication, December 09, 2014). Respondent M similarly concurs with the assertion that the economic strengths in agriculture of the region is “very strong, because the dairy industry is almost centralised in this area, with a number of different factories from Fonterra through to you know, Tatua and those likes” (Respondent M, personal communication, April 28, 2015). Likewise, for Respondent F:

Excerpt 30: Respondent F

I mean its agricultural background. Hamilton still has quite an agricultural focus with AgResearch and the Waikato University...it’s very, very well, very good for all the services that we need to do for our business. Hamilton pretty much has 99 per cent of everything we need...it’s really its location is its biggest asset for the work we do..., location was the main reason because of Ruakura. That was why we were set up here and because we could get access to Innovation Park, yeah (Respondent F, personal communication, March 26, 2015).

As a result, the strong research and economic strengths in agriculture, particularly the dairy industry, help attract agricultural-related companies to base their main operation within the Waikato region. For instance, according to Respondent A, the strong agricultural strengths together with the presence of a large number of agriculture companies and other relevant organisations or institutions influence a decision to locate the AgBio cluster within the region (Respondent A, personal communication, December 09, 2014). In this regard, the locational choice allows the companies to closely align their

core knowledge and technical know-how as well as their company culture with those of the industry. For instance, Respondent G claims that:

Excerpt 31: Respondent G

So the purpose of the company is to generate revenue from food processing. Food processing in New Zealand is primarily about the dairy industry; Fonterra and other companies. Fonterra and other companies are agricultural, rural based companies. That's why we've chosen to be here in Hamilton..., because it means that the culture that we create is very much aligned with the dairy sector in New Zealand, where our primary business is..., the core of our knowledge and how we feel and what we are is aligned with the dairy industry, Waikato based, so that's why we've put our team here (Respondent G, personal communication, April 01, 2015).

5.3.1.2. Proximity to industry leaders

Owing to the strong research and economic strengths in agriculture, locally-based companies are able to stay close to local industry leaders, which include AgResearch, DairyNZ, Tatua, and Fonterra. In this regard, Respondent I emphasises that:

Excerpt 32: respondent I

Yeah, so why it works for me here is, so prior to shifting into this I sat in a different building..., we use AgResearch a lot and prior to that - if you're talking about just being in the Waikato, prior to that the company was based in Northland and Northland's just too far away from the rest of the country..., I deal a lot with AgResearch, so that makes it simple to operate from here..., being able to access AgResearch, to understand what DairyNZ are doing... (Respondent I, personal communication, February 16, 2015).

In this regard, the proximity to the local industry leaders and other relevant establishments facilitates mutually-beneficial relationships and allows a quick access to their service and assistance with more ease. For instance, Respondent M emphasises that:

Excerpt 33: Respondent M

Obviously being local here, if there was a situation and generally there is in the peak in October, there's a lot of milk floating around and they can't get it into their own factories. We're here to take a little bit of that overflow, alright, so that's just an industry - what we call is an industry good exercise, because nobody likes to see spilt milk or milk that we dump to drain (Respondent M, personal communication, April 28, 2015).

5.3.1.3. *Proximity to core customers*

While industry leaders may encompass core customers, companies, especially agricultural-oriented companies, are able to benefit from locating in the vicinity of these establishments. This advantage subsequently influences the locational choice of the companies to situate in the Waikato region. For instance, Respondent G emphasises that:

Excerpt 34: Respondent G

Food processing in New Zealand is primarily about the dairy industry; Fonterra and other companies. Fonterra and other companies are agricultural, rural based companies. That's why we've chosen to be here in Hamilton, because it puts our company very close to the core of the customers, and the customers in New Zealand aren't biscuit makers or tea makers or other consumer products..., because it means that the culture that we create is very much aligned with the dairy sector in New Zealand, where our primary business is. That doesn't mean we can't go and work for Heinz Watties, or we can't go and work for Sanitarium, or we can't go and work for other companies. But the core of our knowledge and how we feel and what we are is aligned with the dairy industry, Waikato based, so that's why we've put our team here. So that's creating the culture and the environment to have empathy with the customer...(Respondent G, personal communication, April 01, 2015).

As a result, the proximity to the core customers increases the likelihood of the companies to maximise profits. The potential for the economic rewards may, however, not be realised if they are further apart. In this regard, Respondent G argues that:

Excerpt 35: Respondent G

So the purpose of the company is to generate revenue from food processing. Food processing in New Zealand is primarily about the dairy industry; Fonterra and other companies. Fonterra and other companies are agricultural, rural based companies. That's why we've chosen to be here in Hamilton..., if you want to have a financially successful business the best revenue you can earn is from dairy, because it's the biggest market. It's 25 per cent of the GDP or something like that, so that's why we've chosen to place our hub in a rural area... (Respondent G, personal communication, April 01, 2015).

Nevertheless, proximity to core customers may not be the main contributing factor influencing a locational choice. For instance, Respondent J states that their company is based Waikato Innovation Park, the Waikato region, but mainly serves overseas markets:

Excerpt 36: Respondent J

Well we don't actually have that many customers in New Zealand. Most of our customers are based actually overseas, so New Zealand is actually one of our smaller sales market. So we're probably an unusual company in that way, because we don't have local customers - not high quantities of them anyway. We've got customers in New Zealand, but not our major income source...obviously we've got customers at AgResearch and places like that you know, but...there are the bigger markets in the US, places like that obviously - because we're doing DNA you know, test, extraction kits. We don't do that many DNA..., we're only a small country compared to... (Respondent J, personal communication, March 05, 2015).

5.3.1.4. Proximity to education institutes

Besides the industry leaders and core customers, close geographic proximity to local world-leading education institutes, particularly the University of Waikato, adds further to the economic strengths and attractiveness of the Waikato region. In this regard, Respondent A and Respondent J assert that:

Excerpt 37: Respondent A

This is a strong base of agri-technology and technology companies..., you've got companies all around here...and it's because you've got AgResearch, you've got DairyNZ, you've got the university...well we're quite lucky because we've got the university and Wintec based in Hamilton, so we're lucky with the qualifications we get...so there's a big cluster around here... (Respondent A, personal communication, December 09, 2014).

Excerpt 38: Respondent J

There's everything you need here. You've got the university just down the road; they help actually - part of the researchers that actually produced our product, so there is that connection...we've had at least three people based from Hamilton and they've always been very good at the job...we've got two scientists but one of the scientists was actually educated up at Waikato University...so we think quite highly of the education down here at Waikato..., I mean obviously it's just convenient for us to be close to the university more than anything else. And that would have been one of the key things when we set up here... (Respondent J, personal communication, March 05, 2015).

Likewise, as an IT-based establishment that does not greatly regard geographic proximity as a main contributor to competitiveness, Respondent L claims that their company also benefits from proximity to local education institutes:

Excerpt 39: Respondent L

Yeah, it is. I mean a lot of the development - we have developers in Auckland for some of the stuff we do. We have our own internal development team and we use another company in Hamilton in terms of development as well. I mean anything when it comes to IT, you don't need them here in Hamilton per se but we do benefit because the two guys that we have working internally here on IT and developing software, come from the - they're university students. So yes, that is an advantage being closer to the university (Respondent L, personal communication, March 12, 2015).

The proximity also facilitates inter-organisational relationships and collaborations between locally-based companies and the education institutes. For instance, Respondent A emphasises that:

Excerpt 40: Respondent A

We work with the university on things like interns...we discuss with the university and clusters as to the requirements...looking forward to the future, what are the educational requirements in agriculture or IT or something like that. We talk with the university and Wintec (Respondent A, personal communication, December 09, 2014).

In this regard, Respondent B specifically highlights collaborations with the University of Waikato. While the collaborations are on the product testing, they also involve having students from the university working on projects in the company.

Excerpt 41: Respondent B

Well in our case there has been a lot of work done with the sugar in the roots of our plant - it's called FOS, F-O-S. And the university people test for that and so we say that we want five grams in a packet, and so the company in Pukekohe makes the mixture with five grams in it. Then we give it to the university and they hold it at nought degrees, 10 degrees, 20 degrees, 30 degrees for a long time, and we see how stable the mixture is..., I generally work with one particular professor up there and she is an expert in testing for FOS. And so we discuss - we might have several meetings and discuss what is wanted, and then she will introduce the students and we will define a body of work..., I generally see the student every one or two weeks just to see how things are going (Respondent B, personal communication, May 18, 2015).

Excerpt 42: Respondent B

We work with the university and they have excellent students who work on our projects...if we established a laboratory we could employ excellent students from the local university..., we could arrange to support students sometimes over the summer and sometimes for a whole year, they could do a study on particularly the stability of our product when it was in a mixture: at what temperature and for how long..., we get good grants to support students and we have to pay some money...so they're not employees of our company; our arrangements are with the university (Respondent B, personal communication, May 18, 2015).

Furthermore, while the proximity facilitates inter-organisational relationships and collaborations between locally-based companies and the education institutes, it also allows the former to stay close to the source of knowledge and more easily access and make use of it for their business purposes. For instance, Respondent J claims that:

Excerpt 43: Respondent J

One of the reasons that we chose Hamilton was to be close to the science community that helped to develop our product..., I mean obviously it's just convenient for us to be close to the university more than anything else. And that would have been one of the key things when we set up here..., you've got the university just down the road; they help actually - part of the researchers that actually produced our product..., it was a co-design between Auckland and Waikato scientists. So that was one of the key reasons we based ourselves here, to be close to those scientists and their knowledge..., I mean obviously we still have strong ties with the Waikato University and so those connections are pretty tight..., they formed a committee that used to come here...it was really set up as the founding scientists and because obviously they've got years and years of knowledge, so it was to help communicate between us and the scientists any issues and how to resolve them...it was just - helping hand from our friends..., but we're not doing that as much now. We sort of just talk to them as when we need some information...well I guess it's just sort of communication with the founding scientists...it's usually informal, just if we've got questions and we think they can help us answer them, we'll talk to them..., it would have been regularly...once a fortnight, once every two weeks..., but I think that's the difference between a very start-up company and someone in the next phase, that you need those kinds of contacts a little bit less as you get more established (Respondent J, personal communication, March 05, 2015).

In relation to product development, Respondent B similarly stresses the important contribution of the local education institutes to the success of their company:

Excerpt 44: Respondent B

We did all that work with our juice processor in Pukekohe and the Waikato University...so we get the product, the mixtures made up at Pukekohe and then the testing done here at the university..., those tests are very valuable to us...overall to repeat one of those studies would cost about \$100,000..., Waikato University was very good for that type of work...the university has been very helpful with our successful analyses. Some of the statistics was beyond my ability and so we got university people to do that (Respondent B, personal communication, May 18, 2015).

Besides inter-organisational relationships and collaborations and knowledge sharing, proximity to local education institutes facilitates the access to their financial assistance including grants. For instance, Respondent J highlights that:

Excerpt 45: Respondent J

As far as raising capital or...grants..., well we're still working with grants with the universities, so because we've still got good connections with the universities, so we have a few on the books...Waikato University...we don't tend to use Wintec or anything like that. It's usually just the university..., so those kinds of grants we're still active with (Respondent J, personal communication, March 05, 2015).

5.3.1.5. Centrality of location

In addition to the other strengths of physical capital discussed above, the centrality of the Waikato region favourably benefits locally-based companies. The advantage of this locational trait influences companies to base in the Waikato region. For instance, Respondent I asserts that:

Excerpt 46: Respondent I

Yeah, so why it works for me here is..., for me in the dairy scene, this is still the largest dairy market in New Zealand..., it's also central for me moving around the countryside..., prior to that the company was based in Northland and Northland's just too far away from the rest of the country..., so that makes it simple to operate from here (Respondent I, personal communication, February 16, 2015).

Furthermore, the proximity of the Waikato region to other locations enables locally-based companies to operate more competitively in the former, while serving the markets in the

latter. Likewise, the locational uniqueness of Hamilton, the Waikato region also facilitates labour movement or migration between its neighbouring locations including a larger city, Auckland. For instance, Respondent F and Respondent J respectively claim that:

Excerpt 47: Respondent F

Location to Auckland..., without all the costs of being in Auckland...one of the good things about Hamilton for our type of work is a lot of the companies that we do work for are based in Auckland, so we're only an hour and a half away from them, yeah (Respondent F, personal communication, March 26, 2015).

Excerpt 48: Respondent J

So like our scientist, he lives in Auckland and he comes down to work a couple of days a week, so he's only based here part time. And of course he can you know, yep, cars it's not a big deal. So he just comes down..., well it doesn't take that long anymore, as long as they leave at the right time of the day..., don't want to leave in traffic time do they (Respondent J, personal communication, March 05, 2015).

Overall, Hamilton, the Waikato region is endowed with tremendous strengths such as agricultural base and centrality of location as well as proximity to industry leaders, core customers, and education institutes. These physical capitals hugely benefit locally-based companies, as they allow and facilitate, for instance, a quick access to service and assistance and inter-organisational relationships. As a result, the strengths of the physical capitals act as a pull factor attracting new entrants into the region. In this regard, Respondent F highlight the key assets of Hamilton, the Waikato region that:

Excerpt 49: Respondent F

We need like analytic laboratories and things like that and we need access to animal production facilities, so paddocks for grazing and then also yards for working with the animals and stuff like that. So Ruakura, AgResearch is perfect for that and we're on the outskirts so they've got access to all the grazing facilities and yards. But they've also - in Hamilton itself is the analytical labs for running samples and doing our local testing of samples and stuff like that, and also Gribbles Pathology...I guess the location to Ruakura, to the AgResearch..., accessibility to Hamilton..., it's very, very well, very good for all the services that we need to do for our business...it's really its location is its biggest asset for the work we do...(Respondent F, personal communication, March 26, 2015).

In addition to the locational strengths discussed above, Hamilton, the Waikato region also renders competitiveness in terms of costs, as it allows locally-based companies to operate more cheaply compared with larger cities such as Auckland. In this regard, Respondent J asserts that “one of the reasons that we chose Hamilton was...the costs, the running costs, it’s cheaper here” (Respondent J, personal communication, March 05, 2015). Furthermore, Respondent J emphasises that transportation is also one of the main contributors to the locational choice:

Excerpt 50: Respondent J

One of the reasons that we chose Hamilton was...there are really no delays as far as couriers or anything. Obviously we do a lot of the exporting, but there are no issues with that. We get all our products overseas within three to four working days, so there’s no sort of down but there are a lot of positives...and of course it’s actually - like now that Auckland’s so busy... (Respondent J, personal communication, March 05, 2015).

Nevertheless, the competitiveness of location resulted from agricultural strengths in New Zealand spreads beyond the boundaries of the Waikato region. For instance, Respondent F claim that “luckily New Zealand - we still remained financially competitive because we can run large animal trials cheaper than overseas, because of the grazing..., just New Zealand as a country itself gives us a competitive advantage, yeah” (Respondent F, personal communication, March 26, 2015). Furthermore, Respondent F also assert that:

Excerpt 51: Respondent F

Most of these companies here are technology based aren’t they, rather than...pharmaceutical based..., there’s just not a lot of pharmaceutical development in New Zealand. But that’s not to say there couldn’t be, because the cost of development is probably cheaper here than it is and that would be kind of nice if there was more...pharmaceutical type products or companies, pharmaceutical companies that were based locally..., rather than just technologies...that would be an advantage to us..., a definite advantage, yeah (Respondent F, personal communication, March 26, 2015).

5.3.2. Factor conditions: Human capital

The findings of this research indicate that the human capital of Hamilton, the Waikato region include tangible and intangible strengths of local workforce, pull factor of local

workforce, and local education institutes. This section also details findings on accessibility of skilled workforce and panaceas for labour shortage. The following section presents the findings on the tangible strengths of the local workforce.

5.3.2.1. *Tangible strengths of local workforce*

With strong research and economic strengths in agriculture together with the presence of a large number of agriculture companies and other relevant organisations or institutions, the Waikato region becomes a hub for a highly-skilled agricultural-related workforce of New Zealand. For instance, Respondent F assert that “for certain roles, yes..., I mean its agricultural background. Hamilton still has quite an agricultural focus with AgResearch and the Waikato University. You’re fairly likely to find those people here, more likely than you would be like Wellington” (Respondent F, personal communication, March 26, 2015). Likewise, Respondent M and Respondent N respectively claim that the workforce in the Waikato region is highly skilled in agricultural-related areas:

Excerpt 52: Respondent M

Yeah very strong, because the dairy industry is almost centralised in this area, with a number of different factories from Fonterra through to you know, Tatura and those likes..., so the workforce, a very highly skilled workforce in the dairy industry based in Hamilton (Respondent M, personal communication, April 28, 2015).

Excerpt 53: Respondent N

If it’s about turning grass into milk we’re already the best in the world. They’re pretty, pretty good..., in terms of grass based, turning grass into dairy and into beef...it’s the best in the world...unbelievably good, absolutely world class. Definitely the best in the world..., specifically around grass..., in that particular focus area we are the best in the world. The companies are the best, the people are the best, and that’s actually true. That’s not even an exaggeration. It’s not being arrogant, because it’s true (Respondent N, personal communication, December 01, 2014).

Besides the highly-skilled agricultural-related workforce, the Waikato region is also home to well-qualified employees with non-agricultural-related and general-skillsets. The availability of the non-agricultural-related and general-skilled workforce sufficiently serves both agricultural and non-agricultural related companies based in the region. For

instance, Respondent F assert that “yes, yep, the ones we use, yep, definitely..., ‘B’ who’s the project officer and she came from Hamilton and was very well suited for that role...so I think for those sorts of positions...Hamilton’s very good, yeah” (Respondent F, personal communication, March 26, 2015). Likewise, for Respondent D and Respondent L whose companies are non-agricultural establishments, the local workforce is well-qualified, and the labour supply adequately meets the needs of their company:

Excerpt 54: Respondent D

Yeah, I think so, yeah. We’ve certainly never felt that we needed to try and cast a wider net and attract people from outside the local area or anything. We’ve been able to fill roles that we need filling..., we’ve got good people here and that’s not going to change (Respondent D, personal communication, March 03, 2015).

Excerpt 55: Respondent L

Yeah, we’re happy with the candidate pool in Hamilton. The city’s of a big enough size..., staff here in Hamilton, they’re mainly on the certification side of the business which is Certificates of Origin and ePhyto certificates for logs and timber. We do a lot of that training internally. They don’t necessarily have to have any particular qualification, but generally we’re looking at people with at least completed a high school you know, Year 13 and ideally if they have a degree of some form, then that’s great too. In terms of our laboratory, we have our own laboratory and they need to have a chemical qualification from a university (Respondent L, personal communication, March 12, 2015).

Furthermore, Respondent M indicates that the Waikato region adequately offers a diversely-skilled workforce, well-qualified employees with multiple skillsets.

Excerpt 56: Respondent M

We generally advertise and we have just recently employed some people. But we’ve targeted individuals that have the expertise in infant formula..., we have selected some that have got skills outside the infant formula, so they might have skills in laboratories but also have the ability to run a dryer, so they’ve got multiple skills (Respondent M, personal communication, April 28, 2015).

In this regard, for Respondent O whose company employs more than 400 employees, mainly in Hamilton (Respondent O, personal communication, March 04, 2015), the strengths of the local labour force allow hiring of a wide range of skills and qualifications:

Excerpt 57: Respondent O

Some of the staff are non-university staff. Like they've got no qualifications and then we've got other staff that have qualifications from a Bachelor of Science right through to a PhD. So there are all different qualifications..., we do research and development as well and we do routine testing. We also have a number of staff that are client managers, so they look after clients. So not really key account management; it's more client servicing management where the client will ring up and want to know what they need to do to meet export regulations. We're also a MAF approved facility, so we also have staff that are looking after the MAF approvals..., so the staff are trained in the different testing that we do. The people that you're talking about with the PhDs, they're technologists and the client service managers will get an enquiry about a new compound that the client wants tested. The technologists will develop that method (Respondent O, personal communication, March 04, 2015).

As a result, the Waikato region becomes one of the New Zealand powerhouse in terms of a highly well-qualified workforce in agricultural-related and non-agricultural-related areas. In this regard, Respondent P emphasises that "Oh absolutely, yes. They're highly qualified..., they might not be highly qualified and all having PhDs...but they have experience or skillsets that are expert" (Respondent P, personal communication, February 05, 2015). In addition to the adequate labour supply, the competency of the local workforce with non-agricultural-related and general-skillsets is relatively comparable to those of other regions in New Zealand. For instance, Respondent F claim that "so Hamilton's not bad. You know, Palmerston North and Christchurch are the other big places so – yeah" (Respondent F, personal communication, March 26, 2015). Likewise, according to Respondent I:

Excerpt 58: Respondent I

I can't say generally but the - I've employed people here. So prior to this job I worked with a bank and I employed staff in the Northland region, South Auckland and the South Island and its no - for what I need to do, it's no better or worse. I'm not employing any of the innovation or research, technical... (Respondent I, personal communication, February 16, 2015).

Besides the adequate supply of highly well-qualified labour, there is also a large pool of relatively low educational attainment workforce based in the Waikato region. For instance, for Respondent Q whose company operates in the baking industry, largely draws needed labour from a local pool of relatively low educational attainment workforce:

Excerpt 59: Respondent Q

I have a very stable workforce..., we haven't had long periods where we've had a staff shortage, because as I said we have a really stable workforce, so we don't have - it's not doors in and out. People are not coming in and out. And we've just hired new people at one of our cafes for a barista's job, but we had maybe 100 applications. So not all of them suitable and some people don't read the job description properly, but we were overwhelmed with people, so it wasn't difficult. I think in this economy now it is not difficult to find staff. There are more people looking for jobs than there are jobs available. We have people calling us up or I had a lady in the supermarket the other day who stopped one of my employees and said I hate it here. Do you have any jobs - I've worked in catering? And then she came down to see us, so there would be a difficulty if we are looking for perhaps a head chef or a baker. Other than that I think it's not difficult (Respondent Q, personal communication, November 28, 2014).

In this regard, Respondent Q stresses the importance of on-the-job training to upskill employees with a low level of educational attainment:

Excerpt 60: Respondent Q

All the people that we employ are skilled, whether they came to us with skills or whether we trained them. Even washing dishes is a skilled job, even our drivers, even our cleaners, you know, there's a skill attached...the young lady who was just here, she's worked for me for 20 years. We've a lot of people who come and they stay and we don't have a lot of - so we do a lot of in house training..., it's only as the company has grown that we have employed experts, well formally trained chefs..., Tracey's a whizz you know, at a computer and doing data processing, so...the last probably 10 years we have employed qualified, people who've got qualifications have come through the Unitec system of hospitality training..., so I consider that we have a skilled workforce (Respondent Q, personal communication, November 28, 2014).

5.3.2.2. *Intangible strengths of local workforce*

While the key assets of the Waikato region include a highly well-qualified workforce, particularly in an agricultural-related area, the local labour force is also endowed with other intangible assets that may be of interest to and more preferable by the demand side. For this reason, locally-based companies and the cluster members, for instance, Respondent D's company may favour local employees compared with those from other parts of the country. Likewise, Respondent G asserts that their company prefer locally-raised and educated employees, citing cultural compatibility and natural empathy as one of the determining factors:

Excerpt 61: Respondent D

I mean we use Seek and Trade Me Jobs and all of those kinds of online and we do always get you know, a reasonably high number of applications and a reasonable number of those applications are from outside the region. Some of them are from outside the country, so you know, that's one of the things I guess that we take into account because you know, obviously we'd prefer someone who is already local rather than someone who's going to have to move from someplace else (Respondent D, personal communication, March 03, 2015).

Excerpt 62: Respondent G

Yes. Again like I said, the culture that we want to create within the organisation is based around rural and agricultural need. The kids that come from Waikato University have very much grown up in that environment, so they understand - they have a feeling and they understand what we're trying to do. If I take kids from Auckland University they do not have a feeling and understanding of the rural environment, because they're generally from a city...so there is quite a difference in the culture between the two cities..., their background (Respondent G, personal communication, April 01, 2015).

Furthermore, owing to their familiarity to the local environment in the Waikato region, Respondent G argues that the locally-raised and educated employees are also more capable to work effectively in a team environment and have a greater degree of loyalty to their company:

Excerpt 63: Respondent G

To be honest the skill level is probably very much the same, but because you're working in teams it's not about the skill; it's about how you get along with others. And so their background and their upbringing has more to do with their success than their technical ability..., work better together, exactly. People who share similar backgrounds, exactly, work better together and that's what we find..., so it's more of a social thing rather than an intelligence thing, much more social (Respondent G, personal communication, April 01, 2015).

Excerpt 64: Respondent G

If I take a person who's been raised in a large city like Auckland, who's been at Auckland University, they might come here and be very technically competent. But after two or three years they're not comfortable with the environment and they'll move back to the city, because that's really what they want to do. That's how they feel more comfortable. It's nothing to do with their ability; it's about their longevity, how long they'll stay with the company and how they will develop as a person (Respondent G, personal communication, April 01, 2015).

Likewise, Respondent P emphasises the importance of an effective teamwork made up of people with similar backgrounds and interests, for instance, in farming. This close-knit team contributes to high retention rates of highly skilled and motivated employees and, therefore, to the success of their company:

Excerpt 65: Respondent P

Well just having a team - for us, having a team of highly skilled and motivated people, so again we've been very fortunate actually. We hardly have any - you know, we don't have a lot of staff leaving, although we have had a couple of people leave in the last year. But it's quite unusual, because we're quite a close knit team; people are really passionate about farming and making a difference. And so getting people to experience the real world, see what farmers are facing and how, what they do and what their problems are, just understanding that, that helps us come up with ideas, helps them work together and have a purpose. But then having a team of people with different skills; they're all highly trained but they all have different skill sets and we work together as a team (Respondent P, personal communication, February 05, 2015).

Besides the cultural compatibility and natural empathy, effective teamwork, and loyalty of local workforce, the relative difficulties of hiring employees from an external workforce contribute to the preference for a local workforce. For instance, Respondent J claims that:

Excerpt 66: Respondent J

Well basically we're not really grown as much, so we've got two scientists but one of the scientists was actually educated up at Waikato University...so it was easy because she's got family here and everything else. So it was easy..., it's a lot easier always to hire people...who have family in the same place...but it is actually quite difficult to get staff to come down to Hamilton as such...but usually people will come down for work, so...like our scientist, he lives in Auckland and he comes down to work a couple of days a week, so he's only based here part time. And of course he can you know, yep, cars it's not a big deal. So he just comes down..., well it doesn't take that long anymore, as long as they leave at the right time of the day..., don't want to leave in traffic time do they (Respondent J, personal communication, March 05, 2015).

5.3.2.3. *Pull factor of local workforce*

Overall, complementary to the strong agricultural strengths of the Waikato region, the adequate supply of highly-skilled workforce particularly in agriculture contributes to the locational choice of the AgBio cluster. In this regard, Respondent N asserts that “well when I was the CEO of the Park, that’s why. If you’re going to try to export something you may as well export the thing you’re the best at. Focus on what you’re good at” (Respondent N, personal communication, December 01, 2014). Likewise, for Respondent D, the human capital strength is the key reason their company remains in the region:

Excerpt 67: Respondent D

I mean my staff are the only reason that tie this company to this spot. If it was just me I could go and live in Turangi or Whangarei or Invercargill. It doesn't matter, as long as we've got an internet connection. I do a fair amount of travelling and all of our work from here we're working remotely for customers on the other side of the world, so it doesn't matter. In some respects, there's a good argument for us being in the U.S. You know, maybe it would be easier for us in the U.S., but we don't want to do that and I think we've got good people here and that's not going to change. So like I say, if I could convince seven people that we should all move to you know, the Gold Coast, then we could all move to the Gold Coast. It really doesn't make any difference that we're here (Respondent D, personal communication, March 03, 2015).

Furthermore, the existing strengths of human capital and of physical capital also enable the Waikato region to become an employment attraction to potential job seekers from other parts of New Zealand. As a result, these regional traits potentially contribute to an expansion of the labour pool of both highly-skilled agricultural and non-agricultural workforce. For instance, Respondent M claims that “we get them from all over the country to be honest. A lot of them come here because they’ve got that skill here. There are more dairy factories based in the Waikato than anywhere else so...” (Respondent M, personal communication, April 28, 2015). Likewise, the relatively lower living costs and its proximity to particularly Auckland also help attract well-qualified workforce especially young employees or those live outside the region. According to Respondent J:

Excerpt 68: Respondent J

I think years ago it was a lot more negative for people to move down to Hamilton to take up a job, but now people are wanting to get out of Auckland. So it's a positive because it's cheaper for you know, like a younger person...I mean I think if you're hiring higher scientists, then it might be a little bit more difficult. But we haven't really come to that state, but for younger up and coming, they're happy to move out where it's cheaper...the pay rate's the same. So we're paying the same as what we'd be paying in Auckland basically...so they're doing well (Respondent J, personal communication, March 05, 2015).

Excerpt 69: Respondent J

Well basically we're not really grown as much, so we've got two scientists but one of the scientists was actually educated up at Waikato University...so it was easy because she's got family here and everything else. So it was easy..., it's a lot easier always to hire people...who have family in the same place...but it is actually quite difficult to get staff to come down to Hamilton as such...but usually people will come down for work, so...like our scientist, he lives in Auckland and he comes down to work a couple of days a week, so he's only based here part time. And of course he can you know, yep, cars it's not a big deal. So he just comes down..., well it doesn't take that long anymore, as long as they leave at the right time of the day..., don't want to leave in traffic time do they..., the pay rate's the same. So we're paying the same as what we'd be paying in Auckland basically...so they're doing well (Respondent J, personal communication, March 05, 2015).

Nevertheless, companies may opt to, besides the strength of the local workforce, establish and remain in the Waikato region, owing to their long-established foundation and attachment. For instance, according to Respondent D, "I mean as I say before I started this business I worked at the University of Waikato. I've always been in this region so that's why the business was started in this region, and that's why we're still here" (Respondent D, personal communication, March 03, 2015).

5.3.2.4. Local education institutes

Although being a hub of an agricultural workforce and having an adequate supply of non-agricultural and general-skilled labour force, some locally-based companies may be challenged by a shortage of labour supply, particularly the workforce with more highly-specific technical skillsets. Nevertheless, the Waikato region is a home to renowned education institutes such as the University of Waikato. These institutes are sources of labour supply for locally-based companies as well as the cluster members and, therefore,

contribute further to the strength of the local workforce. For instance, Respondent K and Respondent P assert that the local education institutes answer the need for labour of their companies, to fill up job vacancies more easily and quickly:

Excerpt 70: Respondent K

Look, as we grow we tend to recruit from the universities, agricultural universities..., mostly they were starting at a low level. We're looking for to bring graduates into the business. We've never had to wait. Generally, it's not a problem..., we haven't had any problems (Respondent K, personal communication, December 02, 2014).

Excerpt 71: Respondent P

We haven't had problems in the past. It's been relatively quick and also a lot of students - we've had a number of students who've come through, done projects for us; we've seen the value in them so they've continued to work for us at a later stage. So I think - and that's quite good; again, quite good being handy to university and the feed off of them (Respondent P, personal communication, February 05, 2015).

Likewise, while the efforts of local education institutes to ensure students work experience through their respective internship programmes help ease the problem related to a shortage of labour supply, they potentially offer financial benefits for local companies. In this regard, Respondent J claims that:

Excerpt 72: Respondent J

Well I mean actually I just got an email the other day about how you know, if they can get students working for us and stuff like this, full grants for that kind of thing. So there are offers out there. We haven't taken that up at this point in time...and we'll probably take that up moving forward at some point... (Respondent J, personal communication, March 05, 2015).

While the local education institutes are sources of a newly-graduate labour supply with relatively lower skills and less work experiences, they also contribute to the pool of more well-qualified workforce. For instance, Respondent J asserts that:

Excerpt 73: Respondent J

Yeah, well we've had great success. We've had at least three people based from Hamilton and they've always been very good at the job...we've got two scientists but one of the scientists was actually educated up at Waikato University...so we think quite highly of the education down here at Waikato (Respondent J, personal communication, March 05, 2015).

Likewise, Respondent B reiterates the important contribution of the local education institutes to the pool of well-qualified and skilled workforce in the Waikato region. "If we established a laboratory we could employ excellent students from the local university...well...the research work we do, we work with the university and they have excellent students who work on our projects" (Respondent B, personal communication, May 18, 2015). While Respondent D and Respondent G claim that their companies benefit from the local education institutes, particularly the University of Waikato, the latter also employs from institutes outside the region:

Excerpt 74: Respondent D

The university, so all of my technical staff here - I think at the moment, yeah - and most of the technical staff we've ever had have come out of Waikato University. The Computer Science Department there is good. They produce good graduates, so it is always challenging to find you know, really, really good software developers. But we've got as good a chance as anybody I think because we have close relationships - I mean I worked at the university before I came here, so I still know people in the department there. So they're kind of the major source for us for talent..., a few years ago we had a summer student, a university student like an intern... (Respondent D, personal communication, March 03, 2015).

Excerpt 75: Respondent G

Oh Waikato Uni, yes, Waikato University has very much met our needs and for the last 10 years we've been taking predominantly Waikato only people. But in the last two years we've gone and taken people from further afield and we're looking at Canterbury, Canterbury University engineering school as well. And last year I took four people from Canterbury University, two from Waikato and four from Canterbury (Respondent G, personal communication, April 01, 2015).

5.3.2.5. *Accessibility of skilled workforce*

Owing to the endowment of a highly well-qualified labour force particularly with agricultural-related as well as non-agricultural-related and general-skillsets, locally-based companies are able to access needed employees with more ease. For instance, Respondent N asserts that “I never have a vacancy. Good people turn up and you grab them” (Respondent N, personal communication, December 01, 2014). Likewise, Respondent M claims that there is no problem finding skilled employees in Hamilton, “No..., we generally advertise for two to three weeks and we get multiple you know, CVs...” (Respondent M, personal communication, April 28, 2015). For Respondent K, “well you know, if we advertise a new position we don't have any shortage of people applying for it, so it's not a problem” (Respondent K, personal communication, December 02, 2014). Furthermore, Respondent O similarly states that:

Excerpt 76: Respondent O

Well we advertise them. We have our own careers on our website and people can register on there. There are all the different levels of jobs advertised on there and we have no trouble getting people to fill positions, like we'll advertise it and have a two week close off date..., it's usually about right (Respondent O, personal communication, March 04, 2015).

For Respondent J, while their company is able to fill job vacancies with relatively more ease, the company size together with the low turnover rate help mitigate the difficulties of accessing needed employees. Likewise, with a low staff turnover rate, Respondent D emphasises that the duration to fill up job vacancy is largely the result of an internal decision-making process:

Excerpt 77: Respondent J

Just usually within a week, two weeks. It's not that long at all, yep. We don't have a problem to date, but we don't have a lot of people moving in and out of our company because we're still quite small. So it's really not a big thing for us being small and you know..., obviously a lot of companies are growing and getting lots more scientists, but we've really stayed small so it's not been an issue (Respondent J, personal communication, March 05, 2015).

Excerpt 78: Respondent D

It takes some time. I mean it's largely dependent on our own internal functions right, how urgent it is that we find someone. But we don't employ very often. We've been pretty fortunate, had low staff turnover over the years. But last time we employed technical people we probably spent six or eight weeks I guess by the time we worked out how we were going to - you know, what the process would look like and advertised and interviewed, and then interviewed some more and kind of worked our way through the whole process. It would have been something like that..., It's not really external factors that cause that. I think if we wanted to find someone and employ them next week, we could. But do we want to do it that quickly? You know, it takes a certain amount of time on our side to kind of go through that whole process, and we want to - because we have a very small stuff, we have low staff turnover, you know, we want to be as sure as we can be that we're choosing the right people. So usually we take a fair amount of care over that process, and that's why it takes so long (Respondent D, personal communication, March 03, 2015).

In line with Respondent D, Respondent I and Respondent L similarly argue that it is merely an inevitable phenomenon during a hiring process:

Excerpt 79: Respondent I

I'd fill a position in eight weeks...do I consider eight weeks would...no, I don't because if I worked back and said if I've got anyone good they're generally employed already. They've got to give four weeks' notice. By the time I work through the employment, the interview process, in a good day that's two weeks, and then there are two weeks to sign, settle agreement, so eight weeks is eight weeks. I don't know if I could do it a lot quicker (Respondent I, personal communication, February 16, 2015).

Excerpt 80: Respondent L

I don't think it's a long period...because inevitably people tend to give you four weeks' notice of them leaving. By the time you've got over that fact and then defined the role that was going - or considered the role, then advertised it, then selected - gone through the interview process and they've given their notice to their company, you're talking a period of at least six weeks to eight weeks..., but that's more the nature of - I mean we can't do anything about it. We don't have people sitting round waiting for a job or waiting for someone to resign (Respondent L, personal communication, March 12, 2015).

Likewise, for Respondent Q whose company operates in the baking industry and largely draws needed labour from a pool of relatively low educational attainment workforce, a

long duration of job vacancy is mainly the result of an internal decision of the company, rather than the shortage of workforce in the Waikato region:

Excerpt 81: Respondent Q

And when I say it takes two months maybe to find someone, it does not mean that we haven't had people coming in trying out for the job in that period, but it may have taken us two months to find the right person..., to get the right - it depends on which area. We could get unskilled workers tomorrow. We could fill a kitchen hand vacancy tomorrow. To get the right chef, the right person for the job can take a couple of months and often - our experience has been we have taken people on a trial basis and they haven't worked out. It has been our experience I think that a lot of people think they have more - are more skilled than they actually are...and just because you have been through the tech training, hospitality training, it doesn't actually mean that you can cook..., well it's also a talent. I think it's a God-given talent and it would be like for me if you taught me how to paint and gave me the paints I still couldn't paint, even though I knew the technicalities of it. And some people are instinctive cooks and know about flavours and all that kind of thing, and not everyone is..., like the girls who make all our sandwiches and things. It's assembling ingredients. The guys who work out the back and the bakers, no, really important they know what they're doing and understand flavour and things... (Respondent Q, personal communication, November 28, 2014).

While locally-based companies enjoy an adequate supply of a highly well-qualified workforce, particularly with agricultural-related skills, the labour supply of highly-specific technical skillsets is relatively less abundant. For instance, Respondent L emphasises that “yeah, we're happy with the candidate pool in Hamilton. The city's of a big enough size..., but we don't need to be hiring specifically like you might for - like Hill Labs. They would find it a bit more difficult...” (Respondent L, personal communication, March 12, 2015). Based on the 2014 survey carried out by Waikato Innovation Park, seven of 33 surveyed cluster members reported that their companies were challenged in finding skilled employees (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). In this regard, Respondent O reiterates that:

Excerpt 82: Respondent O

We don't have a problem with a shortage of staff. We have more people looking for work than what we have positions available. Sometimes if we're looking for a particular person for a particular role, which might be having a lot of experience with a GC analyser...Gas Chromatography..., that might be more of an issue (Respondent O, personal communication, March 04, 2015).

In relation to the workforce with more highly-specific technical skillsets, Respondent F similarly stress the limited supply of thereof in Hamilton, the Waikato region. “No, not for the case of like ‘A’’s role..., not really, no” (Respondent F, personal communication, March 26, 2015). Respondent P similarly stresses that the availability of highly-specific technical workforce in the Waikato region as well as throughout New Zealand is relatively less abundant compared with the labour supply of more general and less technically specific skillsets (Respondent P, personal communication, February 05, 2015). Likewise, for Respondent J:

Excerpt 83: Respondent J

I mean I think if you’re hiring higher scientists, then it might be a little bit more difficult. But we haven’t really come to that state, but for younger up and coming, they’re happy to move out where it’s cheaper...the pay rate’s the same. So we’re paying the same as what we’d be paying in Auckland basically...so they’re doing well..., it’s a positive because it’s cheaper for you know, like a younger person... (Respondent J, personal communication, March 05, 2015).

Furthermore, finding highly skilled technical employees with the ability to effectively work in team environment may add further to a challenge during a hiring process. For instance, Respondent P claims that:

Excerpt 84: Respondent P

It’s very difficult finding the right people, so I’ve been - you know, I have advertised in the last - four months ago, four or five months ago. I didn’t find anyone that was suitable, no one applying for the position. So I think New Zealand’s in quite a shortage of highly skilled technical people and you know, I mean there were a lot of researchers but just getting the right person that fitted with our team - because they’ve got to have the right attitude to fit into the team. They’ve got to have the right skills. We didn’t really find anyone (Respondent P, personal communication, February 05, 2015).

As a result, it may take locally-based companies relatively longer to gain access to needed employees with highly-specific technical skillsets. For instance, Respondent A stresses that “actually for highly technical skills...quite a long time...could be six months - for very technical skills where you're looking for things, but for general skills very quick. But you know, two months, one to two months” (Respondent A, personal communication, December 09, 2014). In this regard, the small population size of New Zealand contributes

to the shortage of highly-specific technical skillsets. For instance, Respondent G stresses that “New Zealand is a very small population base, so for technically competent engineers there’s a very, very small pool to draw from” (Respondent G, personal communication, April 01, 2015).

The contributing factor of the small population size may affect the sustainability of labour supply in New Zealand, as locally-based companies continue to grow. Their growth eventually results in an expansion of personnel and, therefore, a shortage of labour supply of employees with required skillsets. For instance, Respondent G stresses that “well there is a shortage of staff here, so I have about - three years ago I had about 40 engineers, three years ago. Today I have about 170 and about 90 are staff and about 80 are contractors” (Respondent G, personal communication, April 01, 2015).

Besides the size of population, locally-based companies in the Waikato region as well as those in other parts of the country also encounter with a problem involving the misalignment of New Zealand education system. In this regard, the supply side may produce the workforce with skillsets that are less desirable by the demand side. For instance, Respondent G and Respondent A respectively claim that:

Excerpt 85: Respondent G

For people here in Hamilton, okay. So that’s a very difficult task because the education system and primarily we’re engineers; the engineering systems are not based around food processing. If you go and do an engineering degree in New Zealand, you learn about earthquakes because you learn about structural steel. You learn about mining, but you don’t really learn about food and food processing..., so there are very talented engineers in New Zealand, but the engineers don’t come with the right skills to necessarily come into our market... (Respondent G, personal communication, April 01, 2015).

Excerpt 86: Respondent A

I think it’s more the problem at the moment is getting skilled people in New Zealand. Because what I think we have in New Zealand is there’s a misalignment between the education system and what they’re training and what the businesses are requiring. Businesses are requiring people perhaps with more engineering, more science skills and the education system is putting out more soft skills. Well more skills around maybe lawyers or media, all those sorts of things, rather than you know, science or technical skills (Respondent A, personal communication, December 09, 2014).

Furthermore, companies targeting overseas markets may be challenged by the lack of well-qualified workforce that are familiar with the local environment and understand the local culture but also are technically competent with relevant skillsets. In this regard, Respondent N stresses that, although the two complementary traits are important to their business operations, potential employees may not simultaneously acquire them all together:

Excerpt 87: Respondent N

Oh maybe. I mean our challenge is around culture - like 'A', he's Colombian. He's fluent in Spanish, understands Colombian business culture, but didn't know farming technical so that's taken us..., four years for 'A' to change from an engineer to a dairy engineer or beef engineer, and probably another five years and then he will be the best in the world. Because already he knows a lot about farming..., in another five years and he'll be the best in the world (Respondent N, personal communication, December 01, 2014).

Overall, while some companies are able to fill job vacancy with more ease, others may take longer to do so. In this regard, the shortage of labour supply and the duration to fill up job vacancy may negatively affect the operations of the latter. As a result, the disproportional availability of the labour supply of highly-specific technical skillsets compared with the general-skilled workforce may hinder their growth and innovation. For instance, Respondent A stresses that “the problem with the shortages is highly technical skills. It stops growth. It stops product development...” (Respondent A, personal communication, December 09, 2014). Furthermore, Respondent P and Respondent L respectively claim that a long period to fill vacancies may, to some extent, affect the operation of their companies:

Excerpt 88: Respondent P

Yeah, well it does affect. If we can't find anyone to - I mean the quicker we can find one the better, especially because we're a small team and it just means that we can do less things. So we've got a whole lot of projects - we've always got more ideas and more projects than we have staff to do them. So the limiting factor is the number of people we can... (Respondent P, personal communication, February 05, 2015).

Excerpt 89: Respondent L

Well we're doing some employing right now and we find that we can find people within a couple of weeks..., it just puts pressure on other staff because you're one full time equivalent down. So other people have to work harder...longer hours. We don't turn off the service. The ships going overseas with logs on them don't stop because we don't have staff and you know, the goods being exported to China need their Certificates of Origin (Respondent L, personal communication, March 12, 2015).

Likewise, for Respondent Q, although their company operates in the baking industry and largely draws needed labour from a pool of relatively low educational attainment workforce, a long duration of job vacancy, to some extent, also affect their business. In this regard, Respondent Q asserts that:

Excerpt 90: Respondent Q

It has meant in the past that I've had to go back into the kitchen which I try to avoid, because there's been gaps..., and it depends on whether we have had a vacancy which needs filling straight away, or if we're looking forward. If we've had a vacancy where something has happened and someone's had to leave, that makes a gap. It just puts more burden on everyone else, but if it's something that we're looking forward to then it's just irritating and annoying (Respondent Q, personal communication, November 28, 2014).

5.3.2.6. *Panaceas for labour shortage*

Although the imbalance between the labour supply and the labour demand is not majorly prominent, the cluster members develop strategies to deal with the potential shortage. In this regard, as discussed earlier, cluster members actively engage in the recruitment of needed employees from local education institutes. Nevertheless, freshly graduates may acquire limited competency compared with more experienced candidates. For instance, Respondent G claims that their company recruits graduates from the local education institutes, despite their limited competency. "So when there's a shortage of staff we do a number of things. First we recruit, but recruiting doesn't solve a problem because generally we just recruit graduates, so they come with very little competency" (Respondent G, personal communication, April 01, 2015).

In this regard, Respondent M, Respondent N, and Respondent L assert that an appropriate training such as on-the-job training for low-experienced and inexperienced employees is crucial to mitigate the shortage of workforce with needed skillsets:

Excerpt 91: Respondent M

We always take on what we call is a newbie. A newbie in the industry. So we have actually taken on one that has absolutely no dairy experience and we've taken on one that has limited dairy experience in Hamilton..., they're both from here and we would look to up skill (Respondent M, personal communication, April 28, 2015).

Excerpt 92: Respondent N

Like 'A', he's Colombian. He's fluent in Spanish, understands Colombian business culture, but didn't know farming technical so that's taken us..., four years for 'A' to change from an engineer to a dairy engineer or beef engineer, and probably another five years and then he will be the best in the world. Because already he knows a lot about farming..., in another five years and he'll be the best in the world (Respondent N, personal communication, December 01, 2014).

Excerpt 93: Respondent L

We do a lot of that training internally..., so yeah, depending on what skill level is required and generally we have to teach people that anyway. In the accounting area we use Zero, so you can often find people that have had experience with Zero, but in the certification side it's a lot more difficult. They need to go through an internal training process, so when you've got a temp in here you're going to train them up..., we do a lot of that training internally. They don't necessarily have to have any particular qualification, but generally we're looking at people with at least completed a high school you know, Year 13 and ideally if they have a degree of some form, then that's great too. In terms of our laboratory, we have our own laboratory and they need to have a chemical qualification from a university..., but per se, other than the lab, none of them are required to have a professional qualification of any particular form (Respondent L, personal communication, March 12, 2015).

Likewise, in relation to training, Respondent G emphasises the importance of competence development programmes, to develop their potential employees into more technically competent workforces:

Excerpt 94: Respondent G

So we have to develop our own competence and competence development plan to increase the skill of the people, so there are very talented engineers in New Zealand, but the engineers don't come with the right skills to necessarily come into our market so we have to have our own development plan. So we have a graduate plan; we take on graduates. Also New Zealand is a very small population base, so for technically competent engineers there's a very, very small pool to draw from. So if you want to grow your business you can't just get another person to work in it. You have to build your own person, so we take graduates and we build them over five years, into being competent engineers to work in our industry (Respondent G, personal communication, April 01, 2015).

While agreeing with the above respondents on the importance of training, Respondent A also stresses collaboration between the cluster members and local education institutes as one of the key factors contributing to the mitigation of the labour shortage. The collaboration also helps solve the problem involving the misalignment between the education system and the requirements of the demand side from the workforce:

Excerpt 95: Respondent A

Well we're quite lucky because we've got the university and Wintec based in Hamilton..., we discuss with the university and clusters as to the requirements...looking forward to the future, what are the educational requirements in agriculture or IT or something like that. We talk with the university and Wintec..., what we try and do is try and get the universities and that to work with the companies to up-skill the present workforce; extra training or something like that (Respondent A, personal communication, December 09, 2014).

Besides relying on the local education institutes as sources of labour supply, the cluster members also directly engage in a recruitment process., On the one hand, some companies employ needed personnel through recommendation or based on relevant information acquired in the form of communication. In this regard, for Respondent J, "well actually a lot of it's been word of mouth, but we don't seem to have any trouble at all. It's been straight forward. It's just choosing the right people for the job...it's usually what we've heard about their work is what we base obviously a lot on. Then it would go from there..." (Respondent J, personal communication, March 05, 2015).

On the other hand, web-based employment platforms are also used. For instance, Respondent L reveals that "we recruit in two different ways. One is that we'll go directly

to the market using Trade Me or Seek and put job ads in” (Respondent L, personal communication, March 12, 2015). Likewise, Respondent D claims that:

Excerpt 96: Respondent D

Yeah, I mean we use Seek and Trade Me Jobs and all of those kinds of online and we do always get you know, a reasonably high number of applications and a reasonable number of those applications are from outside the region. Some of them are from outside the country... (Respondent D, personal communication, March 03, 2015).

Although there is a preference for locally-based job seekers, the cluster members may need to seek employees with required skillsets beyond the local workforce, to mitigate the shortage of labour supply in the Waikato region. For Respondent M, “we get them from all over the country to be honest...” (Respondent M, personal communication, April 28, 2015). Likewise, for Respondent J and Respondent F, their companies draw needed workforces from both the local and external labour pools:

Excerpt 97: Respondent J

Well basically we’re not really grown as much, so we’ve got two scientists but one of the scientists was actually educated up at Waikato University...so it was easy because she’s got family here and everything else. So it’s a lot easier always to hire people...who have family in the same place...but it is actually quite difficult to get staff to come down to Hamilton...but usually people will come down for work, so...like our scientist, he lives in Auckland and he comes down to work a couple of days a week, so he’s only based here part time. And of course he can you know, yep, cars it’s not a big deal. So he just comes down..., well it doesn’t take that long anymore, as long as they leave at the right time of the day..., don’t want to leave in traffic time do they..., so it’s a bit of a mixture of both (Respondent J, personal communication, March 05, 2015).

Excerpt 98: Respondent F

Well the last person we hired was ‘A’ and ‘A’ came from Palmerston North, so we couldn’t find the right person for this role..., I think the first ad was early January and ‘A’ was on the ground here in beginning of March so...about eight weeks..., I think we had...two people who were Hamilton based who applied for the role as research leader as what ‘A’ is, and both of those weren’t suitable for the role. But the role that ‘A’’s got is pretty specific, yeah, so for that type of role yeah, we couldn’t find anyone in Hamilton (Respondent F, personal communication, March 26, 2015).

The companies may also need to extend their reach further abroad. For instance, Respondent O claims that their company approaches employees with specific skillsets in overseas labour markets:

Excerpt 99: Respondent O

Sometimes if we're looking for a particular person for a particular role, which might be having a lot of experience with a GC analyser...Gas Chromatography..., that might be more of an issue. We have been known to advertise overseas for a person with that technical ability, but personally I haven't been involved in employing anyone like that. So yeah, I do know that we have employed from overseas for technical jobs, yeah..., if we haven't been able to find someone in Hamilton, in New Zealand, then we've had to go overseas (Respondent O, personal communication, March 04, 2015).

Likewise, the cluster members also make use of their global affiliates, to deal with the labour shortage of specific-skilled employees, after exhausting the pool of local workforce. For instance, according to Respondent G and Respondent F:

Excerpt 100: Respondent G

Okay, so a lot of what we do is in product functionality and recipe development for specific nutritional foods. We have a couple of technologists that work with the customers on their sites. We don't do any work here. We don't have a research facility here, so our technologists will go to the customer site and participate with them on formulation and recipe development. So our contribution is to have the expertise in house, but we have no facilities to be able to work with the customer to develop food products. We need to work at their facilities and we can provide experts from locally, or we can bring people in from overseas from our talent pool around the globe...when there's a shortage of staff...we go to Tetra Pak globally and we bring in people with the right skills from around the globe, so at the moment I have people here from Brazil, I have people here from China, from Taiwan, from India, from Sweden, from the USA and that's probably about it. So I have a graduate programme, a contractor base, and some international transferees to try and complement the team (Respondent G, personal communication, April 01, 2015).

Excerpt 101: Respondent F

We could bring people in from Australia as needed...because this company's parent company is in Australia, so staff could come from Australia to fill in, which has happened in the past..., just temporary...for a couple of weeks or a week or a particular study..., if you needed a true study director...we could get someone in, yeah. So that probably would be the strategy in those situations (Respondent F, personal communication, March 26, 2015).

In this regard, to mitigate the shortage of labour supply with needed skillsets through a global recruitment, Respondent A emphasises the importance of working with the New Zealand Immigration to help deal with workforce-related issues. “What we’re trying to do is..., identifying through Immigration how we can, through Immigration New Zealand bring in those skills” (Respondent A, personal communication, December 09, 2014). Furthermore, to meet the demand for labour, cluster members rely also on third-party employment agencies, to supply temporary staffs. For instance, Respondent L reveals that:

Excerpt 102: Respondent L

We recruit in two different ways. One is that we’ll go directly to the market using Trade Me or Seek and put job ads in. The other one is that we will go to a temping agency...the agency that we use is Hamilton-based, so they tend to have Hamilton-based people...there’s always been an abundant supply of temps..., the one we use is called Asset Personnel and we’ll get a temp in to cover, because inevitably people tend to give you four weeks’ notice of them leaving. By the time you’ve got over that fact and then defined the role that was going - or considered the role, then advertised it, then selected - gone through the interview process and they’ve given their notice to their company, you’re talking a period of at least six weeks to eight weeks. So we tend to get a temp in where we can and often those temps are looking for permanent work, so if they’re suitable then we’ll offer them a full time role (Respondent L, personal communication, March 12, 2015).

In addition to temporary staffs, Respondent L also claims that their company is also involved in using contractors to help with business operations. “We don’t have a lot of staff: full time staff are probably about 25; a lot of contractors, probably another 10 or 15 contractors” (Respondent L, personal communication, March 12, 2015). Likewise, Respondent K asserts that contractors in the Waikato region helps answer the need of their company for well-qualified workforces with agricultural knowledge. “We also have a lot of contractors and you know there are a lot of good contractors in the Waikato that have agricultural knowledge, so generally we don't have a problem” (Respondent K, personal communication, December 02, 2014). Furthermore, Respondent I asserts that their company solely employs contractors for certain business operations, while Respondent G emphasises that contracting out jobs help ease a short-term shortage of labour:

Excerpt 103: Respondent I

I don't employ that many people and..., the specific skills, we've made a conscious decision that we don't employ. So I subcontract that, so I work daily with an engineer, weekly with a manufacturer, weekly with concrete, weekly with builders, so that I don't run into that problem..., so none of the people that we use for the development are based here in the Waikato..., we're a small company, we have some office staff here and some sales staff in the Waikato and the South Island, but pretty much we subcontract out our builds and the innovation - well not the innovation. We do that, but the actual engineering, construction and some of the design work is contracted out (Respondent I, personal communication, February 16, 2015).

Excerpt 104: Respondent G

So when there's a shortage of staff we do a number of things...we go and employ contractors, people who are in the market, mature people who have their own business. So that fills a short term gap, so we can take them on contract for six months to fill a specific business need, a project (Respondent G, personal communication, April 01, 2015).

Besides locally-based contractors in the Waikato region, the cluster members also seek those from other parts of New Zealand. For instance, Respondent P reveals that their company hires Auckland-based contractors, to fill the gap:

Excerpt 105: Respondent P

Well by looking at hiring maybe contracting. At the moment we're doing some - we've got a contractor mechanical engineer, so it's just finding the right people that can fit into that..., I've got someone in Auckland, yeah. That's not far away..., and ideally we need some other staff members too because yeah, we're missing a couple of areas. So again they're all complementary areas that we have covered, so we've just got a couple of areas missing at the moment which we'll need to fill (Respondent P, personal communication, February 05, 2015).

5.3.3. Factor conditions: Financial capital

The analysis of the interview data shows that there is no difference in locational competitiveness between the Waikato region and the rest of New Zealand, in terms of the availability of funding. According to Respondent B and Respondent C, the local

government made a financial contribution to the establishment of Waikato Innovation Park but does not provide financial assistance to the cluster members (Respondent B, personal communication, May 18, 2015; Respondent C, personal communication, March 11, 2015). This section details findings on accessibility to private and public funding, ramifications of insufficient financial support, and recipe for success. The following section presents the findings on the accessibility to private funding.

5.3.3.1. *Accessibility to private funding*

Despite the perception of insufficient financial assistance from the business side, Respondent R claims that funding is more readily available to businesses with innovative ideas. “It’s hard. Even for good ideas, it can be hard...there’s always a perception there’s a lack of funding...having said that the funding’s available..., what there’s a lack of funding for is bad ideas” (Respondent R, personal communication, November 24, 2014). In this regard, Respondent K and Respondent R assert that it is the responsibility of recipients to convince the merit of their business ideas:

Excerpt 106: Respondent K

In terms of funds, we know we’ve got options. If you put the right story in front of somebody that you’ve got you know, a valid business case that you know, is viable and it gives a good return on investment, I think you know, there’s funds available from all sources..., I think that the onus is on us to prove that we’ve got something viable and worthwhile investing in..., if we can prove that we’ve got a good business case I think there are avenues to get capital..., if you’ve got a good idea and you sell it well and you know, it can show a potential return on investment right, I think it’s probably easier to attract funding that it is here in New Zealand (Respondent K, personal communication, December 02, 2014).

Excerpt 107: Respondent R

You still have to provide all of the evidence, so it’s hard work to go through to demonstrate that it’s a good idea, to demonstrate there’s a market need, to demonstrate that it works, all of those things is still hard and risky work (Respondent R, personal communication, November 24, 2014).

Although seeking financial support from the business side particularly from banks may, in the past, be of a greater challenge, the bank policy towards small companies has positively changed over the past decade. In this regard, Respondent Q highlights that:

Excerpt 108: Respondent Q

I would say up to 15 years ago maybe the banks were not as supportive of small business. The ANZ used to call themselves the “yes bank” but I thought they were the “no bank” because they said no. And I switched banks to the National Bank which is ironic, because now it’s ANZ..., the ANZ I believe changed their policy or the National Bank changed their policy to support small businesses, because business, small business in New Zealand was the biggest part of the economy...we employ more people. We train more. We do all the right things you know? ...and so they agreed to support small business and it was through their support really..., so the bank offers overdraft facilities. That’s the main thing..., stretching loans, that kind of thing, really supportive...we’ve used them for vehicle loans...and credit cards of course. That’s important (Respondent Q, personal communication, November 28, 2014).

In addition to financial support, the bank also offers, in particular, small companies educational courses related to financial aspects of business. The educational support helps the companies to be more financially efficient. For instance, Respondent Q emphasises that:

Excerpt 109: Respondent Q

I think actually that ANZ has been quite proactive in what it’s doing to educate and run financial courses, because a lot of people go into business and small business are like me; they just were good at something but they haven’t done a business course or learnt about financial management. Everything that I know I’ve learnt from experience really and reading some books, so I think the bank - the more that it can educate people and understand the business, sit alongside the person in the business, that’s a really big thing in helping - because it’s usually the financial aspect of small business that’s the most difficult for people. Unless you are able to put a cash injection or you have a lot of property behind you, it’s very difficult. And I would say many people who start small businesses don’t start with a big capital injection, so...one of the things that we’ve done this year, the bank sent us to a seminar on doing a financial health check of your business. And it was very, very helpful and as a result of that we changed half of our overdraft into a loan..., it means we’re paying a lesser interest rate, plus we’re actually paying it off, getting rid of it..., so we’re paying off principle and interest on a loan and just running on a much reduced overdraft. But we still run to the limit on it (Respondent Q, personal communication, November 28, 2014).

Nevertheless, despite the positive aspects of the financial support from the bank, New Zealand banks are generally deemed high risks especially for entrepreneurs and newly start-ups seeking funds to commercialise their ideas and to expand their businesses. For instance, Respondent R claims that “we’ll seek investment from private investors and from VC. We don’t bother with banks because it’s too high risk. And then corporate funding, so we’ll get companies to invest in the development of the product” (Respondent R, personal communication, November 24, 2014).

Besides banks, Respondent R emphasises that there are other financial sources available including venture capitalists. It, however, remains a challenge seeking their financial support. “The venture capitalists coming down the lines - the venture capitalists are right at the end. Very rarely do we actually touch the venture capitalists, but it’s all about bringing them in...” (Respondent R, personal communication, November 24, 2014). As a result, particularly small companies become critical about the financial availability from the business side, in New Zealand. According to Respondent A:

Excerpt 110: Respondent A

It’s quite difficult in New Zealand..., I’d say that it still - finance for expansion is still a problem in New Zealand for small companies; less so for big companies, but small companies. There’s plenty of money for the bigger companies..., it limits growth. Especially in growth into export markets with risks, funding working capital growth, very difficult (Respondent A, personal communication, December 09, 2014).

In this regard, small companies are more likely to suffer from the lack of financial support from the business side such as banks. For instance, Respondent Q whose company is deemed small in size emphasises that:

Excerpt 111: Respondent Q

So originally it just grew organically. We did everything out of cash flow...everything that we’ve done, we’ve done out of our turnover - on a shoestring you might say...a very short shoestring..., I would say financial is definitely one of them. In hospitality we operate on really tight margins, so you’re looking for volume turnover and one of the biggest constraints that we have in my particular business is that we deal with a lot of corporations. Now we have to pay for everything that we use usually within seven days or 14 days, but we have some understanding suppliers...(Respondent Q, personal communication, November 28, 2014).

Excerpt 112: Respondent Q

...We can sometimes wait two months, up to three months for a corporation to pay us...and in the meantime we have to fund our payroll. So those are exactly the kinds of things - and here is an example. We have three delivery vehicles, three vans. One's died, kaput, not worth fixing. We cannot afford to replace it. Now if we could get all our money in we might be able to, so that's the kind of thing that you're up against...it's a timing issue, yeah and we can't - so when it becomes a dilemma as to do you tell the companies that you no longer want to deal with them, because they'll just go somewhere else; or do you put pressure on them, or do you just hang in there because in the meantime we're paying overdraft interest and we're not collecting any money. So we're actually providing interest free finance to companies..., it means what we do is we run at the top end of our overdraft all the time (Respondent Q, personal communication, November 28, 2014).

With the difficulty obtaining financial support from the business side, Respondent K and Respondent N respectively claim that there is a limited pool of financial capital available to New Zealand businesses:

Excerpt 113: Respondent K

I think this whole area of around funding and availability of funding, you know a lot of people I think are quite naive about it to be honest. In the States for example you know, they're you know, well much bigger economy, much more money to be invested... (Respondent K, personal communication, December 02, 2014).

Excerpt 114: Respondent N

They ran out of venture capital funding didn't they? They got their initial money and then they all ran out and there was no money for round two, so everyone they invested in in round one fell over. Hopeless. Just comical (Respondent N, personal communication, December 01, 2014).

For Respondent N, the absence of critical mass together with the relative immaturity of New Zealand private financial providers influence the lack of financial availability to companies, especially those that are small in size. In this regard, Respondent N stresses that:

Excerpt 115: Respondent N

That would be kind to say it's a challenge. Our angel groups are very immature; our venture capital's not much better and our VC is more like a bank. They behave more like a bank. We just don't have that critical mass and the track record that say Silicon Valley has, so I think we're very, very immature, very immature, you know, as an innovation system (Respondent N, personal communication, December 01, 2014).

In addition to their state of development, New Zealand private financial providers also have other negative characteristics, which pose negative effects on the fund availability. For instance, the private financial providers are overly profit-oriented, with a high expectation in terms of return on investment. For Respondent N, "our VC is more like a bank. They behave more like a bank..." (Respondent N, personal communication, December 01, 2014). In this regard, Respondent R claims that:

Excerpt 116: Respondent R

When it comes to the angels and venture capitalists..., they want their money to get the return on investment then they want the multiples of return on investment. They want to see lots of products being sold and that means sales and marketing and manufacturing, not more research (Respondent R, personal communication, November 24, 2014).

While being profit-focused, New Zealand private financial providers, however, lack the ability to create value nationally for their recipients. As a result, New Zealand companies may look abroad for financial support. For instance, Respondent N stresses that:

Excerpt 117: Respondent N

I've got some angel money. In terms of venture capital, we're doing a deal with an American VC. I wouldn't bother with a New Zealand venture capitalist, because they want very high rates of return but they don't actually bring the value, so they can't create the value in your company. You've got to do it yourself, whereas the American VCs, they already you know, they've got value to bring to your business...(Respondent N, personal communication, December 01, 2014).

Excerpt 118: Respondent N

...So I'm very critical of our venture capital industry. I think it's hopeless. I don't think they create the value in the companies that they invest in. You know, if you want 40 per cent return..., you should have more than just you know, look, there's your million dollars, I want 40 per cent. Sorry, that's wrong. You should be there's a million dollars and here's another part of my network that can create some value for you, so that they can help to earn the 40 per cent. It's not just money, so that's where I think in New Zealand venture capital industry is short (Respondent N, personal communication, December 01, 2014).

Furthermore, New Zealand private financial providers are relatively short-sighted, lagging their overseas counterpart in terms of global value creation. In this regard, Respondent N argues that:

Excerpt 119: Respondent N

Actually have some global value to add. You know, the U.S. guys that we're talking to, got a very good relationship with Monsanto, with Bayer, Pioneer. They know what those big companies are looking for - Coca-Cola. They know what big hedge funds like Pegasus Capital - you know, it's a \$2.8-billion-dollar fund. They know what they're looking for. I don't think New Zealand VCs know any of that..., but it's got to be connected to a global opportunity..., I don't think they've got those networks, because if you're stuck in New Zealand how do you know the guy from Bayer very well? You can't. He's a long way away..., it's way too New Zealand focussed, you know? Hopeless (Respondent N, personal communication, December 01, 2014).

While lacking the ability to create national and global values, New Zealand private financial providers are relatively more risk-averse compared with their overseas counterpart. For instance, Respondent K claims that "I think this whole area of around funding and availability of funding, a lot of people I think are quite naive about it to be honest. In the States for example you know..., a lot more appetite for risk" (Respondent K, personal communication, December 02, 2014). In this regard, New Zealand private financial providers tends to be presumptuous, skewing towards being critically judgemental about potential innovative ideas. Their harshly critical attitude towards businesses may be misconstrued as a complete disapproval. For instance, Respondent R stresses that:

Excerpt 120: Respondent R

The market side will be very harsh around no, the opportunity isn't here. That's a rubbish idea. Don't bother pursuing that..., whereas what they're saying is actually where you're trying to apply that idea isn't right; where you should be applying it is here, because you've got a better opportunity here. Or do it here first, build up some evidence and then take it there; but that's not, not always what's said (Respondent R, personal communication, November 24, 2014).

Overall, it remains a challenge for business, especially small companies, seeking financial assistance from the business side, regardless of the soundness of their business ideas.

According to Respondent R:

Excerpt 121: Respondent R

It's hard. Even for good ideas, it can be hard. Having said that the funding's available..., you still have to provide all of the evidence, so it's hard work to go through to demonstrate that it's a good idea, to demonstrate there's a market need, to demonstrate that it works, all of those things is still hard and risky work (Respondent R, personal communication, November 24, 2014).

5.3.3.2. *Accessibility to public funding*

Besides the business side, New Zealand companies may be eligible for support from the government. According to Respondent R, "there are lots of ideas, lots of very good ideas that won't get funding from a commercial side, but they might get funding from the others, the various grants that are available...but they won't get funding on the commercial side" (Respondent R, personal communication, November 24, 2014). For instance, Respondent D states that:

Excerpt 122: Respondent D

We do certainly - we've taken advantage of things like New Zealand Trade and Enterprise, grant schemes and we had a FoRST grant a few years ago when FoRST still existed...I mean the only financial assistance we've ever had in this business and we have done it several times, probably half a dozen times, is the kind of NZTE different kinds of grant funding where we can get, you know - I think a few years ago we had an R&D grant. So we had a project that was you know, 50 per cent funded by one of those agencies - might have been FoRST, I think that one...(Respondent D, personal communication, March 03, 2015).

Excerpt 123: Respondent D

...And then this last year the sales training and stuff we had was 50 per cent funded by one of those capability funds...we got government funding for that, same kind of thing where they fund up to 50 per cent of what it's going to cost and we have to pay the other 50 per cent. We've done that kind of thing a few times for different capacity building kind of exercises or for R&D stuff over the years, but that's really the only outside funding that we've had (Respondent D, personal communication, March 03, 2015).

As a result, the government financial assistance contributes to the success of small companies and newly star-ups at the early stage and also to their growth and export opportunities at the later stage. For instance, Respondent J claims that “the government grants; we had government grants when we started off...” (Respondent J, personal communication, March 05, 2015). Likewise, according Respondent B:

Excerpt 124: Respondent B

Our company was formed in the year 2000. We started our major project then and we got some initial help to help us to - how to start the business by purchasing some unique plants that had been brought in from South America. And once we had multiplied those we got some further financial assistance to examine markets, particularly in Korea and Japan...they're from the central government..., mainly New Zealand Trade and Enterprise...well we got enough money - usually matching funding so we have to put up a certain amount, but it was a company that started from a zero base. We had no assets or technology knowledge or market knowledge when we started the company, so...we made use of those funds. Since then we have been able to either fund things personally, or bring in outside investors. But the initial government was very important in starting the company...well I mean first they did help us buy some assets. It was a government research organisation called - it's now called Plant and Food. It's a Crown Research Institute, CRI. They brought in plants called Yacon from South America and had done 10 years of testing on how to grow these plants in New Zealand. And then we bought some of these plants from them so that we could do things on a commercial scale (Respondent B, personal communication, May 18, 2015).

Besides a direct support, New Zealand companies may also benefit from the government financial assistance indirectly. For instance, Respondent K highlights that:

Excerpt 125: Respondent K

I mean indirectly we benefit through some what's called Sustainable Farming Fund projects or Primary Growth Partnership funding..., well a little bit through AgResearch, but also there are government funds aimed at the primary sector and you know, one of them is called the Sustainable Farming Fund. Another is called the Primary Growth Partnership you know, through our networking sometimes we get involved in products - projects that are funded through those funds, that help us indirectly...not directly. Indirectly they do. I mean you know, there's plenty of funds available where we might benefit indirectly. Direct financial assistance, no... (Respondent K, personal communication, December 02, 2014).

In relation to the indirect support from the government, locally-based companies may also benefit from financial assistance from local education institutes. For instance, Respondent J claims that:

Excerpt 126: Respondent J

As far as raising capital or...grants..., well we're still working with grants with the universities, so because we've still got good connections with the universities, so we have a few on the books...Waikato University...we don't tend to use Wintec or anything like that. It's usually just the university..., so those kinds of grants we're still active with (Respondent J, personal communication, March 05, 2015).

Likewise, New Zealand-based companies may also benefit from tax incentives designed to attract inward Foreign Direct Investment. For instance, according to Respondent F whose parent company is Australian-based:

Excerpt 127: Respondent F

One of the main reasons the VHR set it up here was because there was a tax break for research to occur in New Zealand in 2008 when we first set up..., so that - yeah, because it was going to be cheaper to perform R&D on animal products in New Zealand than pretty much anywhere else in the world, because we were going to get this tax break. It lasted for a year or so and then they took the tax break off, but luckily New Zealand - we still remained financially competitive because we can run large animal trials cheaper than overseas, because of the grazing. Yeah, so on a government side we probably get very little...but just New Zealand as a country itself gives us a competitive advantage, yeah (Respondent F, personal communication, March 26, 2015).

Nevertheless, while the government financial support is openly available to New Zealand companies, potential beneficiaries are still required to be eligible for the assistance. In this regard, Respondent C claims that the government funding is, therefore, not always readily available:

Excerpt 128: Respondent C

Well yeah, with any funding it's not a guarantee there is always - there's things that must be met...so each proposal is basically assessed on its own merit. It doesn't mean automatic funding...one of the requirements is that they open up their financial books and one small company wasn't willing to do that, so they automatically didn't qualify. If they're not truly export focussed for the benefit of New Zealand for example, they wouldn't get much out of the Callaghan Institute. Yeah, sometimes if they're fairly small companies they have to have sort of a clear management structure as well. They're not going to give money just to anybody. There has to be some sort of rigorous thing..., there's plenty of people with good ideas but to get them started, yeah, that's not where for example the Callaghan comes in. You already have to be an established business (Respondent C, personal communication, March 11, 2015).

In this regard, Respondent J stresses that beneficiaries, on a pro rata basis, are proportionally required to have a prerequisite capital, prior to the eligibility for the government financial assistance. For instance, Respondent J stresses that:

Excerpt 129: Respondent J

The government grants; we had government grants when we started off, but we haven't had any for a while of those...the reason we don't have thing that going at the moment is because you still need to raise a whole lot of money. Usually they're matching, so you've got to be ready for them before you start on a grant and it's fair enough. I don't have a problem with those things, but you sort of have to have money to get the grants. And so that's not always easy...I mean it's like everything, you know. You've got to have money to make money kind of attitude (Respondent J, personal communication, March 05, 2015).

Furthermore, there are also other factors that influence the eligibility of certain New Zealand companies aiming to seek financial assistance from the government. For instance, Respondent K highlights both internal and external aspects leading to their ineligibility:

Excerpt 130: Respondent K

I guess in our particular situation we have quite a conservative Board...so they're quite conservative. So I guess their preference is that - and we do this anyhow - we build and grow through cash flow you know, which is fine. But sometimes that's not quick enough... (Respondent K, personal communication, December 02, 2014).

Excerpt 131: Respondent K

I mean one constraint that you know you or anybody can't do anything about is the fact that we are 50 per cent owned by a Crown Research Institute...AgResearch owns 50 per cent of Farmax, and then we've got a couple of smaller shareholders...you know, the government owns the Crown Research...means that we cannot apply for certain government funding, like for example Callaghan Innovation funding. So we're not eligible, which you know, I actually think that's sort of fair enough. I can understand why, because the government is giving money to the Crown Research Institute and then if a company part owned by them then applies to the government for more funding...it's sort of double dipping (Respondent K, personal communication, December 02, 2014).

In general, although the New Zealand government policy is considerably supportive in terms of providing financial assistance to small companies and newly start-ups, there remains a challenge obtaining funds from the government side. For instance, according to Respondent I, "looking for government funding...is a long drawn out painful process..." (Respondent I, personal communication, February 16, 2015). In this regard, Respondent A claims that there is a limited pool of fund available at the government side (Respondent A, personal communication, December 09, 2014). Likewise, for Respondent C and Respondent K:

Excerpt 132: Respondent C

Unfortunately, New Zealand is a very small place and there's very little money for R&D available, public money..., with any funding it's not a guarantee...there's limited funds to go around, so each proposal is basically assessed on its own merit. It doesn't mean automatic funding...I don't know that there's a lot you can do really because like I said, New Zealand is a small country. That overall pool of money available for that sort of money, it's quite risky. It's fairly small so what would be nice is more different funding opportunities, but you have to be realistic as well (Respondent C, personal communication, March 11, 2015).

Excerpt 133: Respondent K

I think this whole area of around funding and availability of funding, you know a lot of people I think are quite naive about it to be honest. In the States for example you know, they're you know, well much bigger economy, much more money to be invested and a lot more appetite for risk..., we're not rich enough (Respondent K, personal communication, December 02, 2014).

Owing to the small pool of capital, the difficulty to obtain the government financial assistance does not only apply to non-viable business ideas but also to those with great potential for innovation as well as to small companies and newly start-ups. In this regard, Respondent C and Respondent J respectively stress that:

Excerpt 134: Respondent C

Well that'd be very difficult to find. There's plenty of people with good ideas but...New Zealand is a very difficult place for people with good ideas that want to start up something...so yeah, if you're sort of a small start-up and you have some good ideas, it's very hard to get seed funding...I don't know that there's a lot you can do really because like I said, New Zealand is a small country (Respondent C, personal communication, March 11, 2015).

Excerpt 135: Respondent J

It's pretty hard to get out there. We're still doing a lot of R&D...so money's always tight when you're doing a lot of R&D... because we are doing our R&D it's an expensive business...and it's pretty hard going. But you still you know, to make the most - the reason we don't have thing that going at the moment is because you still need to raise a whole lot of money. Usually they're matching, so you've got to be ready for them before you start on a grant and it's fair enough. I don't have a problem with those things, but you sort of have to have money to get the grants. And so that's not always easy...I mean it's like everything, you know. You've got to have money to make money kind of attitude (Respondent J, personal communication, March 05, 2015).

Nevertheless, although experiencing the lack of the government financial support, there is a general comprehension among New Zealand companies of the underlying reason behind the shortage. For instance, Respondent K asserts that:

Excerpt 136: Respondent K

I'd never expect the government to invest directly...I don't actually expect that to be honest...I don't necessarily agree with you know, the government should be handing out funding...that's never going to work you know, like we're not rich enough..., I actually think that's sort of fair enough...I really struggle with what more they could do for us. I guess it's more about what we can do for ourselves...I mean you know, we've got a good product and service that we think can add value to New Zealand farmers, and therefore the economy (Respondent K, personal communication, December 02, 2014).

In this regard, New Zealand companies may be more open to taking risks, instead of seeking the government financial assistance. For instance, Respondent B emphasises that:

Excerpt 137: Respondent B

We have talked to VIF..., 'B' is the organiser of that and we, apart from discussing a project with the Venture Investment Fund we've actually not formally applied to them. We've decided to take the risk by the shareholders of the company, rather than bring in the government as a part owner. Well the thing about government funding as I say, it's usually a matching fund but providing you do what you say you're going to do you have no need to repay those funds. If you take money from the Venture Investment Fund you have an obligation at some stage to repay, so that is entirely reasonable but we decided not to do that (Respondent B, personal communication, May 18, 2015).

Furthermore, New Zealand companies may also put a great effort to become more self-sufficient, rather than financially relying on an external help. For instance, Respondent N stresses that "we had bootstrapping like everyone" (Respondent N, personal communication, December 01, 2014). Similarly, for Respondent K, "we build and grow through cash flow you know, which is fine. But sometimes that's not quick enough..." (Respondent K, personal communication, December 02, 2014). In this regard, Respondent C claims that "companies may have to invest themselves initially, until they're actually at the certain stage where it becomes attractive for say Callaghan Institute to invest in them" (Respondent C, personal communication, March 11, 2015). Furthermore, for Respondent I:

Excerpt 138: Respondent I

So we operate a positive cash flow business..., I don't actually have - so I don't manufacture. I don't own the engineers. I don't own any of the design. So we're very much an IP type company, so our running expenses are ourselves. I don't have - whether I build 20 or if I build 400, my costs are still only us and then my bill process which we don't crank into until we've signed a deposit, so that's someone else's problem to deal with (Respondent I, personal communication, February 16, 2015).

5.3.3.3. *Ramifications of insufficient financial support*

Overall, the lack of financial assistance from both the business and the government sides may negatively influence growth of New Zealand companies. For instance, according to Respondent A, “it limits growth. Especially in growth into export markets with risks...” (Respondent A, personal communication, December 09, 2014). Likewise, Respondent N puts emphasis on the outcomes of the shortage that “we could have gone faster definitely. We would have been bigger and faster...” (Respondent N, personal communication, December 01, 2014). Furthermore, as discussed earlier, the government financial assistance in the form of tax breaks help attract inward Foreign Direct Investment from foreign companies. The reduction resulted from the change in government policy – the subsequent removal of tax breaks may negatively affect competitiveness in terms of costs. In this regard, Respondent F stress that:

Excerpt 139: Respondent F

One of the main reasons the VHR set it up here was because there was a tax break for research to occur in New Zealand in 2008 when we first set up..., so that - yeah, because it was going to be cheaper to perform R&D on animal products in New Zealand than pretty much anywhere else in the world, because we were going to get this tax break. It lasted for a year or so and then they took the tax break off..., it made us less competitive, because all of a sudden we were going to be dearer because we had to pass those costs on that we were getting taxed on. Where if we had a tax break we didn't have to pass those costs on. So we'd have less overheads, so we could be cheaper (Respondent F, personal communication, March 26, 2015).

Likewise, in addition to the limited financial support from the government, the New Zealand tax system – Goods and Services Tax (GST) may further create a heavy burden

for small New Zealand companies and newly start-ups. For instance, respondent DVS stresses that:

Excerpt 140: Respondent DVS

The other thing that puts real pressure on us is the GST...I think sometimes we only work for the GST, because it's such a huge - the more efficiently we run our business, the more GST we pay. The more cost-effective we are, the more GST we pay...and if the government puts it up again that's going to put a huge burden on businesses (Respondent Q, personal communication, November 28, 2014).

5.3.3.4. *Recipe for success*

Nevertheless, although it remains a challenge for companies seeking financial assistance in New Zealand, there are a number of key strategies when dealing with both the business and government sides. First, successful beneficiaries require validation of business ideas or products, to validate that there are market needs for them. In this regard, Respondent R and Respondent K stress that:

Excerpt 141: Respondent R

As soon as you've got the idea presented in a way that the companies and investors understand, and you've validated the market need for it; you've got evidence that if you can make it and you can sell it, then the funding is very easy to get..., there's always funding available for good ideas..., the angel investors and venture capitalists..., what they're investing in is generally after you've achieved the first sales, the first products with a company. So someone, a company has validated that the idea has merit and you're selling something, or you're about to sell something - or you're very close to selling something (Respondent R, personal communication, November 24, 2014).

Excerpt 142: Respondent K

In terms of funds, we know we've got options. If you put the right story in front of somebody that you've got a valid business case that is viable and it gives a good return on investment, I think you know, there's funds available from all sources..., I think that the onus is on us to prove that we've got something viable and worthwhile investing in..., if we can prove that we've got a good business case I think there are avenues to get capital..., if you've got a good idea and you sell it well and you know, it can show a potential return on investment right, I think it's probably easier to attract funding that it is here in New Zealand (Respondent K, personal communication, December 02, 2014).

Second, communication is crucial when seeking financial assistance. In this regard, companies are required to effectively communicate with the business and government sides about their business ideas or products, to successfully receive their supports. For instance, Respondent R claims that “well the thing is the good ideas well communicated will be alright. Good ideas that are poorly communicated won’t get..., it’s all about the communication of the idea, the value of the idea” (Respondent R, personal communication, November 24, 2014). Likewise, a well-established inter-personal relationship with decision makers at the business side are also of vital importance influencing the success of companies seeking financial assistance. In this regard, Respondent Q emphasises that:

Excerpt 143: Respondent Q

I had, I found a supportive manager who believed in me. And years later I said to him that how grateful I was for the bank’s support and he told me that he - they knew that I was going places and they wanted to come with me. And so the bank has been extremely supportive but part of that support - and I think a really important part of that support - is that I developed personal relationships with a business manager and that’s the key, because back in the day you would just deal with call centre, whatever..., I think it’s really important...being able to have a relationship with your bank manager so that I could ring up and say look, I can see we’re going to be a bit short. Can you tide us over? It’s not quite as informal as that now, but it’s still that process of having a bank that believes in you (Respondent Q, personal communication, November 28, 2014).

Third, another important strategy involves determination and a greater effort from the beneficiary side, to increase opportunities for obtaining financial assistance even if it may seem unlikely. For instance, Respondent R asserts that “the venture capitalists coming down the lines - the venture capitalists are right at the end. Very rarely do we actually touch the venture capitalists, but it’s all about bringing them in...” (Respondent R, personal communication, November 24, 2014).

5.3.4. Demand conditions

Although the cluster members of the AgBio cluster locate in Hamilton, the Waikato region, they serve local customers as well as those locate throughout New Zealand and overseas. In this regard, the research findings on demand conditions are not strictly emphasised on the sophistications of the local customers. For instance, Respondent F

reveal that “there are none...our direct customers, the people who we do trials for are all based away...they’re either based in Auckland or overseas” (Respondent F, personal communication, March 26, 2015). Likewise, for Respondent B, their company solely targets overseas customers, particularly those in Japan and South Korea. “We have no customers in New Zealand. That is because this is a small market and not sophisticated in this type of product. The Japanese in particular, but also South Koreans, are much more interested in our type of product” (Respondent B, personal communication, May 18, 2015). In this regard, despite having locally-based customers, Respondent L and Respondent J claim that their companies primarily focus on national and overseas markets respectively:

Excerpt 144: Respondent L

Most of our clients aren’t Hamilton based..., like Carter Holt and some of the log clients are based around the country...well Carter Holt Harvey has mills all around the country. Its head office is in Auckland. So a lot of our clients are in Auckland, but like I said we don’t need to be sitting in the same city as them in order to provide the service...because most of our service is IT based...so yeah, pretty much everything that IVS does is done out on the web, so while we have a server here in Hamilton it’s only used for file storage. There’s no accounting software in there. There’s no software that we use that isn’t sitting out there on the web..., you know a lot of the process and services are on the web and you’ve logged in and been given access rights, it’s a lot more efficient and quick. And I don’t need to be sitting in the relevant city..., I mean anything when it comes to IT, you don’t need them here in Hamilton per se (Respondent L, personal communication, March 12, 2015).

Excerpt 145: Respondent J

Well we don’t actually have that many customers in New Zealand. Most of our customers are based actually overseas, so New Zealand is actually one of our smaller sales market. So we’re probably an unusual company in that way, because we don’t have local customers - not high quantities of them anyway. We’ve got customers in New Zealand, but not our major income source...obviously we’ve got customers at AgResearch and places like that you know, but yeah, we’re not really sort of focussed on it so much as focus is...outside...there are the bigger markets in the US, places like that obviously - because we’re doing DNA you know, test, extraction kits. We don’t do that many DNA..., we’re only a small country compared to... (Respondent J, personal communication, March 05, 2015).

5.3.4.1. *Sophisticated and demanding customers*

According to Respondent A, the cluster members at Waikato Innovation Park are deemed sophisticated and demanding customers. For instance, among other things, the cluster members in Waikato Innovation Park demand larger facilities, a good working environment, network opportunities, and financial contacts for growth:

Excerpt 146: Respondent A

A good environment to work in in the Park..., I think what they're looking for is bigger and bigger facilities probably all the time. I mean these clients are growing so fast, trying to keep up with their growth needs..., well mainly because of growth; they're all growing so fast they're looking for you know, how can they run their businesses better, more efficient, new products, new customers. They're looking for networks to do - achieve that all the time..., obviously the network opportunities, putting them in contact with the right people that could provide help in their value chains. And it could be at the market, it could be in logistics, it could be in their market validation, all those sorts of things..., they're looking for contacts for finance..., That's the key thing they're looking for from us (Respondent A, personal communication, December 09, 2014).

Beyond the boundaries of Waikato Innovation Park, Respondent M claims that, companies including milk powder manufacturers either in Waikato region or the rest of New Zealand, are all demanding customers. Likewise, Respondent G emphasises that their New Zealand customers are deemed very demanding compared with those based in developed countries including the U.S. and Europe:

Excerpt 147: Respondent M

Every dairy factory in New Zealand has knocked on our door...we've got more enquiries than we've got space available, but it doesn't generally come from the Waikato. It'll come from all over, alright. And we've got clients that have their own brands with no dairy company. We have people looking to do R&D work. We have companies existing all over New Zealand that want to do small trials..., they're all just as demanding mate (Respondent M, personal communication, April 28, 2015).

Excerpt 148: Respondent G

So we find the customers in New Zealand very demanding, some of the most demanding in the world...it's no different in the dairy industry...across the country...if we compare our market to other markets around the globe, New Zealand, United States, Europe, very high specifying customers and very well developed markets (Respondent G, personal communication, April 01, 2015).

Nevertheless, the level of sophistications differs in accordance with characteristics of customers. In this regard, Respondent G categories the customers into knowledge buyers and specifiers. The latter possesses a higher level of sophistications:

Excerpt 149: Respondent G

So there are two types of customers in my environment...one customer is called a knowledge buyer and one customer is called a specifier. So a knowledge buyer is a person who doesn't know what they're doing and they're coming to Tetra Pak and saying we have a need, but we do not know how to get there, so we will pay Tetra Pak and buy their knowledge...a knowledge buyer...will come and say all I want to do is make this type of food. We don't know how to go from A to B. You tell us, okay...I mean they expect advice, that's really what they expect...they want to achieve a certain formulation, they don't know how to get there and they need someone to work with them to advise them how to do it...there are knowledge buyers in the market in New Zealand. When you see on the news Asian companies moving into New Zealand like Yili and Yashili and Bright Dairy, all coming to New Zealand and building a brand new plant. They have no history here. They have no products here in the market, so they just turn up and say please build us something, please build us a factory that does this. And they have no staff here in New Zealand as well, so they don't have the infrastructure. They just come to us and buy knowledge off us...the second customer is a specifier. This is a customer who has a long history in the market, has a wide range of food products, knows exactly what they want and exactly how it's going to be delivered. That type of customer is like a Fonterra. Fonterra know all their products. Fonterra know their market. They know their customers. They know all of their plants. So if they come to you they say this is what we want: we want you to deliver this, this, this, this and this. They specify in very high detail what is required..., they have a specific need...so they come with very different needs. The customers in New Zealand are very much skewed towards the specifiers. They have been in the dairy industry a very long time. They know exactly what they want. They have well developed products and well developed markets, so when they want to make a change they are very specific about what they want to deliver...Fonterra is an example of a company who is...very high specifier, large amount of staff, very knowledgeable in the market (Respondent G, personal communication, April 01, 2015).

Respondent N whose company, based within Waikato Innovation Park, acts as a bridge between local customers or partners – cluster members, New Zealand farmers, and those overseas in South American, emphasises that the local customers mainly focus on profit maximisation. “Money. They want sales. Just dollars. Get me an export that I wouldn't have otherwise got” (Respondent N, personal communication, December 01, 2014). As for those in the overseas markets, prices of products are their primary focus. In this regard, Respondent N stresses that the offshore customers are relatively price-sensitive:

Excerpt 150: Respondent N

Rather than buying a total integrated solution they might be buying just grass seed or semen or buying pieces of the solution..., they're very, very price sensitive..., they're always grizzling about price, so they're always haggling about price - always, because they haven't got a lot of money so... (Respondent N, personal communication, December 01, 2014).

Likewise, in relation to price-sensitivity, Respondent B, whose company solely targets overseas customers including Japan and South Korea, stresses that some customers are overly price-focused and subsequently leads to a termination of business deals. "Well again talking about Seoul Dairy..., they started to be very aggressive about reducing the price that they were paying, so we largely held our price to the extent that they are no longer a customer" (Respondent B, personal communication, May 18, 2015). In comparison, Respondent N claims that the New Zealand farmers are relatively less sensitive when it comes to choosing between price and quality and reliability:

Excerpt 151: Respondent N

Locally not so much..., locally people - farmers understand the total cost of ownership much better, so New Zealand farmers are more about quality and reliability. They're pretty price sensitive but they're way better than overseas. Overseas is just price, price, price, price, price. If you went and took a cheap effluent pond - pump to a New Zealand farmer they wouldn't buy it, because they know next year it'd be broken. They would buy a good one and hope that it lasts five years. They've got a much better idea of you know, if it's cheap it's probably crap (Respondent N, personal communication, December 01, 2014).

Although New Zealand customers, compared with those in developing countries, may understand values of goods and services as opposed to price, they still put emphasis on the latter. For instance, Respondent L and Respondent G claim that their customers are sophisticated and demanding in terms of price:

Excerpt 152: Respondent L

That's a good question. My experience has been that New Zealanders tend to place a lot of emphasis on price. They want the service as well, but price is a dominating feature in their criteria for making a choice...I find that the Americans - and I've had a bit of experience there - they value service nearly equally with price. I don't know about Australia. I think Australians are a bit like Kiwis and they tend to look at price rather than service... (Respondent L, personal communication, March 12, 2015).

Excerpt 153: Respondent G

Very much so...all the time..., the customers are very, very focussed on price obviously...if you offer the customers something they go this is great, but we want it to cost less...there is always pressure that the price needs to be more competitive..., the customers want to pay less... (Respondent G, personal communication, April 01, 2015).

In addition to price, Respondent L stresses that delivery time is one of the main attributes demanded by their customers. “We do have those customers..., some of them can be very demanding...A. and B. They want data, so they’re wanting the ability to extract that data as quickly as possible” (Respondent L, personal communication, March 12, 2015). Respondent G similarly asserts that demanding customers emphasise on delivery time and performance criteria of products. “Be delivered faster...there’s always pressure that the delivery needs to be speedier, so not only do the customers want to pay less, they want the services delivered more quickly and they want the performance at a higher level...” (Respondent G, personal communication, April 01, 2015).

Likewise, for Respondent C and Respondent B, besides delivery time, their customers tend to put great emphasis on quality and safety of products respectively:

Excerpt 154: Respondent C

If it’s a desk study they want a quality report where the data are properly analysed and that they can use...price - usually - well within reason. The price is usually not necessarily too much of an issue...so almost by default I think I tend to work more with the more innovative companies..., mostly tend to be the sort of innovative and people that...realise the potential to do research to underpin their services. And companies that tend to be very much focussed on margins and on price don’t do a lot of research anyway...(Respondent C, personal communication, March 11, 2015).

Excerpt 155: Respondent B

Well our first client in South Korea was called Seoul Dairy..., they are the biggest dairy company in South Korea and they wanted to put some Yacon juice in their milk...so that is a prime example and they quite rightly expected us to be able to describe the contents of the milk and the safety of our juice. So we’re talking about the contents and the safety...well again talking about Seoul Dairy, they wanted very large amounts very quickly and we had to strain all our resources to do that (Respondent B, personal communication, May 18, 2015).

Furthermore, while stressing the challenge in the farming industry, Respondent P emphasises that, together with being price and quality-oriented, farmers in the Waikato region also expect user-friendliness from products purchased:

Excerpt 156: Respondent P

Well yeah, farm - it's a difficult industry as we found out when we started the manufacturing and selling to farmers, that everything has to be very robust...the first ones that we got out there, we had no idea really. Got the first sensors out there; we put them on this farm. It took a day to install, you know, big installation and we switched it going and the farmer did his milking. At the end of the milking he's just hosing our sensors down with a high jet of water and we were going grrrr! I hope they're going to withstand that!...and...I think the price is a very big motivator..., everything has to be...inexpensive because they don't have a lot of money to spend on capital equipment, and very simple...well if they've bought something they want to get the value out of it, so they're very value conscious and cost conscious... (Respondent P, personal communication, February 05, 2015).

5.3.4.2. Attitudes towards innovation

According to Respondent A, the customers – the cluster members' attitudes towards innovation become increasingly positive as their businesses grow. "Oh definitely, they're very, growing very rapidly in the Park; growing and very much focussed on exporting new technologies" (Respondent A, personal communication, December 09, 2014). In this regard, Respondent A claims that the cluster members are deemed early adopters if new technologies become available. "The companies within here in this cluster, yes, adopting new technologies, new services. They're always looking for new products to develop, new technologies" (Respondent A, personal communication, December 09, 2014). Furthermore, according to Respondent C, their customers are predominantly innovative companies, earlier adopters of new technologies:

Excerpt 157: Respondent C

So almost by default I think I tend to work more with the more innovative companies..., mostly tend to be the sort of innovative and people that...realise the potential to do research to underpin their services...price is usually not necessarily too much of an issue...and companies that tend to be very much focussed on margins and on price don't do a lot of research anyway... (Respondent C, personal communication, March 11, 2015).

Respondent N whose customers primarily include farmers in offshore markets, South American and that also deals with New Zealand farmers points out that particularly those in the offshore markets give little attention to innovation. For instance, Respondent N emphasises that “most developing nations put zero value on innovation, zero” (Respondent N, personal communication, December 01, 2014). As for the New Zealand farmers, Respondent N points out that although they are more about quality and reliability compared with the offshore farmers, the former still choose to purchase products based on price over the amount of innovation put into them:

Excerpt 158: Respondent N

They just take that for granted that it comes..., if you had a Russian copy of a Gallaghers machine versus a Gallaghers machine..., they’d buy the Russian thing if they knew it would last..., just a little bit cheaper, they’d buy the Russian thing. Even though Gallaghers in five-year time will have a way superior product because they’ve got an innovation. Farmers don’t care..., no one pays for innovation. They don’t care. That’s your problem as a competing company; all I want is for comparable quality I will buy the cheapest that I can get (Respondent N, personal communication, December 01, 2014).

In relation to a financial situation, Respondent P similarly asserts that New Zealand farmers, including those in the Waikato region may also lack sufficient financial capital to adequately spend on relatively more innovative physical capital. In this regard, they tend to be cautious adopters of new technologies available:

Excerpt 159: Respondent P

Farm - it’s a difficult industry as we found out when we started the manufacturing and selling to farmers..., I think the price is a very big motivator..., that everything has to be...inexpensive because they don’t have a lot of money to spend on capital equipment...so they’re very...cost conscious...Really we’re still very, very early stage development for online sensing, so it’s really been the early adopters and there are only a certain number of those, a certain percentage. And to become more mainstream..., it takes a long time to really establish yourself and I think Dairy Automation which are selling our products that we developed to local farmers, I think they’re just really starting to do well now. But it’s taken eight, nine years...one thing we’ve learnt is that the market is very slow to mature and it’s always dependent on milk prices and a lot of factors. But farmers are very cautious..., if farmers are pushing for new technology then that’s great, we don’t really hear a lot of that...I think the price is a very big motivator...(Respondent P, personal communication, February 05, 2015).

Furthermore, Respondent P also claims that customers, particularly farmers also develop rigorous expectations, in relation to problems associated with purchased products:

Excerpt 160: Respondent P

You know, when we put our first sensors out there we started getting problems. Gosh, if a farmer who has bought something and it doesn't work, they ring up pretty fast; fix this! And because we're a small company I think we did quite well at the beginning, so servicing those things, as soon as there was something wrong bang, we go out and fix it. So farmers are always in contact when there is a problem (Respondent P, personal communication, February 05, 2015).

5.3.4.3. Differentiation

Being home to the members of the AgBio cluster, the differentiation of Waikato Innovation Park rest upon value-added services offered to these companies. According to Respondent A:

Excerpt 161: Respondent A

I think it's all the value added. A normal office, all they do is provide the rental right? What we do is provide the networks, being able to point them to where they can go for funding, point to where they can go for training. We add a whole lot more value to their businesses (Respondent A, personal communication, December 09, 2014).

Likewise, as profit-oriented establishments, the cluster members develop a certain degree of product differentiation compared with goods and services offered by competitors. Respondent B identifies key differentiations of their products, mainly safety and quality:

Excerpt 162: Respondent B

I think it's fair to say that the Yacon plant comes from South America and the plant is used in a very different way there. It's used directly as a food, not as a health product. So we sell it as a health product..., as I say because the roots come out of the ground we have to do a lot of very expensive tests to show that our product is safe...I take samples and discuss how we produce the material and the safety aspects; of course being a food product the safety tests are very important. Again we don't do our own testing, but we do use Hill Laboratories and another agency called STS..., it's a Swiss company...based in Auckland...they are recognised companies for doing that type of testing (Respondent B, personal communication, May 18, 2015).

Excerpt 163: Respondent B

We can guarantee a level of activity in our juice and that is our main point of difference...well the Yacon produces valuable sugars in their roots and we have worked on ways of defining the best time to harvest those fruits, so we maintain the highest activity, and then we've done research on special processing and storage so that we retain the high levels of activity. And no other Yacon company does that (Respondent B, personal communication, May 18, 2015).

Furthermore, for Respondent M whose company serves New Zealand milk-power manufacturers claims that their differentiations are based on the business objective, an open access facility to the manufacturers aiming to export their products overseas and the uniquely competitive niche in terms of size. Likewise, Respondent C identifies that the competitive niche in competency set their company apart from other establishments:

Excerpt 164: Respondent M

This is quite a good question. We're quite different. Yes, there are probably 25 different spray dryers around New Zealand. The bit that makes us different and less competitive is one, we're an open access facility, okay. So we're not bound by any agreement to be with certain other individuals within the industry, right. The second thing that makes us unique is that the size - we are 500 kilograms an hour, which is big enough to be commercial, but small enough to be trialled. That's one of our major advantages. The third thing is there is nobody of that size in New Zealand. They're either very small, too small to make it commercially viable, or they're too big, or they're a company that does not want to work with start-ups (Respondent M, personal communication, April 28, 2015).

Excerpt 165: Respondent C

Well I guess that I do a good job, I give them a quality report...where the data are properly analysed and...it's a fairly specialised area, so it's not too many people they can go for it...well there are not many people that have such an extensive R&D background and also in a dairy where I'm quite unique is that I sort of go across on the farm side as well as on the food processing side. I sort of have that full knowledge of the value chain (Respondent C, personal communication, March 11, 2015).

For Respondent N whose company mainly serves offshore customers claims that their ambitious visionary and willingness to take risks partially constitutes their differentiations to competitors. "I mean we're in different markets mainly. No one does what we're

doing..., they might have aspirations to do it, but none of them do it. Probably the closest would be GEA or Tetra Pak, or DeLaval” (Respondent N, personal communication, December 01, 2014). As the front-end of the AgBio cluster, Respondent N also asserts that they are able to differentiate from the competitors, owing to their intermediating and leadership roles, overseas networks, and indefatigable efforts and long-term commitment to the cause:

Excerpt 166: Respondent N

We lead it. So we will engage directly with those local governments. I used to have hair. All my hair’s fallen out now, so it’s pretty painful..., so we will lead it and then normally they would come - they’ll get comfortable with what we’re proposing and then they come to New Zealand and do due diligence, and we would look after them for the week..., and we go around and we look at farms and we go and visit the suppliers and then by the time they’re finished they’re pretty - normally very impressed and then we get on with building it...the hard bit which takes a long time...very long term you know. It takes a long time and agriculture, it’s a very long term business (Respondent N, personal communication, December 01, 2014).

Besides the ability to perform a leadership role in building partnership between disconnected parties, features of products and services produced and sold by the cluster members also differentiates from those offered by external competition. For instance, Respondent P claims that:

Excerpt 167: Respondent P

MilkHub is an example of a competitor, of a New Zealand competitor...they’re made in Wellington but you know, they’ve been a competitor for a while so they’re measuring milk components..., fat and protein and mastitis...well it’s trying to measure similar things...but they’re two completely different technologies...of course they can’t do somatic cell count. No one has that...again the hardware doesn’t compare with ours..., the actual hardware is not so good (Respondent P, personal communication, February 05, 2015).

In relation to the nature of competition, Respondent L also states that their company relies on a key strength of product features, IT-based service and intellectual property, to differentiate from and to gain competitiveness over competing companies:

Excerpt 168: Respondent L

The company itself has got a lot of competitors in different areas, but we differentiate because most of our service is IT based...we've developed a lot of IT sort of intellectual property, which means that our competition finds it hard to compete with us because they haven't got that same IP or IT service...so pretty much everything that IVS does is done out on the web..., a lot of the process and services are on the web and you've logged in and been given access rights, it's a lot more efficient and quick (Respondent L, personal communication, March 12, 2015).

Likewise, Respondent N identifies product features and cost-effectiveness as key differentiations setting their products apart from competition. In this regard, Respondent N points out the uniqueness of their cow breed – Kiwipole compared with those of the American counterparts. Its unique features of include high heat tolerance, exceptional health, regular and easy calving, and the ability to produce milk throughout the year:

Excerpt 169: Respondent N

It was an animal I saw in Costa Rica maybe 10 years ago and I went that's probably the best tropical dairy cow I've ever seen. And I thought jeez I need to copy that because they didn't have it right in my opinion..., and we saw another similar sort of cow called a Carora..., and really that's where it came from was seeing good tropical cows and going, we can do better than that because if we can put New Zealand grazing efficiency in there they'll actually - and fertility - they'll be better than those American crossbreeds..., we had an idea that we wanted a cow that was similar to a New Zealand cow, but it could handle the heat because there is nothing really like it in the low tropics. So in our minds we'd been thinking you know, around grass efficiency, days in milk, fertility, you know, more about milk solids and volume. And it was really just trying to get something with the characteristics of the New Zealand animal..., we'd call it the ideal cow; what is the ideal cow? She doesn't get sick, she gets in calf every year, she milks for 305 days, easy calving..., so less about milk volume and more about profitability, efficiency; efficiently converts grass to milk..., it's significantly better than what most people are using in the tropics today, so that's why we felt it was time to put it on the market..., you can give them rubbish food and they'll still produce milk..., which is what happens in most of the developing world. You know, they don't get good quality food..., it eats less feed or cheaper feed and it still produces enough milk to be profitable..., because they'll live much older. They have calves all the time. You know, they milk longer..., they produce quite a lot less milk but per hectare it's around about the same. But they, you know - like a big American Holstein will produce 10,000 litres and a New Zealand cow's lucky to do 5,000. So you're getting out a lot less volume in milk, but she'll live until she's 14 sometimes and American Holsteins, lucky to have two calves. In the tropics they just fall apart. They can't handle it, so the farmer ends up putting all his grass into growing replacements instead of making milk (Respondent N, personal communication, December 01, 2014).

In this regard, for Respondent J, the key differentiation of their products mainly rests on the cost-efficiency compared with those of competitors. “Basically that’s our big selling thing is it’s that relatively quick to use, easy to use, good results and it’s relatively cheap to purchase compared to the other competitors...” (Respondent J, personal communication, March 05, 2015).

Besides profit maximisation, Respondent K puts emphasis on their moral obligations to the prosperity of the primary industry and New Zealand economy as a main differentiation from competitors:

Excerpt 170: Respondent K

I think we possibly take a slightly different perspective to some other companies in that, my job is to run a commercial company profitably. However, we also have a very strong and genuine industry good mandate or ethic. And that, you know, we know that if what we deliver is good for the industry we'll do well okay? So you know, our focus is very much on not only the primary industry but also you know, if New Zealand's primary industry does well New Zealand will do well. You know it's a big part of what we do (Respondent K, personal communication, December 02, 2014).

In relation to a technological aspect, Respondent P asserts that their company differentiates from potential competing companies through the technological leadership of their products in the industry:

Excerpt 171: Respondent P

No one sells similar products to us. They’re completely new, completely different - especially when we got started. But now, over the last five years there’s been a plethora of different companies developing things. So you know, there are a lot of different technologies out there, but still we lead the market I believe in some of this technology, that’s really useful technology wise...the somatic cell count sensor, there’s only - well DeLaval came out with one but it’s not really competing, the DCC which is what, \$5,000 and it’s really a bench top unit. It’s not really competing with our online sensor...our main competitors are conductivity meters because they’re, you know, for mastitis. They’re so easy to make and they’ve been around for a long time. But yeah, nowhere near as useful (Respondent P, personal communication, February 05, 2015).

5.3.4.4. *Challenges and strategies for demanding customers*

As private profit-oriented establishments, the cluster members at Waikato Innovation Park face different challenges dealing with customers. For instance, Respondent N stresses that their company is challenged by a relatively different mindset of offshore customers, how the customers view profitability in relation to expense:

Excerpt 172: Respondent N

Most of the world does not measure profit..., so it's a big challenge for us is proving profitability in offshore markets where they don't think about profit. They think if a cow does 10,000 litres she's going to be more profitable, but she's not because of the cost of the feed you have to put in her (Respondent N, personal communication, December 01, 2014).

Respondent N also identifies other challenges in offshore markets including relatively high distribution costs leading to a potential profit erosion, impecunious offshore customers, and their aggressively price-oriented approach:

Excerpt 173: Respondent N

If you looked at semen New Zealand farmers would pay \$25 for a straw of semen. In Colombia we should be selling that same straw of semen for \$40, but instead they expect to pay \$7..., and the reason it should be more expensive than New Zealand is because there are lots of small farmers and they're geographically spread all over the place, so you know - in New Zealand it might be taking a can with 300 straws of semen in it, 400 straws or 800 straws of semen. Overseas you're taking that same distribution to someone with five cows and he wants you know, 10 straws of semen, so your costs per straw are astronomical. So that's part of the real challenge is - New Zealand farmers are the best in the world and happy to pay \$25. You start getting overseas and they grizzle at \$7 and yet they've got a higher cost distribution system, so it does create a real problem because if you then say right, to develop the market I'm going to - instead of selling it for \$25 I'll sell it for \$7. Then they think that's it, all they're ever going to pay is \$7. So you're going to lose money forever, so you may as well not tell them anything - and that's where a lot of it ends up in stalemate (Respondent N, personal communication, December 01, 2014).

In this regard, the cluster members at Waikato Innovation Park develop different strategies to manage their sophisticated and demanding customers. For instance, Respondent N adopts a standing-your-ground approach, to deal with price-sensitive

offshore customers. “If they get too aggressive on price you stop selling” (Respondent N, personal communication, December 01, 2014). In this regard, owing to overly price-sensitive, Respondent B stresses that their company undergoes product innovation, aiming to make their products more attractive to customers:

Excerpt 174: Respondent B

Well again talking about Seoul Dairy, they wanted very large amounts very quickly and we had to strain all our resources to do that. And then after about two years they started to be very aggressive about reducing the price that they were paying, so we largely held our price to the extent that they are no longer a customer. So we are now trying to do things in a different way; by that I mean instead of selling an ingredient where Yacon juice is added to milk, we’ll make a mixture here in New Zealand and send it packaged already for sale..., we’ll do the processing here of end products; before we used to supply an ingredient (Respondent B, personal communication, May 18, 2015).

Likewise, Respondent L also puts emphasis on constant innovation and improvements as one of main strategies, to improve their service level and, therefore, to satisfy sophisticated and demanding customers:

Excerpt 175: Respondent L

Well it’s whether the customers or we ourselves are doing things and we’re always looking for opportunities to improve our service level. One example is in our timber testing thing we’ve got what’s called a Timber Testing Portal. So all of the process with timber testing is that the mill, the timber mill cuts a certain number of pieces of wood and they send them to us for analysis. When they send them they can actually log them onto our web portal that says where it’s come from, how many pieces of wood, what it’s being tested for, et cetera. And in order to make that more efficient for them, they can actually watch to see at what stage their pieces of wood are at in terms of the analytical process. And they can actually extract the data from the web portal so that they can use it in their own system for their own reporting purposes et cetera (Respondent L, personal communication, March 12, 2015).

Nevertheless, the cluster members also depend on other approaches, to meet the needs of their demanding customers. For instance, Respondent N claims that the main strategy is to reassure the customers that they are able to profit from the projects, to provide a proof of profitability to the demanding offshore customers:

Excerpt 176: Respondent N

The difficult thing is not the customers; the difficult thing is proving profitability, so it's not the customer because customers are rational. If you can go and show them a farm that's making more money, they'll copy it. In a new market how do you establish a farm and prove that it's more profitable, so that they believe you and trust you. And then everyone will copy it..., we need that proof (Respondent N, personal communication, December 01, 2014).

For Respondent A, their company strategically relies on an effective communication and engagement in dialogues with demanding customers, to understand their needs and, therefore, to be able to deliver appropriate solutions. “We try and lay out a plan in front of them, so what needs that they might be - say within their businesses” (Respondent A, personal communication, December 09, 2014). In this regard, Respondent P states that their company values dialogues through which feedback from customers including comments, complaints, and ideas are used for product improvements:

Excerpt 177: Respondent P

You know, it's all a people thing so when you start marketing to the farming community you go out there, you talk to them, you listen to them. They'll give you quite a bit of feedback which you can use for new ideas; you can use for improvements, so I think capturing those is quite important. When we first got our sensors out there we would have a database of farmer comments or complaints, or ideas. I think that's quite useful to track...well I think if they've bought something they want to get the value out of it, so they're very value conscious and cost conscious and it'd be great to have a lot of really positive response from farmers, how it's improving them (Respondent P, personal communication, February 05, 2015).

Likewise, Respondent L stresses the importance of dialogue as one of the key strategies, to understand requirements and to effectively deal with sophisticated and demanding customers:

Excerpt 178: Respondent L

Oh carefully depending on their size. Some of them can be very demanding, but we're in communication with them about what their requirements might be. We also tend to be trying to keep ahead of them in terms of providing those services before they ask for them (Respondent L, personal communication, March 12, 2015).

Furthermore, the important strategies dealing with sophisticated and demanding customers may also require effective support from the cluster members for their customers. For instance, Respondent J and Respondent P emphasise that:

Excerpt 179: Respondent J

Our attitude is to actually be very helpful. Our scientists do a lot of work trying to help these other labs solve their problems, so that's probably how we mainly help out and creating new techniques by helping other companies...you know, get it to work in their systems...like you might have you know, how can we use your DNA extraction on bones or something like that..., which isn't a very normal thing to do. And it's probably not a high input, but it gets your name out there. It gets your product out there, so it's useful and we get a paper back maybe saying that they're using our product...and so it's a marketing thing. It helps grow the company (Respondent J, personal communication, March 05, 2015).

Excerpt 180: Respondent P

One of the things that we didn't perhaps do as well as we could when we first got products out there, was supporting or telling farmers how to use this new technology in the best way. So farmers developed their own - over time they developed their own way of doing it, but some help would have sped that process up...(Respondent P, personal communication, February 05, 2015).

Furthermore, Respondent P states that strategies to deal with demanding customers, particularly farmers include the development of user-friendly products for cautious farmers:

Excerpt 181: Respondent P

That's the way with a lot of the sensor technologies that are going now; the companies who are developing them, us included, are understanding that, it needs to be packaged a lot better and presented to farmers. A farmer doesn't want to have to think...he's got so many things to think about already, he doesn't want added stress of learning something and we need to make it simple and easy and make decisions for him. We say we're 95 per cent sure that this cow has clinical mastitis; in this quarter, please go and check her...so we try to pitch our developments around...making it in a form that it's...usable for the farmer, so it's easy to use (Respondent P, personal communication, February 05, 2015).

Likewise, with robustness and cost of products being the key concern of farmers, particularly those in the Waikato region, Respondent P states that their company adopts

customer-oriented product development strategies, which primarily emphasise on the development of products suitable to those specific needs:

Excerpt 182: Respondent P

Well yeah, farm - it's a difficult industry as we found out when we started the manufacturing and selling to farmers, that everything has to be very robust and..., I think the price is a very big motivator..., that everything has to be...inexpensive because they don't have a lot of money to spend on capital equipment...well if they've bought something they want to get the value out of it, so they're very value conscious and cost conscious...so we try to pitch our developments around getting a cheap way of getting information out of milk, and making it in a form that it's very robust... (Respondent P, personal communication, February 05, 2015).

Regardless the strategies, Respondent C puts emphasis on legally binding agreement, which helps prevent excessive sophistications. "Each project is sort of unique and...it's a usually contract that's signed. First we sign a confidentiality agreement, then we discuss the project and it's clearly defined what needs to be done...and the point is to set realistic deadlines..." (Respondent C, personal communication, March 11, 2015). Likewise, Respondent G also stresses the importance of contracts:

Excerpt 183: Respondent G

If you offer the customers something they go this is great, but we want it to cost less, be delivered faster and deliver more...there is always pressure that the price needs to be more competitive. There's always pressure that the delivery needs to be speedier, so not only do the customers want to pay less, they want the services delivered more quickly and they want the performance at a higher level than they originally asked for. But that is contracting...everything that we do is tied up in a contract, some sort of agreement between us and the customers...we have contracts with the customers that have performance criteria on food functionality, so we guarantee a certain functionality on the food. And if we can't meet those needs there are penalties for us, so we have great, great pressure on us to help them develop formulations to meet certain food functionalities. And if we can't achieve it there's a penalty against us. A lot of this is tied up sometimes with equipment supply, so they'll say we will buy this equipment off you. This piece of equipment needs to make this food with this functionality at this rate, in this time and if it doesn't then we get penalised. We agree to that. We say yes, we will do that. It will cost you. You will have to pay this amount of money, but we will deliver this back to you in this certain timeframe. Then all of that does have penalties: penalties based on time, that we can't achieve it in the right time, and penalties based on performance, that it doesn't achieve the right criteria (Respondent G, personal communication, April 01, 2015).

5.3.5. Context for firm strategy and rivalry

Although the cluster members of the AgBio cluster locate in Hamilton, the Waikato region, these companies serve local customers as well as those locate throughout New Zealand and overseas. In this regard, their competition exists beyond the boundaries of the cluster and the region. Therefore, the research findings on context for firm strategy and rivalry are not strictly emphasised on local competition.

5.3.5.1. *Rivalries and competitive strategies*

Rivalries, to the cluster members, consist of internal competition within the AgBio cluster and external competition in the Waikato region, nationwide, and overseas. In this regard, Respondent N reveals that their most likely competitors include other cluster members based in Waikato Innovation Park. Nevertheless, the company do not engage in competition with these potential rivals as it primarily sells goods and services in offshore markets:

Excerpt 184: Respondent N

The most likely competitors are other members of our cluster. So our most likely competitor is probably LIC, Gallaghers, PDG Wrightsons; all the companies we work with are our most likely competitors..., I mean we're in different markets mainly...no one does what we're doing (Respondent N, personal communication, December 01, 2014).

Although there exists internal competition, some cluster members may operate without rivalries in Waikato Innovation Park. In this regard, Respondent F state that “in Hamilton there’s no one else that really does the same type of work as what we do. Yeah, there’s only one other main company in...Palmerston North..., New Zealand that does the same sort of work as what we do” (Respondent F, personal communication, March 26, 2015). Respondent B similarly stresses the absence of internal competition within Waikato Innovation Park. “No, we really don’t have any direct competitors from New Zealand...there are a couple of companies; one from Japan and one from Europe that has a rather similar product” (Respondent B, personal communication, May 18, 2015). Likewise, for Respondent J, “we don’t have competitors here in - I mean the competitors here are also going through the science community...there isn’t that many...I think we’re probably the only company in New Zealand actually making DNA extraction kits”

(Respondent J, personal communication, March 05, 2015). In this regard, Respondent P also states there is an absence of direct competition from companies based in the Waikato region:

Excerpt 185: Respondent P

Well there's no one. I don't know if there's anyone in the Waikato region but there's one meter a Wellington crowd developed ages ago. What's it called? MilkHub..., MilkHub is an example of a competitor, of a New Zealand competitor...they're made in Wellington you know, they've been a competitor for a while...but they're two completely different technologies (Respondent P, personal communication, February 05, 2015).

While there is a limited number of rivalries among the cluster members within Waikato Innovation Park, the lack of competition may also extend beyond the boundaries of the Park premises. For instance, Respondent C states claims that relying on own inter-organisational networks for businesses may diminish the need for competition:

Excerpt 186: Respondent C

I haven't come across that yet, no. But again it depends; because I'm only a one-person company it's based on my networks and so yeah, it's usually a pretty good relationship with the company and I haven't had to compete really, which is good...I think both, because it's so specialised...so it's not too many people..., well there are not many people that have such an extensive R&D background... (Respondent C, personal communication, March 11, 2015).

Nevertheless, although the challenge of competition is relatively less prominent among certain cluster members, other companies based within Waikato Innovation Park may engage in more intense rivalries both inside and outside the Park, regionally and nationally. In this regard, Respondent G stresses the inevitable existence of competition, as a profit-oriented establishment:

Excerpt 187: Respondent G

We have to compete..., so no matter what you do in the world there's always a competitor. Whether you have an iPhone or an HTC phone or a Samsung phone, you think you might have the best product but there's always a competitor out there, similar with Tetra Pak. We have competitors and we have big multinational companies like Tetra Pak in the country that compete and make our life very difficult, and we compete with them all the time... (Respondent G, personal communication, April 01, 2015).

Likewise, according to Respondent M, although operating as an open access facility, their company has a considerably large number of potential competitors, which offers similar services. These facilities are based in the Waikato region and nationwide:

Excerpt 188: Respondent M

There are probably 25 different spray dryers around New Zealand..., likes of Tatura is - Fonterra's got Hautapu, Te Rapa, Waitoa. There are probably - there was three on the Waitoa site, there's three on the Te Rapa site, two on the - I think there's two at Hautapu. Lichfield - there's a number of different dryers here (Respondent M, personal communication, April 28, 2015).

Although rivalries are inevitable challenges to profit-making establishments and the cluster members alike, the nature of competition and a level of intensity may vary between companies. In this regard, Respondent G stresses that their company engages intensively in price-based competition in the Waikato region and nationwide:

Excerpt 189: Respondent G

We have competitors and we have big multinational companies like Tetra Pak in the country that compete and make our life very difficult, and we compete with them all the time - based on price...price is the only numeric thing that you can judge two companies by..., the only tangible difference between the two companies...the difference that the customer can see is the price, how much will it cost. One company will make this for 10 cents, the other company will make it for 12 cents. Now is what the other company delivers worth paying the extra? ...the customers are very, very focussed on price obviously (Respondent G, personal communication, April 01, 2015).

Furthermore, while competition exists in the form of price, the cluster members also compete with other companies based on technological features and advancement of their respective products. For instance, Respondent L claims that “we’ve developed a lot of IT sort of intellectual property, which means that our competition finds it hard to compete with us because they haven’t got that same IP or IT service” (Respondent L, personal communication, March 12, 2015). Likewise, for Respondent P, the competition between their company and competitors is largely based on product technologies:

Excerpt 190: Respondent P

MilkHub..., they're measuring milk components..., fat and protein and mastitis...well it's trying to measure similar things...but they're two completely different technologies...of course they can't do somatic cell count. No one has that...again the hardware doesn't compare with ours..., the actual hardware is not so good...but their marketing measures and the way they've presented it is fantastic. So they've been quite successful because farmers can see, it looks really good. It's got a really good message for the farmer on how to manage his farm... (Respondent P, personal communication, February 05, 2015).

As a result of the technology-based competition, companies may be challenged by the attitudes of customers towards relatively more innovative products and services, as they become accustomed to mainstream or conventional technologies that are more widely available in the market. In this regard, Respondent P stresses that:

Excerpt 191: Respondent P

Really we're still very, very early stage development for online sensing, so it's really been the early adopters and there are only a certain number of those, a certain percentage...sure we miss out. I mean there are groups of farms such as Landcorp, so they can make a decision based on one technology. For instance, they went for MilkHub, so that's quite a major coup which did hurt us, but...to become more mainstream...it takes a long time to really establish yourself and I think Dairy Automation which are selling our products that we developed to local farmers, I think they're just really starting to do well now. But it's taken eight, nine years...one thing we've learnt is that the market is very slow to mature and...farmers are very cautious..., if farmers are pushing for new technology then that's great, we don't really hear a lot of that...they just don't use like a mastitis sensor, so there are a lot of farmers like that. It's hard for them to make that jump but yeah, our main competitors are conductivity meters because they're, you know, for mastitis. They're so easy to make and they've been around for a long time. But yeah, nowhere near as useful (Respondent P, personal communication, February 05, 2015).

Nevertheless, regardless of the forms of competition, customers base their decisions to purchase on own opinion, in relation to preferable products and services. As a result, companies are actively involved in an opinion-based competition, to win over prospective customers. For instance, Respondent G emphasises that:

Excerpt 192: Respondent G

So no matter what you do in the world there's always a competitor. There is always a competitor...we have to compete...and a lot of this is...really opinion-based..., everything else about how the plant looks, feels, runs, what it delivers, can be opinion. Of course there are performance criteria, but essentially both companies achieve the same performance, if pushed by the customer to achieve the same performance. The customer has a need, they want to make 1000 pens an hour, then both companies will deliver a plant that can build 1000 pens an hour. So...from a performance specification it's always about the same...that becomes opinion related. The customer has to make a decision based on other intangible things: quality, operability, long term maintenance, lifecycle costs, services, consumptions, a whole bunch of things so... (Respondent G, personal communication, April 01, 2015).

Although there exist potential competitors, some companies may strategically avoid engaging in competition if the former is also potential customers. For instance, Respondent N, as the intermediary of the AgBio cluster, claims that their company adopts a collaborative strategy rather than competing with their prospective competitors. "Try not to. My job's an integrator, so I shouldn't be competing with my companies. Not unless I want them to buy me. And then I'd deliberately say I'm going to compete with you so that you buy me" (Respondent N, personal communication, December 01, 2014). Likewise, Respondent M stresses the importance of collaborations including those with potential competitors, which are also prospective customers:

Excerpt 193: Respondent M

No, generally not...generally those other dryers that are in the Waikato want to come to us, because if they've got a dryer that's making nine tons an hour, for them to take that dryer off line and do a small product trial, it's very, very costly. It's a benefit for them to keep them on the same product and then come to us and we'll do the small trial and then give them the results..., that and overflow sometimes if they've got milk pressure or something like that, yeah. Normally R&D work, yeah - or we have some enquiries where the big companies have got small volumes of product that they feel that it's just too small commercially to manufacture and they think well, we're better off if we can get this outsourced somewhere else (Respondent M, personal communication, April 28, 2015).

Furthermore, regarding collaborative approach, Respondent F similarly claim that their company also work together in partnership with potential competitors, to achieve common goals. Nevertheless, the partnership only exists in certain areas including mutual referrals for prospective customers:

Excerpt 194: Respondent F

In Hamilton there's no one else that really does the same type of work as what we do. There's only one other main company in...Palmerston North...that does the same sort of work as what we do...and we've sort of got a sort of verbal agreement that if there's studies that we can't run, to suggest that they go and talk to the competitor and things like that...but the reality is our clients know who the competitors are and they'll go to them straight away, probably as soon as we said no...they probably might get quotes from both of us to be honest...and pick the cheaper one...but I don't think we've ever run studies combined...we would, but it's never sort of occurred like that at this stage. It's never really sort of come up...and you know, in theory it could be done because I think they do run a good ship, a good company and they're pretty similar to us I think style wise, but it's just never occurred just because of the type of work that we do...it's difficult, yeah...we tend to keep them completely separate, yeah. So there's a sort of verbal agreement if we can't meet the needs of a client, to suggest that they try the competitor. But there's never been a joint study run..., because it would be very awkward (Respondent F, personal communication, March 26, 2015).

On the one hand, despite the willingness of the cluster members to work together in partnership with potential competitors, the effort does not necessarily eventuate in actual cooperation. For instance, Respondent B stresses that “well I mentioned that there was a European company. We have offered to collaborate with them and they did not want to do that” (Respondent B, personal communication, May 18, 2015). On the other hand, there is also a sceptical attitude among the cluster members towards working with competitors. In this regard, Respondent F express the concern about new entrants of similar businesses at Waikato Innovation Park and the potential for working together in partnership with the newcomers:

Excerpt 195: Respondent F

If they were going to do very similar work I wouldn't be very happy..., just because there isn't a huge amount of - yeah, I mean it depends. If there was more work..., there's not a huge amount of work coming through...I mean there are only two companies in New Zealand that do this because it's fairly specialised...and I guess it would depend on if they set up here and did their work somewhere else. But if they set up here and then...did their work on AgResearch..., we'd be a little bit..., we'd have our nose out of joint (Respondent F, personal communication, March 26, 2015).

Likewise, although threat of new entrants is less of a concern, Respondent P, however, stresses threat to confidentiality brought about by newly competing companies as a more important factor that may potentially undermine the success of their business:

Excerpt 196: Respondent P

It wouldn't worry me too much, because we're all sort of separate companies anyway. So what we do stays within here. It's more just that networking and talking to other companies and getting ideas, but I think people still keep to themselves pretty much - and for valid reasons. We've got to have our door locked, so not anyone can just walk in because we're developing a lot of IP and you know, so just from a security point of view we can't...so people are keeping their own separate thing, so if someone that was competing moved across the hallway there's not much we can do really. But I don't know, I haven't really thought about it because we haven't had that happen (Respondent P, personal communication, February 05, 2015).

In this regard, Respondent P firmly asserts that their company does not currently aspire to working together in partnership with competing companies, although opening to the possibility of future collaborations with the potential competitors both in domestic and overseas markets:

Excerpt 197: Respondent P

Working with them? absolutely not!..., well they're not based locally anyway, I can't see that, they're two completely different technologies...maybe there could be a possibility there but probably not. It's probably not going to happen but...now that I'm talking to you and what we were saying about the market size, market still hasn't been penetrated very far so you know, working together - there's still a lot of room. So you can still work with a competitor and there's still plenty of - you're not stepping on each other and maybe some sort of collaboration would be good, yeah (Respondent P, personal communication, February 05, 2015).

In relation to a non-collaborative approach towards working together in partnership with competitors, Respondent G claims that their company policy restricts working together in partnership with rivalries. "Working with the competitors? No. No. No. No, we can't work with competitors. It's not allowed...Tetra Pak is too big to do that. That would be considered a - that - we would not be allowed to do that" (Respondent G, personal communication, April 01, 2015). Nevertheless, a non-collaborative policy does not prevent their company from engaging in non-business-related collaborations with the competitors, for instance, on local community services:

Excerpt 198: Respondent G

Okay, so we have two initiatives, one official and one non-official. So from a charitable organisation point of view we work with a church, donating our time to help with food for local communities, so delivering food to local communities. So that's more of a social thing that our people here in Hamilton do, okay. From a Tetra Pak company point of view, we provide support for the Milk for Schools program okay, so we work closely with Fonterra on the Milk for Schools program. So that's our official Food Development initiative, so one is more of a social initiative that's driven by the people and the social club et cetera, local and the other one, the Milk for Schools, is the Tetra Pak program that Tetra Pak contributes to and is part of with Fonterra (Respondent G, personal communication, April 01, 2015).

With different attitudes towards collaboration with competitors, the cluster members respectively adopt competitive strategies, to deal with challenges presented by the inevitable existence of competition. For instance, Respondent J claims that their company aims for building a brand name through a direct customer outreach:

Excerpt 199: Respondent J

It's really just getting our names - you know, and it depends on what they're doing and how - obviously our kits aren't going to work for everything. It works for certain things, so sometimes they'll need to use the other kits and it's just a matter of people trying things. So sending out samples for them to test our product is one of our techniques of getting them to use our products (Respondent J, personal communication, March 05, 2015).

Likewise, Respondent G emphasises that their competitive strategies include demonstrating the product superiority, building inter-organisational relationships and communication with potential customers, identifying their needs, and differentiating products from those offered by competitors:

Excerpt 200: Respondent G

We have to convince customers that in our opinion our plants or our factories or our solutions are better than our competitor's solutions..., that our functionality is better than other companies functionality; the operability of what we deliver is better...so with all of our work we have to work through a strategy of how we're going to influence stakeholders, who the decision makers with the customer, what's important to them, how do we influence them, and then how we differentiate ourselves from our competition with respect to those things...so that's part of our sales strategy (Respondent G, personal communication, April 01, 2015).

Furthermore, in relation to competitive strategies, Respondent B emphasises on the importance of differentiating their products from those of competitors and identifying market niche:

Excerpt 201: Respondent B

No, we really don't have any direct competitors from New Zealand...there are a couple of companies; one from Japan and one from Europe that has a rather similar product. So we had to define our market niche, so we compete by being the only ones in that market niche and by that I mean we claim that our product is not processed and is natural. Whereas the Japanese product is made by biotechnology, by growing bacteria in vats and so they get a similar active product but it is not natural (Respondent B, personal communication, May 18, 2015).

Although there is prospect of innovation among the companies based in Waikato Innovation Park, their attitudes towards innovation may be exogenously hindered by factors beyond their control. For instance, Respondent F claim that their conformation to existing standards of the status quo influences a tendency to innovate:

Excerpt 202: Respondent F

I guess in a lot of the work we do there hasn't really been a lot of innovation in regards to the type of work we do. We follow certain guidelines that are international standards, so we follow those and they're pretty much set in stone. So we can only be innovative to a degree. We can't differentiate too much from the guidelines, because then we'll become noncompliant and then our research is worth very little...so we have to follow certain guidelines and if they don't take innovation into account we can't either (Respondent F, personal communication, March 26, 2015).

5.3.6. Related and supporting industries

Although the cluster members of the AgBio cluster locate in Hamilton, the Waikato region, these companies deal and trade with local related and supporting companies such as suppliers as well as those locate in other part of New Zealand and overseas. In this regard, the research findings on related and supporting industries are not mainly emphasised on the local suppliers but also those external to the Waikato region.

5.3.6.1. Proximity to local suppliers

As discussed earlier, the Waikato region is endowed with strong research and economic strengths in agriculture and also the presence of a large number of agriculture companies and other relevant organisations or institutions. The endowments of physical capital denote the abundance of local supplying companies. For instance, according to Respondent M, their company mainly relies on local suppliers located through the Waikato region for materials used to build the spray-drying facility:

Excerpt 203: Respondent M

Wherever we can get them. This dryer was actually - other than one fan, everything came from a 12 kilometre radius of Hamilton, everything: the steel, the concrete, the valves, you name it..., that's a \$12.5 million build and everything was bought from companies within a 12 kilometre radius (Respondent M, personal communication, April 28, 2015).

Likewise, owing to an extensive reliance on locally-based related companies and suppliers, for instance, to manufacture the spray drier based in Waikato Innovation Park, Respondent G stresses the important contribution of these organisations to the existent and competitiveness of their company:

Excerpt 204: Respondent G

So we built it...we designed it, developed it, engineered it..., and we're expanding it at the moment. So it's our technology, our design, our intellectual property but...we had it fabricated here in Hamilton at a stainless steel fabricator, it was fabricated by a third party because we don't have a workshop. We don't have welders and a workshop; we have to go to a third party. So we collaborate with other companies or we subcontract to fabrication companies to build stuff...so I mean the suppliers here have a huge influence on the operation of our company...they have a huge influence on the success of our business...because we don't manufacture anything ourselves. We manufacture through third parties..., if they didn't exist, we wouldn't exist...so if they don't have the time to manufacture for us we can't do our business...if they are unable to manage their workload, their staffing and their resources well, then it has an effect on us...if they can't deliver their equipment to us, we can't complete our project to the customer and then like I said, we get penalised financially. They get penalised and it all is a big domino effect: everyone gets hurt in the process and no one's happy (Respondent G, personal communication, April 01, 2015).

In this regard, close geographic proximity to the local suppliers potentially renders competitiveness to locally-based companies and the cluster members. For instance, Respondent M highlights benefits of the proximity, which influences the competitiveness of their company:

Excerpt 205: Respondent M

Quick access to goods and services. That's the one big key. If you've blown a seal or you're wanting a lab service completed on a foreign product, to have somebody here in Hamilton is just a major benefit. They've just pulled the labs out of Hamilton and now we have to send product to Auckland. That's a major inconvenience for us (Respondent M, personal communication, April 28, 2015).

Furthermore, close geographic proximity facilitates mutually-beneficial inter-organisational relationships and commination between customers and local suppliers, which, in turn, renders the former opportunities to influence efficiency and effectiveness of the latter in managing their businesses. It also allows both parties to work together on quality assurance of products with more ease. For instance, Respondent G claims that:

Excerpt 206: Respondent G

So I mean the suppliers here have a huge influence on the operation of our company...they have a huge influence on the success of our business which is good that they're close, because then we can influence them as well. If we feel that they're getting behind, we can influence them in their delivery and make them better. If they were on the other side of the world we wouldn't know until it was too late...the benefits come around speed of communication, quality and relationship. Because we're close we can form a better relationship with them. We can go and see their workshops. We can go and see their equipment. We can get better progress reporting. We have more confidence in quality. Issues can be resolved much more quickly, because if they have an issue we can go and see it. We can sign off of that quite quickly, so the speed of which we resolve issues and keep things moving is much quicker if we're in the same location (Respondent G, personal communication, April 01, 2015).

Likewise, although relying on both external suppliers and those based locally, Respondent F assert an advantage of and put greater emphasis on being close to the latter:

Excerpt 207: Respondent F

Basic lab supply stuff...they're Auckland based, Thermo Fisher and that sort of stuff are all Auckland based...here in Hamilton, well we bought plastic bags and that sort of stuff from our local over in Te Rapa..., AgResearch is a supplier to us...they're a government organisation; they're a government researcher...so they're our biggest supplier..., livestock...and facilities, grounds. They're probably one of our biggest suppliers because they supply the ground for us to run our animals on, and the facilities for us to work with the animals. So they're our biggest one and this is where the location comes into it, because they're right there...and then there's another site, there's another farm down the road where they provide dairy as well, so we've got sort of most things, most of the production systems covered that we work with...So we're based here and we can walk across and see our animals perform our work...it's mostly the commuting really...it saves time that we can just you know, five minutes' walk, one minute by car and they're right there. And if there's any - and you can see the farm staff on a fairly regular basis, the staff we're actually working with so you know, you've got a fair bit of confidence everything's running correctly (Respondent F, personal communication, March 26, 2015).

Owing to the contribution of locally-based related companies and suppliers to the competitiveness of the cluster members, well-established long-term inter-organisational relationships with these establishments may further ensure the sustainable competitiveness of the latter. In this regard, Respondent G highlights efforts to build long-term and mutually-beneficial partnerships with their suppliers:

Excerpt 208: Respondent G

I mean the relationship that we have with our fabricators is driven and managed by our supply management group. So we pick our top 15, 20 suppliers and we make sure that we have - we're talking about long term relationship with them and we have those key suppliers on a regular meeting. We talk about our business and our business growth opportunities; they talk about their business and their business growth opportunities, and we make sure wherever possible that we're aligning and that we're going in the same direction. And when we have growth opportunities we make sure that we try and give the first option to those top 15, top 20 suppliers, before we go looking at any of our other suppliers or vendors. So we give them the first chance at working with us wherever possible (Respondent G, personal communication, April 01, 2015).

Besides close geographic proximity, locally-based suppliers also possess other attributes, which influence to the competitiveness of companies in the Waikato region. For instance,

Respondent F identifies the competency of and price-based competitiveness offered by the local suppliers:

Excerpt 209: Respondent F

Yes, very, very much so, yeah. And that's one of the things that gives us a lot of confidence, and we know that what they say they're going to do and they're very good at what they do, so it makes us very happy...they have sheep and cattle..., good grazing and facilities and animals...you know, they move, they graze the stock and they look after the grazing and feeding of the stock and they keep an eye on them as well, so if they actually do need veterinary care they've got vets that they work with. Like there's one but there's one down south as well, that they'll call in specifically and we know and trust them. So they're providing veterinary services there as well, so it's quite useful for us because with animals you have to keep in mind all that sort of stuff...and then there's another site, there's another farm down the road where they provide dairy as well, so we've got sort of most things, most of the production systems covered that we work with...in regards to actually running the study, whether there are enough animals, whether we can put the animals on there, we've never had that issue because they always have some space ready for research animals, because they are a research farm...we come to them with propositions saying we want to use x their facilities or x number of animals, and it's very rarely that they say no...they also provide - so all our animals studies require ethics approval and they have their own ethics committees that we can utilise, and we work with them to get ethics approval. And that's actually pretty important..., otherwise we'd have to have our own internal ethics committee and that would be a pain...that's another service they provide...for a lot of work we do, they charge us for that because we're an external company, but it's not a crazy amount of money and that's pretty helpful for us (Respondent F, personal communication, March 26, 2015).

For Respondent G, although their locally-based related companies and suppliers do not render competitiveness in terms of price, they are, however, highly competent both in national and overseas markets through their exporting activities:

Excerpt 210: Respondent G

So about a third of my supply comes out of Hamilton, mainly stainless steel fabrication...they service markets all round the globe...stainless steel fabrication has got a 100-year history in New Zealand, so they are very good at what they do...in terms of competency, quality and technology, probably global best practice..., easily global best practice...they probably are the best that is out there. But that comes at a cost and of course we always compare the cost to cheaper Asian manufacture and on that basis, on a global basis, they are not the cheapest...they're not price competitive, on a global basis; not price competitive at all (Respondent G, personal communication, April 01, 2015).

Along with locally-based related companies and suppliers in Hamilton, the Waikato region such as AgResearch, Respondent F highlight the presence of highly competent related companies within Waikato Innovation Park, which may also contribute to the competitiveness of their company:

Excerpt 211: Respondent F

Hill Laboratories...their accreditation..., that's our biggest thing. Their accreditation is the same as ours where it's internationally recognised..., so in certain studies we need that accreditation. And there are only two or three labs in New Zealand that have that accreditation...Hill is pretty big..., they analyse different types of area...they do the analysis of the samples that we collect, so we do treat the animals, sacrifice the animals, collect the samples. They do all the analysis of it so yeah, so they do the laboratory phase of the study...I think the first trial we put through those guys would have been about 2009...at the start quite a bit, but it varies just depending on the type of studies that we have come through. Sometimes you're very busy and some studies you need a lot of analytical; some studies you need none, so it's very study specific (Respondent F, personal communication, March 26, 2015).

Furthermore, while contributing to the competitiveness, Respondent F claim that local suppliers pose no constraints to the competitiveness of their company:

Excerpt 212: Respondent F

They don't really influence us negatively too much...I don't really see any constraints that they give us..., if anything, any time an issue is raised they will work with us to try and alleviate the problem, or they see it before us. So I see there's no real constraints because we're beneficial to each other, because AgResearch being a government organisation wants to see external money coming in, so they like us because we put money into them, and because they are researchers themselves, they understand what we want so we're happy to work with them and they're happy to work with us. So it's really win/win, yeah (Respondent F, personal communication, March 26, 2015).

Furthermore, in terms of contribution to competitiveness, to some extent, there exists a degree of differentiations between local suppliers in the Waikato region and externally-based supplying companies. For instance, Respondent F claim that, in addition to proximity as one of the key differentiations, the local suppliers such as AgResearch offer services more compatible with their core business interests, put greater emphasis on value creation as opposed to profit maximisation, and are relatively more competent:

Excerpt 213: Respondent F

I guess if we had to go to a regular farm..., if we had to contract another farm that would be further away. They would still have similar services, but because AgResearch since they're not so focussed on production, they're used to doing farming systems with research. They understand more what our demands are, as opposed to a straight farm that's just there to make money. They're very focussed on making sure they ensure make money out of it and you know, if you come in with a research proposal they're a bit like oh..., how's that going to influence me making money at the end of the day? So it's yeah, AgResearch is much more used to that style...and it gives us confidence to use them. We'd use them over a normal farm just because we have more confidence...and they're much more familiar with what we do than a regular farm which may be completely inexperienced with it (Respondent F, personal communication, March 26, 2015).

In relation to the competitiveness, while trading goods and services regionally and through New Zealand, local suppliers in the Waikato region are also involved in exporting activities. For instance, Respondent M claims that “those suppliers are - yeah, both, mostly supplying the dairy industry but yeah, they do a little bit of export stuff as well” (Respondent M, personal communication, April 28, 2015). Likewise, Respondent G also states that their company relies on local related companies and suppliers, which are involved in exports. “So about a third of my supply comes out of Hamilton, mainly stainless steel fabrication...they service markets all round the globe, all round the globe” (Respondent G, personal communication, April 01, 2015). In this regard, close geographic proximity to the local suppliers, which are active and potentially competitive in overseas markets may contribute further to the competitiveness of locally-based companies and the cluster members. Nevertheless, local companies also rely on their goods and services of external suppliers as complementary to those available near the Waikato region. For instance, Respondent J claims that:

Excerpt 214: Respondent J

They're probably not based in Hamilton actually. They would be more based in Auckland. Because we're buying from the major science companies you know, the general ones...I think most of them are Auckland...I guess that's where their biggest markets are, so obviously they've got more sales, so it would be quicker for them to get their products..., here it's not a problem you know, couriers are overnight so there's no difference for us. We don't have any problems with that (Respondent J, personal communication, March 05, 2015).

Likewise, as an IT-based establishment, Respondent L claims that, to a greater extent, their company relies on Auckland-based supplying companies, particularly developers for IT-related service:

Excerpt 215: Respondent L

Yeah, it is. I mean a lot of the development - we have developers in Auckland for some of the stuff we do...and we use another company in Hamilton in terms of development as well. I mean anything when it comes to IT, you don't need them here in Hamilton per se (Respondent L, personal communication, March 12, 2015).

In this regard, Respondent B cites a lack of needed suppliers as the main reason their company relies on supplying companies based outside Hamilton, the Waikato region:

Excerpt 216: Respondent B

Our business model is not to own assets, physical assets like land and factories and that sort of thing...so we work with companies that are established and will do cold processing for us..., we take 10 tons of our plant there and they process it into a juice and we pay for 10-days work...and that is our general business model, so we own the special plant material and we own the intellectual property that we have developed over 10 years and we own the product, but we don't own land to grow the plants and we don't own factories...I have a new business partner and he has some land, and...we now grow...the plants on his land...around Pukekohe...then the processing to make juice is done by a company in Pukekohe...well...we don't do things in this region..., there is very little food processing done in the Waikato so we go to Pukekohe, South of Auckland, and that's where the food companies are based. And that's where we get our product processed and produced...and once the juice has been made we store it in that region as well...so what I'm telling you is, it's silly to say that there's no food processing in the Waikato because some of the world's biggest dairy companies and dairy factories are here. But in terms of developmental work on a small scale such as we are, Pukekohe is a much better place and the government has established the FoodBowl...that belongs to ATEED..., they do sporting events and economic development for Auckland. They have done some developmental work for us and that's a new facility by the Auckland Airport...and again partly why we work with crop growers at Pukekohe, is that that is a major area for New Zealand cropping and they have all sorts of innovation. And so they can modify machinery so that it suits our crop particularly, and whereas in the Waikato there's very little cropping and the farmers - we tried two or three places to grow the crop. And the farmers really had no innovation to meet our particular needs, and so one of the cluster benefits of working in Pukekohe was the innovation among the farmers (Respondent B, personal communication, May 18, 2015).

Furthermore, with the advent of globalisation, companies increasingly widen their options seeking needed goods and services overseas. For instance, Respondent M claims that their company also imports from overseas. “There's certain materials or seals or something that we have to import too” (Respondent M, personal communication, April 28, 2015).

Regarding being sophisticated and demanding customers, the cluster members at Waikato Innovation Park demonstrate a different degree of sophistication towards suppliers in the form of pressure or expectations. Their sophisticated demand conditions may, in turn, influence the competitiveness of the supplying companies. In this regard, Respondent F highlight that their company demands from local suppliers, particularly from AgResearch to be able to act in accordance with requests, for instance, associated with company protocols and employee lending arrangements:

Excerpt 217: Respondent F

We are more demanding in the ways we do our work and in that same sense in the way that they have to work with us. We are more demanding, yes, because we're very particular...as a customer we supply them with a protocol of what we're going to do and how we're going to do it, and we expect them to follow that...that's our expectations and they know that very well...and that's one of the things that gives us a lot of confidence, yeah and we know that what they say they're going to do and they're very good at what they do, so it makes us very happy (Respondent F, personal communication, March 26, 2015).

Excerpt 218: Respondent F

When do we put pressure on them? Nothing really apart from staff, when they've been busy and we'd like to borrow one of their staff for a couple of hours...we set times up for them that we would like them to come in and help us with say animal handling. That's our expectations and they know that very well..., we are more demanding in the ways we do our work and in that same sense in the way that they have to work with us. We are more demanding, yes, because we're very particular (Respondent F, personal communication, March 26, 2015).

In this regard, Respondent F and Respondent M identify punctuality and timing as key demands they expect from both external suppliers and those based locally in the Waikato region:

Excerpt 219: Respondent F

We are more demanding in the ways we do our work and in that same sense in the way that they have to work with us. We are more demanding, yes, because we're very particular...when we've had to push through an animal ethics application, because they only meet every two weeks and there are certain deadlines you have to get them in. We have sort of said can you do this like after the deadline so that we can get it on? But they're usually very responsive to that because we don't do it very often...and as long as we can say why we want that done by that time, they're quite reasonable with it (Respondent F, personal communication, March 26, 2015).

Excerpt 220: Respondent M

I don't know if we put pressure on our suppliers, but we have deadlines to meet like everybody else so we need our ingredients here at a certain time. So it's just normal expectations, but I wouldn't say it's you know, undue pressure (Respondent M, personal communication, April 28, 2015).

Likewise, in addition to punctuality and timing, Respondent B identifies product safety and quality as their key demands expected from supplying companies:

Excerpt 221: Respondent B

Yes, when we started making our juice in wineries, we insisted on a very high level of cleanliness and they did it once. But when we went back to try and do it a second time they said it was too much hard work. Because of the alcohol in wine they don't have to be very clean, but with fruit juice loaded with sugar they had to be very clean and it was a lot of trouble. And the other area of pressure is to get farmers to do things at the right time. The quality of the juice goes up and down and we want to get it right at the top. And so we say to the farmers we want this job done early in June, and they say but I'm busy doing something else, come back in July. And we say no, it must be done in June. Well the only pressure we have is to say well if you won't work with us we'll find someone else..., if you don't do it we'll go somewhere else (Respondent B, personal communication, May 18, 2015).

Likewise, together with the commitments to punctuality and timing, Respondent G also stresses the importance of price and quality of goods and services. Nevertheless, there is also an understanding of a risk related to using a price-based factor as the main determinant for competency, as opposed to product quality:

Excerpt 222: Respondent G

A big differentiation between them is price, okay. So when we do an evaluation of a supplier we look at price first; then we look at time, so what is their delivery schedule? Time is the only resource I can't buy and all of my contracts have a time component in them, so time is a huge part, and then quality is third; can they meet our quality needs? Do they have lean manufacturing? Do they have a quality - ISO9001 system? Are they manufacturing to a standard? Do they have traceability in their process? (Respondent G, personal communication, April 01, 2015).

Excerpt 223: Respondent G

We'll choose quality over price every time, because even if you're saving a few dollars, if the quality is bad all you've done is waste money. You haven't saved anything. Instead of saving \$100,000 I've just wasted \$1,000,000, so I have to choose quality over price every time, every time (Respondent G, personal communication, April 01, 2015).

Furthermore, being a demanding customer, Respondent G also identifies efficiency and effectiveness of locally-based related companies and suppliers and their honouring of commitments as the main expectations from their company:

Excerpt 224: Respondent G

We need all of the equipment suppliers in the Waikato..., their competence of them managing their own business..., to have time, resources, to have longevity in the industry, so that we can be similar and deliver our products...we just expect them to deliver on what they promise, deliver what they say they're going to deliver. So that's all about meeting the time requirements, meeting the budget, meeting the quality. You know, that's all they have to do is do what they said they were going to do. Where we fall over and where we disagree is when they don't achieve that, when they promise something that they clearly can't deliver. That's the problem for us (Respondent G, personal communication, April 01, 2015).

Nevertheless, customers may be more willing to lower their expectations or to accommodate with suppliers and, therefore, relatively less sophisticated and demanding. For instance, although expecting suppliers to develop capability of Just in Time Inventory, Respondent J explains the main reason their company does not put a pressure in order to realise that expectation. Likewise, Respondent F also stress the importance of more competitive prices but, however, put greater emphasis on quality or value of services:

Excerpt 225: Respondent J

Well having stock would be great. I guess - but I can understand why they don't...and I guess that's a cost - it's all a cost thing...I don't - we don't put pressure on them...don't have a rush...we don't have that kind of supply need you know? They're pretty standard. They're just usually what's on supply. All I care about is getting them here when I need them obviously...but I think that goes for the whole science community. It's not easy to get products and sometimes it can take up to two months, three months to get a product in. But that's so standard for the science community. I don't think there's - we're used to it...but you tend to stick with what you want and so you'll wait two months, but you just need to plan for it (Respondent J, personal communication, March 05, 2015).

Excerpt 226: Respondent F

I mean as far as the actual services that they provide there's no real way they can improve that apart from cost and...get cheaper..., but everyone - you can say that to anyone. Everyone wants to get something cheaper...but I'd much rather pay a little bit more for something and have confidence that I know it's done right, than get something cheaper and run the risk of getting it wrong...so if you take price out of the equation, there's really nothing else there. Everyone wants something cheaper so..., there's not much else they can add really (Respondent F, personal communication, March 26, 2015).

With a various level of competency demonstrated by different suppliers, the cluster members may respectively identify areas in need of improvement by the former. For instance, in relation to room for improvement, Respondent G puts emphasis on the ability of suppliers to honour time commitments and to improve efficiency and effectiveness in managing businesses:

Excerpt 227: Respondent G

Oh there's huge room for improvement. The suppliers are all struggling at the moment. They're struggling to meet their commitments in terms of time, so when business is good - and the business is good in New Zealand at the moment - the dairy industry is the only growing sector at the moment. The suppliers have all overcommitted and none of them are meeting their time commitments, and I said to you at the start time is the only resource I can't buy. So I have trouble with all of my suppliers failing to meet the time commitments that they have, because they've overcommitted; they're under resourced, they've filled up their workshops too much. So how can they work better for us? Again, as long as they deliver what they say they're going to deliver we'll be happy, so they need to work better on managing their own workloads in their workshops or in their manufacturing facilities; manufacture on time, deliver on time (Respondent G, personal communication, April 01, 2015).

Chapter Six:

Intermediaries

6.1. Research findings on influences of intermediaries

An examination of the extant literature reveals that intermediaries are capable of helping sustain the competitiveness of companies (Zhang & Li, 2010; McEvily & Zaheer, 1999). On the other hand, the ability of the latter to create and acquire new knowledge and learn continuously constitutes their competitiveness (Zack, 1999; Sharkie, 2003, Asheim & Coenen, 2005; Dyer & Nobeoka, 2000). This chapter presents research findings on the influence of intermediaries on the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation. In this regard, this research identifies six companies or organisations as the intermediaries at AgBio cluster. Based on Nonaka's Spiral model, knowledge creation involving four modes: socialisation, combination, externalisation, and internalisation. (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). This chapter provides an answer to the research question two of this study: "*How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?*" The follow section presents findings on Intermediary 1.

6.1.1. Intermediary 1

Referred to as Intermediary 1 in this research, Waikato Innovation Park was established with the help of Hamilton City Council through public and charitable funds. The funding is, however, not extended to assist the development of particular cluster members or to business projects. Nevertheless, the Park procures a great degree of autonomy with an independent board (Respondent A, personal communication, December 09, 2014; Respondent B, personal communication, May 18, 2015; Waikato Innovation Park, 2015a). The purpose of the establishment is to contribute to the regional and national economic development. In this regard, the Park undertakes a task to build an agriculture technology cluster informally known as the AgBio cluster (Respondent A, personal communication, December 09, 2014; Respondent B, personal communication, May 18, 2015; Waikato Innovation Park, 2015a). As a result, the Park acts as an intermediary within the cluster, which may subsequently contribute to its competitiveness. The following section details its intermediating role in facilitating inter-organisational relationships and collaborations.

6.1.1.1. *Inter-organisational relationships and collaborations*

Waikato Innovation Park effectively offers businesses a clustering experience, paying particular attention to building relationships (Waikato Innovation Park, 2015b, 2015d). Owing to its ideal location together with association with the Waikato Agrihub, the Park builds strategic partnerships with important organisations such as research institutions and commercial entities in the Waikato region, across the country, and overseas. This connected culture benefits the cluster members in many ways including an easier access to research capabilities and new commercial introductions. It also increases opportunities for the cluster members to build strategic partnerships with like-minded and successful companies within the Waikato region and beyond, which in turn promote growth (Waikato Innovation Park, 2015c). According Respondent H:

Excerpt 228: Respondent H

There's some historical things. When we first came here we were a very small company and we didn't have much of a reputation in the industry, whereas the Park had a name and had contacts in the industry. So the Park helped us in that context where we could effectively build on their reputation. Now that time has passed and the Park is mainly just a Park and we have a reputation in the industry. But the Park is still helpful (Respondent H, personal communication, May 13, 2015).

The commitment to networking allows Waikato Innovation Park to develop abundant networks within and outside the cluster. As a result, the Park effectively becomes a central point of contacts – an intermediary facilitating inter-organisational relationships among the cluster members and an information provider, a signpost for many other companies (Waikato Innovation Park, 2015a). For instance, with a strong connection with the University of Waikato, the Park becomes a source of employment for the university. In this regard, the Park acts as an employment agency to the cluster members, while the latter is able to benefit from the contribution of the university in terms of labour supply to their businesses. For instance, Respondent D and Respondent J reveal that:

Excerpt 229: Respondent D

We have used them for those things over the years. So a few years ago we had a summer student, a university student like an intern and they paid - I can't remember if they paid all of or some of that person's salary over the summer. So you know, that kind of stuff we've used them for (Respondent D, personal communication, March 03, 2015).

Excerpt 230: Respondent J

Well I mean actually I just got an email the other day about how you know, if they can get students working for us and stuff like this, full grants for that kind of thing. So there are offers out there. We haven't taken that up at this point in time...and there have been offers there from here, from the Park, so trying to let us know what's available. And we'll probably take that up moving forward at some point, but... (Respondent J, personal communication, March 05, 2015).

Being central point of contacts, Waikato Innovation Park facilitates collaborations and match different companies with common interests or those that are able to work together and share information and knowledge to make better products. Based on the 2014 survey carried out by Waikato Innovation Park, 12 of 33 surveyed cluster members reported that their companies actively worked in partnership with other tenants within the Park (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). For instance, Respondent H's company works in partnership with other cluster members through various means including business referrals:

Excerpt 231: Respondent H

We have a couple of customers who are here in the Park and for us a customer relationship is usually not just one way. It's not usually just them coming and asking us for stuff. We will look for opportunities for our customers and often that means then collaboration, yeah. So I'll go to one of our customers and I'll say you know that software we developed for you, I've found some people who I think could use this software. You need to provide a special license to them and blah blah blah. So then effectively we're collaborating to help another customer...so those companies that we interact with, we collaborate with them frequently. So some of my people will be talking to them every week. Other companies, Hill Labs, WaikatoLink, so other organisations in the Park, I might catch up with them at some of the events that they run here in the Park, or we might have coffee. But it might only be like once a year and so that's where there's not active collaboration (Respondent H, personal communication, May 13, 2015).

Although not commercially involved, the Park helps identify opportunities for mutually beneficial collaborations. These companies may seek a route to market and share similar technologies. Respondent A highlights key strategies, which help with collaborations among the cluster members:

Excerpt 232: Respondent A

So what we do is bring these people, A and B, and say to them you guys need to get together because you are going for the same market. You know, I think you people should get together...usually it starts at an informal situation, like it might be at these events...and those sorts of things, you know. The events not only run by us but run by say the Fieldays, all that sort of thing. So those events start off informal and builds to a formal relationship, a formal business relationship. But generally it's really just bringing people together and networking (Respondent A, personal communication, December 09, 2014).

According to Respondent A, owing to the relatively small district size of Hamilton, the Waikato region, there is a strong inter-personal relationship and among the people and subsequently a tendency towards collaboration. Furthermore, there is generally a goodwill among small domestic companies to collaborate on export, to make critical mass and to have a better chance of success in bigger overseas markets.

Excerpt 233: Respondent A

The reason why New Zealanders want to collaborate, you know, we're in a small district, lots of agriculture companies in this district and therefore a lot of people personally know each other...might be kids at the same school and all that so there's a lot of personal relationships or connections. So bringing them together because we know these businesses is not that difficult, and generally there's a goodwill...because you know like everybody else to survive has got to export. So you know, the domestic market is small, the export is large so yeah (Respondent A, personal communication, December 09, 2014).

Waikato Innovation Park, as an intermediary, leads the way for collaborations among the cluster members by exploring the prospect of joint production for both local and overseas markets. For instance, the Park helps connect a small IT programming company with another company located within the premises to work in partnership on business decision models for horticulture. According to Respondent A:

Excerpt 234: Respondent A

So what we do is we on a quarterly basis go around and interview our tenants, our people here about what they're doing, understanding what they are doing and how we could help them, so we can understand them. Then we'll be talking to other ones...so an example is a small information technology programming company and another company which is on the Park which is about putting together information business decision models for horticulture. So we brought in those two together, those technologies people together, because we thought they could assist each other (Respondent A, personal communication, December 09, 2014).

Besides local markets, Waikato Innovation Park also facilitates collaborations among the cluster members for overseas markets. “We came back from Colombia and we sat down with about five companies to talk about our experience in Colombia. We said this is the Colombia situation. Can we supply this: this is the sort of product that they want...” (Respondent A, personal communication, December 09, 2014). Furthermore, The Park helps match farmers and a company looking to collaborate on joint production for overseas markets, to achieve economies of scale. Although the collaboration has only been about one year, it offers the farmers a route to the market and allows the company to improve its production capability. According to Respondent A:

Excerpt 235: Respondent A

So for example, we knew of farmers that wanted to get into making sheep milk alright? And we know of a company which is already selling to China this product, okay. So we were able to bring them together so they could get more production - obviously for the farmers a route to market and for the marketer, he was lacking production capability. So we brought them together so they'd, you know...this particular one...only a year. Longer term ones, I mean I talked about livestock improvement and LIC. That's been going for 10 years (Respondent A, personal communication, December 09, 2014).

6.1.1.2. Platforms for relationship building and collaborations

Waikato Innovation Park promotes inter-organisational relationships and collaborations among the cluster members through communication and face-to-face interactions by regularly organising monthly events and six-monthly events. On the one hand, the monthly events or educational events are relatively less formal and established to focus on general knowledge. The monthly events subsequently help promote ongoing communication and face-to-face interactions, which potentially result in long-term inter-organisational relationships and collaborations (Respondent A, personal communication, December 09, 2014). These events may involve New Zealand guest speakers and those from overseas including the U.S., to speak on various topics such as leading technologies that are changing agriculture and technologies related to data collection on farms (Respondent A, personal communication, December 09, 2014; Respondent N, personal communication, December 01, 2014). The guest speakers or third-party experts helping the Park run the events include Fielddays and Precision Agriculture (Respondent A, personal communication, December 09, 2014). According to Respondent A:

Excerpt 236: Respondent A

Every month we'd have an event when we invite all these people, really more like an educational event, you know, speakers and that. So that's how we do it and that's how we bring...them together socially and for an educational event and you know, business event. I think that way it continues that collaboration going and then we work as a team to try and see where we can spot opportunities...we might get somebody...the events not only run by us but run by say the Fieldays...we have the group which was called Precision Agriculture, so this is where all the companies that are involved with data collection on farm, bringing them together and talking about that sort of technology...so those events start off informal and builds to a formal relationship, a formal business relationship. But generally it's really just bringing people together and networking (Respondent A, personal communication, December 09, 2014).

On the other hand, the six-monthly events are relatively more formal involving a particular company or organisation doing a presentation, to make known to others about its business. "More formal...specifically about one company, you know, as against a general event about general knowledge. So one every six months might be about discussing what this particular company does" (Respondent A, personal communication, December 09, 2014). In this regard, the Park undertakes a task to invite all the cluster members to participate, "You know, we ran this event..., I think you should all come and visit Gallagher on this day...". The events potentially lead to collaborations among like-minded companies. For example, Livestock Improvement Corporation (LIC) attended the event presented by Gallagher Group and discovers that both companies share a common interest in data collection on farm, drafting animals. According to Respondent A:

Excerpt 237: Respondent A

We'd go and visit say one company and we'd invite all the others to come to those, that company would talk about what it was doing, all that sort of thing. Example of that is Gallaghers and then Livestock Improvement went along and they found they are both working in the area of data collection on farm. And this is you know, weigh scales. LIC was working in the direction of drafting animals - know what drafting animals is? You know, just sorting them...and identification through electronic things. So electronic identification and weighing the animals. So LIC were involved with that. They're both involved with that and Gallagher are involved with that, so what they did is jointly decided to put this product together as one...and that's because you know, we ran this event... (Respondent A, personal communication, December 09, 2014).

Subsequently, the six-monthly events enable Waikato Innovation Park to promote communication and face-to-face interactions and potentially result in long-term inter-organisational relationships and collaborations among the cluster members. “Longer term ones, I mean I talked about livestock improvement and LIC. That’s been going for 10 years” (Respondent A, personal communication, December 09, 2014). Based on the 2014 survey carried out by Waikato Innovation Park, 21 of 33 surveyed cluster members requested more networking events (Waikato Innovation Park, 2014) (Refer to Figure 27 in Appendix K). Nevertheless, besides the assistance from the Park, the cluster members’ own actions influence the building of inter-organisational relationships that lead to future collaborations. According to Respondent H:

Excerpt 238: Respondent H

So that would be the classic. So for instance we’d identify that there’s an organisation who we should be talking to. Maybe one of our existing partners has recommended we should have a talk to them, or maybe we’ve just discovered them. We’ll look up their profile on LinkedIn and read about them. I’ll get my PA to see if we can make an appointment with them and often that will be an appointment for can we have a coffee and catch up? But not always. Sometimes that first meeting, you go to their office and you talk about what you do and you listen to what they do, and you say look, I’m just here to introduce myself and get to know you, and figure if there are any opportunities. Most people are open to that. So having formed that initial relationship, then we will follow up. So sometimes there’s some stuff that you can do straight out of that, but often the trust isn’t there yet and so you might send them some information that’s useful, or put them in touch with somebody who you think they should meet. But what we’ll do is we’ll then arrange and we’ll say hey, I’m back in town next month. Do you want to catch up for a coffee? So that time they won’t do it in their office. You’ll go to a cafe or something like that and you’ll have coffee together, and you’re starting to talk less formally. So you start to build a bit more trust and it’s at that point you can have some conversations about real opportunities (Respondent H, personal communication, May 13, 2015).

6.1.1.3. Trust-based and long-term relations and collaborations

As discussed earlier, the social events, monthly and six-monthly events, organised by Waikato Innovation Park offer platforms for the cluster members to develop inter-organisational relationships and collaborations through a continual social mixing or more regular communication and face-to-face interactions. “Well in the New Zealand context I think mixing socially, you know, they have this educationalist. They have some drinks

and all that sort of and start talking together” (Respondent A, personal communication, December 09, 2014). As a result, the events enable the building trust among the cluster members. According to Respondent A:

Excerpt 239: Respondent A

That’s why we try and have these events, that people are not networking regularly so they get to know each other and they get to trust each other, because that’s a real issue. Because they perceive each other as competitors initially, so you try and make an environment of trust (Respondent A, personal communication, December 09, 2014).

While the social events, monthly and six-monthly events, bring about trust-based relationships, they also contribute to ongoing collaborations among the cluster members. In this regard, Respondent A claims that “social networking allows them to go on to the next step. And usually the next step might be more formal, where they might sign some NDAs, non-disclosure agreements” (Respondent A, personal communication, December 09, 2014). As a result, Waikato Innovation Park promotes a collaborative environment among the cluster members. In this regard, Waikato Innovation Park facilitates long-term relations and collaborations among the cluster members through building an early success. This approach involves aiming for relatively more simple and achievable collaborative goals. Subsequently, the early success further promotes trust and also intra-cluster and external collaborations within New Zealand and overseas. It influences reluctant businesses to be more open to working in partnership with other cluster members in the future. According to Respondent A:

Excerpt 240: Respondent A

Well I suppose what you’ve got to do is if some businesses don’t want to participate and it’s too difficult we say well okay, you know, because we’re all busy. We just work the two or three or four that are really keen. And if we can show success there, then it may bring the others into the collaboration (Respondent A, personal communication, December 09, 2014).

Likewise, Waikato Innovation Park assists the cluster members to find a niche where they are able to work together, by isolating cooperation from competition. According to Respondent A:

Excerpt 241: Respondent A

What generally happens is they might work out well look, we're going to compete here, here and here; but over here say in - I don't know - it might be in Cambodia we'll work together. So you can isolate into a market, a particular market, even though you might be competitors in these markets...but maybe here they might be collaborative. So, what you try and do is isolate it down to an area where they can be collaborative (Respondent A, personal communication, December 09, 2014).

Furthermore, Waikato Innovation Park carries out regular quarterly reviews with the cluster members intending to or already collaborating, to understand what they have been doing and to offer help. For instance, Respondent A emphasises that:

Excerpt 242: Respondent A

What we generally do is within this thing, you know, we have a quarterly review with the tenant, so we might have during the last review said oh, we had this and this and this we were working on. So when we come back to the next review we go back and say well you know, how's that going...you were talking to iQuest. How is that going and what, you know, can we do to help? So, we effectively have a review on a quarter basis, so that's a more formal with our tenants (Respondent A, personal communication, December 09, 2014).

Nevertheless, although Waikato Innovation Park makes great efforts to promote trust-based relationships and the prospect of collaborations, an ultimate decision whether to work in partnership is of the cluster members. In this regard, Respondent A stresses that:

Excerpt 243: Respondent A

This is really - you know if A and B decided no, we don't want to work together, well..., I mean the end of the day it's the businesses choice. Now if they decide look, I'm not going to work with B because they're competitors...it's their choice. So it's very difficult. You can't force people to work together (Respondent A, personal communication, December 09, 2014).

In this regard, the cluster members' own actions gradually influence the building of long-term trust-based relationships that lead to future collaborations. According to Respondent H:

Excerpt 244: Respondent H

Well it's easy to destroy trust, so you have to be careful you don't destroy trust. To build trust, so again firstly it's all about people and relationships and it's about being interested in them, showing active listening, all of those sorts of things. Secondly it's about showing that you've got some knowledge, so demonstrating that you understand the sorts of things they're talking about and we've got a reasonable track record, so when people talk to us about something I can usually say oh yeah, I met something like that before. And then the third thing is being - what would you say - showing that you understand their business a bit, but also that you understand that businesses need - there's sensitivity around business. You know, people are worried about confidentiality and those sorts of things. So if I say to somebody, if they're asking me about something I say oh yeah, I have done some work in that area in the past. I can't tell you much about it though because it's confidential. What that does is it gives them a degree of confidence that what they tell me confidentially I'm also not going to share with other people, yeah. So it's all about just building, little things that build trust I guess (Respondent H, personal communication, May 13, 2015).

Furthermore, Respondent H also emphasises that the building of long-term trust-based relationships is a gradual process that involves creating a positive impression at the initial encounter or project:

Excerpt 245: Respondent H

We go into agreements with our customers and obviously you've got to negotiate legal agreements, and it's all about liability and et cetera, et cetera and who's going to pay who when and all of that sort of - now you need to be as flexible and as balanced as possible, because again it's not just about this transaction. It's about the long term relationship. Often we'll do an initial project for a customer and it will be very small. By small, it might be a \$10,000 project - which is very small - or maybe a \$20,000 project, something really small. They're kind of testing us, you know? Will these people be good to work with? We'll do a little project with them. And they'll go great, that was really good, and then a year later they'll come back and say hey, want to do this project with you and it's \$100,000 project. It's because you've been fair, you've been balanced. Maybe you went the extra mile. Maybe you didn't actually make very much money on that little wee project - because you don't typically. But they've seen that you were concerned about the relationship and you were fair and good to them, and they say oh, I want to work with those people again (Respondent H, personal communication, May 13, 2015).

6.1.1.4. Business growth supports

Waikato Innovation Park, a representative of NZTE and Callaghan Innovation, offers free Business Growth support and advice to innovative and export-focused companies in both the Waikato and Bay of Plenty regions. As a result, the Park becomes a great first point of contact for those seeking assistance from the government agencies. The Business Growth team assists the companies and provide connections with other like-minded businesses seeking growth (Waikato Innovation Park, 2015f). The team helps uncover obstacles and suggest appropriate actions suitable for their growth strategies (Waikato Innovation Park, 2015e). They commit to progress by keeping communicate with eligible companies, to identify opportunities for further supports (Waikato Innovation Park, 2015d). In this regard, the Business Growth team works closely with the cluster members and the other eligible companies to assess opportunities for growth (Waikato Innovation Park, 2015e). “We work as a team to try and see where we can spot opportunities” (Respondent A, personal communication, December 09, 2014). Through Business Growth service, the cluster members are eligible for support to access overseas markets, although others may not benefit from this particular service. For instance, Respondent D stresses that their company does not rely on the support from Waikato Innovation Park to access the market in the U.S. (Respondent D, personal communication, March 03, 2015), while Respondent B, on the other hand, highlights the important contribution of the Park in helping their company penetrate markets, particularly in Japan and South Korea:

Excerpt 246: Respondent B

Well we have used New Zealand Trade and Enterprise representatives based in those markets..., particularly in Korea and Japan..., to help us locate customers...in Korea, New Zealand Trade and Enterprise got their representative to do some preliminary market research for us and then I would go and meet their contacts (Respondent B, personal communication, May 18, 2015)

Furthermore, Waikato Innovation Park connects the cluster members and eligible companies with experts and needed resources regionally, nationally, and globally, to stimulate growth (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015d). “We can just put in front of them training or experts that can help them in that area. We try and connect them with some experts that can help them; maybe looking at different business models, different distribution models...”

(Respondent A, personal communication, December 09, 2014). Likewise, being the representative, the Park assists the eligible companies to seek fund from NZTE and Callaghan Innovation for a wide range of business skill training (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015a, 2015e, 2015f, 2015g). According to Respondent M:

Excerpt 247: Respondent M

We have what we call a Business Growth team, alright. So the Business Growth team works with Callaghan Innovation and NZTE, alright. It's clearly defined what each one does, so NZTE is about providing funds to businesses to grow people and their skills within the business. It's a bit like the fishing net story. It's not there to find somebody to - so say somebody wants a food safety programme written on a new business. It's not there to give them that person to write the food safety programme; the funding's about giving them the knowledge to write the programme themselves okay, it's very important. It's very defined. So the NZTE side is about people, and the Callaghan side of it is about development of products..., huge benefit. You can get up to 40 per cent of your R&D funding through Callaghan..., that funding's offered all over New Zealand. We are just one of many that work with the government to provide the service (Respondent M, personal communication, April 28, 2015).

In relation to training support, Waikato Innovation Park undertakes a task to discover and select well-qualified and skilled trainers throughout New Zealand. The Park subsequently helps companies identify needs for training and direct them to the pre-approved trainers. At the completion of their training, the Park does a follow up review with the companies, while NZTE and Callaghan Innovation similarly carry out customer surveys quarterly on whether the training services meet the needs or help expand their competence and knowledge. The surveys also aim at assessing the performance of the Park in assisting the companies with the training needs. In this regard, Respondent A emphasises that:

Excerpt 248: Respondent A

We don't do the training ourselves...what we do is you've got trainers and then you've got the NZE...so we identify the trainers we think have got the skills and the right things...and we go out to customers. We identify needs and we direct them to the trainers...and so the dollars come down to here, and the dollars go over to here for them to train...and when we give that money we only give it to them that are going to go to trainers that we have pre-approved...and we only give training after we have identified the actual needs and to ensure this training is just not wasted, that there's an actual real need...(Respondent A, personal communication, December 09, 2014).

Excerpt 249: Respondent A

...So after the training's happened we do a follow up review...and then the NZTE do - every quarter there's a survey. They may survey customers as to you know, are they satisfied. Now as for level of service from there, the level of service from that and did the training meet their needs. The NZTE do carry out the survey and give feedback to us as to our performance. And Callaghan does the same (Respondent A, personal communication, December 09, 2014).

Regarding the usefulness of the training assistance at Waikato Innovation Park, Respondent D emphasises also that:

Excerpt 250: Respondent D

I mean us being part of this Park, we do have access to - you know, they run training - they have - at times there are seminars and kind of training opportunities that we come across. We had some work last year with a sales consultant or a sales consulting company and that was very much arranged through this place. So we kind of have access to that kind of stuff by being here, which is helpful... (Respondent D, personal communication, March 03, 2015).

Through the Business Growth service, Waikato Innovation Park also involves in providing financial assistance to the cluster members and other companies based in the Waikato and Bay of Plenty regions. In this regard, the Park helps connect with relevant organisations or establishments, which are able to provide financial support to the companies. For instance, Respondent A explains that:

Excerpt 251: Respondent A

We do run seminars where venture companies come along and we do run seminars where companies present to venture capitalists, right. And we also run seminars run by New Zealand Trade and Enterprise about how to raise capital, how a company should do it. So we try and provide the information to the companies and try and make those connections and networks...we put them in contact with all sorts of alternatives. It could be the banks; it could be Government Export Credit Office. We put them in contact with venture capitalists. We put them in contact with - well people that could actually help them. Maybe they can actually finance through their own cash flow if they rearrange their business, so we put them in contact with the likes of you know, accountants; PriceWaterhouse or something like that (Respondent A, personal communication, December 09, 2014).

In relation to financial assistance, Respondent J claims that Waikato Innovation Park takes the initiative in offering relevant advice to their company. “They contacted us about possible grants that we could go for and things like that, so they communicate with us if they think there’s something that we could use” (Respondent J, personal communication, March 05, 2015). Furthermore, Respondent B and Respondent D also put emphasis on the important contribution of the Park, through connection to relevant financial institutions, to the success of their companies:

Excerpt 252: Respondent B

Our company was formed in the year 2000. We started our major project then and we got some initial help to help us to - how to start the business by purchasing some unique plants that had been brought in from South America...well I mean first they did help us buy some assets...from a government research organisation called - it’s now called Plant and Food. It’s a Crown Research Institute, CRI. They brought in plants called Yacon from South America and had done 10 years of testing on how to grow these plants in New Zealand. And then we bought some of these plants from them so that we could do things on a commercial scale...and once we had multiplied those we got some further financial assistance to examine markets, particularly in Korea and Japan. That helped us a lot and knowing that these funds were available and helping us to access them was a major part of getting our company going and we got that through being located at the Park. If we’d been in an ordinary industrial area I doubt we would have that funding. They’re from the central government..., mainly New Zealand Trade and Enterprise...well we got enough money - usually matching funding so we have to put up a certain amount, but it was a company that started from a zero base. We had no assets or technology knowledge or market knowledge when we started the company, so...we made use of those funds. Since then we have been able to either fund things personally, or bring in outside investors. But the initial government was very important in starting the company..., that really helped us a great deal...so it is generally for a small start-up company like ours, this is a good place to be...the funding agencies are still here, NZ Trade and Enterprise and the Callaghan Institute, so knowing what they do is always of interest to us (Respondent B, personal communication, May 18, 2015).

Excerpt 253: Respondent D

There are some benefits. We do certainly - we've taken advantage of things like New Zealand Trade and Enterprise, grant schemes and we had a FoRST grant a few years ago when FoRST still existed. So we've done a little bit of that kind of thing and obviously there are people based in this building who have helped us with that..., so we use them - we have used them for those things over the years (Respondent D, personal communication, March 03, 2015).

6.1.1.5. Newly start-up companies

Waikato Innovation Park provides a transformative platform, which supports the growth of particularly newly established businesses. For instance, Respondent B and Respondent J put emphasis on the contribution of the Park to the success and growth of their companies, for instance, through networking opportunities and financial facilitation:

Excerpt 254: Respondent B

Our company was formed in the year 2000. We started our major project then and we got some initial help - how to start the business by purchasing some unique plants that had been brought in from South America...I mean first they did help us buy some assets...from a government research organisation - it's now called Plant and Food. It's a Crown Research Institute, CRI. They brought in plants called Yacon from South America and had done 10 years of testing on how to grow these plants in New Zealand. And then we bought some of these plants from them so that we could do things on a commercial scale...and once we had multiplied those we got some further financial assistance to examine markets, particularly in Korea and Japan. That helped us a lot and knowing that these funds were available and helping us to access them was a major part of getting our company going and we got that through being located at the Park. If we'd been in an ordinary industrial area I doubt we would have that funding. They're from...mainly New Zealand Trade and Enterprise...well we got enough money - usually matching funding so we have to put up a certain amount, but it was a company that started from a zero base. We had no assets or technology knowledge or market knowledge when we started the company, so...we made use of those funds. Since then we have been able to either fund things personally, or bring in outside investors. But the initial government was very important in starting the company...it is generally for a small start-up company like ours, this is a good place to be...the funding agencies are still here, NZ Trade and Enterprise and the Callaghan Institute, so knowing what they do is always of interest to us (Respondent B, personal communication, May 18, 2015).

Excerpt 255: Respondent J

I think more so when you're beginning out and for us it was in the beginning...we set up our network and things like that through the business, through here...we had a lot more contact with them...that helped to get us contacts overseas...New Zealand grants...they were really what we needed at that point, but once you know what you're doing it's just a matter of getting enough money together to actually get out there and get ourselves known...it's basically we do it all ourselves at this point..., we're not so much of a start-up anymore...I think that's the difference between a very start-up company and someone in the next phase, that you need those kinds of contacts a little bit less as you get more established...but...I mean you know, if we need anything we obviously go and talk to them if it's something that we think they can help us with (Respondent J, personal communication, March 05, 2015).

Likewise, in relation to the opportunities for growth, Respondent F claim that Waikato Innovation Park is a great place for an expansion and diversification of their company:

Excerpt 256: Respondent F

I mean and that's you know, potentially for us in the long run is maybe to look at whether we could branch out into looking at testing innovative technologies and animals. It's certainly something our competitor does, but we really haven't gone down that path. But it's specialised. So that maybe something for us to do and because of that, it would be a good location to be (Respondent F, personal communication, March 26, 2015).

Nevertheless, while Waikato Innovation Park is a great place for particularly newly established businesses, there may be fewer incentives for more-well established cluster members to remain in the Park. For instance, despite the benefits offered, Respondent D highlights, as their company grows and becomes more well-established, a plan to purchase and relocate to own business premises:

Excerpt 257: Respondent D

I mean we've been here a long time. We've been here more than 10 years and it suits us, but primarily we use this place as office space. We lease the office space. It is handy. There's a lawyer right here on the premises, so when I need some legal advice or I need a solicitor to witness some contracts for me or something like that, then that's very useful. Like I say there's the NZTE guys there and there's the Park people themselves who we've done a little bit of kind of grant type work with. But aside from that it's really office space and we're actually in the process of considering moving - not because we have any problems with this place. It's just that financially it makes sense I think for us to buy a premises and work out of our own premises, so we may well do that in the not too distant future..., I mean, this is a completely privately held company, so it makes sense I think for me as the owner of this place to be paying off - in some respects it makes sense to be paying off our own building, as opposed to continuing to pay rent here forever (Respondent D, personal communication, March 03, 2015).

Although no longer tenants, exiting cluster members looking to relocate outside Waikato Innovation Park still benefit from their existing intra-cluster relationships built over the years. In this regard, Respondent D stresses the diminishing importance of locating their company at the Park:

Excerpt 258: Respondent D

They have a mailing list and things here. When they're running something they send it out and I imagine that even if we leave here we will stay on all those lists. I mean it's really I guess just being part of the kind of local business community. We've been in it for long enough that we're on the lists for those sorts of things, so we kind of get to find out about that stuff without necessarily having to be in the Park..., I'm not sure that we actually need to physically be in this building to do that. We could still be part of that network if we were in Central Hamilton some place (Respondent D, personal communication, March 03, 2015).

6.1.1.6. Barriers to intra-cluster relationships and collaborations

Despite the effort by Waikato Innovation Park, intra-cluster relationships and collaborations are lacking among the cluster members. According to Respondent H:

Excerpt 259: Respondent H

I have to say in the Park here, the majority of the companies we don't have much interaction with and there's very little what I would call for instance, collaborative product development. It's not like two companies get together and say hey, we could between us develop a product or a service that does x. I don't see that a lot. It's more hey, here's an opportunity. We need somebody who can do that. Are you interested? If you're not maybe there's somebody outside the Park I can talk to...(Respondent H, personal communication, May 13, 2015).

Furthermore, there is also limited communication among the cluster members, regardless the effort by Waikato Innovation Park. In this regard, Respondent E highlights that "I think the Park is a cluster by definition in terms of there are lots of companies operating here. The biggest challenge for the Park at the moment is trying to get the firms talking to each other more" (Respondent E, personal communication, February 25, 2015). The social events, monthly and six-monthly events discussed earlier, aiming to promote more regular communication and face-to-face interactions receive overwhelmed support in the earlier years, they may also be used as a platform for a sales pitch. This practice may potentially lower future participation rates among the cluster members and, therefore, undermine the original purpose of the events. For instance, Respondent E stresses that:

Excerpt 260: Respondent E

The After 5 concept used to be much more well supported in previous years and I think - I didn't go to this particular presentation, but I think one of the companies just did it as a sales pitch to everybody. I think that turned a lot of people off and so they didn't want a sales pitch; they want to just tell, you know, tell us what you're doing rather than try and sell services. And so the challenge for companies at the Park is to not look at other companies in the Park as their clients. I think they've got to look at being able to work together to create value for a third company, you know? So for example a design company has just come into the Park and so they just sent emails to everybody trying to advertise their services, which I don't think is particularly helpful. I think it would be better to say hey, we're here and we're doing this kind of work, and let people come and ask if they want to (Respondent E, personal communication, February 25, 2015).

According to Respondent H, gradually building inter-organisational relationships, without overly focusing on financial gain, provide better outcomes, which lead to collaborations in the future. Furthermore, communication through face-to-face interactions and telephone conversations are also key for promoting inter-organisational relationships and collaborations.

Excerpt 261: Respondent H

So some of that happens by effectively doing little favours, so you think of them and you send them an article that's interesting, or you introduce them to somebody who you think they would benefit from meeting, those sorts of things. And that's moving away from a purely transactional model where you do something for them that they've asked for and they pay you. Here you're giving them something for free and that says it's about the relationship (Respondent H, personal communication, May 13, 2015).

Excerpt 262: Respondent H

So to promote collaboration the two primary methods, the first method, the one that works best is coffee. Yeah, you go and have coffee with people. And you discuss and have a chat and see what they're doing, talk about what you're doing and see if there are any opportunities. The more we do that, the more collaboration happens. It's really simple. So that's the primary method, but the second method is we're working on a project and we identify hey, it would be really good to have some company involved. In that case we need to call them and have a discussion with them and see if they're interested, so that's where the effective - and look, this is hard for IT people, because you can't just send an email. It's not as effective. You have to pick up the telephone, and so I'm always saying to our people oh, have you called them? Oh no, I haven't yet. Right, well call them (Respondent H, personal communication, May 13, 2015).

Despite communication, the heterogeneity of the AgBio cluster may reduce the need for interactions among the cluster members. For instance, Respondent J and Respondent B claim that:

Excerpt 263: Respondent J

Being in the Park..., they do have meet and greet kind of things...I mean I think generally Kiwis like to work together. We don't have a problem with it. I think other countries aren't probably as friendly as we are and as open as we are, but I think that generally we're all one happy family. If someone can help us out and we can help them...but we kind of stick to ourselves...we don't interact too much with the other companies within the building. That's not something that we need to do. I wouldn't even know all the companies in this building...I guess it's just that we're all quite different and our areas aren't overlapping particularly..., so we run just like a business you know? (Respondent J, personal communication, March 05, 2015).

Excerpt 264: Respondent B

Well they do arrange presentations by companies here from time to time. That was a very common feature in the early days of the Park...it's always interesting to find out what other people are doing...but there's less and less of that goes on now...it used to be every two weeks. Now it might be, I don't know, five times a year...now most companies have settled into their line of business there's no so much interaction between the companies (Respondent B, personal communication, May 18, 2015).

Furthermore, the diversity of the AgBio cluster also limits the opportunities for intra-cluster collaborations. For instance, Respondent C claims that "there isn't much of a cluster here actually to be honest. I haven't done much with companies in the Park here. I don't know why but there's about 50 different companies here and many have very different sorts of focuses" (Respondent C, personal communication, March 11, 2015). Likewise, Respondent L, Respondent B, and Respondent D emphasises that:

Excerpt 265: Respondent L

While we have a partial bio security, you know, New Zealand bio security focus, a lot of the companies here are involved in the agricultural sector - although I think that's spreading. It's either the agricultural sector or a service in terms of Innovation Park, you know? The SkyPoint, the IT people aren't involved in the agricultural sector. The lawyers down below aren't but they provide a service to the Park tenants. So we're different because we're not focussed on agriculture (Respondent L, personal communication, March 12, 2015).

Excerpt 266: Respondent B

In the early days I was aware in the first two years of about four direct collaborations between different companies...at the Park. But there's less and less of that goes on now that people have settled in to their line of business...in the early days there was a company here called BioVittoria...their product comes from China and they grow their plants in China and process them there..., but there were certain similarities and we did some collaboration with them initially...on the initial learning of how to develop a food product...because we were both learning what to do...they were in the office next to us and we saw them on a daily basis for two years..., but...in terms of the way our company has developed and other companies have developed in the Park, we really haven't found other collaborators because the Park has gone in the agritech direction...since then we have not had any direct collaboration with other companies in the Park...apart from BioVittoria, there's no other company in the Park with similar interests to ours. The Park has become more to do with agricultural technology, not so much product development (Respondent B, personal communication, May 18, 2015).

Excerpt 267: Respondent D

I'm not sure that we necessarily gain a great deal out of being involved in the Park here..., in terms of rubbing shoulders with the other businesses here, I mean it's not a huge thing for us...I mean this is a very agricultural technology kind of sector here and that's not what we do. So I think a lot of the businesses that have clear agricultural technology products that they're developing do work together, but we generally don't..., I mean we're a software company, we're a technology company, but it is very much a very narrow niche and so there's no one here who's really doing anything related to what we do (Respondent D, personal communication, March 03, 2015).

Along with the heterogeneity of the cluster members or the lack of similar companies at Waikato Innovation Park, the specificity of their business focuses is also a contributing factor to a limited area for collaboration, working in partnership to achieve common goals. For instance, Respondent J and Respondent F respectively claim that:

Excerpt 268: Respondent J

It's a very specialised area, so we're not general. There's a lot to it and so we're a very specialised company. So maybe if you were more general, then you would rely on them a lot more than what we have...I think that's why there's a whole lot of like cattle and you know, our major resources kind of working within the building and they probably interact a lot more than we do..., not for us...so we run just like a business you know? (Respondent J, personal communication, March 05, 2015).

Excerpt 269: Respondent F

Most of these companies here are technology based aren't they, rather than...pharmaceutical based...you know, it's hard...it's just the type of kind of work that we do..., it's a limited area...I mean there are only two companies in New Zealand that do this because it's fairly specialised...there's no one else here that we can really work with..., doing pharmaceutical production...for animals...Hill Laboratories..., they analyse different types of area. They're mainly human stuff and they don't have the right accreditation for what we need for our studies...there's just not a lot of pharmaceutical development in New Zealand. But that's not to say there couldn't be, because the cost of development is probably cheaper here than it is and that would be kind of nice if there was more...pharmaceutical type products or companies, pharmaceutical companies that were based locally..., rather than just technologies...that would be an advantage to us..., a definite advantage, yeah (Respondent F, personal communication, March 26, 2015).

Regardless of the heterogeneity of the AgBio cluster or the specificity of their technology, Respondent G emphasises that intra-cluster relationships and collaborations are not their primary focus and, therefore, do not influence the decision to locate in Waikato Innovation Park:

Excerpt 270: Respondent G

No, no, not really - although they are based in the same sector..., the technology is different. You know, we're working in different parts of the sector. I mean for what we do there are really only three companies in New Zealand that do what we do. Two of them are based in Auckland and we're based here, so...there's really few companies that do what we do...like I said, because there are very few companies that do what we do and not many of them are based here. A lot of the companies based here are more agricultural based, so at the primary end of the sector where we're more in the secondary processing part of the sector, so we're not here to form relationships - we're not here because it's a good place to form relationships with others. We're here because it's a fantastic working environment and it sets the right culture for our organisation (Respondent G, personal communication, April 01, 2015).

Owing to the limited opportunities for intra-cluster collaborations, the cluster members based in Waikato Innovation Park may seek partnerships outside the boundaries of the AgBio cluster. For instance, Respondent B emphasises that, with the lack of prospects for working with the cluster members in the Park, their company extensively relies on external companies mainly based in the Auckland region:

Excerpt 271: Respondent B

Well at the moment we have no collaboration with any other company in the Park...I know Tetra Pak very well, they sell machinery and food processing machinery and packaging and that sort of thing. And so we know them but don't work with them..., I'm not really expecting a great deal in that regard...what we're doing now, we are working with New Zealand companies that market a similar product in the markets that we're interested in, so a similar finished product. And by that I mean particularly a company called Nekta...in Wiri...that is a joint venture between the two companies..., our close association...they have a juice that they get from kiwifruit. Now they're looking at a mixture of kiwifruit and Yacon...the packaging that we are using that's what Nekta supplies..., we essentially expect Nekta to do that sort of work...they own the factory that does packaging...and they sell in 17 Asian countries...they've been in the market for 20 years now, so they know what they want to do for similar markets (Respondent B, personal communication, May 18, 2015).

Despite the lack of opportunities for intra-cluster collaborations, the cluster members realise the significance of working in partnership and, therefore, welcomes collaboration with other companies, to achieve common goals. "I haven't come across that, but if that should present itself yeah, I don't see why not. There's strength in numbers and if they're willing to collaborate, yeah. I certainly would give it a try" (Respondent C, personal communication, March 11, 2015). Likewise, for Respondent J, their company readily opens to other cluster members for potential business deals and collaborations. "Oh if something, yeah, that would actually require to use them, yeah, we haven't got a problem - it makes life easier if they're right next door doesn't it" (Respondent J, personal communication, March 05, 2015). In this regard, Respondent F emphasise that the potential for future collaborations rest upon the growth of market size, the industry in which their company operates. "If they were going to do very similar work I wouldn't be very happy, yeah...just because there isn't a huge amount of work, I mean it depends. If there was more work...yeah, I think that would be potentially viable" (Respondent F, personal communication, March 26, 2015).

6.1.1.7. Areas for improvements

Nevertheless, despite the benefits offered by Waikato Innovation Park, there are rooms for further improvements, to offer a better quality of service to the cluster members based within the premises and potential new entrants. For instance, there exists the divergence between the initial ambitions and the actual development of the AgBio cluster, the Park.

The gradation results in a cluster with a different configuration from that originally intended. Nevertheless. Respondent B stresses the absence of stakeholders' desires, particularly those of the government, for cluster realignment. In this regard, further improvements of the AgBio cluster, Waikato Innovation Park require proactive involvements of various local stakeholders such as businesses, for instance, to emulate the success of overseas-based exemplary clusters, particularly those in Australia.

Excerpt 272: Respondent B

Well I think it's very interesting; when we were establishing the Park I went to an international meeting about science parks and the initial ambition for Hamilton was to have a true science park. So a professor from the university or a senior scientist from AgResearch might come here with a couple of students and work for a couple years and develop an idea. Now this is further down the scale and as you notice it's called an Innovation Park, so they concentrate on companies that already have an idea and perhaps a product and there's collaboration in taking local farm techniques and farm equipment to different parts of the world. And that has become the business of the Park really, and so I'm not disappointed in the Park. I think it's been a great success, but it hasn't developed as a science park which was the original ambition. And then sort of the meter on the scale would be a straight manufacturing park and we have a park in Hamilton called the Titanium Park..., out by the airport...and that is just to co-locate manufacturing companies with similar interests. So there's gradation in the type of park and the ambitions for it, and I still think there is room for a true science park in Hamilton but there is no particular interest in that in the current City Council who are the owners of the Park (Respondent B, personal communication, May 18, 2015).

Excerpt 273: Respondent B

It would take a new group of people here to try and get that going...well I think the role of the government then is to respond. I mean there are funds there for that sort of thing and I think you need local people who will drive it...local people - mainly companies I think, though some farmers these days are very wealthy and they can help fund that sort of thing..., who then go to the City Council and to the central government with a proposal, and as I say there are several funds for that sort of thing...in my experience I guess the best local experiences in Brisbane in Australia, and they got Federal money and State money and city money, and they really did develop a science park. That has been very successful and that would be the best example that I know of in this region, but there are hundreds of parks around the world and it's possible to go and see them and - now I have not kept up with this sort of thing, because as you know I focus on the product development...but somebody could pick up the work that I know is there and enthuse some different people to start a different type of organisation (Respondent B, personal communication, May 18, 2015).

In relation to the cluster improvements, the ICT service available at Waikato Innovation Park calls for a further upgrade, to meet the need of the cluster members, particularly of large enterprises. In this regard, Respondent G emphasises that an upgraded ICT service at the Park positively influences the operation of their company:

Excerpt 274: Respondent G

There's room for improvement in terms of the services that the Park provides, in terms of the IT services and other things. We're a global company. Everything is online. I think every company in the country complains about the speed of IT..., I'd like fibre at my desk so I can get the information that I need globally much faster. But other than that you know, there could be some slightly better external services, but in general the environment is very, very good (Respondent G, personal communication, April 01, 2015).

6.1.2. Intermediary 2

Intermediary 2 is a subsidiary company of Waikato Innovation Park, which builds and owns an open-access spray drying facility of the former. Although the spray dryer is based within the Park premises in Hamilton, it serves food and beverage companies from coast to coast, from the bottom of Bombay of New Zealand to Taranaki (Respondent M, personal communication, April 28, 2015). As the only independent facility in New Zealand (Waikato Innovation Park, 2015i), Intermediary 2 undertakes a task to assist companies with R&D and moving from concepts to commercialisation (Respondent M, personal communication, April 28, 2015; Waikato Innovation Park, 2015h; Waikato Innovation Park, 2015i). "Generally our clients know what they want to get to the market with. They just don't know how to get it from a concept through to the market point" (Respondent M, personal communication, April 28, 2015).

During the concept-commercialisation process, Intermediary 2 assists clients in product development trials or small-scale manufacturing for testing in target markets, before committing to build factories and a full-fledged production (Respondent M, personal communication, April 28, 2015; Respondent A, personal communication, December 09, 2014). For instance, Intermediary 2 helps an avocado oil company produce a few tons of avocado powder based on the research of Massey University. As a result, the company is able to test the U.S. market with the small-scale production of the powder (Respondent A, personal communication, December 09, 2014). In this regard, Intermediary 2 works

one-on-one with the clients to identify gaps in customers' projects, to understand products and how to manufacture them, and to determine an intended usage as well as target consumers and markets (Respondent M, personal communication, April 28, 2015; Respondent A, personal communication, December 09, 2014).

For infant formulas, knowing target markets is essential for regulatory compliance and formulations. "We need to understand what market it's going to so that we meet the regulations" (Respondent M, personal communication, April 28, 2015). Likewise, Intermediary 2 works with the clients to ascertain all their requirements, prior to the production. "Before we do any production we would clearly identify all the parameters of the product requirements, all the profiles it needs..., so those are formally identified and written up and signed off by the client before we produce" (Respondent A, personal communication, December 09, 2014). The following step usually involves interviews with the customers for feedback. "I've just come yesterday from a meeting with our customer about their requirements, so we were producing infant formula for them. And they're saying it's too dry. They want it more moist...but the customer's always right" (Respondent A, personal communication, December 09, 2014).

During the process of trials or small-scale production, Intermediary 2 offers advice on production models: full dry blend, full wet blend, and base powder, along with their relative advantages and disadvantages. For infant formulas, "we explain the different pitfalls in each one of those production models, and then we explain to the client...the reason why all the industry around the world is now making base powders, because it's a superior product" (Respondent M, personal communication, April 28, 2015). It also advises clients on quality enhancement through the addition of certain ingredients into final products. For instance, Intermediary 2 helps companies eliminate a fish odour taste of AA/DHA in their final products by recommending adding it in as a dry product instead of oil, with extra vitamins and minerals (Respondent M, personal communication, April 28, 2015).

Furthermore, Intermediary 2 also works on a one-on-one basis with clients assisting them in a by-product-to-new product transformation. For example, Intermediary 2, for a couple of years, works closely on innovation with a company that dumps about nine tons of by-product daily to extract oil for a primary product. "We assisted that company with food safety plans. We reviewed their process, suggested how it could be improved"

(Respondent M, personal communication, April 28, 2015). Subsequently, with the help of Intermediary 2, the company is able to convert its 100-per cent food safe by-product into the spray-dried pure avocado powder, the first in the world. It is now worth more than the primary product on the market (Respondent M, personal communication, April 28, 2015).

Therefore, Intermediary 2 openly shares invaluable experience and knowledge, during the process of trials or small-scale production. “We generally share our knowledge...it’s those sorts of things that we can offer our experience to a client” (Respondent M, personal communication, April 28, 2015). In this regard, Intermediary 2 facilitates knowledge transfer, through an active involvement in discussions or dialogues with the clients, prior to the trials, on topics related to ingredients, target customers, and suppliers. “We’ve got a trial coming up at the start of next month and we’d be in dialogue probably four times a week, and have been like that for the last eight months planning this” (Respondent M, personal communication, April 28, 2015). Furthermore, it enables a practical learning through observation, by working closely with clients on the ground. “We have plenty of clients that stand here with us, side by side, for 18 hours through a trial and we welcome that” (Respondent M, personal communication, April 28, 2015).

In this regard, Intermediary 2 is involved in training services with government organisations or education institutes, for example, Wintec. “It’s really basically about having a class of students coming in and letting them crawl all over the plant to understand what’s happening, how does the milk flow, what’s happening with each stage” (Respondent M, personal communication, April 28, 2015). The aim is to put the students or trainees in the environment in which they learn through practice and observations. “We then turn the plant off so everything’s cooled down and nothing’s running, and then they can kind of crawl all over the pipes and find out where the milk’s flowing and which piece does what” (Respondent M, personal communication, April 28, 2015). The training complements Dairy Diploma courses, which are designed for students and employees of New Zealand dairy companies to enhance existing knowledge and learn new one (Respondent M, personal communication, April 28, 2015).

Furthermore, Intermediary 2 uses the open-access spray dryer as a training facility to upskill employees of qualified companies with their own products. For instance, Intermediary 2 helps train over 20 employees of Dairy Goat Co-operative. “DGC had a

contract with us for three years, we would train their staff up during that period and then when they leave they can take experienced staff to run a brand new facility” (Respondent M, personal communication, April 28, 2015). It also uses the facility for training employees of another company, which have recently become its clients. At the end of the training, Intermediary 2 signs them off as being competent in operating certain parts of the dryer. This requires all trainees to be subjected to assessments, which include quizzes on different areas such as regulations around risk management, halal procedures, or organics production. As a result, the trainees individually obtain training records in which their competency is determined by different levels: one, two, and three, with one being the best (Respondent M, personal communication, April 28, 2015).

Besides knowledge sharing, Intermediary 2 offers clients connections with the right people for funding or needed ingredients as well as with professional experts and engineers to build factories. “Some of our clients just want to know where to go...We don’t have to do it physically, but we’re able to point them in the right direction or connect them with the right people to get them to market” (Respondent M, personal communication, April 28, 2015). For example, Intermediary 2 helps a start-up company making chocolate in Tauranga find expertise and market, to export to China. Furthermore, it connects infant formula companies with formulators with knowledge of laws and regulations of overseas markets. For instance, the Chinese Guobiao standards allow Lactoferrin in an infant formula, while New Zealand regulations prohibit it. Therefore, “we’ve got goalposts their formula needs to meet, and then we would sit down and make sure that they understand..., we’d work with a formulator and we’d come up with a spec” (Respondent M, personal communication, April 28, 2015).

Furthermore, Intermediary 2 also links new start-ups or companies whose products are brand new to the market with Massey University for R&D work and relatively smaller scale manufacturing of milk powder or infant formulas (Respondent M, personal communication, April 28, 2015). In this regard, the Massey University spray dryer produces approximately three kilograms (Respondent A, personal communication, December 09, 2014), while that of Intermediary 2 manufactures between 350 and 500 kilograms an hour. “The difference is if you go to Massey University the volume is very small, but if you come here the smallest volume we could do would be about a three-hour run” (Respondent M, personal communication, April 28, 2015).

As the intermediary, Intermediary 2 also connects clients with other facilities of the New Zealand Food Innovation Network: FoodBowl, FoodPilot, and FoodSouth (Respondent M, personal communication, April 28, 2015; Waikato Innovation Park, 2015h, 2015i, 2015j; New Zealand Food Innovation Network, 2015). For instance, “a client rings up and says I need an expert in extraction of olive pomace and I need to know how to get a certain mineral out” (Respondent M, personal communication, April 28, 2015). Although Intermediary 2 is not be able to provide a solution, it helps link the client with or reaches out to the other sister facilities within the network. “Generally, nine out of 10 times somebody will know where to go and that’s the power of the network” (Respondent M, personal communication, April 28, 2015).

The main purpose of these facilities is to work together and to assist New Zealand companies in the food and beverage industry, all the way through to market, in developing new products. Similar to Intermediary 2, “they’re doing courses, they’re doing networking, they working with government agencies, they working – you name it, they’re all over the place” (Respondent M, personal communication, April 28, 2015). Therefore, being part of the network along with the other facilities enables Intermediary 2 to be more effectively in providing supports to companies seeking to move from concepts to commercialisation, with product development trials or small-scale manufacturing. “That’s a massive plus and it works time and time and time again, because one person can’t physically around New Zealand but when you’re spread out like that. Remember I’m only doing what I’m doing in the Waikato” (Respondent M, personal communication, April 28, 2015).

Likewise, Intermediary 2 helps match open and like-minded companies seeking collaborations, when opportunities presented. “It just shows you what we’re doing as a cluster bringing these likeminded businesses together” (Respondent M, personal communication, April 28, 2015). This requires Intermediary 2 to engage with the companies, to identify needs and be able to make a judgement call whether there is willingness to collaborate. “I have seen two companies trying to achieve the same thing. I brought them together. We had a meeting. Before I left that meeting they agreed on an \$800,000 project together and now it’s going to market” (Respondent M, personal communication, April 28, 2015). The collaborations also include those on Intellectual Property (IP), which involves the companies to work together on solving engineering

issues, for example, in a packaging product (Respondent M, personal communication, April 28, 2015).

To promote further collaborations, Intermediary 2, through the Business Growth Services of Waikato Innovation Park, organises approximately three to four events or workshops a month. Being held at the Park, the events facilitate socialisation and inter-organisational relationships among the cluster members as well as with other attending companies. “We actually got everybody to stand up and introduce themselves...then you see the networking start to happen at lunchtime. It’s absolutely amazing to sit back and watch companies go oh, I could use that...” (Respondent M, personal communication, April 28, 2015). For example, Intermediary 2 runs a full-day Bio-Processing Alliance Workshop – BPA aiming to help companies discover new or relatively untapped business opportunities, to convert wastes of primary products or by-products into new valuable products. “We might see an advantage of putting two companies together and saying if...we could use your waste product and make a new product” (Respondent M, personal communication, April 28, 2015).

While Intermediary 2 facilitates inter-organisational relationships and collaborations across New Zealand, it is also capable of connecting clients with overseas partners or experts. “Definitely overseas, if they need it. Doesn’t have to be in New Zealand” (Respondent M, personal communication, April 28, 2015). In this regard, Intermediary 2 provides a global expert assistance to those needing help with developing new products for export markets. For example, Intermediary 2, through the Business Growth Services of Waikato Innovation Park, connects one of the cluster members seeking assistance in developing a new product with an English university expert. As a result, the company is able to produce acne cream from a protein it extracts out of milk. Likewise, Intermediary 2 helps connect another company that sells high end products into China with their clients. Therefore, as the intermediary, “it’s about joining the dots for our clients” (Respondent M, personal communication, April 28, 2015).

Besides acting as the third-party intermediary to facilitate inter-organisational relationships and collaborations, Intermediary 2 adopts a collaborative approach to working in partnership with other companies and organisations to achieve common goals. For example, Intermediary 2 collaborates with a government organisation – the Bio-Processing Alliance (BPA) to seek fund from the government and major New Zealand

companies, to build a new spray dryer facility for non-dairy products. Their collaboration is the result of the change in regulations based on which non-dairy products such as fruits and vegetables are, in the future, not allowed to be spray dried in the same plant used for making infant formula. Furthermore, Intermediary 2 is also involved in collaboration with other companies and organisations including Analytica and AgResearch (Respondent M, personal communication, April 28, 2015).

While working with Wintec on a spray dryer skill course, Intermediary 2 is involved in collaboration with Massey University aiming at changing the current Ministry for Primary Industries regulations, which prohibit holding milk for longer than 48 hours. In this regard, Intermediary 2 also cooperates with other companies on grading milk, holding it for between 70 to 144 hours in test tubes, and performing the micro analysis. This collaboration involves writing a report with findings and submit it to the government, to make an amendment to the current MPI regulations. A successful supplication allows farmers and small businesses to hold a small volume of milk for a longer period of time to get to a volume that is sufficiently large enough for a commercial dryer. This may subsequently contribute to their growth (Respondent M, personal communication, April 28, 2015).

To increase opportunities for networking and further collaborations with other organisations and companies, Intermediary 2 strives to build reputation with its success stories. “You can’t beat success. Unlike other government departments, we don’t receive Opex. We only received the initial small amount of funding to get the place built, and we stand on our own two feet” (Respondent M, personal communication, April 28, 2015). Intermediary 2 also promotes and makes itself more well-known within the food and beverage industry. “It’s making sure that we’re advertising ourselves and getting out there and getting noticed” (Respondent M, personal communication, April 28, 2015). For instance, its business development manager is actively involved in conferences across the country, to promote Intermediary 2. “I’ve got another conference coming up which I’ve been asked to speak at which is the infant formula conference down in Hawkes Bay” (Respondent M, personal communication, April 28, 2015).

Overall, Intermediary 2 offers a collaborative environment through the open access facility, which serves to attract the industry to come together. “There’s no way that somebody from Fonterra is going to be allowed into a Westlands plant...But for us we’re

an open access facility, so we have no issues” (Respondent M, personal communication, April 28, 2015). In this regard, Intermediary 2 plays an important role as the intermediary facilitating inter-organisational relationships and collaborations among both commercial allies and rivals. Nevertheless, an ultimate decision whether to cooperate is of respective companies (Respondent M, personal communication, April 28, 2015; Respondent A, personal communication, December 09, 2014). “You can’t force a company to collaborate. They either want to or they don’t” (Respondent M, personal communication, April 28, 2015).

6.1.3. Intermediary 3

Intermediary 3 is a commercialisation office of the University of Waikato, comprising a team of highly-skilled staffs from diverse backgrounds (WaikatoLink, 2015a, b, c, d). The objective is primarily to increase knowledge transfer (KiwiNet, 2015a) through transforming early-stage technologies and research into valuable and easy-to-use products for businesses. “Our job is to get these ideas out and then for other people to make money off” (Respondent R, personal communication, November 24, 2014). In this regard, Intermediary 3 assists in commercialisation, to seek funding and partners for researchers (WaikatoLink, 2015b, e). Furthermore, Intermediary 3 acts as a negotiator and a bridge between the researchers who look for an opportunity to transform innovative ideas into a commercial success and businesses that are able to help actualise this aspiration. “Our job as the broker and supporter is to handle the negotiations, the contracts and all those sorts of things..., be the middle man between the two” (Respondent R, personal communication, November 24, 2014).

At the initial stage of commercialisation, once approached by researchers or vice versa, Intermediary 3 assesses commercial potentials of research ideas. This may involve patent analysis to corroborate a proof of principles whether the ideas are novel and inventive. As the intermediary, Intermediary 3 aims to reduce the complexity of commercialisation. “We’re not building too many bridges for the researcher because we want to keep them focussing on what they do which is just building up research” (Respondent R, personal communication, November 24, 2014). For instance, on behalf of the researchers, Intermediary 3, if there is merit, takes the initiative to discuss with or present the research ideas to multiple companies. The objectives of approaching a wide audience of companies are to create a backup plan, to generate a greater interest, to ascertain the merit of the

ideas, to validate the opportunity, and to determine the demand. In this regard, “the more people aware of it, the more likely it is to end up on a useful path” (Respondent R, personal communication, November 24, 2014).

Intermediary 3 also gets the researchers involved by arranging meetings between the two stakeholders. “We prefer to bring the company and the researcher together because generally in conversation they may even go beyond what their idea was...” (Respondent R, personal communication, November 24, 2014). They may benefit from a direct discussion with the companies, from their invaluable advice, although the latter is not interested in or lacks the expertise to take on the ideas. “It’s best to take the researcher out to see the company, because then you get more people from the company involved and more perspectives” (Respondent R, personal communication, November 24, 2014). Subsequently, Intermediary 3, if there is an agreement, brings in external and in-house legal experts, from New Zealand and overseas, including patent attorneys to file a provisional patent as well as lawyers to deal with material transfer agreements, confidentiality agreements, and memorandums of understanding (Respondent R, personal communication, November 24, 2014).

Nevertheless, the difficulties in providing evidence that helps demonstrate the value of early stage or high-risk new ideas and validate their market needs contribute to a lack of funding from the business side. Therefore, Intermediary 3 may request for grants from the Kiwi Innovation Network (KiwiNet), to fund commercialisation and also to complete the proof of principles. On behalf of the Ministry of Business, Innovation and Employment (MBIE), KiwiNet administers PreSeed Accelerator Fund (PreSeed), which is equally matched by the financial contribution of Intermediary 3 (Respondent R, personal communication, November 24, 2014; KiwiNet, 2015b). Although not directly involved in research commercialisation, KiwiNet contributes to a transformation of scientific discoveries or innovation into marketable goods and services and an increase in start-up opportunities, while matching businesses with relevant technologies (KiwiNet, 2015b).

KiwiNet is a network of public research institutions and commercialisation offices in New Zealand. Besides Intermediary 3, it also works in partnership with other well-renowned research institutions. They include AUT Enterprises Ltd, AgResearch, Callaghan Innovation, Cawthron Institute, Institute of Environmental Science and Research, GNS

Science, Landcare Research, Lincoln University, NIWA, Otago Innovation, Plant & Food Research, Scion, University of Canterbury, and Viclink. Likewise, KiwiNet, at the business side, works together with companies, entrepreneurs, and investors (KiwiNet, 2015b). As the intermediary, KiwiNet undertakes a task to facilitate an access to investments, market and technical experts, training tools, and networks and connections. It also takes the initiative to promote collaborations among the partners (Respondent R, personal communication, November 24, 2014; KiwiNet, 2015b).

In this regard, KiwiNet may suggest that “you should be working with them and them because they have the expertise...They’ll perform the role of the kind of networking organisation to say you should be collaborating” (Respondent R, personal communication, November 24, 2014). Furthermore, KiwiNet helps connect New Zealand research institutions and commercialisation offices to overseas networks. For example, “one of the Investment Committee members is an investor/venture capitalist from Australia who links us in to lots of the Australian networks as well, so it’s not just a New Zealand thing” (Respondent R, personal communication, November 24, 2014). In this regard, KiwiNet contributes to a great visibility to New Zealand early-stage technologies nationwide and abroad (Respondent R, personal communication, November 24, 2014; KiwiNet, 2015b). It also increases opportunities for Intermediary 3 and the other partners to bundle similar and complementary technologies together (Respondent R, personal communication, November 24, 2014).

Besides KiwiNet, Intermediary 3 develops broad networks and connections with a range of partners in New Zealand such as companies, innovators and inventors, entrepreneurs, industry, and angel investors and venture capitalists. Likewise, Intermediary 3 forms partnerships with other research institutions and universities, working closely together to achieved common goals (Respondent R, personal communication, November 24, 2014; WaikatoLink, 2015b, g). Besides New Zealand, the collaborations also stretch to overseas, for instance, with other universities including Stanford University in the U.S. and RMIT University in Australia, to work on research as well as commercial and IP discussions (Respondent R, personal communication, November 24, 2014). Furthermore, Intermediary 3 teams up with the National Intellectual Property Management Office (NIPMO) and Innocentrix (Pty) Ltd – South African IP management office and innovation management company, to facilitate a commercialisation workshop in Pretoria, South Africa (WaikatoLink, 2013).

The primary objectives of the Pretoria workshop are to transfer important innovation and emerging technologies to a marketplace through partnerships with relevant stakeholders as well as to expose researchers to investors or venture capitalists. With the broad networks and connections extended overseas, Intermediary 3 is, therefore, able to help identify opportunities for collaborations between South African researchers and the University of Waikato as well as New Zealand companies (WaikatoLink, 2013). Although these external partners may not be interested in, for example, a joint development of technologies or research ideas commercialised by Intermediary 3, they may act as a portal to their own networks of contacts and also offer valuable advice. “It’s often, the most successful commercialisation projects are usually ones where we’ve had all of this advice – not formal advice, but just steers from people” (Respondent R, personal communication, November 24, 2014).

Likewise, successful commercialisation requires trust. While trust is the result of long-term relationships built on a lot of small win-win situations, at each stage of commercialisation, it is also a by-product of honesty and living up to promises. From a business perspective, trust is, however, risky. For instance, companies or investors may distrustfully ask questions “are these people that we think if we put either our company money into or investment money into, it’s going to get a return?” (Respondent R, personal communication, November 24, 2014). In this regard, Intermediary 3 undertakes a task to promote trust with the business side, by removing risks and through assurance. As the intermediary, “...our job, it’s always about removing risk, from a business perspective..., all you’re trusting is that we’re going to get to the next step” (Respondent R, personal communication, November 24, 2014).

On the other hand, dishonesty, together with ineffective communications that leads to misinterpretation or misunderstandings, eventually break trust and create conflicts. “Conflict can come through a misunderstanding or miscommunication..., from the company side or the investor side about what the technology or the idea can do, and a misunderstanding from the researcher’s side on what the company actually wants” (Respondent R, personal communication, November 24, 2014). In this regard, Intermediary 3 acts as a translator or interpreter to manage miscommunications or misunderstandings and as a mediator to resolve conflicts between the two sides. For instance, if a conflict arises, “we’ll go and talk to the companies just to try and get their understanding. We’ll go and talk to researchers to get their understanding and then try

and come to this mutually agreed position” (Respondent R, personal communication, November 24, 2014).

Furthermore, the existence of discrepancy between the nature of communication at the research side and that at the business side may result in misunderstandings, during their encounters. While the former is predominantly collegiate, the latter tends to be unpleasantly harsh, regarding the business opportunity of research ideas. As a result, researchers may personally get offended at constructive criticism of companies or investors. Therefore, as the translator or interpreter, Intermediary 3 emphasises on the importance of managing the misunderstandings or miscommunications resulted from their usage of different languages or terminologies. For instance, Intermediary 3 explains that “when they were saying this..., they weren’t being offensive to you. They were saying look, the commercial opportunity is somewhere else..., because you’ve got a better opportunity here” (Respondent R, personal communication, November 24, 2014).

Similarly, misunderstandings or miscommunications may arise, during patent registration, between researchers and patent attorneys. For instance, research ideas are already covered off in different patents making it nearly impossible to get another registration for the researchers. Therefore, the patent attorneys may suggest a legalistic process to circumvent the rules set around patents. “The patent examiners are saying..., your idea says this, but how about we present it like this, or write it in a different way so we can try and get that novelty?” (Respondent R, personal communication, November 24, 2014). While the intention is to provide an alternative solution to the problem, the researchers may misunderstand the suggestion as interference or a critique on their works, which potentially leads to conflicts or aggravations. In this regard, Intermediary 3 takes the initiative to manage the misunderstandings or miscommunications between them (Respondent R, personal communication, November 24, 2014).

As the commercialisation office, Intermediary 3 also helps researchers gain trust from companies or investors, through education on presentation skills. The proficient researchers are able to talk business yet remain concurrently the academic experts. In this regard, the researchers are able to demonstrate capability, to clearly answer technical questions in an intelligent way, and to stay focused on a business opportunity of research ideas rather than long technical descriptions. As a result, the ability to carry out presentations effectively and professionally triggers a general innate trust among the

companies that the research ideas work, even prior to seeing supporting evidence. Furthermore, Intermediary 3 assists in a basic understanding of the commercialisation process. This enables the researchers to comprehend what is happening in the meetings, what types of questions to prepare answers for, and what are the company expectations (Respondent R, personal communication, November 24, 2014).

Besides the education or informing exercise, personalities of researchers also influence trust and the prospects for research commercialisation. For instance, “I’ve been in situations where you’ll have the researcher arguing with the venture capitalist saying no, you’re wrong and no, that’s not where the opportunity is. It’s really bad..., there’s no chance you’re going to get funded” (Respondent R, personal communication, November 24, 2014). In this regard, from a business perspective, good working relationships with companies or venture capitalists are often more important than the quality of research ideas. “Often it comes down to not so much the technology or how good the idea is, but whether they get on with the people..., are these nice people and do we want to work with them?” (Respondent R, personal communication, November 24, 2014).

Therefore, Intermediary 3 takes the initiative to develop positive relationships with the business side, through ongoing communications including face-to-face meetings, e-mails, and teleconferences. “That is part of the broker’s role is to make sure that communication keeps on going” (Respondent R, personal communication, November 24, 2014). Furthermore, researchers with well-communicated research ideas are more likely to receive financial assistance from the business side, compared with those that are equally good but poorly-communicated. For this reason, Intermediary 3 undertakes a task to help improve the researchers’ communication skills, to communicate in a way that companies or investors understand and, therefore, are more interested in pursuing further conversations. “Often that’s like a fishing hook. You capture, catch their interest...you let them steer; can you give me more information on this and this and this? And then you give them the information as they ask” (Respondent R, personal communication, November 24, 2014).

As the technology transfer company of the University of Waikato (WaikatoLink, 2013), Intermediary 3 works with researchers on the development of prototypes or demonstrators, to sell technologies or attract investments. In this regard, Intermediary 3 acts as a bridge linking the research side to the business side, to the right individuals

whose decisions represent those of their companies. “We’ve got where possible one point of contact and one point of negotiation with the company..., so that communication...has to be with the most senior person in the team, because he can collect the thoughts of everyone together” (Respondent R, personal communication, November 24, 2014). The prototyping progressively goes through augmented stages of development that require the involvements of, besides the researchers, the companies. “They see the development all the way through. It’s much more powerful; they see it build and grow” (Respondent R, personal communication, November 24, 2014).

In this regard, the development of prototypes or demonstrators involves frequent communications, face-to-face and non-face-to-face, between Intermediary 3 and companies or investors concerning prototype requirements and evidence they need to see before proceeding further. “We’ll get a written, something written, either on email or meeting notes or whatever it is, to say if we meet these criteria then, that will trigger the next stage of communication or investment...” (Respondent R, personal communication, November 24, 2014). Having a written target list of specific requirements allows Intermediary 3 to determine the plausibility of building the prototypes. “We’ll review and say well that’s impossible..., and so there might be a bit of a negotiation around what that looks like. Because some of the things that might put in will be just too hard to achieve” (Respondent R, personal communication, November 24, 2014).

Once there is an agreement between both sides, the development starts off with a proof of principles, to demonstrate the functionality of small-scale prototypes in a laboratory. Subsequently, Intermediary 3 moves forward to larger scale demonstrations in a lab-based but real-world circumstance, in a field where the technologies are used and also with real materials. For example, a demonstration initially involves using polymers to remove specific molecules out of water and subsequently out of a barrel of wine. The real-world demonstration gives rise to an internal confidence, although there may be a need for further evidence. This leads to the last stage at which Intermediary 3 scales up with the removal of the molecules from a huge vat of wine, before presenting the final prototypes. At this final stage, “we get people along to make sure that the whole system’s working...we’ve got the industry partners saying we need it to do this before we’ll invest” (Respondent R, personal communication, November 24, 2014).

Nevertheless, it becomes a challenge if companies or venture capitalists are not outright about their decisions. For this reason, the main task of Intermediary 3 is to ensure that they do not string researchers along. “Part of our job is to encourage them to say yes or no, we’re interested, and the degree to which they’re interested” (Respondent R, personal communication, November 24, 2014). Furthermore, there may be ambiguity in researchers and companies’ responsibilities, which potentially hampers the progress of developing prototypes or demonstrators. In this regard, the researchers’ obligation is to build prototypes or demonstrators, while the business side is solely responsible for the scaling up or manufacturing them into final products. Therefore, Intermediary 3 helps distinguish their respective obligations. “Your job is the scale up..., we’re going to get it to this point..., do you agree in writing that if we achieve the goals, you will take it on?” (Respondent R, personal communication, November 24, 2014).

Despite the efforts to identify specific requirements and to eliminate the ambiguity in responsibilities, prototyping requires a written agreement in the form of contract or, to a lesser extent, written commitment. “What we don’t want happening is us taking a prototype or demonstrator onto site and then it does something, and they go well that’s not what we wanted” (Respondent R, personal communication, November 24, 2014). A choice between the two forms of enforcement is mainly contingent on the level of trust between both sides. The success of prototype development, therefore, involves trust as well as open communication. As discussed earlier, Intermediary 3 promotes trust and also ensures a clear communication, which enables researchers to be more well-prepared and aware of what they need to achieve, while companies or investors have a better understanding of their commitments. “It comes back to that trust. So we have to be very clear in our communication all the way through that this is what we’re building; do you still agree that this is what you want?” (Respondent R, personal communication, November 24, 2014).

Alongside the development of prototypes, Intermediary 3 creates a wide range of new technologies by tying different ones together or merging research in one area with that in another (Respondent R, personal communication, November 24, 2014). It, therefore, needs partnerships to transform them into successful products (WaikatoLink, 2015f). In this regard, Intermediary 3 takes the initiative to promote the early stage innovations to companies in New Zealand and overseas including the U.S. “Here are all the things that we’ve got available to us. Which ones are really interesting to you? And they’d say well

this, this and this, but let's combine these together" (Respondent R, personal communication, November 24, 2014). The main strategy leading to collaborations involves identifying demand for the technologies. "What's the biggest demand? What are people looking for? Let's go and source those ideas and create the collaboration around the manufacture of a solution to a problem" (Respondent R, personal communication, November 24, 2014).

Besides partnerships with businesses, Intermediary 3 also scouts around New Zealand for research institutions and universities, to seek opportunities for collaborations. For instance, "there's research going on in different active compounds at different universities or different research organisations, and then we look and say what happens if we combine all these active compounds together in one product?" (Respondent R, personal communication, November 24, 2014). Owing to the efforts in promoting partnerships with other institutions, Intermediary 3 successfully establishes Aldera Limited, a company specialises in animal health technologies or products, located at Waikato Innovation Park (Respondent R, personal communication, November 24, 2014; Aldera, 2016). Likewise, Intermediary 3 is also involved in another external collaboration on a 3D vision technology called Time-of-Flight (Respondent R, personal communication, November 24, 2014).

Furthermore, Intermediary 3 is also involved in partnerships with Waikato Institute of Technology (Wintec) through a jointly established company named Ligar Polymers, located in proximity to Waikato Innovation Park (Respondent R, personal communication, November 24, 2014; Ligar, 2016). Although Wintec provides the technology, the institute, however, lacks expertise to carry out commercialisation. For this reason, Intermediary 3 undertakes the commercialising work, which includes raising all the investment needed (Respondent R, personal communication, November 24, 2014). Likewise, Intermediary 3 teams up with Balance and Prima Group – a commercial partner of Wintec, through KiwiNet, to focus on commercialisation of a jointly-developed filter technology. Therefore, the collaborations give an opportunity for the two renowned research and education institutes in the Waikato region to work more closely together (The University of Waikato, 2012).

6.1.4. Intermediary 4

Intermediary 4 is a commercial consortium resulted from combining the vast knowledge and experience, technologies, and also delivery capabilities of the AgBio Cluster. With Waikato Innovation Park being a central partner, the consortium includes agricultural producers and suppliers within and outside the Park (Dairy SolutionNZ Beef SolutionNZ, 2015a, 2015b, 2015c). They include Livestock Improvement Corporation (LIC), CRV Ambreed, Sexing Technologies, Animal Breeding Services (ABS), Cropmark Seeds, Tru-Test, and Lincoln University (Respondent N, personal communication, December 01, 2014; Dairy SolutionNZ Beef SolutionNZ, 2015c, 2015d). While having valuable knowledge of dairy and beef farming systems, Intermediary 4 also develops deep insight into the dynamics of dairy markets and trade (Dairy SolutionNZ Beef SolutionNZ, 2015c). As a technology transfer company, it designs and builds large scale offshore farm operations – land development and technology deployment with New Zealand technologies and systems (Dairy SolutionNZ Beef SolutionNZ, 2015a, 2015b, 2015c).

Offshore projects, wherever sensible, involve the partners, which are highly competent on the international stage. In this regard, Intermediary 4, with the extensive knowledge and experience working on the ground abroad (Dairy SolutionNZ Beef SolutionNZ, 2015c), becomes the information provider or intermediary connecting overseas clients with the suppliers. “Our suppliers wouldn’t know anything about what was happening in Ecuador or Colombia or Peru or Hawaii. They’d have no idea at all, so we’ve led that, shaped it up and brought them in” (Respondent N, personal communication, December 01, 2014). Likewise, Intermediary 4 helps link the overseas clients with relevant New Zealand farmers. “We had a guy who managed 180,000 hectares of farm land in Argentina and we looked after him for a week. So you spend a week in a van running around farms, meeting suppliers...” (Respondent N, personal communication, December 01, 2014).

Intermediary 4 aims at helping offshore clients maximise the quality and quantity of production, improved performance and profits (Dairy SolutionNZ Beef SolutionNZ, 2015a, 2015b). It adopts a collaborative approach by teaming up with the partners, working closely with offshore clients to provide support and education for their farm operations (Dairy SolutionNZ Beef SolutionNZ, 2015a, 2015b). “We work together on all sorts of projects...It’s almost every engagement we’ve got, we never operate as a company alone. We are always the front-end of a cluster of companies” (Respondent N, personal

communication, December 01, 2014). For example, Intermediary 4 leads the partnership working on offshore projects, to help solve a profitability problem for the dairy industries in South American countries including Colombia, Ecuador, and Peru. “We will engage directly with those local governments. I used to have hair. All my hair’s fallen out now...” (Respondent N, personal communication, December 01, 2014).

In this regard, the whole offshore operations involve two layers: operation procedures and education. On the operation procedure layer, the work includes creating demonstration farms using New Zealand technologies and designs, to confirm a relatively superior profitability. “The farms that we’re building we’ve got a 10 year operate deal, so we operate those farms for 10 years, so we provide their systems and their operating procedures..., it’s how do you design, build and operate farms overseas” (Respondent N, personal communication, December 01, 2014). Intermediary 4 also teams up with its long-term partners: LIC, ABS, and Sexing Technologies to set up genetics centres to breed bulls locally in host countries such as Ecuador and Peru. “We’ve got what we need to be able to give them a bull centre, design, build and operate a bull centre and put the right bulls in it” (Respondent N, personal communication, December 01, 2014).

The education layer involves helping offshore clients expand knowledge. Although they, to some extent, may have a moderate understanding of farming, it does not necessarily result in successful farm operations. “They know their piece, but they don’t know the whole farming system” (Respondent N, personal communication, December 01, 2014). In this regard, Intermediary 4 partners with Lincoln University – Telford Campus in Otago, which provides the clients a Level 3 Certificate in Farming (Dairy). For instance, “we’ve got two people coming from Ecuador. They spend a year on the Telford..., and then they do a Level 3 qualification...while they’re doing that they’re converting the content and adapting it back to Ecuadorian context” (Respondent N, personal communication, December 01, 2014).

Besides Lincoln University and particularly the Telford campus in Otago, Intermediary 4 leads a collaboration with the cluster members: CRV, LIC, and ABS to create ideal cows with characteristics of New Zealand animals – Kiwipole. They aim at achieving high specifications such as high heat tolerance, exceptionally healthy, calving regularly and easily, and producing milk throughout the year. “We had an idea that we wanted a cow that was similar to a New Zealand cow, but it could handle the heat because there is

nothing really like it in the low tropics” (Respondent N, personal communication, December 01, 2014). Kiwipole involves different stages of development, inspired by the Costa Rica Senepol and the Carora of Venezuela. It is, therefore, suitable for grass-based dairy systems founded in the tropics (Respondent N, personal communication, December 01, 2014; Dairy SolutionNZ Beef SolutionNZ, 2015e).

Kiwipole currently becomes a final product heading to markets. “It’s significantly better than what most people are using in the tropics today, so that’s why we felt it was time to put it on the market” (Respondent N, personal communication, December 01, 2014). The main objective is to become the best pasture genetics in the world, surpassing both Senepol and Carora at improving production under heat stress (Respondent N, personal communication, December 01, 2014; Dairy SolutionNZ Beef SolutionNZ, 2015e). For this reason, Intermediary 4 pays particular attention to grass efficiency, to efficiently convert grass to milk that consequently leads to higher profitability. “We can do better than that because if we can put New Zealand grazing efficiency in there...they’ll be better than those American crossbreeds” (Respondent N, personal communication, December 01, 2014). With grazing efficiency, farmers get approximately the same volume of milk per hectare, although Kiwipole produces quite a lot less – fewer than 5,000 litres compared with 10,000 litres by a big American Holstein (Respondent N, personal communication, December 01, 2014).

Furthermore, Kiwipole milks longer than the American Holstein, owing to the significantly greater lifespan. It also calves more frequently and has a higher tolerance to heat. “She’ll live until she’s 14 sometimes and American Holsteins, lucky to have two calves. In the tropics...they can’t handle it, so the farmer ends up putting all his grass into growing replacements instead of making milk” (Respondent N, personal communication, December 01, 2014). In terms of feed consumption, Kiwipole consumes relatively less or cheaper feed but still produce a sufficient amount of milk to be profitable. As a result, it is particularly a more ideal breed for farmers in developing countries. “You can give them rubbish food and they’ll still produce milk...which is what happens in most of the developing world. They don’t get good quality food” (Respondent N, personal communication, December 01, 2014).

While Intermediary 4 works in partnership on offshore projects, the collaboration may become a difficult task when the partners are competitors. “It’s difficult in a cluster. It’s

when there are competitors in there...my biggest challenge probably is when I'm working with competitors..., I might be doing a deal with LIC, also doing a deal with CRV and they're competitors" (Respondent N, personal communication, December 01, 2014). This demands comprehensive knowledge of SolutionNZ/Beef SolutionNZ, as the intermediary, to recognise their relative strengths and weaknesses and, subsequently, to speak honestly about who offers the best solution for a particular customer's need. "You've got to know the companies well enough to know what it is they're good at and sometimes you have to tell them what they're not good at and that's why you've used someone else" (Respondent N, personal communication, December 01, 2014).

Despite of rivalries between the cluster members, their real competition is not with each other but those in overseas markets. "Corn based beef and dairy; that's our enemy, not each other. We have to get the world off the American and European systems and heed the grass, so we've all got a common need to get that message across" (Respondent N, personal communication, December 01, 2014). This requires the relevant cluster members to work in partnership towards the shared goal. Likewise, there is also a need to include other New Zealand companies in the collaboration, to promote grass-fed beef to the world and expand the market for New Zealand dairy industry. In this regard, the key to success involves the adoption of collaborate-first-compete-later approach based on which competition is distinguished from collaboration. "Everyone can contribute to growing the market. Then they can compete for how much of the market they actually secure" (Respondent N, personal communication, December 01, 2014).

Likewise, in the case of Kiwipole, while the emphasis is on profitability brought about by a cheaper cost of feeding, there is a large number of farmers in the world still focus on a volume of milk produced per cow. "They think if a cow does 10,000 litres she's going to be more profitable, but she's not because of the cost of the feed you have to put in her" (Respondent N, personal communication, December 01, 2014). For this reason, there is a need for SolutionNZ/Beef SolutionNZ and the collaborating cluster members such as CRV, LIC, and ABS as well as other relevant New Zealand companies to work in partnership, to promote the concept of grass efficiency to the world and also the New Zealand dairy industry as a whole. "We need that proof...it's a big challenge for us is proving profitability in offshore markets where they don't think about profit" (Respondent N, personal communication, December 01, 2014).

Although there is no recipe for success, making communication easier contributes to long-term and mutually beneficial relationships and collaborations. In this regard, Intermediary 4 promotes ongoing communication with the partners through phone calls, e-mails, and Skype. “DTS, Gallagher, Tru-Test, and Read Industrial. They run almost all of our projects, so you’re always talking to them about something – if it’s not Colombia it’s Ecuador or Hawaii or Peru. You’re always talking to them about something” (Respondent N, personal communication, December 01, 2014). In addition to virtual communication, a close geographic proximity facilitates face-to-face interactions such as office visits and, therefore, contributes further to their continuing relationships and collaborations. At Waikato Innovation Park, “we’ve got to the point where people don’t make appointments. They just feel comfortable enough if they’re in the area they drop in” (Respondent N, personal communication, December 01, 2014).

While a close geographic proximity is important for networking, successful clusters that are built on trust, to a greater extent, require socialisation. “You’ve got to build social capital first...the whole thing started as having a few drinks and it was sort of wine and cheese...” (Respondent N, personal communication, December 01, 2014). Socialisation helps the cluster members develop positive attitudes towards each other and build trust “I can do a proposal and commit them to doing work – because we’ve done it before, I can then just give them the final version and say please approve this. And they will get it back to me within hours” (Respondent N, personal communication, December 01, 2014).

Likewise, another key ingredient to building trust is honesty, which is being straight, open, and transparent with the collaborating partners and also offshore clients. “They know that I know them well enough that I won’t sell something they can’t deliver on..., and if I thought it was a low probability of being successful I would tell them that right up front” (Respondent N, personal communication, December 01, 2014). In this regard, Intermediary 4 also offers honest opinion about time needed to successfully accomplish a certain project. “I might go I think this one’s going to happen, but it might take us a long time. Or I go well this one looks really good. It’s hot and I think we’ll get it, nail it pretty quickly” (Respondent N, personal communication, December 01, 2014).

While trust is important for long-term relationships and collaborations among companies, the success of clusters also requires respect. “I think a lot of clusters don’t work because it’s not only trust but the person who’s running the cluster...They’ve got to be as good as

them or better...someone who's capable of creating deals and making money for everyone" (Respondent N, personal communication, December 01, 2014). In this regard, being able lead the way for the cluster members towards business opportunities and generating revenues helps Intermediary 4 gain their respect and trust. "Help them make money...I mean most people respond pretty well if you can give them revenue they wouldn't have otherwise got they kind of trust you pretty well" (Respondent N, personal communication, December 01, 2014).

6.1.5. Intermediary 5

According to Davenport and Harris (2007), the ability of companies to make smart business decisions based on systematically assembled data and analysis rather than on intuition remains the point of difference that provides long-term competitiveness, while previous bases for competition such as protective regulation and proprietary technologies are no longer viable. Therefore, successful and competitive companies are those that build strategies around analytical capabilities, compete on analytics (Davenport & Harris, 2007; Davenport, Harris & Morison, 2010). Davenport and Harris (2007, p. 7) describes analytics as "the extensive use of data, statistical and quantitative analysis, explanatory and predictive models, and fact-based management to drive decisions and actions". Davenport, Harris and Morison (2010) identify several benefits of analytics such as helping the companies understand their business dynamics, cut costs and improve efficiency, manage risk, and anticipate changes in market conditions.

Intermediary 5 develops an extensive knowledge and experience in applying analytical techniques across a range of applications (Mark Loeffen & Associates Ltd, 2015d). "That actually forms quite a large part of our business, so quite a lot of our business is based around analytics" (Respondent E, personal communication, February 25, 2015). With a great understanding of business, science, and technology, they help businesses in the primary industries improve decision making and achieve positive commercial outcomes (Mark Loeffen & Associates Ltd, 2015a, 2015d). Two companies operated under the same management constitute Intermediary 5. While one was established earlier in 1999 (Mark Loeffen & Associates Ltd, 2015p), the second company was founded in 2012 through a long-term collaboration among different entities including Plant & Food Research, and business analytics specialists (Delytics, 2015a).

Intermediary 5 loosely follows the Data, Information, Knowledge, and Wisdom (DIKW) methodology to assist clients develop decision support systems, to better utilise their existing data for improving decision making (Mark Loeffen & Associates Ltd, 2015d). The methodology is basically a hierarchical structure, having data with the lowest value at the bottom, while wisdom – knowing how to utilise knowledge – is at the top (Respondent E, personal communication, February 25, 2015). Based on the DIKW paradigm, Intermediary 5 specialises in adding value to the data by utilising their own knowledge to turn them into information, knowledge, and ultimately wisdom. “There’s some debate about whether the knowledge is created - we tend to not think so much about the data creating knowledge, as we add knowledge into it. We use our knowledge...to add more value to the data” (Respondent E, personal communication, February 25, 2015).

Intermediary 5 assists growers and primary sector businesses to optimise crop quality, to consistently provide customers with a quality eating experience and meet quality standards set by the primary industries (Delytics, 2015a, 2015b, 2015c, 2015d; Mark Loeffen & Associates Ltd, 2015b, 2015c). For instance, Intermediary 5 adds values and knowledge into a large volume of data collected by Zespri – a New Zealand kiwifruit marketing company, to build a system for predicting harvest dates (Respondent E, personal communication, February 25, 2015). In this regard, Intermediary 5 offers consultancies on crop quality assurance together with the Purchase Predictor and Crop Quality Advisor tools (Delytics, 2015a, 2015b, 2015c, 2015d; Mark Loeffen & Associates Ltd, 2015b, 2015c).

The Purchase Predictor allows growers and primary sector businesses to identify ideal harvest specifications including colour, firmness, taste, and size as well as to predict consumer liking and response to crops prior to harvesting. The predictor tool is also used to carry out a quick prediction of a difference in the consumer liking for different crops in different geographic markets. This capability enables a more informed decision-making regarding where to market a certain line of produce to achieve maximum consumer acceptance and, therefore, sales (Delytics, 2015b, 2015c). Likewise, the Crop Quality Advisor helps determine harvest times based on the specifications identified by the Purchase Predictor. This involves transforming a large volume of data into a more easily-understandable report and, therefore, results in quicker and more accurate harvest decisions (Delytics, 2015b, 2015d).

Therefore, Intermediary 5 specialises in interpreting a variety of complex data generated by clients, which involves analysing and turning them into a more easily understandable format (Delytics, 2015e). For instance, they assist Zespri with the interpretation of data generated from fruit logistics via reefer vessels. With up to 40 data loggers installed to monitor air temperatures from the refrigeration system on each vessel, they collect a large volume of data of up to 80,000 temperatures at the end of each voyage. Furthermore, Zespri has approximately 50 voyages per year as well as a massive amount of data collected over the course of many years (Respondent E, personal communication, February 25, 2015).

“They came to us and said we’re struggling to analyse this data...it’s just such a large number and how do you reduce to something that management can make a decision about whether this voyage was good, bad or indifferent...?” (Respondent E, personal communication, February 25, 2015). With technological experience in developing new technologies such as a real-time data collection system and control system (Mark Loeffen & Associates Ltd, 2015j, 2015k, 2015l, 2015m, 2015n), Intermediary 5 designs a full system for Zespri, which involves scoring each voyage in a percentage, ranking all of the approximately 50 voyages, and further reducing the data in an easily-understandable format – metrics for the management decision making concerning the quality of a particular voyage. “We like to use a lot of graphical tools...we’ve come up with a single graph that summarises the entire voyage and the vessel, each deck and all the loggers and all that sort of thing on that” (Respondent E, personal communication, February 25, 2015).

As a result, the system designed by Intermediary 5 helps inform the quality of the voyages. For instance, “a typical voyage was around 80 per cent...if you got a number and it was above 80 you know it was better than average...if it was down sort of 50 or 60 per cent you know it was pretty bad” (Respondent E, personal communication, February 25, 2015). Furthermore, the system also generates important data and knowledge that Zespri shares with its suppliers both shipping and fruit-supplying companies and uses to determine the performances of the shipping suppliers. For example, “there’s three companies supply ships to them,...Let’s say to the company well actually I’d rather a vessel that can consistently sits at 90 per cent and so now they’ve got all these metrics that they can discuss with their suppliers” (Respondent E, personal communication, February 25, 2015).

Besides data interpretation, Intermediary 5 helps businesses in the primary industries identify and implement customised commercial solutions (Mark Loeffen & Associates Ltd, 2015a). For instance, they offer Zespri a solution to the problem concerning avoiding expensive costs of multi-million dollars to purchase extra data loggers. “They manufacture or create 400,000 pallets a year...They have data loggers that monitor 10 per cent of those pallets, monitor the temperatures of them” (Respondent E, personal communication, February 25, 2015). In this regard, Intermediary 5 employs a strategy, which involves using data from the pallets with the loggers installed to predict temperatures on the other 90 per cent of the pallets (Respondent E, personal communication, February 25, 2015).

This requires the development of a model or prototype called a virtual or inferential sensor to measure how temperature varies within a pallet. “What we’ve been doing over the last few months is just exploring that model, exploring how it works, understanding its limitations and that sort of thing” (Respondent E, personal communication, February 25, 2015). The modelling or prototyping work demands Zespri to be more articulate and expressive about their requirements concerning the development. Therefore, “we force them to start thinking about that and it’s just a matter of dialogue and discussion. We don’t try and answer all the questions for them..., because some questions we can’t answer, only they can answer” (Respondent E, personal communication, February 25, 2015). Nevertheless, Intermediary 5 is also involved in writing and setting prototype requirements as Zespri lacks a clear idea of what they want out of the development. “As a practitioner often times you have to lead the client. You have to present a situation to them...” (Respondent E, personal communication, February 25, 2015).

In this regard, modelling or prototyping requires an ongoing communication between Intermediary 5 and clients. “I go through a reasonably formal process of trying to set some requirements and starting the discussion, then a backwards and forwards exchange of emails or documents,...They agree or they disagree and that then becomes the communication” (Respondent E, personal communication, February 25, 2015). Furthermore, modelling or prototyping is also an iterative process, which involves moving backwards but also forwards towards a desired solution rather than going around in a circle. “Here’s what I think you want, what do you think? Oh no, you haven’t quite got it right,...So we look at it, we’ll change it. And so we’ll go backwards and forwards

until we agree on something” (Respondent E, personal communication, February 25, 2015).

Therefore, owing to uncertainty during the process of modelling or prototyping, there is a need for contracts between Intermediary 5 and clients concerning requirements or specifications. “The process is creative, and therefore lots of unexpected things come out that never are mentioned in the specification because they never were envisaged” (Respondent E, personal communication, February 25, 2015). Nevertheless, it potentially results in new knowledge creation. “We expect new things to come up on a regular basis...We just don’t know what they are. And our existing clients know to expect that now, but it’s very difficult to write that into a specification” (Respondent E, personal communication, February 25, 2015). For instance, during the data logger project for Zespri, Intermediary 5 discovers a new way of using the temperature data, which is not written into the original requirements or specification (Respondent E, personal communication, February 25, 2015).

Intermediary 5 also specialises in assisting companies manage innovation – capturing, evaluating, and maximising the potentials of employees’ innovative ideas and hidden expertise, tacit knowledge (Mark Loeffen & Associates Ltd, 2015i). For instance, it works with NIWA as a generalist – an interpreter among specialists in different fields, who think differently and, therefore, are not able to effectively communicate with their respective languages. Furthermore, “you’ve got to remember also about innovation is you’ve got all the technical stuff, science and all that side of things, and then you’ve got all the commercial stuff as well” (Respondent E, personal communication, February 25, 2015). This requires the generalist being able to understand and to converse in the languages of those specialists, particularly being able to interpret between the scientific side and the commercial side. “We’d be sitting in a meeting...one of the scientists would say something, and the commercial manager would lean over to me and say what did that person just say, because he heard the English words but didn’t understand” (Respondent E, personal communication, February 25, 2015).

As the generalist or interpreter, to promote productive dialogues – brainstorming or ideation sessions between the scientific and commercial sides, Intermediary 5 initially aims to elicit as many ideas out on the table and leave the critique and analysis parts to a later stage. It subsequently puts emphasis on encouraging constructive criticisms. “I’m

always looking for people in teams not just to be ‘yes’ people. That’s very dangerous...that’s not helpful, we’re always looking for people who have a strong enough personality or strong enough self-worth that they’re able to disagree with something” (Respondent E, personal communication, February 25, 2015).

In this regard, Intermediary 5 helps mediate the differences between both sides and ensures that the expression of disapproval is on the ideas rather than personally on individuals. “Even in my own company, we debate vigorously at times. We can disagree quite strongly for quite long periods of time, but we never let that affect us personally” (Respondent E, personal communication, February 25, 2015). Likewise, it also makes certain that the objective of the dialogues or debates is to find solutions to problems regardless of tension brought about by their differences. Nevertheless, the constructive criticisms require the ability to offer an alternative solution. “They need to offer up an alternative scenario. So just to say that won’t work, and not offer an alternative solution that might work, is not acceptable to me” (Respondent E, personal communication, February 25, 2015).

With extensive knowledge and experience as the generalist, on the commercial side, Intermediary 5 provides support on new product development or to connect them with relevant experts. It helps companies design tailored strategies, processes, and business cases to support the companies in intellectual property strategies and commercialisation (Mark Loeffen & Associates Ltd, 2015f, 2015g, 2015h). For instance, Intermediary 5 helps write a commercialisation process for a commercial manager of NIWA (Respondent E, personal communication, February 25, 2015). On the technological side, Intermediary 5 specialises in technology reviews, which involves helping the companies identify a range of new technologies, rank and evaluate them, and subsequently translate technical jargons into a more easily-understandable language (Mark Loeffen & Associates Ltd, 2015j, 2015o). For example, Intermediary 5 assists a Norwegian company to carry out a technology review on a robotic shearing of sheep. Likewise, it helps another Australian company to review one of newly developed and commercialised technologies, to identify a need for further improvement and to perform a cost–benefit analysis. “Basically give them an idea of how their development processes were going, whether the benefits that were promised at the beginning of the project actually occurred at the end” (Respondent E, personal communication, February 25, 2015).

In this regard, Intermediary 5, adopting the concept of a networking company, also works in partnership with other specialists both at the technical and commercial sides. As a result, it builds a large network of varied experts, to accomplish tasks outside the area of expertise. “If I didn’t know how to fix a problem, but I knew people who would know how to fix the problem” (Respondent E, personal communication, February 25, 2015). For instance, Intermediary 5 brings in and works together with technical experts in heat and mass transfer and a microbiologist for NIWA to solve a problem involving a product that uses fungi for creating an aquatic herbicide that kills weeds. “We completely redesigned their laboratory and some of their equipment, and so over the next months and years the process of producing this fungus improved just dramatically because I’d brought in people outside their area of expertise” (Respondent E, personal communication, February 25, 2015). On the commercial side, Intermediary 5 also collaborates with external specialists, while working for Landcare Research on a patent. “I said look, I’d like to bring in a colleague. He lives in New Plymouth, and so he came in and he did an evaluation of their technology” (Respondent E, personal communication, February 25, 2015).

Furthermore, with an extensive experience in managing R&D projects and portfolios, Intermediary 5 solitarily and collaboratively with external training providers outside Waikato Innovation Park offers practical R&D-training courses. The aim of the courses is to train and equip trainees with knowledge and skill, which enable them to effectively plan, manage, and finish their R&D projects within timeframes and budgets as well as up to the expectations of customers (Mark Loeffen & Associates Ltd, 2015e). For instance, Intermediary 5 provides a commercial manager of NIWA the training service. Likewise, it offers, twice per year, two-day R&D management courses to between 10 and 20 employees of AgResearch. “They’ve got four key sites in New Zealand, so they’ll just say look, I want you to run a course in Christchurch for example and so we’ll agree dates and times and places” (Respondent E, personal communication, February 25, 2015).

In order to ensure that the training effectively helps expand knowledge and meet the expectations, Intermediary 5 works with trainees’ companies to carry out a training needs analysis, adjusting the course material. The trainees also, after each training, do course review involving scoring and ranking and subsequently pass their feedback back to the training provider. Furthermore, managers may attend as observers during the training courses, to witness what their employees are involved in (Respondent E, personal

communication, February 25, 2015). As a result, Intermediary 5 is able to help the clients expand existing knowledge base through the R&D-training courses (Respondent E, personal communication, February 25, 2015).

Intermediary 5 is involved in collaborations with companies and organisations both outside and also within the cluster such as a law firm at Waikato Innovation Park. “They just would call me in to say hey, we’ve got a client here. We’re sending them to you. You do this thing with us. Once you’ve done that, then we will do our next bit of work” (Respondent E, personal communication, February 25, 2015). More recently, they provide two training courses to its staff. In this regard, a close geographic proximity to the other cluster members facilitates inter-organisational relationships and collaborations among the cluster members. For instance, “if I want to go and see the HR company I just walk over to the other building and it’s easy, and they come and see me from time to time if they’ve got questions” (Respondent E, personal communication, February 25, 2015).

Being based in Waikato Innovation Park also allows Intermediary 5 to stay closely connected to the major organisations such as AgResearch, Plant & Food Research, Landcare Research, NIWA, NZTE, Callaghan Innovation, and the University of Waikato. This provides opportunities to build inter-organisational relationships with their clients or associates. “Often times somebody might be coming to AgResearch for example, and if they know me they might come in and say hello or come in and set an appointment with me while they’re over here” (Respondent E, personal communication, February 25, 2015).

The social events regularly organised by Waikato Innovation Park allow the cluster members to showcase their businesses and to seek opportunities for collaborations within and beyond the boundary of the cluster, both nationally and internationally. For instance, through a social event organised by the Park, Intermediary 5 carried out a ten-minute presentation on a topic related to their businesses to a number of attendees including Sir Lockwood Smith, the Head of Mission based in London. The Park also has mutually-beneficial agreements with other innovation parks based in the UK. “I was in Scotland a couple of years ago and through the Park I was able to get some introduction to some parks over there and they gave me introductions to other people” (Respondent E, personal communication, February 25, 2015). Furthermore, Waikato Innovation Park provides, to the cluster members seeking to penetrate overseas markets, needed assistance and

training. “The Business Development team will do analysis of your business,...they’ll work with you and NZTE, or look at other resources that they have. They’ll give you training if you need that and so there are some good services around that” (Respondent E, personal communication, February 25, 2015).

In general, the cluster members are relatively less involved in intra-cluster collaborations, which is, therefore, not as strong as external collaborations. “It’s something that the Park has struggled with, just how to improve that collaboration. I’m not sure if I can give a reason for it” (Respondent E, personal communication, February 25, 2015). Nevertheless, one of the contributing factors that may influence the prospect for intra-cluster collaborations is the size of the cluster members. “Our clients typically tend to be large companies, so they tend to be companies turning over more than \$100 million typically, up into the billions. The companies in the Park are far too small for what we do” (Respondent E, personal communication, February 25, 2015). Therefore, although there generally is willingness among the cluster members working in partnership to achieve shared goals, it, however, may not eventuate in business-related collaborations (Respondent E, personal communication, February 25, 2015).

For this reason, Waikato Innovation Park plays an important role as the intermediary linking the cluster members together. “One of the guys at the Park in the Business Development team said to me the other day, I think you need to go and have a chat with this person. And so we’ll have a chat” (Respondent E, personal communication, February 25, 2015). Likewise, Intermediary 5 is actively involved in promoting long-term inter-organisational relationships with the other cluster members. As a result, their effort potentially leads to mutually-beneficial collaborations. “I’m quite strong on trying to build relationships, so I regularly try and meet with people or discuss, find out what companies are doing, discuss what they’re doing” (Respondent E, personal communication, February 25, 2015).

Furthermore, Intermediary 5 looks for a niche, which allows them to collaborate with the cluster members on areas that involve working with clients of the latter. “From time to time I’ve spoken to various people in the Park and say, this is what we’re doing and we think this could help you, and we’ll start those discussions” (Respondent E, personal communication, February 25, 2015). For instance, Intermediary 5 initiates a conversation about collaboration with a training company at Waikato Innovation Park. Likewise, they

reach out to another cluster member – a data logger company that creates a large volume of data, to seek an opportunity for collaboration. “It would make sense if we could work with some of your clients because that would strengthen your relationship with the clients, because they would be getting more value from your data, and it’d be good for us as well” (Respondent E, personal communication, February 25, 2015).

Nevertheless, the business propositions to both cluster members have not resulted in collaborations or joint projects. “Most people seem to be focussed on their own business and struggle to sort of think how can we grow that and - with things outside their own control” (Respondent E, personal communication, February 25, 2015). Although there are not many companies at Waikato Innovation Park that they regularly deal with, as a business mentor at Business Mentors New Zealand, Intermediary 5 helps refer new businesses seeking certain services to relevant companies, for instance, the law firm and an HR company at the Park. “If you’re not sure of anybody there’s a good company here at the Park” (Respondent E, personal communication, February 25, 2015).

6.1.6. Intermediary 6

Intermediary 6 has expertise in livestock recording systems, nutrient management and environmental modelling, and farm systems modelling. The company develops capabilities in large databases, machine learning and data analysis, and mathematical modelling (Rezare Systems, 2019). Intermediary 6 plays an important role in knowledge creation for customers in the agricultural sector.

First, today farming has become more complicated and very data rich. These data include maps of farms and soils, paddocks, slope, and type of land (Respondent H, personal communication, May 13, 2015). Once captured and collected, the data need to be edited or processed and combined into a more usable and a better-organised form. The combination process is enhanced by IT-based systems including database, documentations, and online networks (Nonaka & Konno, 1998) or modern computer systems (Nonaka et al., 1994). In this regard, Intermediary 6 helps the farmers combine these disparate data into a more meaningful form. According to Respondent H:

Excerpt 275: Respondent H

One is getting the data into a database where you can be confident in the quality or completeness of the data. It's always incomplete to some extent and it's always of variable quality, but you can at least test and ascertain are we at a level where we can use this. The second step is having some mathematic models that help you to combine that data, and sometimes they are really complex models: things like OVERSEER which is New Zealand's nutrient budgeting model, a very complex tool with dozens of sub-models of all aspects of farming...increasingly we're using machine learning techniques to help us with building and tuning those models. And then the third step is how you make that information - how you present it to farmers or to advisors... (Respondent H, personal communication, May 13, 2015).

Furthermore, Intermediary 6 also intermediates between the farmers and their advisors, consultants, and account managers, in relation to data interpretation. According to Respondent H:

Excerpt 276: Respondent H

Often farmers don't want to spend a lot of time doing deep information analysis...many farmers don't even want to spend time looking at graphs or simple tables of numbers. They just want to have a conversation with somebody who is able to interpret that for them, so that's where farm advisors, consultants and the account managers from the nutrient companies come in, because they bridge that gap. They don't necessarily know everything, but they're able to take the numbers of graphs or tables and convert that into explanations and recommendations a farmer can understand. So you've got almost two levels of interface there; you've got some software for farmers who are interested or for advisors, and then you've got the advisors themselves as an interface for farmers (Respondent H, personal communication, May 13, 2015).

Second, the process of knowledge creation also involves transforming tacit knowledge into an explicit form. This process requires a series of meaningful dialogue that enables articulating the tacitness of experiences or perspectives. Prototyping is an example of this form of knowledge transformation (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002). In this regard, Respondent H's company has expertise to develop farming software products or tools that involves a prototyping process, for the purposes of software designs and to test a product concept. At the early stage of prototyping, the company regularly engages in dialogues with customers or

intended users and also works as an intermediary between the two, to help articulate and understand requirements and obtain feedback. According to Respondent H:

Excerpt 277: Respondent H

So typically somebody wants the product developed and somebody else is the intended user, and so you immediately have one level of disconnect because the person who wants the product might not really know what the intended user wants. But there's another level of disconnect because the intended user may not know what they want either. And that's the problem. Most of our users, particularly farmers, they don't know what a software product could do or a tool could do, so they can't tell you what they want it to do...with a focus group of farmers it's a little bit different, because you really have to draw them out, whereas with a client you're still drawing them out but they are much more engaged already. They've come because they want to work this out...but often they won't have a clear idea of how this might work. They're not software specialists. They're not designers and so they kind of know what they want to achieve, but they might even find it quite hard to explain it (Respondent H, personal communication, May 13, 2015).

Excerpt 278: Respondent H

So there's a lot of asking open-ended questions to start with. If you've heard of the 'five why's', asking why you want to do something and then when they give you an answer you ask why is that the case? And then when they explain that you say okay, so why is that the case? And by the time you've done that about five times you've drilled in to hopefully some root causes...that starts with trying to understand the needs...I tend to write things up on the board. Visual note keeping and that's bullet points of what they have just said. And the reason is because then it's up in front of everybody and there's no need to take paper notes, but also they can look at that and say oh, well yeah, okay, that's not quite what I meant, you know?...so if I write it on the board they can see it and go no, no, no, no, what I meant was...and correct it. So that's quite important. If we're particularly lucky the client will get enthusiastic and they'll pick up a whiteboard marker and start drawing on the board. That's great, because then it's coming straight out of their head...so we have those explanations and we like to do that interactively with our customers, but we'll also go out on their behalf and talk to farmers or we will use our experience to assess how farmers might view things...you go and have a discussion with farmers and say if we gave you a tool that could do this, would that be valuable? How might you get the value from that? And you challenge them to say well what would you do different if you had this information... (Respondent H, personal communication, May 13, 2015).

According to Nonaka (1991, 1994, 2007), Nonaka et al. (1994), Nonaka and Konno (1998), and Harryson (2002), a series of meaningful dialogue using metaphors and analogies enable articulation of tacit experiences, perspectives, and knowledge. A metaphor enables linkages and comparisons of two concepts that subsequently discern their contradictions or discrepancies. On the other hand, an analogy helps harmonise and resolve the contradictions or discrepancies of the concepts, by highlighting their common attributes. In this regard, Respondent H's company and their customers, to some extent, engage in the concepts of metaphors and analogies, during their dialogues. According to Respondent H:

Excerpt 279: Respondent H

We had a company approach us a few months ago who wanted to develop a new software product. They had a set of goals they wanted to achieve with that software product, which was basically collecting some information from farmers that they could use for other purposes. They had some ideas of how they might do it...their ideas were reasonably complex, so they came here and there were two of them who came here. We brought in two or three members of our team...(Respondent H, personal communication, May 13, 2015).

Excerpt 280: Respondent H

...We spent a lot of time around the whiteboard, saying okay, what data do you want to collect? That was fairly easy. What quality does it need to be, because again if the farmer's not interested they might give you data but it might be low quality. Then what is the value we can give back to farmers, and how can we use that value to incentivise them to give good quality data? Yep, and how can we do that regularly, all of those sorts of things? So we spent a lot of time throwing around ideas, came up with some ideas and because we'd had some initial conversations with them we had some discussions with just ourselves and came up with some ideas as well, which we could then provide to the client and get their feedback on it. That was good. They decided they liked some of those ideas, so then we had a whiteboard session where we drew what this might look like on the whiteboard, yep, so we're drawing up some screens and those sorts of ideas, rubbing them out, saying no, that isn't going to work, all of those sorts of things (Respondent H, personal communication, May 13, 2015).

Third, post-prototyping and software development, Respondent H's company is also involved in knowledge creation and sharing through a training programme designed for intended users, farmers on how to use its software products. For Nonaka (1994), Nonaka et al. (1994), Nonaka and Konno (1998), and Harryson (2002), knowledge may be created through exercises, learning by doing, and training. This process is practically contingent on embodying knowledge into practice and action or on learning through active involvement, personal commitment, and constant self-improvement. In this regard, Respondent H's company provides two methods of training, on-site and remote training:

Excerpt 281: Respondent H

If farmers are prepared to come into a training course, sometimes we deliver training by that method. The reason for doing that is because farmers don't always get many social opportunities because they're quite remote. They're remote and they're busy, so sometimes a training course is an opportunity for them to come together and meet other farmers and they like that. So sometimes that's the way we deliver training...and we provide telephone support...when they had some time to sit down and talk to us on the phone and then got their mobile phone or their tablet with. Then we walked them through connecting that to the net - well it was already connected, you know, finding the web browser, putting in the URL, all of the basic stuff, getting them set up and...making sure they were confident, getting them to put in the first piece of data. Then we'd check on the web. We can't see their screen of course because they're on a mobile device, but we know what screen they're on and we can immediately see the data, yes, so we know if they're having problems. And then we'd say okay, now I'm going to just wait here and you put the second piece of data in it. So they put it in, they give us some feedback about how they're finding it, ask questions, and then we would leave them to it. A few days later we'd check up; how did they get on? Have they got it all in? (Respondent H, personal communication, May 13, 2015).

Respondent H emphasises the importance of technology in the agricultural sector. "I think if you can get two-thirds of the population to pick up the software product, that's probably pretty good. Some of those people are very successful farmers and business people..." (Respondent H, personal communication, May 13, 2015). Nevertheless, farmers may develop different attitudes towards technology. In this regard, Respondent H identifies three groups of farmers: technophiles, moderates, and technophobes. With different views on using software, these farmers may require different approaches to training:

Excerpt 282: Respondent H

I think we tend to see three groups of farmers. The first group are the ones who actually don't need training. They might need a brief explanation of what the goal is, but more and more nowadays people are smart with computers and they can just pick it up and do it. They don't actually want us trying to train them, yeah, so that's the first group. And so typically they succeed. Sometimes they need some support because they haven't read any manuals, they go and do something the wrong way, get themselves tied up in knots and then call us: can you help sort this out? The second group are those who will follow a recipe and so you can train them, or you can provide them with the action cards, the one-page instructions...if they're not confident with computers they can follow that...they can follow the recipe and they can get how to use the software. And the third group, you can give them a recipe and you can train them, and they will still not get it, yeah. And that's quite difficult, because they've spent the money - if it's paid software - and they just don't use it, because it's too hard and it's not necessarily that the software's hard, because the other groups got it. It's just it's too hard for them - or maybe they can even do it. Maybe they can follow the recipe, but they don't enjoy so they just stop using it...the reason they're not enjoying it is they have to sit in front of the computer in the office. But for others there's a fear of technology, or a dislike of technology. It may not be a fear: I just don't like it. I don't want to spend my time on it...I often find farmers who are quite happy to go to the Farm Source of Fencepost websites and log on and see their milk graph. That's all they do. They don't put any data into that website. They just look at that milk graph and go oh, okay! And they're quite happy to do that, so they're not truly technophobic, but they don't like using the computer for other stuff...and I'm not sure you can readily change that...if we find we've too large a number of people dropping through into that third group, or the process of supporting people in the second group is too hard, then it means there's stuff we have to address with the software (Respondent H, personal communication, May 13, 2015).

Last, Respondent H engages in intra and inter-cluster relationships and collaborations through which the companies share knowledge and experiences with partners both inside and outside the cluster. Dyer and Nobeoka (2000) argue that thriving networks depend on the ability to motivate member companies to participate and openly share their valuable knowledge. In this regard, Lanza (2005) asserts that knowledge sharing is fundamental for an effective knowledge creation. For Nonaka and Konno (1998) and Harryson (2002), knowledge creation can be achieved through shared experiences, individual interactions, and joint activities. These are facilitated by geographic proximity that allows direct or face-to-face interactions (Nonaka & Konno, 1998; Harryson, 2002). According to Respondent H, their company work in partnership with other cluster members through the exchange of employees:

Excerpt 283: Respondent H

There are a couple of companies here in the Park who work in the computer or software space. So one's LayerX which is just down the hallway here. They do hosting and so we use them for hosting. When we are short of resources, we've got more work than we can do, some of their staff will help us on contract. There's another company in the Park that does the same (Respondent H, personal communication, May 13, 2015).

Chapter Seven:

Discussion

7.1. Discussion on AgBio cluster

This research examines how competitiveness is created in clusters using a New Zealand example. A single embedded case study of the AgBio cluster in Hamilton, the Waikato region is chosen for this purpose. The AgBio cluster consists of heterogeneous companies as well as private and public institutes specialised in different aspects of business particularly agricultural technology, food and beverage, R&D services, professional services, and ICT services (Waikato Innovation Park, 2013). While there are about 48 companies locate within Waikato Innovation Park premises, the cluster also includes memberships based externally. The presence of the variety of companies and organisations with different focuses and expertise indicates the characteristics of active business clusters (Gray, 2002). For the purposes of this research, as the AgBio cluster is established and managed by the Park and the participated cluster members locate within its premises, the two are used interchangeably. Overall, the regional strengths influence the establishment of the AgBio cluster in the region and the decision of the cluster members to locate in the Park. In turn, the establishment of the cluster adds further to the existing regional strengths.

This section helps answer the research question one of this study: *“How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?”* The following section provides discussion on Waikato Innovation Park.

7.1.1. Waikato Innovation Park

This research shows that Waikato Innovation Park effectively play an intermediating role within the cluster. While Baxter and Tyler (2006) separately distinguish three generations of intermediaries, this research identifies the Park as a cross-generation of intermediary, which carry out the roles respectively performed by the second and third-generation intermediaries. For instance, based on Baxter and Tyler (2006), the Park exhibits the characteristics of the second-generation intermediary, which functions as an autonomous organisation from Hamilton City Council helping with the establishment through public and charitable funds. According to Baxter and Tyler (2006) the second-generation intermediaries enhance and develop assets including expensive-commonly needed

facilities as well as land and sites to build a critical mass of companies. They offer supports to small companies and serve as a central source of information for new entries.

As the third-generation intermediary, Waikato Innovation Park develops well-established relationships with education institutes such as universities, playing an important role bridging academics and companies. For instance, as evidence by the presence of Intermediary 3, the Park establishes a strong connection with the University of Waikato. The third-generation intermediary also helps maximise productive interactions such as informal relationships among entrepreneurs, investors, and researchers in order to foster R&D and innovation (Baxter & Tyler, 2006). In this regard, Waikato Innovation Park resembles science parks as described by Quintas et al. (1992), defining it as property-based initiatives that establish formal relationships with universities and research institutions. These science parks provide supports for research-based commercial activities and academic-industry linkages. They bridge a gap between academics and private sectors and enable the former to commercialise their research and raise funds from the latter (Quintas et al., 1992). Furthermore, they help embryo high-tech companies develop in a protected or secured environment in their early and vulnerable stage (Seaton & Cordey-Hayes, 1992). As a result, the science parks are seen as an instrument facilitating scientific knowledge that leads to technological innovation and transfer to industry (Quintas et al., 1992). Therefore, with these attributes, the cluster members opt to locate within Waikato Innovation Park to access research results, academic expertise, and advanced technologies.

For instance, Waikato Innovation Park is home to leading agricultural-based companies including Tetra Pak, Lely Sensortec, FoodWaikato of New Zealand Food Innovation Network, Hill Laboratories, Farmax, and Dairy Solutionz Beef Solutionz. With these leading agricultural-based companies located within the Park, this research also suggests that the present of the AgBio cluster contributes further to the locational strengths of Hamilton, the Waikato region. In this regard, the findings concur with Dana and Winstone (2008) showing that business clusters help promote a locational or regional identity in which they are based, the key source of competitiveness, and, in turn, attracts major companies and organisations to establish in the region. These companies and organisation contribute further to the region and local community, for instance, through employment, financial investment, infrastructure, and research. They also help spawn related and supporting industries. This results in critical mass, which further promote the region

(Dana & Winstone, 2008). Therefore, the regional identity may help promote the AgBio cluster nationally but also internationally, indirectly leading to the development of an international identity and export opportunities for the cluster members.

This research finds that while the Waikato Innovation Park premises provide an environment that facilitate inter-organisational relationships and collaborations among the cluster members, the relatively small district size of Hamilton, the Waikato region further promotes strong inter-personal relationships, which subsequently help enhance collaborations among small local companies, for instance, on export. Furthermore, the management team at the Park commits to networking, building strategic partnerships with important organisations such as research institutions and commercial entities in the Waikato region, nationwide, and overseas, as well as among the cluster members. The commitment to networking allows the Park to develop abundant networks and to effectively become a central point of contacts, an intermediary facilitating inter-organisational relationships among the cluster members as well as an information provider, a signpost for many other companies. This is consistent with Haga (2009) identifying intermediaries as a central point of contact, with extensive networking relationships with a large number of organisations in clusters (Zhang & Li, 2010; Todeva, 2006; McEvily & Zaheer, 1999). This connected culture increases opportunities for the cluster members to build inter-organisational relationships and renders them an easier access to strategic partners of the Park for, for instance, research capabilities and new commercial introductions.

Furthermore, as an intermediary, Waikato Innovation Park, being central point of contacts, helps identify opportunities for mutually beneficial collaborations, matching companies with common interests, for instance, to share information and knowledge and exploring the prospect of joint production to achieve economies of scale for both local and overseas markets. In this regard, the Park promotes a continual social mixing or regular communication and face-to-face interactions among the cluster members by regularly organising monthly events and six-monthly events. As a result, these events offer platforms to promote more regular networking and build trust-based inter-organisational relationships, which influence intra-cluster and external collaborations within New Zealand and overseas.

The findings of this research are confirmed by Levi et al. (2004) that long-term inter-organisational relationships influence trust relations and a credible alteration of interests of distrusted parties. Likewise, Cox and Mowatt (2004) and Nooteboom (2003) argue that, along with information sharing and communication, long-term relationships is an important component for trust building. Such mutually beneficial interactions enable networked companies to develop trust further (Lütz, 1997; Williamson, 1971). For Burt and Knez (1996), trust is produced through repeated interactions and, therefore, makes future collaboration more likely. In this regard, the findings of this research are also consistent with past research arguing that trust is the main mechanism governing collaborations (Lütz, 1997; Creed & Miles, 1996; Grandori & Soda, 1995), fosters cooperative behaviours (Mishra, 1996), assures reciprocity of information exchange (Burt, 1992), and sustains durability of collaborations (Smith-Doerr, 2006). Furthermore, it eliminates a fear of being exploited and increases communication of undistorted information (Mishra, 1996).

Furthermore, the findings of this research concur with other studies in relation to the importance of social events. For instance, informal relations between employees, competitors, customers, and suppliers through conventions, seminars, trade fairs, and other social events influence the success of companies in Silicon Valley (Dahl & Pedersen, 2004; Saxenian, 1994). Likewise, the Waipara wine cluster in New Zealand helps build inter-personal and organisational relationships among the cluster members and facilitates learning and the sharing of information, knowledge, and experience related to viticulture through educational seminars or conferences and social events (Dana & Winstone, 2008). This research also concurs with previous studies, which suggest that communication as a cost-effective mechanism, which helps establish inter-organisational relationships and maintain a long-term collaboration (Grandori & Soda, 1995; den Hartog, 2003).

Although business clustering and the social events at Waikato Innovation Park provide platforms for networking, the findings of this research add to our understanding that inter-organisational relationships do not always result in collaboration. In this regard, the prospect of collaboration is an ultimate decision of the cluster members whether they are willing to work in partnership with other companies. In this regard, as an intermediary, the Park helps increase the chance for intra-cluster and external collaborations. For instance, the Park identifies the need and niche for collaboration and incrementally help

build an early success resulted from the collaboration, aiming for relatively more simple and achievable collaborative goals. The early success acts as a proof of concept, which encourages reluctant businesses to be more open to future collaborations.

Besides the intermediating role of Waikato Innovation Park, the potential for trust-based inter-organisational relationships and collaborations as well as information and knowledge sharing also rest upon geographic proximity between and co-location of the cluster members within the Park premises. The co-location also allows the cluster members to access highly competent related and supporting companies based in the Park premises and engage in intra-cluster business relationships and deals with more ease. The findings are consistent with that previous studies that geographic proximity or co-location facilitate and increase the likelihood of inter-organisational relationships (Pavlovich & Akoorie, 2010; Scott-Kennel, 2007) as well as allow the transfer of information and knowledge with more ease (Pavlovich & Akoorie, 2010). Likewise, Fraser and Kelly (2010) claim that co-location contributes to the development of buzz within clusters, a major contributor to the cluster success and growth. In this regard, buzz enables a continuous diffusion of information and knowledge and new knowledge creation (Fraser & Kelly, 2010; Bathelt et al., 2004).

Nevertheless, the advent of ICT may diminish the importance of co-location, giving the cluster members at Waikato Innovation Park a greater freedom in terms of locational choice, especially non-agriculture-related companies. The importance of ICT is confirmed by Toland and Yoong (2005) that, along with social networks, ICT networks becomes an important tool used to improve the flow of knowledge and, therefore, contribute to the successful development of the New Zealand learning regions. Although ICT may undermine business clustering, clusters remain essential to competitiveness (Guerrieri & Pietrobelli, 2004; Zaheer & Manrakhan, 2001). The clusters allow a better flow and an easier exchange of information (Rooney et al., 2005; Toland & Yoong, 2005) and a quick and direct learning and acquisition of information and knowledge at minor or no costs (Rosenfeld, 1997; Zaheer & George, 2004; Toland & Yoong, 2005; Maskell, Bathelt & Malmberg, 2006). In this regard, while geographical distance limits the scale and range of communication and makes an exchange of information and knowledge harder and costlier, an institutionally rich location of the clusters enables information related to new knowledge and technologies to diffuse more rapidly and completely (Zaheer & George, 2004).

Despite the advantages of co-location, the cluster members still enjoy the above benefits being based outside Waikato Innovation Park, in other locations in Hamilton, the Waikato region. In this regard, this research finds that the attractive amenities play an important role attracting the cluster members. As complementary to the locational strengths of the region, a dynamic business site with attractive and modern amenities at the Park is relatively cost-effective, which influence the locational choice among the cluster members to locate in the Park premises. For instance, the Park offers a free access to common meeting rooms and reception, event facilities, and easy-parking spaces. The cluster members also enjoy innovative laboratories and high-tech IT services including a high-speed Internet connection and on-site IT specialists. Nevertheless, while the high-tech IT services offered at the Park are of great benefit to small clusters, these services may require further improvement to accommodate the needs of larger cluster members. Along with the amenities, the on-site café – deVice is a key asset of the Park, being popular among staff and visitors and allowing greater networking opportunities. As a result, this research finds that the facilities available at the Park facilitate inter-organisational relationships and collaborations among the cluster members and allow them to project a more professional image and reputation, showcasing successes to relevant stakeholders such as customers and business partners.

Along with facilitating inter-organisational relationships and collaborations, as a representative of New Zealand Trade and Enterprise – NZTE and Callaghan Innovation, Waikato Innovation Park is actively involved in providing Business Growth support, to stimulate growth among the cluster members and eligible companies. Although not directly involved in venture financing, the Park offers advice including that related to business and financial needs and helps connect with relevant experts and organisations such as financial institutions. In this regard, the findings of this research concur with previous studies in relation to the involvement of intermediaries in finance-related assistance. For instance, owing to well-established relationships with different organisations including financial institutes (Haga, 2009), intermediaries are able to facilitate the diffusion of information and knowledge related to, for instance, finance (Baxter & Tyler, 2006). In this regard, the roles of intermediaries include helping find funds and supports for, for instance, innovation (Howells, 2006).

Likewise, to stimulate growth, Waikato Innovation Park helps identify the needs for business skill training and direct the cluster members and eligible companies to pre-

approved well-qualified and skilled trainers. The Park, as an intermediary helping the cluster members and other eligible companies with business skill training, advice and connect with the trainers are important especially for small companies. Financial constraint limits their ability to invest in internal competencies including training (Clark & Guy, 1998). The findings of this research further add to our understanding of the role of intermediaries in training. While previous research by Howells (2006) argues that intermediaries work on one-on-one basis to provide companies with direct services including training, this research also shows that the intermediates also play a role as facilitators helping connect the cluster members with relevant experts specialised in providing training service.

This research shows that the positive attributes discussed earlier allow Waikato Innovation Park to become a transformative platform supporting the growth of the cluster members, in particularly to expand and diversify. For instance, Tetra Pak, a large corporation, has grown being at the Park. Likewise, there are also increased opportunities for growth among small and newly-established companies at the Park. For instance, Respondent H emphasises that, with the established brand name and networks, the Park assists with building reputation in the industry and growth, at the early stage of their company. In this regard, this research is supported by previous studies claiming that small companies are more likely to rely on clusters to build inter-organisational relationships (Perry, 2007b; Palakshappa & Gordon, 2007). The network and cluster approaches compensate for their weaknesses, to tackle resource constraints, access skills and knowledge, accelerate technological advancement, and build and maintain competitiveness in both local and global marketplaces (Palakshappa & Gordon, 2007). For Macpherson, Jones, Zhang and Wilson (2003) and Akoorie and Scott-Kennel (1999), these approaches help improve and expand their competences and competitiveness.

Furthermore, these findings are supported by previous studies in relation to the role of intermediaries in supporting small and newly-established companies. Clark and Guy (1998) find that there is noticeable growth in the importance and numbers of intermediaries assisting small companies. In this regard, the small companies rely on the intermediaries (Weber & Schnell, 2003; Shohet & Prevezer, 1996), to offset the lack of capabilities (Bessant & Rush, 1995) and for consultancy services, assistance, and advice (Bharati & Chaudhury, 2010; Brown & Lockett, 2004; Bessant & Rush, 1995) and to compensate for the lack of capabilities (Bessant & Rush, 1995). Likewise, the

intermediaries are able to provide the new-established businesses a wide range of information, knowledge, and other opportunities, as well as to help establish networking with other organisations such as companies, research institutes, and universities (Zhang & Li, 2010). While this research concurs with a previous study by Quintas et al. (1992) in relation to the benefits of being based at the Park, it adds to our understanding that large and more-well established companies are relatively less like rely on the Park for their business growth.

While helping small and newly-established companies mitigate challenges in domestic markets, this research finds that Waikato Innovation Park spots opportunities and assists the cluster members, particularly those small in size, to enter overseas markets including Japan and South Korea. A rapid globalisation is of an enormous pressure particularly for those from a small economy such as New Zealand (Chetty & Campbell-Hunt, 2003). Besides being prone to bankruptcy (Salman, von Friedrichs & Shukur, 2011), they lack management and marketing skills, technical know-how, experience and knowledge about export procedures and foreign markets (Sadeghi et al., 2018; Rutashobya & Jaensson, 2004). They are relatively more vulnerable to cultural differences once engaged in foreign markets compared with larger companies (Tihanyi, Griffith & Russell, 2005). Furthermore, the small companies tend to be risk-averse (Bitzenis & Marangos, 2008; Eapen & Krishnan, 2009), are wary of psychological and geographical distances (Chen & Ku, 2002; Rutashobya & Jaensson, 2004), lack potential in global markets (Stanton & Stanton, 2011). As a result, they are less able to engage directly in globalisation (Dana & Winstone, 2008). This research concurs with previous studies that as intermediaries widen their roles into overseas markets (Howells, 2006), they acquire information about and, therefore, are able to provide access to different markets including those overseas (Forstner, 2004).

While advantages of locating in Waikato Innovation Park are evidenced, this research finds that there is a limitation in relation to the aims of the social events, to promote inter-organisational relationships and potentially lead to collaborations. For instance, attending companies, which include the cluster as well as non-cluster members may quickly attempt sales or collaborations and bypass the important part of the process, relationship building. This finding concurs with that of Perry (1996) claiming that intermediaries may be of limited direct assistance to develop networks through social events. Such events tend to become arenas for marketing, rather than networking, as attending companies solely

focus on identifying potential customers. For this reason, this research suggests that collaborations that potentially result in monetary gains are the by-product of inter-organisational relationships. Nevertheless, the social events still provide opportunities for relationship building that increases the likelihood of collaborations.

Despite the effort by Waikato Innovation Park to promote inter-organisational relations through the social events, there remains a lack of communication among the cluster members within Waikato Innovation Park. While this phenomenon can be partly attributed to the disregard of the original purpose of the social events, as discussed above, the heterogeneity of the AgBio cluster, differences in and specificity of business focuses of the cluster members, also influence the need to build relationships and, therefore, to communicate. In this regard, the diversity of the AgBio cluster limits the opportunities and areas for collaborations among the cluster members to achieve common goals. Nevertheless, the relatively small market size in New Zealand influences the intra-cluster collaborations among the cluster members. In this regard, the growth of the market size, the industry in which the cluster members operate in determines the potential for future collaborations. Therefore, the relationship between the heterogeneity and the limited intra-cluster interactions and collaborations may not be found in a larger cluster.

This finding suggests that the heterogeneity nature of the AgBio cluster is a characteristic of a functioning cluster as suggested by Perry (2007a). Likewise, Lindsay (2005) identifies this attribute as a complementary cluster, a diverse cluster encompassing members across a wide range of value chains. The diversity provides opportunities for collaborations and ensures continuous flows and creation of new knowledge among the cluster members (Lindsay, 2005). Although the cluster diversity is deemed a positive characteristic of a functional cluster, this research, in contrast to the findings of Perry (2007a) and Lindsay (2005), identifies that the diverse nature of the cluster members hinders the opportunities for intra-cluster relationships and collaborations. Nevertheless, the willingness to work in partnership remains strong, especially that of the smaller or newly established companies. Furthermore, the limited internal collaborations encourage the cluster members to seek partnerships with external partners including those based in nearby regions such as the Auckland region.

Besides the lack of opportunities for intra-cluster collaborations, this study also identifies another drawback associated with Waikato Innovation Park, the divergence between the

initial ambitions to establish a true science park and the actual development. For this reason, there is a concern that the Park gradually evolves into co-location of companies with similar interests. For instance, the finding of this study shows that the Park disproportionately concentrates on companies with existing business ideas or products, for instance, to help with exports of local farm techniques and farm equipment. In contrast, a previous study shows that science parks assist embryo high-tech companies develop in a protected or secured environment in their early and vulnerable stage (Seaton & Cordey-Hayes, 1992).

Furthermore, while there is a lack of desire among stakeholders, particularly the local government, to realign the Park into a true science park, this research suggests that to become a true science park requires proactive involvements of the local stakeholders such as businesses, for instance, to emulate the success of overseas-based exemplary clusters, especially those in Australia. In contrast, Perry (2004) argues against the excessive emphasis on the overseas-based exemplary clusters, claiming that policy designed to promote business clustering in New Zealand is misled by the belief that resulted outcomes correspond to those of the exemplar clusters. The development of these clusters requires a substantial and sustained public expenditure over a period of time, along with distinctive market and industry conditions. Therefore, instead of conforming to characteristics of the overseas-based exemplary clusters, the aim is to customise the policy based on those of eligible clusters (Perry, 2004).

7.2. Discussion on innovativeness of cluster members

According to Mason et al. (2008), an innovative capability of companies is one of the most important competitive components for clusters. This chapter discusses competitiveness of the AgBio cluster, in terms of innovativeness of the cluster members located in Waikato Innovation Park. This involves an examination of innovation data collected through the CIS-style questionnaires during the three-year period between 1 April 2011 and 31 March 2014, as well as the secondary data made available at the Park. Based on the research results in Chapter Five, the discussion is on product innovation; process innovation; innovation-related activities; sources of information and co-operation for innovation; constraints on innovation; and business growth in terms of employment size. Overall, this section helps answer the research question one of this study: “*How can*

the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?" The following section discusses innovations within the AgBio cluster.

7.2.1. Innovations within cluster

This research describes innovations within the AgBio cluster as product (good or service) innovation, process innovation, and other innovation-related activities. Product innovation includes all new or significantly improved goods or services such as improvement in quality or distinct user benefits, regardless of their origin. The innovation, although new to companies, does not need to be new to a market. Likewise, process innovation comprises all new or significantly improved methods for the production or supply of goods or services, regardless of their origin. It, although new to the companies, does not need to be new to the industry or market. Besides product and process innovations, innovation-related activities consist of organisational and managerial changes. Other activities include design activities, training, prototyping, internal and external R&D, as well as acquisitions of advanced machinery, equipment, software, and intellectual property rights.

The majority of the respondents were actively involved in product innovation. More of these innovating cluster members undertook service-based innovation compared to good-based innovation. In this regard, this phenomenon is due to the fact that services are the main products of more of the respondents. While an equal number of the respondents carried out product innovation through their own capabilities and through cooperation with other organisations, only few companies solely rely on others. This pattern indicates that the cluster members possess a high level of innovation capabilities and also value working with others in partnership. Cooperation for innovation is discussed further in the later section of this chapter. Furthermore, the same proportion of the respondents introduced product innovation that are new to market and new to business. The introduction that are new to the market may give the cluster members a competitive edge over competitors. It may also stimulate competition in that market and subsequently further innovation and improvement leading to competitiveness.

While the innovating cluster members partaking in the survey anticipate financial rewards from their investments, to increase sales, the majority of these companies reported the

largest percentage of their total turnover came from products that are unchanged or only marginally modified in 2014. The second highest percentage of respondents report no turnover from products that are new to market and only new to their businesses during the same period. On the one hand, this may indicate that investment on innovation may not eventuate in larger turnovers in the short run. On the other hand, it may also indicate the importance of marketing strategies, to make innovative products more well-known to potential customers.

Although the cluster members participating in the survey undertook process innovation, fewer were involved in this type of innovation compared to product innovation. The former involves changes in how companies operate, focusing on both internal and external aspects of businesses (Statistics New Zealand, 2010). Similar to production innovation, an equal number of the respondents carried out process innovation with their own capabilities and through cooperation with other organisations. Only few companies solely rely on capabilities of others to innovate. Furthermore, more of the innovating cluster members introduced process innovation only new to business. The patterns identified in the survey, in relation to process innovation, are in line with Statistics New Zealand (2010) claiming that process innovation tends to be a less visible type of innovation to customers and is less likely to result in changes in sales and incomes for businesses, compared to product innovation. This is probably the main reason that there was a lower proportion among the respondents to carry out process innovation.

Besides product and process innovations, innovation activities undertaken by the respondents include organisational and managerial changes. Among these changes, the largest proportion of the respondents undertook the changes in organising external relationships. This shows that the cluster members value and are willing to engage in inter-organisational relationships and collaboration. Cooperation for innovation is discussed further in the later section of this chapter. In comparison, fewer of the respondent undertook changes to marketing concepts or strategies. This result may indicate that there is a tendency among the cluster members to rely on the intermediary, Waikato Innovation Park to carry out a marketing job collectively for all the businesses.

Many of the respondents were also involved in other innovation-related activities including design, training, prototyping, as well as internal and external R&D. Their involvement in training and prototyping activities, in particular, helps these cluster

members create knowledge (Nonaka, 1994; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002), which a source of lasting competitiveness in the presence of uncertainty (Nonaka, 1991, 2007). Furthermore, the majority of the respondents undertook innovation-related activities carried out internal R&D and a half of them external R&D. According to Statistics New Zealand (2010), R&D is one of the key elements of innovation and may take up a large proportion of expenditure on innovation. This shows that the innovating cluster members in this research understand the value of innovation and are actively involved in innovation activities that potentially lead to new product development.

Innovativeness of the cluster members is also discussed in Chapter Five (Regional competitiveness). In this regard, attitudes towards innovation among these companies become increasingly positive, especially as their businesses grow (Respondent A, personal communication, December 09, 2014). Furthermore, these cluster members also develop to a certain degree of differentiation from competitors. Their differentiations include a technological leadership in the industry, unique product features, an open access facility to New Zealand exporters, and a uniquely competitive niche in terms of size (Respondent P, personal communication, February 05, 2015; Respondent N, personal communication, December 01, 2014; Respondent M, personal communication, April 28, 2015). Information or knowledge is important to businesses that innovate. The following section discusses sources of information the cluster members use for their innovations.

7.2.2. Sources of information for innovations

Besides internal resources and customers, inter-organisational relationships are important mechanisms for information and knowledge transfer and creation leading to innovation (Gerke, 2016; Toland & Yoong, 2005; Kodama, 2005). The relationships generate knowledge, innovative ideas, and innovations (Smedlund, 2006; Smedlund & Toivonen, 2007). Lindsay (2005) similarly stresses the importance of synergistic relationships between cluster members and external companies or organisations, as rich sources of new knowledge and innovation. Likewise, close working relationships with related and supporting industries including capable locally-based suppliers and competitive related industries allow a readier access to components and machineries, as well as information and ideas that lead to innovation (Porter, 1998a). Furthermore, working in partnership

with competing companies is no longer seen as a threat but an effective way to tackle a high cost of innovation or technological change (Lanza, 2005).

In this research, the majority of the respondents considered an internal source of information from within their businesses being most important for innovation, followed by external information from their customers. In the order of their importance, other external information from suppliers, businesses from related industries, and competitors are also deemed important sources of information for innovation. As discussed in Chapter Six, Waikato Innovation Park or Intermediary 1 effectively becomes a central point of contacts and an information provider, a signpost for many other companies (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015a). Furthermore, the Park organises and runs seminars and other social activities or events through which it helps connect the cluster members with experts and relevant organisations and with other like-minded businesses (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015d; Waikato Innovation Park, 2015f).

Only a small proportion of the respondents relies on information for innovation from science, industrial or innovation parks and that available through forums, conferences, trade fairs, exhibitions or social events. The difference in perception between newly start-up companies and more established businesses, in relation to the degrees of importance, help explain this phenomenon. For instance, the established businesses that are more readily to innovate may find the information generic and less relevant for the purposes of innovation. In this regard, these companies are relatively less dependent on intermediaries and largely rely on own capabilities and inter-organisational networks to obtain information for innovation. In this research, the survey respondents fall under the latter group of companies and, therefore, consider these sources of information relatively less important (Respondent J, personal communication, March 05, 2015; Respondent B, personal communication, May 18, 2015; Respondent D, personal communication, March 03, 2015). Nevertheless, the cluster members use a variety of information sources for innovation activities. This renders more information choices that help these companies to successfully innovate. Working in partnership is important to businesses that innovate. The following section discusses cooperation for innovation among the cluster members.

7.2.3. Cooperation for innovation

Cluster members may engage in cooperation with other companies or organisations for the purposes of innovation. This strategically cooperative arrangement leads to an exchange of information and knowledge, as well as innovation (Porter, 1998a, 1998b; OECD, 1999; Toland & Yoong, 2005; Dana & Winstone, 2008). It affords collaborative partners an access to complementary skills, technologies, knowledge and markets, enhances their learning capabilities, and shortens innovation cycles (Powell, 1996; Roijakkers & Hagedoorn, 2007). Likewise, the survey respondents in this research also engage in cooperation for the purposes of innovation. While these cluster members engage in the cooperative arrangement for their product and process innovations, they also actively participate in joint innovation projects with other businesses or organisations. These partners locate locally or regionally, throughout New Zealand, in Australia, and overseas.

Although the cluster members participated in the survey locate in Hamilton, the Waikato region, overall, the majority of these companies have cooperative arrangements with partners located throughout New Zealand. This is followed by locally or regionally, overseas, and Australia-based partners. These respondents tend to collaborate with local or regional suppliers but with customers nationwide, as well as in Australia and overseas. This pattern indicates the importance of local or regional suppliers to competitiveness, as described in Porter's Diamond model, related and supporting industries (Porter, 1998a, 2000). It also shows that these cluster members serve national-based customers and export their products to Australia and overseas, in addition to those within the Waikato region. Their involvement in exporting activities and cooperation for innovation with the customers in those markets suggest competitiveness. According to Ketels (2006) the ability of companies to export to overseas markets is associated with their competitiveness.

Besides participating in joint innovation projects with business partners in the market, the respondents' companies also have a cooperative arrangement with organisations deemed as intermediaries. In this regard, the majority of these companies engage in cooperation with universities or higher education institutes located in New Zealand, followed by science, industrial or innovation parks, centres or institutes embedded in universities, and consultants or private agencies within the same location. In comparison, a smaller

proportion of the respondents work in partnership with the same types of cooperating partners based locally or regionally. This pattern may be explained by the locational competitiveness of Hamilton, the Waikato region, being in proximity to nearby locations, particularly the Auckland region. This centrality of location may increase a number of cooperating partners and also facilitate cooperation on innovation between the cluster members and their national partners.

Therefore, it is more likely that the respondents' companies carry out cooperation for the purposes of innovation with non-cluster members. As discussed earlier in this chapter on Waikato Innovation Park, the heterogeneous nature of the AgBio cluster limits opportunities and areas for collaborations among the cluster members. The limited opportunities for internal collaborations encourage the cluster members to seek partnerships with external partners including those based in nearby regions such as the Auckland region. Furthermore, there is a limitation in relation to the aims of the social events organised and run by the Park, to promote inter-organisational relationships and collaborations. In this regard, attending companies may quickly attempt sales and bypass the important part of the process, relationship building. Diverging from the original purpose of the social events may further limit intra-cluster collaborations. Nevertheless, the willingness to collaborate remains strong, especially that of the smaller or newly established companies. There are factors that hamper innovation or discourage businesses from undertaking innovation. The following section discusses the factors hampering innovation of the cluster members.

7.2.4. Constraints on innovation

Although companies innovate, not all complete their innovation activities. In this research, the majority of the respondents still had their innovations ongoing as in 2014, while a relatively smaller proportion engaged in innovations that were abandoned or suspended before completion. In this regard, there are hampering factors that discourage these companies from continuing with their innovation. They encompass cost and knowledge factors, as well as availability of previous innovations and no demand or lack of customer responsiveness. Knowledge factors are the least hampering on innovation, followed by the availability of previous innovations and lack of demand or responsiveness. This pattern shows that the cluster members tend to possess adequate innovation-related knowledge that allows them to innovate whereas demand for their

innovative products exists. Nevertheless, cost factors such as availability of finance, direct innovation costs, and cost of finance are the main factors hampering their innovation activities.

Financial constraints encountered by the cluster members is emphasised earlier in Chapter Five (Regional competitiveness). For instance, banks in New Zealand are generally deemed high risks especially for entrepreneurs and newly start-up companies (Respondent R, personal communication, November 24, 2014; Respondent Q, personal communication, November 28, 2014). It is also a challenge for particularly small companies to seek financial support from, for instance, venture capitalists and angel investors in New Zealand (Respondent R, personal communication, November 24, 2014). In this regard, there is a limited pool of financial capital (Respondent K, personal communication, December 02, 2014). The absence of critical mass together with the relative immaturity of these private financial providers may result in the lack of fund (Respondent N, personal communication, December 01, 2014). Furthermore, overly profit-oriented venture capitalists and angel investors with a high expectation for return may negatively affect the fund availability (Respondent N, personal communication, December 01, 2014; Respondent R, personal communication, November 24, 2014). The lack of funding from the private sector is further affected by the attitude of these financial providers towards risk, being relatively more risk-averse compared with their overseas counterpart in the U.S.

Owing to the difficulties obtaining fund from the private sector, eligible businesses may seek support from the government (Respondent R, personal communication, November 24, 2014). As discussed in Chapter Five (Innovativeness of cluster members), the majority of the survey respondents receive financial assistance from the central government, while a smaller proportion are assisted by the local or regional government. Furthermore, one of the cluster members also receives non-financial assistance from the two forms of government. In this regard, Toland and Yoong (2005), Gray (2002), Brimblecombe (2005), and Buerkler (2013) put emphasis on government policies and initiatives aiming to promote business clustering and networking. For instance, cluster-related government initiatives include those set up by NZTE aiming to facilitate the development of business clusters having potential for significant growth, as well as to provide guidance and financial assistance to regions with strategies for sustainable economic growth (Toland & Yoong, 2005).

Government assistance is further evidenced in Chapter Six (Intermediary 1). For instance, the cluster members may be eligible for financial assistance from NZTE and Callaghan Innovation, with a range of business skill training and development of products respectively (Respondent A, personal communication, December 09, 2014; Respondent D, personal communication, March 03, 2015; Respondent M, personal communication, April 28, 2015; Waikato Innovation Park, 2015a, 2015e, 2015f, 2015g). They may receive up to 50 per cent of capability building funds for sale training (Respondent D, personal communication, March 03, 2015) and up to 40 per cent of R&D funding through Callaghan Innovation (Respondent M, personal communication, April 28, 2015).

Furthermore, eligible businesses may indirectly benefit from government financial assistance, through universities such as the University of Waikato (Respondent J, personal communication, March 05, 2015) and collaborating partners' projects funded by Sustainable Farming Fund (SFF) and Primary Growth Partnership (PG) (Respondent K, personal communication, December 02, 2014). Tax incentives is another form of government assistance (Respondent F, personal communication, March 26, 2015). Overall, the government financial assistance influences innovation among the cluster members. It contributes to the success of small companies and newly star-ups at the early stage and also to their growth and export opportunities at the later stage. (Respondent J, personal communication, March 05, 2015; Respondent B, personal communication, May 18, 2015). The following section discusses in more details business growth among the cluster members and highlights the influence of Waikato Innovation Park on the growth.

7.2.5. Business growth

The results from the CIS-style survey and from the secondary source show that the majority of the cluster members experience growth, in terms of employment size and finance. The growth is also confirmed by the findings discussed in Chapter Six (Intermediary 1) (Respondent G, personal communication, April 01, 2015; Respondent A, personal communication, December 09, 2014). According to Brown et al. (2010), cluster development agencies included those formed in partnership between a cluster and government play an important role in identifying and coordinating actions to satisfy specific needs of small cluster members. For Gray (2002), a proactive approach adopted by the government and local economic development agencies helps place New Zealand among leading countries that understand and develop local business clusters. To date, the

local economic development agencies establishes around 80 per cent of New Zealand clusters.

In this research, Waikato Innovation Park, assuming the role of a development agency or intermediary, helps with the cluster development and business growth of the cluster members. For instance, its Business Growth team helps uncover obstacles and suggest appropriate actions suitable for growth strategies (Waikato Innovation Park, 2015e). The team commits to progress by keeping communicate with the companies, to identify opportunities for further supports (Waikato Innovation Park, 2015d). In this regard, it works closely with the cluster members to assess opportunities for growth (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015e). As a result, the Park becomes a great first point of contact for those seeking assistance with business growth (Respondent F, personal communication, March 26, 2015).

The influence of Waikato Innovation park or Intermediary 1 on the growth of the cluster members is further confirmed in Chapter Six. In this regard, being a representative of NZTE and Callaghan Innovation, the Park offers a free business growth support and advice to innovative and export-focused companies in both the Waikato and Bay of Plenty regions. For instance, the Business Growth team assists these eligible businesses to access overseas markets including Japan and South Korea (Respondent B, personal communication, May 18, 2015). Furthermore, the team helps seek fund from NZTE and Callaghan Innovation. The two organisations offer a wide range of business skill training and development of products respectively (Respondent A, personal communication, December 09, 2014; Respondent D, personal communication, March 03, 2015; Respondent M, personal communication, April 28, 2015; Waikato Innovation Park, 2015a, 2015e, 2015f, 2015g).

Furthermore, Waikato Innovation Park helps connect with experts and needed resources regionally, nationally, and globally, to stimulate growth (Respondent A, personal communication, December 09, 2014; Waikato Innovation Park, 2015d). In this regard, the Business Growth team organises and runs seminars and other social activities or events. The aim is to promote dialogues and networks and to help connect the cluster members with relevant organisations such as Government Export Credit Office, as well as financial institutions that are able to provide financial support. These include venture capitalists and banks. The team also organises conferences or seminars run by, for

instance, NZTE on how to raise capital (Respondent A, personal communication, December 09, 2014; Respondent J, personal communication, March 05, 2015; Respondent B, personal communication, May 18, 2015; Respondent D, personal communication, March 03, 2015). Through these seminars and social events, the team also help connect with other like-minded businesses seeking growth (Waikato Innovation Park, 2015f). According to Saxenian (1994) and Dahl and Pedersen (2004), the success of companies in Silicon Valley is influenced by informal relations between employees, competitors, customers, and suppliers through conventions, seminars, trade fairs, and other social events.

7.3. Discussion on regional competitiveness

According to Lechner and Leyronas (2012), cluster competitiveness depends on competitiveness of a location or region in which they are based. This section discusses the competitiveness of Hamilton, the Waikato region, based on the research findings in Chapter Five. The regional competitiveness influences the competitiveness of the AgBio cluster. The discussion involves a subjective assessment of the four determinants of Porter's Diamond model: factor conditions; demand conditions; related and supporting industries; and firm strategy, structure and rivalry. Nevertheless, this research does not assess the influence of 'Chance', the external determinant of the Diamond model, on the regional competitiveness. Justification for the subjective assessment is primarily based on inputs made by the interviews of this research. While (+) represents a positive view towards each aspect of the determinants, (-) denotes a negative view. On the other hand, (+/-) signifies neither positive or negative view, a determinant has no positive or negative effect on the competitiveness. Overall, this section helps answer the research question one of this study: "*How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?*" The following section discusses the influence of factor conditions on the regional competitiveness.

7.3.1. Factor conditions: Basic factors

Hamilton, the Waikato region is endowed with the strengths of both basic and advanced factor conditions. Although the advanced factors, to a greater extent, influence

competitiveness of the region, the basic factors also play an important role that further help elevate its competitive position among other locations within New Zealand. In this regard, this research identifies basic factor conditions that help companies to successfully compete, according to (Porter, 1998a, 2000; Clark & Guy, 1998). First, the research findings show that the centrality of Hamilton, the Waikato region to other important locations such as Auckland is deemed beneficial to local companies. For instance, the centrality is viewed by some of the interviewees such as Respondent I, Respondent F, and Respondent J as one of the key attributes making the Waikato region a desirable location for particularly agriculture-related companies.

In this regard, owing to the proximity to other places and also to the countryside within the North Island, the location of Hamilton facilitates business operations of the local companies, compared with the Northland region of New Zealand. This notion is highlighted by Respondent I. Likewise, the proximity to Auckland and an efficient transportation facilitate inbound and outbound labour movement or migration and business operations including exporting activities, according to Respondent J. Furthermore, the proximity to Auckland also renders cost competitiveness, allowing the local companies to serve the Auckland market at relatively lower running costs. This notion is highlighted by Respondent F and Respondent J. Nevertheless, the cost competitiveness, for instance, related to grazing is not limited to the Waikato region per se. It also extends to agricultural-related companies based in other locations in New Zealand. Overall, while the basic factor conditions contribute to competitiveness, they may also serve as pull factors attracting existing companies and new entrants. This is emphasised by the Respondent F, claiming that these attributes influence the locational choice of their company. As a result, the presence of these companies adds further to the existing strengths and attractiveness of the region, which influences the competitiveness of the region.

While the most effective global strategies rest mainly on locational advantage that requires geographic proximity (Porter, 1998a; Moon et al., 1998), scholars have increasingly paid attention to the importance of geographic proximity as it reinforces relationships between companies (Ivarsson, 2002; Martin & Sunley, 2006; Porter, 1998a). For instance, according to Porter (1998a, 1998b), Scott-Kennel (2007), and Pavlovich and Akoorie (2010), geographic proximity increases the likelihood of inter-organisational linkages, which allow the transfer of information and knowledge with more ease

(Pavlovich & Akoorie, 2010; Nonaka & Konno, 1998; Harryson, 2002). Likewise, for (Porter, 1998a), the proximity facilitates communication, scientific collaboration, joint development, flow of information and knowledge, and exchange of ideas, knowledge, and innovations. While these scholars relate proximity to co-location, this research adds further to our understanding concerning the importance of the former for neighbouring locations or regions, for instance, Auckland and Hamilton, the Waikato region.

Besides the physical capital, human capital is another key strength of Hamilton, the Waikato region. Based on Porter's Diamond model, while the highly well-qualified workforce needs ongoing investments, the lower educational attainment labour force can be acquired through a passive inheritance or moderate investments but proportionally influence competitiveness. In this regard, the former is deemed advanced factors whereas the latter basic factor conditions (Porter, 1998a). Although the advanced factors and basic factors both constitute human capital, this section particularly discusses the latter.

The research findings show that the Waikato region is endowed with highly well-qualified workforces specialising in both agriculture and non-agriculture. For instance, according to Respondent O, the strength of the local workforce is reflected by the availability of a wide range of skills and qualifications including R&D experts, technologists, and client service managers, from Bachelor degrees through PhDs to those with no qualifications. In this regard, a relatively lower educational attainment workforce is also abundant within the region. For instance, at the lower end of the qualification and skillset, operating in the hospitality industry, Respondent Q's company enjoys the sufficient availability of needed workers drawn from the local labour pool.

While Perry (2004) stresses the need for New Zealand clusters to include memberships nationwide, Dana and Winstone (2008) similarly emphasise that for the New Zealand Waipara wine cluster to advance from an embryonic phase into a highly-developed wine cluster, there is a need to open memberships to companies from related and supporting industries particularly tourism, chemical companies and those specialised in bottling and corking, as well as universities or education institutes, research centres, and government agencies. These new entrants help build critical mass that makes possible a cost-sharing practice within the cluster, for example, driving down costs associated with shipping, visit by international wine writers, and discounted group tour for foreign tourists. As a result, the cluster expansion, through the new entrants, helps develop a regional identity and,

subsequently, a possible development of an international identity. They significantly contribute to the cluster competitiveness (Dana & Winstone, 2008). In line with Perry (2004) and Dana and Winstone (2008), the relatively small size of the AgBio cluster calls for a further expansion of its memberships including those based outside Hamilton, the Waikato region. For instance, according to Respondent A and Respondent D, there is an open policy aiming to extend the memberships to all establishments, without financial obligation to become members of the cluster.

Despite the importance of incorporating new memberships, Perry (2004) stresses travel distances between locations as a main hinderance that discourages the participation of particularly small and medium-sized companies, citing the cases of the Canterbury and Nelson Nutraceuticals cluster and the earthquake engineering in Wellington. Nevertheless, the findings of this research show that the unique location of the AgBio cluster, the proximity of the cluster in Hamilton to the Auckland region as well as to other nearby locations, facilitates the further expansion of the cluster. In this regard, while Perry (2004) stresses the negative effect of travel distances, this research shows that the proximity to the Auckland region and an efficient transportation connecting the two cities, together with the cost competitiveness – relatively lower running costs – rendered to companies based in Hamilton may serve as pull factors attracting new entrants.

Regardless of the locational competitiveness of Hamilton, the Waikato region, further membership expansion, however, demands appropriate strategies and policies from the management of the cluster, as well as from the local and central governments. On the one hand, benefits of joining the cluster need to be made more well-known to potential establishments. For instance, the locational choice based on the benefits offered by Waikato Innovation Park is highlighted by the cluster members including Respondent D, Respondent J, Respondent G, Respondent F, Respondent I, Respondent C, Respondent K, and Respondent L. In this regard, a marketing strategy aiming to promote or advertise the AgBio cluster may help achieve this purpose.

On the other hand, there is a need to address scepticism among existing cluster members about contributions of new entrants to common areas of interest and subsequently regarding them as a competitive threat (Perry, 2004; Simpson & Bretherton, 2004). While such negative attitude may subsequently hamper the potential for cluster expansion (Simpson & Bretherton, 2004), it is evident in a number of New Zealand clusters

including the Matakana Wine Trail cluster, the Matakana Coast cluster (Simpson & Bretherton, 2004), the Southern Wood Council cluster, and the Northland Wood Processing cluster (Perry, 2005; Perry, 2007a). One of the important measures that may help increase memberships of the AgBio cluster requires identification potential opportunities for and benefits of mutual benefits or collaborations, to reveal the benefits brought about by the new entrants to the existing cluster members.

Furthermore, it also requires greater involvements of intermediaries, with the aim to expand memberships into the AgBio cluster. In this regard, in line with Baxter and Tyler (2006) who stress the role of intermediaries in supporting new entries, the findings of this research show that these establishments, particularly Waikato Innovation Park, help spawn new star-up companies within the cluster, promote its identity in offshore markets, and, subsequently add new memberships. Nevertheless, this research shows that, despite the effort by the Park, the heterogeneous nature of the AgBio cluster limits opportunities and common areas for collaborations among the members. With the limited intra-cluster collaborations, potential new entrants, especially small businesses that primarily seek for opportunities to work in partnerships with other like-minded companies may hesitate to become members. In this regard, it may be a vicious cycle in which a further expansion of the cluster – to become a highly-developed as opposed to an embryonic cluster, as per Dana and Winstone (2008) – requires more frequent intra-cluster collaborations that, in turn, demand an increasing number of cluster members, in particular those of homogenous nature.

7.3.1.1. Summary of assessment

Overall, this research identifies six aspects that constitute the basic factor conditions of Hamilton, the Waikato region. They are all deemed positive and, therefore, individually contribute to competitiveness of the region. Centrality of Hamilton, the Waikato region, its proximity to nearby and important locations within New Zealand, particularly Auckland, together with efficiency of infrastructure and transportation connecting them make it a desirable location among especially agricultural companies, as well as employees, particularly those of young ages. In this regard, while the local semi-skilled, unskilled, and low qualification workforce are abundant, the attractiveness of Hamilton, in particular, serves to entice an external workforce into the region and, therefore, add further to its existing strength. These locational attributes are, therefore, assigned (+),

supported by positive views of the interviewees towards these basic conditions. Furthermore, benefits enjoyed by local companies, to be able to serve the nearby Auckland market at relatively lower running cost denotes cost competitiveness. This attribute is also assigned (+), as it contributes to the locational competitiveness of the region.

- + Centrality of the location
- + Proximity to nearby locations, Auckland
- + Efficiency of infrastructure and transportation
- + Semi and low-skilled workforces
- + Cost competitiveness i.e. running costs
- + Attractiveness of the region to external workforces

7.3.2. Factor conditions: Advanced factors

7.3.2.1. Physical capital

This research identifies the advanced factors of Hamilton, the Waikato region, particularly its strong research and economic strengths in agriculture, owing to the centralisation of the dairy industry in the region. For instance, according to Respondent A, Respondent M, and Respondent F, the region is endowed with leading agricultural companies including AgResearch, DairyNZ, Fonterra, Tatua, and Ruakura as well as other relevant organisations or institutions such as local world-leading education institutes, particularly the University of Waikato. With the presence of the cluster of these establishments, the region is self-sufficient for the operation of locally-based companies. For instance, for Respondent F, the region has 99 per cent of goods and services needed by their company.

The strength of the physical capital provides an incentive for agricultural-related companies, including Waikato Innovation Park, to base their main operations within the region. For instance, the locational choice of the Park, the AgBio cluster, according to Respondent A, is the result of the strong agricultural strengths, the presence of a large

number of agricultural companies and other relevant organisations or institutions within the same location. Furthermore, for Respondent G, the choice of location allows the locally-based companies and potential new entrants to align core agriculture-related knowledge and technical know-how as well as company culture, interests, and specialities with those of the dairy industry. It also allows better generation of revenue for agricultural companies from the dairy industry, for instance, food processing, being in close geographic proximity to the local industry leaders such as AgResearch, Fonterra, DairyNZ, and other agricultural companies. For Respondent I and Respondent M, the proximity renders a quick and convenient access, especially for those frequently seeking their goods and services as well as expertise. For instance, according to Respondent M, during peak season in October, being local allows dairy companies that are unable to adequately accommodate excessive milk production to promptly access the service of FoodWaikato. With this industry good exercise offered by the local industry leader, the companies avoid financial loss resulted from the spoilt milk. Therefore, the proximity renders a quick and convenient access to goods and services as well as expertise of local industry leaders.

While the local industry leaders are potential core customers, proximity to these leading agriculture-oriented companies is associated with economic rewards, increasing the likelihood of profit maximisation. For instance, according to Respondent G, the locational choice of their food processing company in Hamilton, the Waikato region is primarily due to proximity to these core customers, which subsequently allows generation of revenue from food processing, the dairy industry. Nevertheless, the relationship between the locational choice and proximity to customers is relatively less beneficial to locally-based companies primarily targeting overseas markets. Likewise, while the region is a strong base of agricultural-related companies, non-agricultural companies, for instance, companies providing IT-related goods and services, do not fully realise the benefit of proximity to the local industry leaders such as AgResearch, Fonterra, DairyNZ, and other agricultural companies. Therefore, this attribute of the Waikato region may not be the main contributing factor influencing the locational choice.

This research shows the importance of proximity to leading agricultural-based companies presented in the Waikato region, although these companies are not cluster members. The finding is in line with that of Fraser and Kelly (2010) that identify large pillar companies, leading companies, as the key success attribute of New Zealand clusters, particularly ICT

clusters. Likewise, Perry (2007a), Perry (2005) and Perry (2004) emphasise the positive influence of leading or dominant cluster members on the success of those smaller in size within the Northland Wood Processing cluster and the Earthquake Engineering cluster in New Zealand. While these leading companies may demand the expertise of the small cluster members to deliver their projects, they also play an important role attracting new entrants into the clusters, helping ensure an agreement over marketing strategies, reducing uncertainty associated with investments in markets overseas, and boosting the chances of success in exporting activities (Perry, 2005; Perry, 2007a). Nevertheless, besides the presence of leading companies, successful clusters also require business relationships among the cluster members, for instance, between suppliers and customers and their active involvement (Perry, 2005; Perry, 2007a).

Besides local industry leaders and core customers, Hamilton, the Waikato region is also home to renowned education institutes, particularly the University of Waikato and Wintec. The presence of these institutes further influences competitiveness and attractiveness of the Waikato region. In this regard, the University of Waikato contributes to a pool of well-qualified workforce, which further strengthens the local workforce. For Respondent K and Respondent P, the university becomes a source of labour supply, particularly well-educated graduates to Respondent K's and Respondent P's companies as well as to locally-based companies. According to Respondent J, one of the two highly well-qualified scientists at their company was educated from the University of Waikato. Likewise, for Respondent B, the University of Waikato offers excellent students to work on projects and research of their company.

In addition to agriculture-related field, the University of Waikato also contributes to a varied well-qualified workforce within the Waikato region and throughout New Zealand. For example, the University of Waikato becomes a major source of well-qualified labour supply for Respondent D's company, particularly technical staffs who have already joint the labour force with software development qualifications from the Computer Science Department. On the other hand, although newly-graduates are relatively of limited work experiences, though its graduate programme, Respondent G's company predominantly employed from the University of Waikato for the last ten years, compared with other education institutes throughout New Zealand. Likewise, other local companies willingly engage in this recruitment practice and receive financial incentives, particularly grants for job placements. For instance, Respondent B's company receives good grants from the

University of Waikato for supporting students through its internship programme. As a result, this temporary measure, on the one hand, mitigates a problem associated with a shortage of needed staff and, on the other hand, with an appropriate training such as on-the-job training, helps develop interns into more technically competent workforces.

Therefore, close geographic proximity to the University of Waikato adds further to the economic strengths and attractiveness of the Waikato region. For instance, according to Respondent A and Respondent J, with the quality of qualifications including in agriculture and science, their companies value the importance of proximity to this education institution. Furthermore, the proximity affords Respondent J's company opportunities for and a more convenient access to financial assistance, particularly internship grants provided by the University of Waikato. As a result, the presence of the University of Waikato influences the locational choice of Respondent J's and Respondent B's companies. In this regard, the findings of this research show that the benefits of proximity, in terms of financial assistance, is more important to small companies compared to those larger in size.

Furthermore, proximity to the University of Waikato gives local companies opportunities to seek assistance or work in partnership on projects such as product development and testing, to stay close to the source of knowledge. For instance, a decision of Respondent J's company to base in Hamilton, the Waikato region is due to the presence of the university, a science community that helped to develop its product. In this regard, this education institute forms a committee of founding scientists to help resolve issues, particularly at the early stage of the company. Likewise, the university assists Respondent B's company in product development and testing. The work involves testing for Fructo-Oligosaccharides (FOS), sugar in the roots of plants, to determine stability of the products at different temperatures, for example, at nought, ten, 20, and 30 degrees. This complicated and expensive analysis, with the cost of approximately NZ\$100,000, demands technical expertise beyond that possessed by the company and requires the assistance of the university. As a result, the proximity facilitates the university support that leads to the successful product development and testing of the two companies.

Proximity allows a more regular face-to-face interaction and informal communication, which contribute to stronger inter-organisational relationships and collaborations with the University of Waikato. This notion is highlighted by Respondent J that their company

maintains communication with the founding scientists at the university for needed information and assistance. Likewise, the inter-organisational relationships and collaborations facilitated by the proximity help align the needs of businesses and the provision of labour supply from the local education institutes, which may subsequently mitigate the shortage of workforce with certain qualifications and skillsets. For instance, for Respondent A, the interactions allow a meaningful discussion between the business side and the education side – the University of Waikato and Wintec – on educational requirements, for example, in agriculture or IT.

Although the local education institutes, particularly the University of Waikato contribute to a pool of well-qualified labour force, the size of Hamilton, the Waikato region adds further to the exist strength of the workforce and the competitiveness of the region. For instance, according to Respondent L, the city is of a big enough size, which proportionally influences the sizable labour pool and, therefore, the sustainability of well-qualified workforce. This, in turn, influences the availability and duration spent by local companies on seeking needed employees. Furthermore, despite the contribution to the well-qualified workforce, the University of Waikato is not the only source of labour supply. In this regard, to mitigate the shortage of particularly highly-specific skills in Hamilton, the Waikato region, local companies also recruit from external education institutes. For instance, besides having the local university as a predominant source of recruitment, Respondent G's company also takes people from further afield, recently employing four staffs from the Engineering School at the University of Canterbury. The local companies also rely on other external sources of labour supply nationwide such as employment agencies for temporary staffs and on contractors including those with agricultural knowledge, in Hamilton, the Waikato region and nationwide, particularly in Auckland. They also extend their reach further abroad including through global affiliates. For instance, besides the local labour supply, the cluster members including Respondent M's, Respondent J's, Respondent F's, Respondent L's, and Respondent D's company draws needed workforces from external pools including Auckland and Palmerston North.

In this regard, these respondents' companies engage in a direct recruitment process, for example, using web-based employment platforms such as Seek and Trade Me Jobs or indirectly via third-party employment agencies and using contractors as complementary to full-time employees. For instance, Respondent L's company relies on a Hamilton-based agency for supply of locally-based temps, to cover temporarily vacant positions

and, in addition to about 25 full-time staffs, employs up to 15 contractors to help with its business operation. While Respondent G's company employs contractors to fill a specific business need or project when there is a shortage of staff, Respondent K's company extensively makes use of well-qualified contractors in the Waikato region, particularly those with agricultural knowledge. Besides locally-based contractors, Respondent P's company also uses a mechanical engineer contractor from Auckland. Likewise, serving clients nationwide, Respondent I's company makes a conscious decision not to employ permanent staffs, besides office and sale staffs in the Waikato region and the South Island, but solely subcontracts its engineering, construction, and design works out to contractors including engineers, manufacturers, and builders throughout New Zealand.

Besides the local and national labour markets, locally-based companies may also need to extend their reach further abroad, especially with a limited labour supply of employees with specific skillsets or technical abilities, after exhausting the pool of the local workforces. For instance, Respondent O's company may have to approach particular persons to fill specific roles – highly-experienced technical employees including Gas Chromatography (GC) analysers – in an overseas labour market, owing to the lack thereof in Hamilton and New Zealand. In this regard, the companies may attain needed employees from the overseas markets through their global affiliates or parent companies. In this regard, Respondent G's company, when there is a shortage of staffs or a need to complement the team, engages in an international transfer to bring in people with specific skillsets such as technologists specialised in formulation and recipe development for specific nutritional foods. This international transfer is from its global affiliates in the U.S., Brazil, China, India, and Sweden. Likewise, Respondent F's company draws, for example, study directors, from a talent pool in its parent company in Australia, as a temporary measure for a short period of time or a specific study. While these respondents' companies highlight the significance of overseas labour markets to mitigate the labour shortage, New Zealand Immigration plays an important role in facilitating inflows of, for instance, specifically-skilled workforces needed by companies operated in the Waikato region and throughout New Zealand. This notion is stressed by Respondent A.

Overall, the findings of this research show that the strength of physical capital constitute the advanced factor conditions and, therefore, influence the competitiveness of Hamilton, the Waikato region.

7.3.2.2. *Human capital:*

As discussed earlier, human capital is one of the key strengths of Hamilton, the Waikato region. Based on Porter's Diamond model, while the basic factors and advanced factors both constitute competitiveness, the latter requires ongoing investments that subsequently produce a highly well-qualified and competent workforce. Therefore, the advanced factor conditions, to a greater extent, influence competitiveness of a location (Porter, 1998a). This section particularly discusses the advanced factors of the region. The findings of this research show that the Waikato region is endowed with a highly well-qualified workforce, particularly that specialising in agriculture. For instance, according to Respondent N, the Waikato region is home to a world-class grass-based work force, among the best in the world in terms of turning grass into dairy and into beef. The strength of the agricultural workforce is also emphasised by other interviewees including Respondent F, Respondent M, and Respondent P.

In addition to the large pool of agricultural workforce, highly well-qualified labour force with a non-agricultural background is also abundant and widely accessible to local companies. This phenomenon is highlighted by Respondent F, Respondent D, Respondent L, Respondent M, Respondent O, Respondent P, and Respondent I. For instance, Respondent F's company is able to employ a well-qualified project officer in Hamilton with ease. Likewise, Respondent D's and Respondent L's non-agricultural companies both have an adequate access to a well-qualified pool of labour locally, without the need to cast a wider net to draw from external workforce outside the region. The level of competency in non-agricultural-related areas, according to Respondent F and Respondent I, are relatively comparable to those of other regions such as Auckland and Palmerston North, as well as the South Island including Christchurch. Nevertheless, the highly-qualified non-agricultural workforce is not unique to the Waikato region and, therefore, does not render competitiveness over other locations, for instance, the Auckland region, compared to the agricultural workforce.

In this regard, due to the endowment of the agricultural workforce, together with the strong research and economic strengths in agriculture, Hamilton, the Waikato region becomes home to a large number of world-renowned agricultural companies and other relevant organisations or institutions. For instance, according to Respondent N, New Zealand farmers and companies are among the best in the world in terms of grass-based

knowledge, turning grass into particularly beef and dairy produce such as milk. The strong agricultural background of the region produces a larger pool of a highly well-qualified workforce specialising in agriculture than, for instance, Wellington. This notion is highlighted by Respondent F. Likewise, according to Respondent M, the availability of a very highly-skilled workforce in agriculture owes itself to the centralisation of the dairy industry within the region, for instance, the presence of renowned companies including Fonterra, Tatura, and many more. Therefore, the agricultural workforce correlates with the strong research and economic strengths in agriculture.

The adequate supply of highly-skilled agricultural workforce, together with the strong agricultural strength help make Hamilton, the Waikato region a location of choice for particularly agricultural companies and, subsequently, transform it into a larger agricultural base. For instance, according to Respondent N, these two regional traits influence the establishment of the AgBio cluster. Subsequently, the human capital and research and economic strengths in agriculture further act as pull factors enticing highly well-qualified and skilled labour force from other locations, resulting in an expansion of the local workforces, both agricultural and non-agricultural. This notion is highlighted by Respondent M as well as Respondent J whose company employs a highly-qualified scientist living in Auckland. On the agricultural side, the inflow of well-qualified labour force further helps transform the region into a hub of particularly a highly-skilled agricultural-related workforce.

The attractiveness of Hamilton, the Waikato region, especially to young workforce, is attributed to cost competitiveness, the cost of living in relation to that of Auckland. For instance, according to Respondent J, undifferentiated wages between the two regions give younger job seekers a financial incentive to take up jobs in Hamilton. Although highly-skilled workforce may be less willing to do so, their close geographic proximity helps attract those in this pool of labour force. For instance, Respondent J emphasises that one of their scientists, living in Auckland, conveniently commute between the two cities for work. Therefore, while the proximity facilitates the movement of workforce, the relatively lower living cost further influences the expansion of existing labour pool. Therefore, this research shows that the endowment of the agricultural workforce correlates with the strong research and economic strengths in agriculture, the presents of a large number of agricultural companies and other relevant organisations or institutions. Furthermore, while the agricultural strengths in human capital and physical capital are

the key assets influencing competitiveness, they add further to the existing strength of the region. These regional attributes enhance the locational appeal that, in turn, attracts highly well-qualified and skilled workforce from other locations including Auckland.

While the local agricultural workforce is a unique asset rendering local companies an adequate access to a pool of highly well-qualified employees, the availability of non-agricultural workforce, although less important, also contributes to the existing strength of the region. Nevertheless, besides the level of competencies accumulated by the local labour force, their intangible attributes add further to regional competitiveness. In this regard, the familiarity of the labour force with local environment as well as cultural and empathic compatibility with local employers constitute intangible traits, which complement the competencies of the workforce. For instance, as an agriculture-related business, according to Respondent G, growing up in rural and agricultural environments, locally-based and educated employees have greater empathy with the culture of their company, which is based around rural and agricultural need. Compared with those from larger regions particularly Auckland, they develop deeper feeling and a better understanding of the company's goals and visions. These intangible attributes make the local workforces unique and relatively more preferable by the local companies.

On the social side, according to Respondent G, while the level of competencies is comparable between the local workforce and that of, for instance, Auckland, the shared rural background and upbringing allow the former to work more effectively in a team environment. Such the attributes also mean comfortability with the status quo and, therefore, a greater degree of loyalty to their company, resulting in high retention rates of highly skilled and motivated employees. Likewise, while a close-knit team of employees sharing similar passion, for instance, about farming is attributed to high staff retention rates within Respondent P's company, Respondent D's company prefers locals rather than external employees who eventually leave and move to someplace else. In addition to these traits, it is also relatively more convenient for employers to hire locally-based employees whose families locate within a shared geographic location, compared with those in, for instance, Auckland. This notion is highlighted by Respondent J.

Overall, this research identifies the intangible strength of the local workforce that is not easily emulated by an external labour force and, therefore, its influence on competitiveness of local companies. In this regard, it adds to our understanding that,

besides technical competencies of highly-skilled workforce measurable by qualifications, skill, and experience, their intangible qualities are also of importance to employers. While these intangible attributes contribute to the strength of human capital and, therefore, influence competitiveness, they are not identified as the elements of the advanced factor conditions in Porter's Diamond model. Therefore, the findings of this research suggest that they merit incorporation into the model.

Despite the abundant labour supply of competent workforce, challenges remained, particularly for locally-based companies that largely rely on technological competencies of staff, specifically in the fields of engineering and science. For instance, according to Respondent G, there is a shortage of engineers, while their company grew from having approximately 40 to about 90 engineers plus 80 contractors during the period of three years. Likewise, according to Respondent P, Respondent F, Respondent J, Respondent L and Respondent O, their companies may face some difficulties looking for employees having highly-specific technical skillsets with lots of experience, for instance, scientists and Gas Chromatography analysers for Respondent O's company. As a result, the limited supply prolongs the duration of gaining access to the labour with highly-specific technical skillsets, which may subsequently affect the operations of companies and hinder their growth. For instance, according to Respondent A, it may take six months to fill positions of highly-technical skills compared to general skills. Likewise, for Respondent P, their company was not able to fill a research position that requires highly technical skill after advertising for approximately five months.

The problem of labour shortage, particularly in the areas of engineering and science is exacerbated by the misalignment between the supply side, New Zealand education system and the demand, companies. For instance, the education system produces more skills unrelated to engineering and science. This notion is highlighted by Respondent A. Likewise, according to Respondent G, the areas of focus of the New Zealand engineering education are more related to fields including earthquakes, structural steel, and mining rather than food and food processing. In this regard, despite the availability of very talented engineers presented in New Zealand, the Waikato region included, they may not possess the right skill demanded by the market.

Nevertheless, while the difficulties generally applied to companies targeting New Zealand-based consumers, those serving overseas markets may also face similar

challenges. For instance, according to Respondent N, the difficulties arisen when seeking employees with specific skillsets, those who are technically competent in farming, particularly in dairy or beef engineering but also understand the language as well as local environment and culture of their targeted overseas markets and buyers. Furthermore, the limited supply of highly-specific technical skillsets is not merely regional specific but occurs through New Zealand. In this regard, according to Respondent G, there is a small pool of technically competent engineers to draw from throughout the country, owing to the small population size.

Overall, the findings of this research show that the strength of human capital, particularly the agricultural workforce constitute the advanced factor conditions and, therefore, influence the competitiveness of Hamilton, the Waikato region.

7.3.2.3. *Financial capital:*

While being in the Waikato region does not render competitiveness brought about by financial availability, this research reiterates existing finance-related challenges of particularly small companies and as well as newly start-ups and entrepreneurs alike, regardless of their locations. For instance, according to Respondent R, it remains a challenge to obtain financial assistance from the New Zealand private sector including banks, venture capitalists, and angel investors. For Respondent Q and Respondent A, the financial-related challenge for business expansion holds true particularly for small businesses, which subsequently limits their growth, for instance, into export markets. In this regard, a limited pool of financial capital in New Zealand, owing to a relatively small economy or an absence of critical mass together with the relative immaturity of the venture capitalists and angel investors, influences the difficulty to obtain financial support from the private side. For instance, this is highlighted by Respondent N and Respondent K. According to Respondent R and Respondent N, while being be overly critical of potential innovative ideas, the overly profit-oriented approach of the New Zealand venture capitalists and angel investors, in terms of return on investment, further exacerbates the lack of assistance. The venture capital industry, in particular, also falls short in terms of value creation for recipients, compared with that overseas such as the U.S. The lack of ability to create value among the New Zealand venture capitalists, for instance, to help connect the recipients to valuable networks and opportunities nationally and internationally, is noted by Respondent N. Furthermore, for Respondent K, the New

Zealand private financial providers are relatively more risk-averse compared with the U.S. counterpart.

Nevertheless, despite of the difficulties discussed above, the overly critical business side may be of great value in terms of advice that helps transform potential innovative ideas into business success. Furthermore, the financial assistance may remain readily available particularly to business ideas that venture capitalists or angel investors deem innovative or profitable. This is highlighted by Respondent R. In this regard, while the probability of receiving investment fund is largely influenced by the goodness of the ideas, it is also contingent on companies or entrepreneurs' persuasive power, to convince the venture capitalists or angel investors. Therefore, according to Respondent K and Respondent R, the onus is on the companies or entrepreneurs to show proof of merit and a potential return on investment. That, however, requires evidence or demonstration of a market need. Therefore, with a small pool of capital available in New Zealand, the findings of this research indicate an intense competition among particularly small New Zealand companies and newly start-ups for fund from the business side.

Furthermore, although banks in New Zealand are generally deemed high risk, as pointed out by Respondent R in the research findings section, compared to venture capitalists and angel investors, their policy towards small companies has positively changed over the past decade. For instance, Respondent Q's company benefits from a shift of ANZ policy showing a greater degree of favour towards small businesses, the significant contributors to the New Zealand economy. The more lenient policy covers areas including overdraft and credit cards, facilities, education or seminars on financial management and financial health check. The educational support or seminars are particularly helpful to Respondent Q's company and to other New Zealand small businesses alike, in terms of cost savings, helping the former to change half of its overdraft into a loan. As a result, the company significantly reduces overdrafts, pays less interest rate, and pay off principle and interest on its loan.

Besides the financial assistance from the private side, such support from the government both local and central governments are also made available to New Zealand companies with innovative ideas. For instance, according to Respondent B and Respondent C, the Hamilton City Council contributed NZ\$2 million of the NZ\$6 million to establish Waikato Innovation Park. The companies may similarly be eligible for grants, matching

funds from the central government. This is pointed out by Respondent R and also by Respondent J whose company was started off with the grants. Furthermore, New Zealand Trade and Enterprise (NZTE) provides financial assistance, matching funds that results in the establishment of Respondent B's company in the year 2000. The initial assistance enables the company to purchase unique South American plants called Yacon from Plant & Food Research, a Crown Research Institute whereas further support helps examine overseas markets particularly in South Korea and Japan. As a result, the government financial assistance allows Respondent B's company to purchase the needed products, as well as to develop technological and market knowledge, and to become financially sustainable. In this regard, the government grants significantly influence success of their companies at the early stage and growth at the later, according to Respondent J and Respondent B.

Likewise, Respondent D's company, a few years ago, acquired a 50 per cent fund of a now-defunct research grant known as FoRST, as well as NZTE grant schemes for several times. The company also more recently receives a capability building fund amounted to 50 per cent of the total costs for sales training. While the government financial assistance specifically targets New Zealand companies, those of foreign origin operated in the country may also, to some extent, gain from such support. For instance, Respondent F's company whose parent company is Australian-based, in 2008, enjoys tax incentives designed to attract inward Foreign Direct Investment, for research to occur in New Zealand. Although this tax break lasts for about one year, it is one of the key reasons influencing the company to set up in New Zealand.

Nevertheless, although companies may not be eligible for government support, they may, however, enjoy indirect benefits from this form of subvention. For instance, Respondent K's company is involved in and benefits from projects, through their business networks, funded through Sustainable Farming Fund (SFF) and Primary Growth Partnership (PGP), government funding aimed at the primary sector. In line with the earlier discussion about the importance of location, proximity to institutes or establishments that are direct recipients of the government funding helps realise the indirect benefits from such support. Respondent J's Respondent B's companies, for example, indirectly benefits from the government financial assistance through grants received from the University of Waikato.

Despite the availability of government funding, certain requirements exist for eligibility including financial viability of businesses seeking funds. For instance, according to Respondent C, while being assessed on merits, eligible companies need to be established businesses with clear management structures, as well as be ready to disclose their financial books to the benefactor. The potential recipients also need to be truly export-focused for the benefit of New Zealand and fully private-owned, to be qualified for a certain government funding, for instance, from the Callaghan Institute. In this regard, with 50 per cent owned by a Crown Research Institute, AgResearch, Respondent K's company is not eligible for Callaghan Innovation funding. Further government assistance made available to their company is, therefore, deemed double dipping. In addition to these requirements, with a limited pool of funds in New Zealand together with the relatively smaller economy compared to, for instance, the U.S., challenges remain even for those with innovative ideas. This notion is pointed out by Respondent A, Respondent K, Respondent C, and Respondent J. As a result, seeking financial assistance from the government side is a long-drawn-out painful process, according to Respondent I.

With the limited availability of financial support from the government side, New Zealand companies, to a certain extent, develop an entrepreneurial spirit, in this regard, the willingness to take risks and to become self-reliance. These attributes may subsequently lead to their success. For instance, although established with the help of the government, particularly NZTE, Respondent B's company subsequently opts to take risks by bringing in private shareholders rather than approaching New Zealand Venture Investment Fund for further assistance. In this regard, owing to a relatively small pool of capital, according to Respondent K, Respondent I, and Respondent N, as private establishments, it is more about self-reliance through, for example, cash flow or bootstrapping, instead of becoming a financial burden to the government.

As discussed earlier, although the Waikato region exhibits strong research and economic strengths in agriculture, the findings of this research shows that the limited financial assistance from the business side and from both the central and regional governments may hinder growth of small businesses and newly star-ups. In this regard, local companies do not gain competitiveness by locating in the region. Nevertheless, the lack of financial support is not region-specific but occurs throughout New Zealand. Therefore, this research indicates that Porter's Diamond model is less applicable to assess competitiveness of locations or regions in particularly small nations such as New Zealand

in which homogeneity in relation to financial rules and regulations uniformly exist throughout the countries.

7.3.2.4. *Summary of assessment*

Overall, this research identifies eight aspects that constitute the advanced factor conditions of Hamilton, the Waikato region. These eight aspects are categorised under physical capital, human capital, and financial capital. Guided by a subjective assessment of the interviews with the respondents of this research, six aspects of the advanced factor conditions are viewed positively and, therefore, contribute to competitiveness of the region, the other two are, however, deemed negative. On the physical capital side, the key attributes of Hamilton, the Waikato region viewed positively by the respondent include the strong agricultural base with the presence of leading agricultural companies as well as renowned education institutes, particularly the University of Waikato. The contribution of the physical capital to the competitiveness of the region is explained by the existing strength in the agriculture, which serves to attract more of both agricultural New Zealand and overseas companies operated in New Zealand, as well needed labour force. The presence of an increasing number of the companies and workers helps strengthen the agricultural base and also the local workforce.

On the human capital side, this research particularly identifies the local agricultural workforce as a positive aspect of the advanced force conditions of Hamilton, the Waikato region and, therefore contributes to competitiveness of the region. Besides a large pool of highly-skilled and highly well-qualified workforces in agriculture, non-agricultural workforce is also widely available within the region. This complements the former and adds further to the strengths of the local workforces. The strength of the local workforces is not limited by the level of competencies accumulated by the local labour force, but its intangible attributes are also of important, not easily emulated by external workforce. Therefore, highly-skilled and highly well-qualified workforces in agriculture and non-agriculture and their intangible traits are assigned (+), guided by the subjective assessment of the interviews. Nevertheless, although the local companies enjoy an abundant of labour supply, highly-specific technical-skilled workforce, particularly in the fields of engineering and science is less readily available, in comparison. Therefore, this aspect of the advanced factors is assigned (-). Furthermore, while the financial capital is not unique to Hamilton, the Waikato region per se, this advanced factor condition is

generally viewed natively by the respondents of this research. This is due to the lack of financial availability from the business side including venture capitalists, angel investors, and banks, as well as from the public side both central and local governments. This advanced factor is, therefore, assigned (-).

- + Highly skilled agricultural workforce
- + Highly skilled non-agricultural workforce
- + Intangible traits of workforce
- + Strong agricultural base
- + Leading agricultural companies
- + Renowned education institutes
- Highly-specific technical skills e.g. engineering and science
- Venture capital
- Angel investment
- Bank loan
- Government financial assistance

7.3.3. Demand conditions

7.3.3.1. Sophisticated and demanding customers

As discussed earlier, this research identifies the advanced factor conditions of Hamilton, the Waikato region, particularly its strong research and economic strengths in agriculture, the centralisation of the dairy industry within the region. The presence of leading agricultural companies contributing to this regional phenomenon includes AgResearch, DairyNZ, Fonterra, Tatua, and Ruakura as well as other relevant organisations or institutions such as local world-leading education institutes, particularly the University of Waikato. This is highlighted by the interviewees including Respondent A, Respondent M, and Respondent F. As a result, the region becomes self-sufficient for locally-based companies. For instance, according to Respondent F, the region has 99 per cent of goods and services needed for the operation of their company. The size of Hamilton, the Waikato region, in relation to other locations, adds further to its existing strengths,

according to Respondent L. The endowment of the advanced factor conditions indicates the presence of sophisticated local demand both within the AgBio cluster and the region. Nevertheless, the cluster members interviewed serve both local and national customers, as well as overseas markets. Therefore, the sophistications of the local customers are not the only contributing factor influencing the competitiveness of the cluster members and the region.

Within the AgBio cluster, in terms of sophistication, according to Respondent A, the cluster members are generally deemed innovative companies and earlier adopters of new technologies. Although demonstrating a different degree of sophistication towards Waikato Innovation Park that provides service to the companies based at its premises in the form of pressure or expectations, the cluster members are overall reasonably demanding. For instance, their demanding nature is generally related to facilities, working environment, network opportunities, and financial contacts for growth. The sophistication of these demands subsequently influences the performance of the management team at the Park, which strives to satisfy these companies. Likewise, for Respondent F, Respondent M, Respondent B, and Respondent G, traits of supplying companies that are deemed important to their companies include punctuality in terms of delivery times, honouring of commitments, as well as safety, quality, and price of products. Nevertheless, although price is one of the demanding conditions, there is also an understanding of a risk of using a price-based factor as the main determinant of competency, as opposed to quality or value of goods and services. This notion is highlighted by Respondent G. Furthermore, efficiency and effectiveness of the supplying companies are important factors to Respondent G's company. Overall, these sophisticated demand conditions, in turn, influence the competitiveness of the AgBio cluster.

Based on Respondent G, a world-renowned multinational food packaging and processing company, this research identifies two types of agriculture-related customers: knowledge buyers and specifiers in the New Zealand dairy industry. The former is characterised by their lack of agricultural knowledge, therefore, requires expertise of others and are willing to buy that from external source. These companies tend to be overseas establishments, for instance, from China, operating in New Zealand. Although the knowledge buyers may have a series of specific demands such as a strict compliance with safety standards, this demanding nature is merely the result of the regulatory system set by their government in China for all imported products, rather than their sophistication. The specifiers, on the

other hand, are relatively more established companies operating in the same industry, with a larger repertoire of knowledge related to particularly agriculture. The specifiers are generally New Zealand companies such as Fonterra, as well as milk powder manufacturers and other agriculture-related companies in the Waikato region and across the country. In comparison, these New Zealand companies are deemed more demanding and sophisticated than the knowledge buyers. With a greater extent of sophistication, these New Zealand customers may contribute more the competitiveness of their supplying companies and a location in which they are based, compared to knowledge buyers.

This research suggests that knowledge or technical know-how possessed by companies about products and markets as well as their financial situation influence the extent of their sophistications. In this regard, those from developing economies tend to be less sophisticated, owing to their limited agriculture-related knowledge and their lack of financial capital. For instance, offshore dairy farmers, particularly in South America including Colombia, Ecuador, and Peru are deemed less sophisticated, being price-sensitive and having no regard for the value of innovation. In comparison, New Zealand customers are relatively less price-sensitive and more innovative. They put greater emphasis on quality, reliability, and safety of products or services, and delivery time. Likewise, in terms of sophistications and demanding, user-friendliness or simplicity of products is also of importance to New Zealand farmers, particularly based in the Waikato region. While being conscious of both cost and value of products, the choice between the two, for the New Zealand farmers in the Waikato region, for instance, depends on their financial situation. Therefore, limited financial capital results in cautious adopters of new technologies, a situation in which price is preferred over innovation. Nevertheless, the level of sophistications of the New Zealand farmers is comparable to those of the U.S. and Europe.

The findings of this research also help inform particularly New Zealand agricultural companies of the two main types of agriculture-related customers namely the knowledge buyers and specifiers in the New Zealand dairy industry. The awareness of the presence of these customers allows the companies develop specific strategies to address their specific needs and demands, to offer specialised expertise or to customise goods and services as well as communications. As a result, the better understanding enables the companies to better serve the customers. Furthermore, the ability of Respondent G's company to serve both the knowledge buyers and specifiers, which locate on the opposite

sides of knowledge spectrum is an indication that the company possesses a large repertoire of diverse knowledge. Being a world-renowned multinational food packaging and processing company, the presence of Respondent G's company corresponds to the existence of a leading company, which may contribute to the cluster competitiveness. In this regard, the significance of Respondent G's company as the leading company within the AgBio cluster coincides with Perry (2004) that stresses the importance of leaders within New Zealand clusters, to work towards, for instance, the success of exporting activities.

7.3.3.2. *Differentiation*

Differentiations constitute competitive strategies and, therefore, contribute to competitiveness of companies (Porter, 1998c). In this regard, this research shows that the cluster members achieve a certain degree of differentiations, which influence their competitiveness as well as that of the AgBio cluster and the Waikato region. While the regionally agricultural strength, the presence of world-renowned and many other agriculture-related companies differentiates itself apart from other locations within New Zealand, the establishment of the AgBio cluster add further to the differentiation. Besides this regional uniqueness, Waikato Innovation Park where the cluster members are based also manage to distinguish itself from other office spaces available within the region. For instance, together with the state-of-the-art amenities, according to Respondent A, the Park offers value-added service including networking, funding, and training opportunities.

In line with Waikato Innovation Park, the cluster members also achieve, to some extent, a variety of differentiations. These companies include Respondent B, Respondent M, Respondent N, Respondent P, Respondent L, Respondent J, and Respondent K, In this regard, product safety and quality are both the key focus of Respondent B's company making them the mains differentiations. While these attributes help achieve competitiveness, other forms of product features also play an important role differentiating one company from another. For instance, Respondent P's company focuses on technological features to set its products apart from those provided by competitors including MilkHub. Although their products similarly measure milk components including fat, protein, and mastitis, those of Respondent P's company come with online sensors that do somatic cell count. The online sensors are relatively a new and more-advanced technology compared with competing conductivity meters. Likewise,

Respondent L's company differentiates from competitors with an IT-based platform, its own intellectual property asset that allows service to customers all over the country.

As for Respondent J's company, the main differentiation rests on simplicity of its products, being quick and easy to use but also relatively cheap to purchase compared to competitors. Likewise, Respondent N's company differentiates from competition in South-American markets with features and cost-effectiveness of products, a unique cow breed called Kiwipole that is high heat tolerant, exceptional healthy, regular and easy calving, and able to produce milk throughout the year. Furthermore, ambitious visionary and willingness to take risks in these countries help Respondent N's company to develop extensive knowledge about the markets and of networks there. These, in turn, enable the company to perform a leadership and intermediating role helping connect between disconnected parties, New Zealand farmer with offshore customers and, therefore, to differentiate from potential New Zealand-based competitors.

Furthermore, the commitment of Respondent M's company to the prosperity of the primary industry and New Zealand economy helps differentiate from other profit-maximising competitors, about 25 similar companies around New Zealand. In this regard, this cluster member offers an open access facility that serves New Zealand milk-power manufacturers, both large and small companies as well as start-ups or those produce commercial and trial products. For this reason, Respondent M's company is able to develop a uniquely competitive niche in terms of size, while there are no other companies of that size in New Zealand. Likewise, Respondent C's company is able to distinguish from potential competitors by operating in a fairly specialised area in which it develops a competitively niche competency. In this regard, the company possesses a full knowledge of the value chain, with an extensive R&D together with dairy backgrounds, that allow the company to go across on the farm side and on the food processing side.

While the variety of differentiations achieved by the cluster members constitute their competitive strategies, this research shows that a decision to differentiate may be influenced by exogenous factors. For instance, international standards with which Respondent F's company follows prevent, to a certain extent, it from differentiating from those well-established guidelines and, therefore, other similar companies. In this regard, differentiation may be deemed non-compliant, and subsequently risking their work becoming worthless. In this regard, although differentiations contribute to

competitiveness of companies (Porter, 1998c). this research also identifies a negative side of this competitive strategy, which may subsequently hold off the decision to differentiate or innovate. Therefore, innovation may require a collective effort working to influence policy or to minimise restrictions that limit a boundary in which companies are able to innovate and differentiate.

Overall, while the differentiations discussed above influence their competitiveness of the cluster members and, subsequently, that of the AgBio cluster and the region, the uniqueness of Waikato Innovation Park – the value-added service such as networking, funding, and training opportunities as well as the state-of-the-art amenities – distinguish from other local office spaces. These differentiations may be translated into attractiveness and subsequently evokes interest among potentially-new entrants across the value chain in becoming members of the cluster. According to previous studies, new memberships or a sustainable participation including those from related and supporting industries as well as from relevant institutes and agencies are of vital importance to the success and competitiveness of clusters (Dana & Winstone, 2008; Perry, 2005; Perry, 2004), to advance from an embryonic phase into highly-developed clusters (Dana & Winstone, 2008). This can be seen in a number New Zealand clusters including the Waipara wine cluster as well as four other business clusters in the timber industry (Dana & Winstone, 2008; Perry, 2005; Perry, 2004). In this regard, new entrants help clusters build critical mass and also develop their regional and international identities (Dana & Winstone, 2008). According to Respondent A of this research, owing to a small domestic market, there is a goodwill among locally-based agriculture companies in Hamilton, the Waikato region to collaborate, to build critical mass that helps increase their chance of success in bigger overseas markets.

7.3.3.3. *Challenges and strategies for demanding customers*

As discussed earlier, while this research shows that the cluster members of the AgBio cluster are generally deemed demanding, these companies also, in turn, serve customers having high expectations. This attribute influences attitudes towards innovation or improvement and, therefore, competitiveness. For instance, Respondent L's company makes great efforts to focus on constant innovation and improvements of their service by introducing a web portal for timber testing. Nevertheless, demanding customers also pose challenges to those working to meet their specific needs, particularly those concurrently

associated with both value and price of products. For instance, according to Respondent P, their company is pressured by demanding farmers including those based in the Waikato region who are both value conscious and cost conscious.

While demand for innovative or better goods and services is typically associated with sophistication, this research also suggests the opposite that it can also be linked to unsophistication, a situation in which customers solely focus on a price factor rather than value of products. For instance, Respondent N's company faces a big challenge in proving profitability to offshore customers in South America. These customers place zero value on innovation and are relatively more economical, with limited budget, and overly price-oriented compared to those in New Zealand. This is exacerbated by high distribution costs in those markets resulted from small farmers geographically spreading in different locations. As a result, unsophisticated demand, an overly price-sensitivity, potentially inflicts a profit erosion and may also lead to stalemate or termination of business deals, as emphasised by Respondent N as well as Respondent B. Nevertheless, this form of unsophisticated demanding also encourages companies to improve. For instance, Respondent B's company undergoes product innovation, modifying their products to sell in a different target market.

With challenges presented to companies working to meet specific needs of customers, legally binding agreement helps deal with excessive sophistication and demanding, particularly those concurrently associated with overly price sensitivity and value consciousness. For instance, Respondent G's company relies on contracts with customers. These contracts include specification of and guarantees for performance criteria of, for example, equipment that makes food with certain functionalities, as well as details on a delivery timeframe and penalties. Despite of the challenges associated with customer sophistication and demanding, this phenomenon also serves as a push factor influencing decisions of companies to improve or innovate. For instance, the pressure from demanding customers helps push Respondent P's company to make their products both robust and economical.

In this regard, to capitalise on the benefits brought about by the demanding nature, according to Respondent A, Respondent P, and Respondent L, their companies engage in communication and dialogues with customers, to understand requirements and needs. An effective communication and dialogues produce feedback including comments,

complaints, and ideas for product improvements. For instance, Respondent P's company maintains a database of farmers' comments, complaints, or ideas resulted from the communication and dialogues that subsequently help improve their sensors. This includes making the sensors user-friendly for and provide technical support to the farmers, especially those overly occupied and more cautious about the new technology that assists in statistically-based decision making in relation to clinical mastitis control. The importance of technical support to customers is also highlighted by Respondent J. Nevertheless, this is a marketing strategy aiming to help make their products more well-known through the customers and for growth, rather to improve or innovate.

Overall, the different forms of improvements or modifications undertaken by, for example, Respondent L's and Respondent B's companies lead this research to suggest that the nature of customer demanding may determine how company innovate, to meet customers' needs. For instance, Respondent L's company, without the need to deal with overly price-oriented customers, is able to focus on innovation to better serve existing customers. On the other hand, overly price-sensitive customers force Respondent B's company to make modifications to their products that better suit different markets. In line with Porter (Porter, 1998a), the findings of this research show that demanding customers, whether sophisticated or unsophisticated, to a certain extent, pressure companies to respond to their specific needs or to meet their high standards and, therefore, to innovate or carry out modifications to existing products. In this regard, it adds further to the extant literature that unsophisticated demand also plays a role in innovation. Furthermore, the findings also suggest the importance of communication and dialogues that help identify problems and satisfy customers' needs.

7.3.3.4. *Summary of assessment*

This research also identifies a certain degree of differentiations among the cluster members and locally-based companies, particularly within an agriculture-related area. In this regard, the strength in agriculture helps differentiate the region from other locations in New Zealand. The presence of Waikato Innovation Park, home to the cluster members of the AgBio cluster adds further to the regional differentiation. Furthermore, this research identifies the presence of sophisticated and demanding agriculture-based companies and farmers based in the AgBio cluster as well as within Hamilton, the Waikato region. With the level of sophistications comparable to those of the U.S. and

Europe, these companies, known as specifiers, also spread throughout New Zealand. They tend to possess a larger reservoir of knowledge or technical know-how, compared with knowledge buyers – less or unsophisticated customers. In this regard, this research identifies correlation between the knowledge and the extent of sophistication. There is also an indication that financial capital possessed by the companies may also influences their sophistication, especially small farmers. Nevertheless, this relationship demands further investigation as Chinese-based companies, with a large financial capital but lack agriculture-related knowledge, are also deemed relatively less sophisticated than New Zealand companies.

Overall, the differentiations among the cluster members and locally-based companies contribute to the strength in agriculture of the region. This unique phenomenon is, therefore, is deemed positive and influences the competitiveness of the AgBio cluster and that of the region. Furthermore, the findings of this research indicate that the local sophisticated demand nature is deemed positive and, therefore, influences the competitiveness of the AgBio cluster and of Hamilton, the Waikato region. Nevertheless, there are also relatively less sophisticated or unsophisticated customers or farmers in local, national, and overseas markets, served by the cluster members. These customers can also be demanding, particularly in terms of price-related demand. Although such demand may lead to different forms of changes or modification, it does not contribute to the competitiveness of the region. According to Porter (1998c), sophisticated customers pressure companies to make improvement to their products and to innovate, to move from low quality goods and services. While the cluster members also serve national and overseas markets, the local demanding customers is not the only contributing factor influencing the regional competitiveness.

- + Attitudes towards innovation & adoption new technology
- + Sophistication and demanding customers
- + Product differentiation
- + Specifiers i.e. New Zealand customers
- Knowledge buyers i.e. offshore customers
- Unsophisticated customers i.e. offshore customers
- Price-sensitive offshore customers

7.3.4. Context for firm strategy and rivalry

As discussed earlier, the cluster members of the AgBio cluster target both local and national customers. Some of these companies also serve overseas markets. In this regard, competition is not merely restrained within close geographic proximity but extends beyond Hamilton, the Waikato region. For instance, while Respondent M's company engages in competition throughout the country, Respondent G's company also competes intensively with potential rivalries locally and nationally, as well as in overseas markets. Therefore, the findings of this research related to context for firm strategy and rivalry are not strictly emphasised on the influence of local competition on competitiveness.

7.3.4.1. *Types of competition*

In general, competing companies may engage in price-based competition and technology-based competition, focusing on technological features and advancement. This notion is highlighted by Respondent G, Respondent L, and Respondent P. Regardless of the forms of competition, Respondent G's customers, for example, largely rely on an opinion-based decision to make purchase. In this regard, according to Respondent F, their customers are rational decision makers, comparing and choosing products based on price. For this reason, this research suggests that technology-based competition may be relatively less rewarding, while competition based on prices of products potentially provides a greater financial incentive, at least in a short run. For Respondent G, price-based competition tangibly allows their customers to make a quicker distinction between products and provides a numeric justification for the decision.

The appeal of competition based on prices may be more prevalent where early adopters of technologies are relatively few. For instance, this may be the case for businesses, including Respondent P's company, which introduce new or unconventional technologies in the industry in which a number of slow technology adopters overwhelm that of early adopters. In this regard, although companies may benefit from getting a head in technology-based competition, gaining competitiveness over competitors, economic reward for innovation may not exist with the absence of the latter. While innovation renders competitiveness (Porter, 1998a), it may also hamper profits, in a short-term and, in turn, discourage companies to innovate or improve. Therefore, government policy

aiming to promote innovation should also focus on expanding and strengthening the base of early adopters.

7.3.4.2. *Strategies for competition*

With the presence of competition, this research identifies a number of key strategies adopted by different cluster members at Waikato Innovation Park. For instance, being a small business, Respondent J's company directly reaches out to customers with the aim to make its products more well-known within the industry, to build a more well-established brand name. With an understanding of opinion-based competition, Respondent G's company follows different strategies that help influence customers' decisions to purchase and to get an advantage over competitors. In this regard, it focuses on building inter-organisational relationships and communication with customers, particularly decision makers, identifying needs, demonstrating product superiority, and differentiating from those offered by competitors. Likewise, without direct competitors from New Zealand but in overseas markets, Respondent B's company strategically identifies a niche in those markets, to differentiate its nature-based products from those of the competitors.

7.3.4.3. *Lack of competition*

Furthermore, although potential rivalries exist, there is a lack of internal competition within the AgBio cluster. The lack of rivalries is highlighted by Respondent N, Respondent F, Respondent B, Respondent J, and Respondent P. In this regard, this research identifies three contributing factors influencing this phenomenon. First, it is a by-product of the heterogenous nature of the AgBio cluster. Second, besides competition, some companies may also, to a certain extent, adopt a collaborative strategy, especially if rivals are potential customers. This notion is highlighted by Respondent N, Respondent M, and Respondent F. For instance, while Respondent N's company, acting as an intermediary, works with potential competitors in overseas markets, Respondent M's company takes on a complementary role helping potential rivals in the region to fulfil jobs that they are unable to including those in peak season. Likewise, Respondent F's company has a verbal agreement with its main competition within the region, to refer each other customers who does not engage with their respective companies.

Last, over reliance on inter-organisational networks may also diminish competition. For instance, while operating in a highly specialised field in which rivalries are relatively small in size, Respondent C's company relies on own networks for businesses. Within the networks, it is able to, to a great extent, avoid the need to compete with other companies. Nevertheless, to further foster growth demands Respondent C's company to seek business opportunities outside the networks and subsequently to compete with other companies. Therefore, while the influence of competition on innovation and competitiveness (Porter, 1998a) is relatively well-studied, this research also suggests its influence on business growth. This, therefore, demands a further study on a relationship between the two.

7.3.4.4. *Lack of collaboration*

As discussed above, although aspiration for working in partnership to achieve common goals may exist among the cluster members, it does not necessarily eventuate in actual cooperation. This is highlighted by Respondent B. For instance, as a multinational corporation, Respondent G's company restricts business-related collaborations with rivals. The restriction does not, however, apply to non-business-related collaborations, for instance, with Fonterra in Hamilton on social or charitable work such Food Development initiative, a Milk for Schools programme. Furthermore, there is a sceptical attitude towards external and internal collaborations, including those with new entrants that are direct competitors. First, intra-cluster collaborations with directly competing companies are of greater concern to Respondent F's company, partly due to a limited amount of work in their fairly specialised field. Second, confidentiality of intellectual property also contributes to Respondent P's scepticism, although opening to collaboration with rivals including the cluster members, for example, to increase market share.

This research suggests that working in partnerships among the cluster members, particularly competing companies on business-related projects may be more viable among small companies. Nevertheless, scepticism exists, regardless of the size or type of companies, which may subsequently hamper both intra and inter-cluster collaborations among competing companies looking to work together to achieve common goals. While business clustering promotes trust (Faulconbridge, 2007; Horaguchi, 2008; Zaheer & George, 2004), the finding indicates, to a certain extent, the lack thereof among potential competing companies within the AgBio cluster. For this reason, this research highlights

the importance of promoting trust among the stakeholders through inter-organisational relationships, as well as an intermediary such as Waikato Innovation park. This is in line with Buerkler (2013) claiming that successful collaborations require sufficient trust. Likewise, for Burt and Knez (1996), trust is produced through repeated interactions and, therefore, makes future collaboration more likely.

In relation to the scepticism, trust is a main mechanism governing collaboration (Lütz, 1997; Creed & Miles, 1996; Grandori & Soda, 1995). It fosters cooperative behaviours (Mishra, 1996), assures reciprocity of information exchange (Burt, 1992), and sustains durability of collaborations (Smith-Doerr, 2006). In this regard, trust eliminates opportunism (McCann, 2003) and eliminates a fear of being exploited and increases communication of undistorted information (Mishra, 1996). It reduces concerns about the need to monitor performances or behaviours (Cook & Gerbasi, 2006) and, therefore, associated costs incurred (Cook & Gerbasi, 2006; Mandelli, 2004; Levi, 2000; Creed & Miles, 1996; Hill, 1990). A lack of trust, on the other hand, incites uncooperative behaviours and leads to conflictual relationships (Levi, 2000), making collective undertakings more difficult (Cook & Gerbasi, 2006; Lampel, 2004). Owing to the importance of trust for collaboration, this research also puts emphasis on strengthening inter-organisational networks among the cluster members. In this regard, long-term relationships founded in the networks help build trust relations (Levi et al., 2004; Cox & Mowatt, 2004; Nooteboom, 2003).

Although business clustering helps companies build inter-organisational networks and trust and intermediaries exist within the AgBio cluster, this study suggests, with the lack of collaboration, a more extensive role and use of the latter. The intermediaries help build trust (Ipe, Raghu & Vinze, 2010; Nooteboom, 2002; Bailey & Bakos, 1997) and prevent opportunistic behaviour (Janssen & Sol, 2000; Bailey & Bakos, 1997). These entities are particularly important to small companies, which are hindered in their ability to invest in or build extensive networking (Bharati & Chaudhury, 2010; Weber & Schnell, 2003; Clark & Guy, 1998; Shohet & Prevezer, 1996). Having extensive networking relationships with a large number of organisations (Zhang & Li, 2010; Todeva, 2006; McEvily & Zaheer, 1999), they are able to help establish relationships bridging disconnected parties (Verona et al., 2006; Howells, 2006; Hansen, 2002). Within the AgBio cluster, the management team of Waikato Innovation Park acts as the intermediary helping build inter-organisational relationships and trust, as well as collaboration.

Therefore, complementary to business clusters, intermediaries act as a catalyst enhancing networking capabilities that lead to trust-based relations and, subsequently, collaboration.

7.3.4.5. Summary of assessment

Overall, this research identifies different forms of competition in which the cluster members engage in, how they form a decision to purchase, and their competitive strategies. As discussed earlier, although New Zealand customers including farmers are relatively more sophisticated, compared to offshore customers, particularly from under-developed or developing nations, they are also price-focussed. This, together with an opinion-based decision to purchase, influence the cluster members interviewed to direct their competitive strategies, to a greater extent, towards price-based competition, at least in a short-term. Nevertheless, competing based on price prevent innovation and hampers competitiveness. Guided by a subjective assessment of the interviews with the respondents of this research, this, the form of competition with which the cluster members engage in is assigned (+/-) as it neither have positive or negative effect on competitiveness of the AgBio cluster and the Waikato region.

Strategies for intra or inter-cluster competition adopted by the cluster members are assigned (+). This assignment is due to the effort undertaken by thee companies interviewed to strive for winning over competition and for the success of their companies, although there is no evidence that these strategies produce a positive result for the companies interviewed. Nevertheless, despite the presence of these strategies, competition is lacking among the cluster members. The lack of competition may constitute the lack of a push factor that pressures companies to further innovate and improve. Therefore, this is assigned (-), regarding its influence on competitiveness of the cluster and the region.

- Rivalries among cluster members
- Collaboration among rivals
- Attitudes towards new entrants and collaboration
- + Product differentiation
- ± Influence of opinion-based decision to purchase

7.3.5. Related and supporting industries

Although the AgBio cluster locates in Hamilton, the Waikato region, locally-based related and supporting companies such as suppliers are not the only trading partners of the cluster members. For instance, Respondent G's company engages with about 400 suppliers, including those based within the region and throughout New Zealand as well as overseas. In this regard, the findings related to related and supporting industries in this research are not merely emphasised on the influence of local suppliers on competitiveness but also on that of those locate outside the region.

7.3.5.1. Locally-based supplying companies

Hamilton, the Waikato region displays the characteristic of self-sufficiency, in terms of accessibility to goods and services needed for business operation. This notion is highlighted by Respondent F. For instance, Respondent F's company enjoys a convenient access to service provided by a highly competent related company, which is also a cluster member at Waikato Innovation Park. Furthermore, Respondent M largely relies on highly competent local suppliers throughout the Waikato region, within a 12-kilometre radius of Hamilton for materials used to build the facility that costs about NZ\$12.5 million. One of these key suppliers is Respondent G's company, a world-renown multinational corporation, which is also a cluster member. In turn, Respondent G's company, to a great extent, uses local supplies within the region to build the spray-drying facility for Respondent M's company. In this regard, locally-based stainless steel fabricators, as well as those based throughout New Zealand, are considered global best practice by Respondent G's company, in terms of competency, quality, and technology. Therefore, the findings of this research suggest that the inter-dependability among local companies creates a healthy cycle, which further strengthen the industry, as well as the competitiveness of the cluster and the region.

Furthermore, the Waikato region exhibits a strong research and economic strength in agriculture, with the presence of a large number of agriculture companies and other relevant organisations or institutions. While these establishments serve local and national markets, they are also involved in exporting activities. This is emphasised by the cluster members interviewed including Respondent M and Respondent G. As a result, locally-

based companies including the cluster members enjoy the abundance of renowned supplying companies specialising in an agriculture-related field. For instance, Respondent F's company is able to conveniently access service of a highly competent Crown Research Institute, AgResearch based within the Park premises. While being competitive in terms of price, AgResearch, to a great extent, puts greater emphasis on value creation for customers, as opposed to profit maximisation. These positive attributes may subsequently contribute to competitiveness of Respondent F's company.

Overall, the findings of this research suggest that the abundance of highly competent related and supplying companies specialising in agriculture-related and non-agricultural fields influences the operation and success, as well as competitiveness of locally-based companies and the cluster members alike. This notion is highlighted by Respondent G. Nevertheless, their high level of competency may not translate into competitiveness in terms of price. For instance, although being considered global best practice, stainless steel fabricators based within the region and throughout New Zealand are not price competitive on a global basis, especially if compared to Asian manufactures. This notion is emphasised by Respondent G. The juxtaposition of competitiveness based on technological advancement and that based price indicates that the New Zealand fabricators, to a great extent, engage in technology-based competition. These manufacturers subsequently gain competitiveness in terms of technological advancement over particularly their Asian counterparts at the expense of price competitiveness. In relation to opinion-based decision to purchase discussed in the section on Context for firm strategy and rivalry, technology-based competitiveness may not ultimately help these fabricators maximise profit. This may be the case if their customers are largely unsophisticated.

7.3.5.2. *External supplying companies*

Owing to the efficiency of infrastructure and transportation, related and supporting companies based in Hamilton, the Waikato region are not the only sources of supplies. In this regard, locally-based companies including the cluster members also rely on external suppliers located in other regions of New Zealand, especially non-agricultural suppliers. For instance, Respondent J's company largely uses suppliers in Auckland, a base for most of major science companies. Likewise, Respondent L's company, an IT-based establishment engages with Auckland-based developers for IT-related service, owing to

the geographic freedom rendered by ICT. This is in line with previous studies arguing that the advent of ICT may diminish the relevance of geographical location (Guerrieri & Pietrobelli, 2004; Zaheer & Manrakhan, 2001). Besides New Zealand, the advent of globalisation also allows the locally-based companies, for instance, Respondent M's company to import certain materials, for example, seals from overseas. Therefore, despite the abundance of highly competent agriculture companies, limitations remain, particularly in the non-agriculture area. For this reason, the use of national supplying companies in larger regions, particularly Auckland, as well as those overseas helps offset this regional shortage.

The reliance among locally-based companies including the cluster members on external sources for goods and services is partly due to the unavailability of needed local suppliers that fit their specific purposes. For instance, being a small business, Respondent B's company relies on an Auckland-based food processor, FoodBowl that allows a small-scale processing of their plants into juice. Similar to FoodWaikato, FoodBowl is part of the New Zealand Food Innovation Network (New Zealand Food Innovation Network, 2015). As discussed earlier, while FoodWaikato influences competitiveness of the AgBio cluster and the Waikato region, the entrance of FoodBowl adds further this locational strength. Therefore, future policy aiming to enhance the competitiveness may involve establishing FoodBowl within the region, as well as a lobby from the local government to fulfil this ambition. As discussed earlier in the Factor conditions on Basic factors, the relatively small size of the AgBio cluster calls for a further expansion of its memberships. According to Dana and Winstone (2008), new entrants help clusters build critical mass and also develop their regional and international identities. In this regard, the presence of FoodBowl help maintain existing and also attract new businesses into the region and the cluster.

7.3.5.3. *Geographic proximity*

As discussed earlier, the efficiency of infrastructure and transportation as well as the advent of ICT and globalisation increase opportunities to trade beyond geographical boundaries. Nevertheless, agriculture-related businesses may, to a greater extent, benefit from proximity to world-renowned agricultural companies and other relevant organisations or institutions based within the Waikato region. According to Porter (1998a), close geographical proximity to suppliers, especially those that are active and

potentially competitive in overseas markets contributes further to competitiveness. Although trading with both internal and external related and supporting companies, the cluster members interviewed including Respondent M, Respondent G, and Respondent F put greater emphasis on the importance of proximity to their trading partners. The proximity shortens commute time, which subsequently allows, to a greater degree, a quick and convenient access to, for instance, materials or services, an active involvement in problem solving with the counterparts, and influencing or monitoring quality and performance. It also allows more regular face-to-face interactions or meetings that facilitate inter-organisational relationships.

The findings of this research are in line with Porter (1998a) claiming that close working relationships with locally-based supplying companies enable companies of downstream industries to readily access components, machineries, information, and ideas that lead to innovation. These relationships are facilitated by close geographical proximity, which in turn, facilitates communication, scientific collaboration, joint development, flow of information and knowledge, and exchange of ideas, knowledge, and innovations (Porter, 1998a). Based on the interviews with Respondent G and Respondent F, this research shows that the relationships ensure mutual benefits, for instance, opportunities for business growth with their suppliers. In line with Porter (1998a), relationships between buying and supplying companies are mutually beneficial, especially when the former act as demanding buyers influencing the latter to innovate. As discussed earlier in the section on Porters' Demand conditions, the cluster members interviewed including Respondent F, Respondent M, Respondent B, Respondent G demonstrate a certain degree of sophistication. In this regard, the demanding cluster members may pressure both local and national supplying companies, as well those overseas to improve or innovate, to meet their needs. This influences the competitiveness of these suppliers and subsequently that of the region.

7.3.5.4. *Summary of assessment*

This research identifies geographical locations of related and supporting companies, which locally-based companies and the cluster members trade with. These supplying companies locate within the Waikato region and throughout New Zealand as well as overseas. Although engaging with the external suppliers, those based locally are deemed highly competent, especially agriculture-related suppliers. Their numbers are also

abundant. Guided by a subjective assessment of the interviews with the respondents of this research, quality and quantity of local suppliers and related companies are assigned (+), in terms of their influences of competitiveness of the Waikato region and that of the AgBio cluster. Likewise, geographical proximity is also assigned (+). In this regard, the benefits of the proximity to the local companies include a quick and convenient access to goods and services, a more active involvement in problem solving with the suppliers, to influence or monitor quality and performance, and inter-organisational relationships. External supplying companies, particularly those in the Auckland region is also assigned (+), to influence competitiveness of the region and the cluster. The Auckland region is a base for most of major science companies, in comparison to Hamilton. With the efficiency of infrastructure and transportation, the presence of renowned companies, for instance, FoodBowl in the adjacent Auckland region, to a certain extent, contributes to the competitiveness of the Waikato region and that of the AgBio cluster.

- + Quality of related & supporting companies e.g. agriculture-related
- + Quantity of related & supporting companies e.g. non-agriculture
- + Proximity to related & supporting companies
- + Quick access to goods and services
- + Inter-organisational relationship
- + Influencing & monitoring quality & performance
- + Active involvement in problem solving
- + Quality of related & supporting companies
- + Quantity of related & supporting companies
- + Proximity to external related & supporting companies e.g. Auckland

7.3.6. Adjustment to Porter's Diamond model

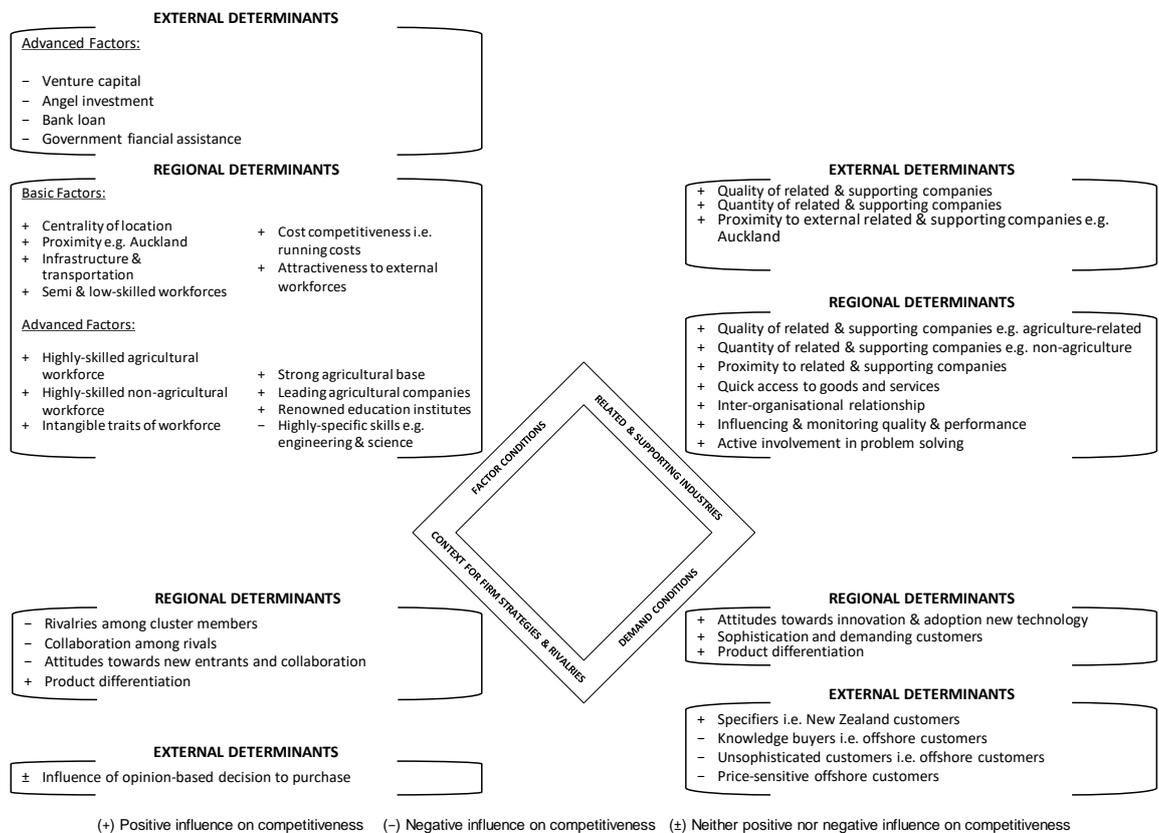


Figure 25: Combined regional and external Diamonds

Sources: Own creation based on (Porter, 1998, 2000)

This research assesses the competitiveness of a New Zealand-based cluster, the AgBio cluster by examining the environment in which the cluster is based, particularly Hamilton, the Waikato region. The assessment of the competitiveness is based on Porter's Diamond model. Owing to the size of the region, besides the Waikato Diamond, the cluster members also draw on the external Diamond, national Diamond and international Diamond. First, the cluster members rely on both the factor conditions of the Waikato region as well as the national and international factors. For instance, although the region develops a large pool of skilled labour, especially in agriculture and the world-renowned educational institution, the cluster members also draw needed employees, including those with specific or highly technical skills, from the rest of the country and overseas. Furthermore, in terms of financial capital, the cluster members seek financial assistance

from private and public sources based nationwide. Their source of financial support, in this regard, is not location-specific in the Waikato region.

Second, although the cluster members deal with customers in the Waikato region, they also serve those nationwide and overseas. In this regard, the competitiveness is not solely the result of the sophisticated and demanding local customers. Third, the cluster members rely on both regional and national supplying companies, as well as those overseas. Last, although the cluster members engage in competition with locally-based companies, their competitors also locate nationwide and overseas. Therefore, together with the regional determinants, the entire New Zealand determinants proportionally influence competitiveness of the Waikato region. In this regard, this research argues that the Diamond model is less applicable for assessing competitiveness of a single location that is part of a larger location or of a nation. Locally-based companies in the smaller location, with limited regional determinants, largely draw on national and international determinants. Similarly, Kim (2006) argues that the Diamond model is a less applicable model for small economies. These economies are less likely to achieve economies of scale or build up 'broad and deep clusters' (Grunsven & Egeraat, 1999, p. 146).

The findings of this research suggest that an adjustment to the Diamond model is required. The adjustment involves combining the regional and national determinants into a single Diamond model, considering the influence of all the determinants on competitiveness of a region. Furthermore, this form of Diamond model also identifies overlaps between determinants of the Waikato Diamond and those of New Zealand Diamond, for instance, financial capital of the Waikato region and that of New Zealand, the common determinants influencing the competitiveness of the region. As discussed earlier, while some of the cluster members are involved in business activities abroad, international determinants also play an important role in the competitiveness. Nevertheless, Porter's Diamond model exclusively focuses on home-base markets (Dörrenbächer & Wortmann, 1991; Bellak & Weiss, 1993; Dunning, 1993; Moon & Lee, 2004; Bowen Jr & Leinbach, 2006; Kim, 2006; Lagrosen, 2007; Sardy & Fetscherin, 2009; Liu & Hsu, 2009). Therefore, the Diamond model in this research addresses the influence of these international determinants in conjunction with that of regional and national determinants, to assess competitiveness of a region within a particular country (Refer to Figure 25).

7.4. Discussion on influences of intermediaries

An examination of the extant literature reveals that intermediaries are capable of helping sustain the competitiveness of companies (Zhang & Li, 2010; McEvily & Zaheer, 1999). On the other hand, the ability of the latter to create and acquire new knowledge and learn continuously constitutes their competitiveness (Zack, 1999; Sharkie, 2003, Asheim & Coenen, 2005; Dyer & Nobeoka, 2000). This section discusses the influence of intermediaries on the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation. In this regard, this research identifies six companies or organisations as the intermediaries at AgBio cluster. Based on Nonaka's Spiral model, knowledge creation involving four modes: socialisation, combination, externalisation, and internalisation. (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). Overall, this section provides an answer to the research question two of this study: "*How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?*" The follow section discussed the influence of the intermediaries, in relation to socialisation.

7.4.1. Socialisation

According to Nonaka (1991, 1994, 2007), Nonaka and Konno (1998) and Harryson (2002), socialisation allows knowledge creation and sharing through shared experiences, individual interactions, and joint activities. These are facilitated by geographic proximity that allows direct or face-to-face interactions. Socialisation usually begins with building a field for interaction that allows sharing of experiences, perspectives, and knowledge and also collaboration leading to creation of new concepts. The field for interaction also helps develop mutual trust essential for shared experiences.

7.4.1.1. Geographic proximity

Falling under the third-generation intermediaries as identified by Baxter and Tyler (2006), Waikato Innovation Park is formed with the help of Hamilton City Council through public and charitable funds, to contribute to the regional and national economic development. This involves the Park to undertake a task as a third-party intermediary, to build a cluster of companies, organisations, and research and educational organisations that is informally

known as the AgBio cluster. While the establishment is the result of the Hamilton City Council initiative, the Park is financially self-sufficient with incomes collected from lease of spaces, contracts, and services. In this regard, the Park operates as a for-profit intermediary, which benefits and profits from disunion of others in the networks by entering structural holes separating them and broker or mediate their relationships (Burt, 1992; Smith-Doerr, 2006).

The locational choice of the cluster members within Waikato Innovation Park in the Waikato region makes easy for the promotion of inter-organisational relationships and collaborations and face-to-face interactions among the former as well as between them and other companies, organisations, and institutions within the Waikato region. For instance, close geographic proximity facilitates the inter-organisational relationships between the cluster members: Dairy SolutionNZ/Beef SolutionNZ, CRV, LIC, and ABS. Their inter-organisational relationships, in turn, contribute to a mutually-beneficial collaboration, to create Kiwipole – the New Zealand-bred cows with exceptionally high specifications ideal for farmers in developing countries. In this regard, the collaboration results in knowledge creation and transfer among the collaborating partners within the cluster as well as to the offshore clients.

While Waikato Innovation Park provides a platform in which the cluster members located in the same premises interact and collaborate more easily, the on-site café allows inter-organisational and inter-personal relationships among their staff and also with clients or visitors. Furthermore, the strong research and economic strengths in agriculture together with the presence of a large number of agriculture companies and other relevant organisations or institutions within the Waikato region matches with the aim of growing like-minded businesses as part of the cluster. At a personal level, owing to the relatively small district size, there are strong inter-personal relationships among people reside within the Waikato region including business owners or managers. As a result, the strong inter-personal relationships translate into the prospect of stronger inter-organisational relationships and collaborations, at the organisational level.

Subsequently, the close geographic proximity together with the strengthened relationships contribute to knowledge creation and transfer within and beyond the boundary of the AgBio cluster. The findings of this research are supported by that of Porter (1998a), close geographic proximity facilitates inter-organisational relationships,

communications, collaborations, flow of information and knowledge, exchange of ideas, knowledge, and innovations. Likewise, for Nonaka and Konno (1998) and Harryson (2002), close geographic proximity allows face-to-face interactions and self-transcendence, which lead to knowledge creation and transfer.

7.4.1.2. *Inter-organisational relationships*

In addition to the benefits of close geographic proximity, the commitment to promote inter-organisational relationships and collaborations allows the intermediaries at the AgBio cluster to build large networks of contacts with professionals, companies, organisations, and institutions within the Waikato region, across New Zealand, and abroad. These contacts, in turn, act as conduits to their own networks allowing the intermediaries to develop broader and more diverse inter-organisational relationships. For instance, KiwiNet connects Intermediary 3 with other public research institutions and commercialisation offices in New Zealand as well as overseas networks including those in Australia. These national and international networks allow Intermediary 3 to help increase the visibility to the early-stage technologies and the likelihood of research commercialisation as well as of information and knowledge transfer and sharing of experience. Likewise, with large networks of contacts, the intermediaries also play an important role helping the cluster members to network with those contacts. As a result, they may directly benefit from information and knowledge flow.

With extensive networking relationships, the intermediaries effectively become the central point of contacts within their networks and are able to facilitate inter-organisational relationships and collaborations with more ease. For instance, Intermediary 1 and Intermediary 2 are actively involved in networking between open and like-minded businesses. Their roles extend further beyond New Zealand, to help connect the businesses with overseas partners or experts via the global expert assistance. Likewise, while Intermediary 4 acts as a bridge between New Zealand companies and the offshore clients, Intermediary 3 helps identify opportunities for collaborations between overseas partners and the University of Waikato as well as other New Zealand companies. Beyond the area of expertise, Intermediary 2 also connects non-target customers with or makes a referral to appropriate collaborating partners and the sister facilities. Similarly, Intermediary 5 links companies to relevant specialists. They also take the initiative to promote inter-organisational relationships and collaborations, to refer their contacts to the

cluster members that potentially results in reciprocity. Overall, through promoting inter-organisational relationships, the intermediaries contribute knowledge creation and transfer.

Furthermore, broad and diverse networks enable the intermediaries such as Intermediary 2 and Intermediary 4 to act as information intermediaries or infomediaries, to share useful information with companies and organisations within and external to the AgBio cluster. For instance, Intermediary 2 openly shares invaluable experiences, information, and knowledge with New Zealand food and beverage companies. This involves providing advice and working with businesses on product development trials or small-scale manufacturing as well as on the transformation of by-products into new products. Likewise, Intermediary 4 shares information related to the offshore projects with agricultural producers and suppliers as well as associated farmers in New Zealand. As a result, Intermediary 2 and Intermediary 4 play an important role in knowledge creation and transfer, through sharing of information and knowledge with the companies and organisations within and external to the cluster.

Nevertheless, knowledge creation and sharing may not require the assistance from intermediaries. In this regard, two companies may directly engage in collaborations, which subsequently results in knowledge sharing. For instance, Intermediary 6 works in partnership with other cluster members through the exchange of employees. In this regard, this practice allows sharing of experiences and knowledge between the involved companies. According to Nonaka and Konno (1998) and Harryson (2002), knowledge creation and sharing can be achieved through shared experiences.

Similar to the findings of this research, previous studies claim that intermediaries maintain extensive networking relationships with a large number of companies and organisations (Zhang & Li, 2010; Todeva, 2006; McEvily & Zaheer, 1999). Being a central point of contact within the network (Haga, 2009) enables the intermediaries to promote inter-organisational relationships bridging disconnected parties (Verona et al., 2006; Howells, 2006; Smith-Doerr, 2006; Hansen, 2002; Burt, 1992). Furthermore, the intermediaries are able to facilitate knowledge transfer (Haldin-Herrgard, 2000; Yakhlef, 2005; Smedlund & Toivonen, 2007) and convey needed information and knowledge between two sides in a timely fashion (Smedlund & Toivonen, 2007; Burt, 1992). Overall, inter-organisational relationships and information and knowledge sharing are important

components for the development of trust (Cox & Mowatt, 2004; Nooteboom, 2003). Trust is, in turn, essential for information and knowledge sharing (Nonaka, 1994; Nonaka et al., 1994). The important of trust in knowledge creation and transfer is discussed later in this chapter.

7.4.1.3. *Field for interaction*

Owing to the importance of inter-organisational relationships and collaborations, Intermediary 1 regularly organises social events at its premises. The social events enable informal and formal social mixing, more regular communications, and face-to-face interactions, which lead to the development of relationships and collaborations among companies within and external to the AgBio cluster. In this regard, the social events allow a single company to become part of a group of companies with a large pool of information and knowledge. Subsequently, while the participants may benefit from information and knowledge sharing among themselves, they also gain from information and knowledge flows from the Park. Likewise, Intermediary 2 utilises social events or workshops as a means to promote the sharing of information and knowledge among food and beverage companies within and external to the cluster. Overall, Intermediary 1 and Intermediary 2 organise a platform that allows interactions and removes a barrier hindering knowledge creation and transfer.

The findings of this research coincide with those of Nonaka and Konno (1998) and Harryson (2002), knowledge creation and transfer are achieved through shared experiences, individual interactions, and joint activities. In this regard, networked companies that meet repeatedly and share the same local environment are able to create knowledge with more ease (Di Guardo & Galvagno, 2005). Likewise, self-transcendence also influences knowledge creation and transfer (Nonaka & Konno, 1998) – a single cluster member to become part of a group of the other cluster members with a large pool of knowledge. These arguments highlight the importance of a field for interaction that enables sharing of experiences, perspectives, and knowledge as well as collaborations leading to the creation of new concepts and knowledge (Nonaka, 1994; Nonaka et al., 1994). The field for interaction also allows the development of trust that is, in turn, essential for sharing information and knowledge (Nonaka, 1994; Nonaka et al., 1994). The important of trust in knowledge creation and transfer is discussed later in this chapter.

7.4.1.4. Trust

The intermediaries, particularly Intermediary 1, Intermediary 3, and Intermediary 4, are involved in building trust within and outside the AgBio cluster. As discussed above, Waikato Innovation Park organises social events through which the cluster members and other participants build inter-organisational relationships, initiate collaborations, and share information and knowledge. These subsequently help build trust. Likewise, for Intermediary 4 trust requires social capital, socialisation that helps develop positive attitudes among the cluster members towards each other. Furthermore, the Park works to develop trust through an early success. The early success promotes the willingness among the cluster members to collaborate and their confidence in the Park, being capable of leading them towards success through collaborations. In this regard, respect complements trust, for the success of clusters. Respect, for Intermediary 4, is the ability to lead the way towards business opportunities and generating revenues.

The main strategy, for Intermediary 3, to build trust involves developing long-term relationships built on a lot of small win-win situations. In this regard, Intermediary 3 acts as a translator or interpreter to ensure a clear communication or helps manage misunderstandings or miscommunications and resolve conflicts between the research and business side. Furthermore, Intermediary 3 also helps build a general innate trust among the business side towards the researchers through education, to assist the latter to become more knowledgeable in the commercialisation process, more proficient in presentation and communication skills, and also to develop inter-personal skills. The main ingredients needed to develop trust, for the intermediaries such as Intermediary 3 and Intermediary 4, include honesty – being straight, open, and transparent as well as assurance and living up to promises and also the ability to remove of risks involve collaborations.

Nevertheless, the intertwined relationship between collaboration and competition within the cluster may present a challenge for the intermediaries working with those that compete with each other. For this reason, in order to develop trust, Waikato Innovation Park takes the initiative to remove a perception of competition, to isolate it from cooperation by building an environment of trust through the social events. Likewise, for Intermediary 5, the main strategy is to identify a niche for collaboration, which may involve the cluster members jointly providing a complementary service to their respective customers. This

may result in mutually-beneficial relationships and collaborations among the cluster members and, at the same time, lead to better commercial outcomes for the customers.

Likewise, for Intermediary 4, to overcome the challenge of the internal competition within the cluster as well as within the New Zealand dairy industry more broadly, there is a need for the adoption of collaborate-first-compete-later approach. In this regard, Intermediary 4 emphasises on separating collaboration from competition, to divert the attention to the former, aiming to successfully compete in overseas markets as well as to promote the New Zealand dairy-related concept and the dairy industry to the world. The co-existence of collaboration and competition within the cluster highlights the important role of the intermediaries in building trust that influences the decision of the cluster members to work in partnership towards shared goals. Overall, the intermediaries play an important role in developing trust that, in turn, promote long-term inter-organisational relationships and collaborations as well as information and knowledge sharing.

The findings of this research are in line with those of previous studies, which emphasise on the important role of intermediaries in building trust (Ipe, Raghu & Vinze, 2010; Nooteboom, 2002; Bailey & Bakos, 1997) and resolving conflicts (Burt, 1992) or mediate differences among cluster members (Baxter & Tyler, 2006). Trust, in turn, fosters knowledge transfer (Meyer & Alvarez, 1998) and mutual learning (Lütz, 1997; Creed & Miles, 1996; Grandori & Soda, 1995). It eliminates a fear of being exploited, increases communication of undistorted information (Mishra, 1996), and assures reciprocity of information exchange (Burt, 1992). Subsequently, information and knowledge sharing contribute further to the development of trust (Cox & Mowatt, 2004; Nooteboom, 2003).

7.4.2. Externalisation

As discussed earlier, owing to close geographic proximity, the intermediaries are, with more ease, able to facilitate inter-organisational relationships and collaborations, organise social events for face-to-face interactions, and develop mutual trust. They also promote the sharing of experiences, information, and knowledge. As a result, the intermediaries influence knowledge creation and transfer within and beyond the boundary of the AgBio cluster. For instance, Intermediary 2 is involved in the creation and transfer of knowledge through an active involvement in discussions or dialogues with customers, during the concept-commercialisation process. Throughout the process, Intermediary 2 works with

the customers to identify their requirements for the trials or small-scale production and to ascertain that it meets those requirements. In this regard, the discussions or dialogues allows sharing of knowledge related to product development trials or small-scale manufacturing with clients.

With the aim of selling technologies and attract investments for further development, Intermediary 3 is indirectly involved in the process of developing prototypes or demonstrators, working between the researchers and the business side. In this regard, on behalf the researchers, Intermediary 3 engages in frequent communications both face-to-face and non-face-to-face with the business side. The aim is to identify prototype requirements and evidence that potential customers expect to see from the prototypes, to determine the plausibility of building ones, and subsequently to enter negotiation with the customers. Furthermore, Intermediary 3 also ensures a genuine commitment from the business side to the researchers once the latter meet all the requirements, to ensure that the researchers benefit from their efforts.

As software development company, Intermediary 6 is also involved in developing prototypes. In this regard, the company regularly engages in dialogues with customers or intended users and also works as an intermediary between the two, to help articulate and understand requirements and obtain feedback. Likewise, to implement customised commercial solutions for businesses in the primary industries, Intermediary 5 is involved in developing models or prototypes. While assisting the businesses articulate requirements for the prototypes, Intermediary 5 also leads the way, to help with writing and setting the requirements. In this regard, they engage in ongoing communications and discussion, both face-to-face and non-face-to-face, which potentially result in new knowledge creation. For instance, Intermediary 5 helps discover a new way of using the temperature data, which is not anticipated during the development process. Therefore, based on the Spiral model, prototyping represents a way for knowledge creation and transfer by making tacit knowledge more explicit to others for better shareability (Nonaka, 1994; Harryson, 2002).

Besides modelling or prototyping, Intermediary 5 also specialises in assisting businesses with innovation, to help capture, evaluate, and maximise the potentials of their innovative ideas and hidden expertise, tacit knowledge. In this regard, they act as a generalist – an interpreter between a heterogeneous group of experts from the scientific and commercial

sides, to facilitate communication and interpret their differences. As the generalist or interpreter, Intermediary 5 is involved in promoting productive dialogues – brainstorming or ideation sessions, to elicit as many ideas out from both sides. This involves encouraging constructive criticisms on the ideas, mediating their differences and tension, and ensuring the expression of disapproval on the ideas rather than personally on individuals. Furthermore, they focus on diverting the attention from the tension brought about by the differences to finding solutions to problems.

As a result, Intermediary 5 plays an important role as the intermediary – the generalist or interpreter in innovation. They facilitate knowledge creation and transfer between the scientific and commercial sides, through a series of dialogues – brainstorming or ideation sessions. Similarly, previous studies find that intermediaries are able to assist companies in innovation (Baxter & Tyler, 2006; Hilaire-Perez & Verna, 2006; Nooteboom, 2002). Furthermore, based on the Spiral model, dialogues allow articulation of the tacitness of experiences, perspectives, and knowledge and, subsequently, transformation into explicit knowledge for better shareability (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002).

Furthermore, in relation to product development, Intermediary 4 leads a collaboration with the cluster members: CRV, LIC, and ABS to create Kiwipole – the New Zealand-bred cows based on the Costa Rica Senepol and the Carora of Venezuela. The whole process begins with an idea, to aim for the animals with high heat tolerance, exceptionally healthy and long lifespan, grass efficiency, and that calve regularly and easily. The development of Kiwipole based on the Senepol and the Carora provides an example of knowledge creation and transfer, which closely conforms to the argument on the externalisation mode of the Spiral model, metaphor and analogy (Nonaka, 1991, 1994, 2007; Harryson, 2002).

On the one hand, metaphor enables linkages and comparisons of the two concepts, in relation to this research, between that of New Zealand Kiwipole and those of Senepol and Carora, which subsequently discern their contradictions or discrepancies, the characteristics of these breeds. On the other hand, analogy helps harmonise and resolve the contradictions or discrepancies of the concepts, by highlighting their common attributes. In this regard, analogy allows an exploration of how the two concepts are alike and subsequently results in a discovery of a way to produce the similar product, Kiwipole.

Therefore, based on the Spiral model (Nonaka, 1991, 1994, 2007; Harryson, 2002), the joint project to develop Kiwipole results in knowledge creation and transfer among the collaborating partners within the cluster and also to the offshore clients.

7.4.3. Combination

From the above discussion, while knowledge creation and transfer are influenced by close geographic proximity, inter-organisational relationships and collaborations, face-to-face interactions, and mutual trust, they may also take place through dialogues or brainstorming or ideation discussion and prototype development. Furthermore, knowledge creation is also the result of combining different pieces of information and knowledge and translating them into a more complete set of knowledge. In this regard, with an extensive knowledge and experience in analytics, Intermediary 5 specialises in interpreting a variety of complex data of businesses in the primary industries. This involves reducing, analysing, and turning the data into information, knowledge, and ultimately wisdom, into a more easily understandable format such as reports with graphs and metrics. The more usable and better-organised form of information and knowledge subsequently provide the businesses a useful means for improving decision making and achieving positive commercial outcomes.

Furthermore, Intermediary 5 specialises in technology reviews, to identify and evaluate a range of new technologies both for intended users and developers. They subsequently rank and translate technical jargons related to the technologies into a more easily-understandable language, to provide the customers with information and knowledge useful for decision making. Although they may not be involved in capturing or collecting customers' data, Intermediary 5 is responsible for editing, reducing, processing, analysing, and translating them into a more useable or a better-organised form, for example, reports with graphs and metrics to assist decision making. Likewise, Intermediary 6 helps farmers combine these disparate data and convert them into a more meaningful form. In relation to data interpretation, the company also works as an intermediary between the farmers and their advisors, consultants, and account managers.

Overall, Intermediary 5 and Intermediary 6 play an important role in knowledge creation and transfer through the use of customers' existing data, information, or knowledge and translating them into a more complete set of knowledge. The finding of this research is in

line with that of a previous study, which identifies the important role of intermediaries in combining different pieces of knowledge (Howells, 2006). In this regard, the service offered by Intermediary 5 and Intermediary 6 is closely related to the combination mode of the Spiral model based on which different pieces of information and explicit knowledge are edited, processed, and translated into an organised form such as documents or reports, a more complete set of explicit knowledge (Nonaka, 1991, 1994 & 2007; Nonaka & Konno, 1998; Harryson, 2002). This process can be enhanced by IT-based systems (Nonaka & Konno, 1998; Nonaka et al., 1994), for example analytics (Davenport & Harris, 2007).

7.4.4. Internalisation

In addition to knowledge creation and transfer, knowledge implementation allows broadening and extending of existing knowledge. In this regard, Intermediary 2 is involved in training services through which trainees and students work closely side by side with its specialists on the ground at the spray drying facility. The training services enhance the trainees' existing skill and knowledge and also help them to learn new ones. These subsequently enable the trainees to operate other similar facilities. Likewise, Intermediary 2 assists the students with knowledge implementation involving turning the existing knowledge on the paper into action at the open-access spray drying facility. Furthermore, the Intermediary 2 training service complements more formal agricultural-related courses provided by other education institutes such as Dairy Diploma courses. Therefore, Intermediary 2 plays an important role in knowledge implementation.

Likewise, Intermediary 4, as a technology transfer company, helps the offshore clients expand knowledge of farm operations through education, for instance, the Level 3 Certificate in Farming (Dairy). The educational operation is carried out collaboratively with New Zealand partners including Lincoln University – Telford Campus in Otago. While the education results in knowledge creation and transfer from the New Zealand side, Intermediary 4, to the offshore clients, it also allows the latter to expand their existing knowledge. Furthermore, Intermediary 5 is involved in practical R&D training to both the cluster members and external companies or organisations. The training equips the trainees with knowledge and skill that enable effective planning, managing, and finishing R&D projects within timeframes and budgets. It, therefore, allows the trainees

to expand their existing knowledge base. Similarly, Intermediary 6 provides a training programme designed for intended users, farmers on how to use its software products.

The findings of this research coincide with those of previous studies, which identify the important roles of intermediaries including in training (Howells, 2006) and knowledge implementation (Smedlund, 2006; Smedlund & Toivonen, 2007). In this regard, learning through active involvement, personal commitment, constant self-improvement, and participation in a field of action allows the expansion of knowledge receivers' knowledge base (Nonaka & Konno, 1998; Nonaka, 1991, 1994, 2007; Nonaka et al., 1994). It allows the transfer of explicit knowledge and gradually turning that into a more concrete form of knowledge, tacit knowledge (Nonaka, 1991, 1994, 2007; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002).

7.4.5. Supplementary roles of intermediaries

Besides their core business activities, the intermediaries in this research also perform various roles within and outside the AgBio cluster. For instance, Intermediary 5 primarily specialise in combining and translating different pieces of information and knowledge into a more complete set of knowledge. Nevertheless, the extensive knowledge and experience as the generalist together with the large networks of varied specialists allow Intermediary 5 to comprehensively accomplish a variety of tasks outside their core expertise. For instance, Intermediary 5 are also involved in assisting companies in intellectual property strategies and commercialisation. For this reason, Intermediary 5 undertake a core role carried out by Intermediary 3. In this regard, Howells (2006) similarly claims that intermediaries encompass a broad range of different entities with numerous and diverse roles (Howells, 2006). Nevertheless, two different intermediaries may undertake a similar intermediating role (Nooteboom, 2002). Furthermore, these intermediaries may also help reduce transaction costs, attract new entrants, and act as a leading company. The following section discusses the influence of the intermediaries on transaction costs.

7.4.5.1. Transaction costs

Owing to their involvements in building trust, the intermediaries at the AgBio cluster play an important role in reducing transaction costs. For Intermediary 3, trust determines whether the research and the business sides opt for a formal written contract, regarding to the development of prototypes, which entails relatively higher costs, or merely a written commitment. Likewise, the intermediaries contribute to the reduction of transaction costs, through facilitating inter-organisational relationships and information and knowledge sharing. For instance, being a central point of contact, Intermediary 1 and Intermediary 4 act as a bridge between disconnected parties within and external to the cluster. They effectively become an information provider, a signpost for those seeking information. In this regard, they freely share useful information and knowledge and, therefore, helps reduce search and information costs. As a result, the intermediaries contribute to the reduction of transaction costs associated with contract, search, and information costs.

The findings of this research coincide with those of previous studies, which find that intermediaries help reduce transaction costs (Spulber, 2009; Feller et al., 2009; Nooteboom, 2002; Hartman et al., 2000). In this regard, they play an important role in building trust (Ipe, Raghu & Vinze, 2010; Nooteboom, 2002; Bailey & Bakos, 1997) and reducing contract costs (Nooteboom, 2002), search costs (Spulber, 2009; Feller, Finnegan, Hayes & O'Reilly, 2009; Hartman et al., 2000), and information costs (Spulber, 2009). The influence of the intermediaries in driving down transaction costs recapitulates their contribution in building trust. First, transaction costs include contract costs (Coase, 1960; Pitelis, 1993; Dietrich, 1994; Spulber, 2009, 2007), which are made up of the costs of drafting, negotiating, and safeguarding contracts (Vitikainen, 2007; Dietrich, 1994). In this regard, the contracts can be difficult to draft and monitor and, therefore, requires a technical or professional expertise (Lampel, 2004). As a result, together with incomplete information (Dietrich, 1994), it is costly and dauntingly difficult to create a complete contract (Vitikainen, 2007).

Second, transaction costs also include costs associated with discovering relative prices and the right people to deal with (Coase, 1960; Pitelis, 1993; Dietrich, 1994; Spulber, 2009, 2007), to obtain relevant information and search for the best offers (Stubkjær, Frank & Zevenbergen, 2007). In this regard, insufficient information may lead to opportunistic actions (North, 1990; Vitikainen, 2007), which subsequently contributes further to

transaction costs (Williamson, 1975). Therefore, trust eliminates opportunism (McCann, 2003) and renders the need to monitor trustee's performances or behaviours unnecessary (Cook & Gerbasi, 2006). Subsequently, trust reduces transaction costs (McCann, 2003) associated with contracts, monitoring and sanctioning costs as well as search and information costs (Cook & Gerbasi, 2006; Mandelli, 2004; Levi, 2000; Creed & Miles, 1996; Hill, 1990).

7.4.5.2. *New entrants*

As the technology transfer company, Intermediary 3 primarily acts as bridge between the research side and the business side, to transform a wide range of new technologies into successful products. While the efforts lead to knowledge transfer from the former to the latter, they also result in new star-up companies, adding further to the strength of the AgBio cluster. For instance, Intermediary 3 contribute to the start-up of Aldera Limited, a company specialises in animal health technologies or products located at Waikato Innovation Park. Intermediary 3 is also involved in the establishment of Ligar Polymers, together with the cluster member – Wintec. Ligar Polymers is based in proximity to the Park. As a result, Intermediary 3 contributes to further development of the AgBio cluster, by adding new memberships, and also to the regional economy of the Waikato region. Similar to the findings of this research, previous studies find that intermediaries support new entries (Baxter & Tyler, 2006) and contribute to the development of clusters and regions as well as economic development more broadly (Baxter & Tyler, 2006; Weber & Schnell, 2003).

7.4.5.3. *Leading companies*

As a commercial consortium, Intermediary 4 acts as a front-line for the AgBio cluster, to represent agricultural producers and suppliers within and outside the AgBio cluster. The primary focus is to get these companies involved in the design and building of large-scale offshore farm operations – land development and technology deployment based on New Zealand technologies and systems. In this regard, Intermediary 4 leads the partnership working on the offshore projects, to help the offshore clients maximise the quality and quantity of production and solve a profitability problem. Subsequently, being the leading company allows Intermediary 4 to promote the identity of the AgBio cluster in the offshore markets. Based on Dyer and Nobeoka (2000), a strong network identity may give

rise to a shared purpose and a sense of belonging, which, in turn, help motivate the cluster members to engage in knowledge sharing activities. Overall, the significance of Intermediary 4 as the leading company within the AgBio cluster coincides with Perry (2004), which stresses the importance of leaders within New Zealand clusters, to work towards, for instance, the success of exporting activities.

7.4.6. Summary of intermediaries

Overall, the findings of this research show that the intermediaries at the AgBio cluster, along with their core business activities, perform a range of different roles that influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation. In particular, these intermediaries are respectively involved in the process of knowledge creation: socialisation, externalisation, combination, and internalisation. Besides their involvements in the processes of knowledge creation, these intermediaries undertake supplementary roles that potentially result in lowered transaction costs such as search and information costs, as well as increased new entrants. Furthermore, one of the intermediaries also assumes the role of a leading company, representing New Zealand agricultural producers and suppliers within and outside the cluster and increasing their success of exporting activities. This leading company also helps promote the identity of the cluster in the offshore markets.

Chapter Eight:

Conclusions

8.1. Introduction

This research acknowledges the importance of regional meso-level factors, which influence the competitiveness of clusters and that of micro-dynamics, whose interaction affects the clusters. The following sections present an overview of this research.

8.2. Research overview

“A cluster is a geographically proximate group of interconnected companies and associated institutions in a particular field, linked by commonalities and complementarities” (Porter, 1998a, p. 199). Clusters facilitate inter-organisational relationships (Pavlovich & Akoorie, 2010), allowing face-to-face interactions (McCann & Shefer, 2005; Malmberg & Maskell, 2002), and enable the transfer of information and knowledge with more ease (Pavlovich & Akoorie, 2010). The interplay between competitive and collaborative relationships is the key feature of functional clusters (Porter, 1998a; Dana & Winstone, 2008). Despite the advent of ICT, business clustering remains essential to competitiveness (Guerrieri & Pietrobelli, 2004; Zaheer & Manrakhan, 2001).

As a small open economy in which companies engage in competition globally, business clusters are still being seen by New Zealand policymakers as key. Most of these companies are small and medium-sized (Ministry of Business, Innovation & Employment, 2017; Ministry of Economic Development, 2011; Chetty & Stangl, 2010; Agndal & Chetty, 2007; Brimblecombe, 2005; Ministry of Business, Innovation & Employment, 2013). They are more likely to rely on clusters (Perry, 2007b; Palakshappa & Gordon, 2007) as well as intermediaries (Bharati & Chaudhury, 2010; Brown & Lockett, 2004; Weber & Schnell, 2003; Shohet & Prevezer, 1996; Bessant & Rush, 1995; Seaton & Cordey-Hayes, 1992). As a result, business clustering becomes an important part of economic development strategies for many regions (Brimblecombe, 2005).

Successful clusters are competitive clusters (Clarkson et al., 2007). In this regard, policy-driven attempts to develop clusters have largely been based on the pursuit of competitiveness (Porter, 1998b; Prats, Guia & Molina, 2008). Despite the plethora of studies on cluster competitiveness, little research has been done on the collective

contribution of business environment, knowledge, and innovation. At the micro level, there has also been a paucity of research to examine how knowledge is created and dispersed through clusters by the action of intermediaries.

Therefore, this research adds to the literature by combining the three theoretical perspectives to examine how competitiveness is created in clusters using a New Zealand example, the AgBio the cluster and the influences of intermediaries on the cluster competitiveness. The combination of different theoretical mechanisms renders a better understanding to phenomena (Greve, 2009). At the meso level and micro level, the two-level research is informed by Porter's Diamond model, Regional Systems of Innovation, and Nonaka's Spiral model. It adopts mixed methods design, the embedded mixed-method case study involving a combination of qualitative and quantitative methods.

Overall, this research finds that the AgBio cluster is deemed a competitive cluster. Concerning the research question one, "How can the competitiveness of a New Zealand-based cluster be assessed by examining the cluster, its environment and the innovativeness of the member firms?", the competitiveness of Hamilton, the Waikato region and the innovativeness of the cluster members contribute to the cluster competitiveness. Furthermore, there has also been a paucity of research to examine the action of intermediaries, "How do intermediaries in a New Zealand-based cluster influence the cluster competitiveness through knowledge creation, knowledge transfer, and knowledge implementation?". The research findings show that the intermediaries associated with the cluster also contribute to its competitiveness. The following section further details key findings of this study.

8.3. Key findings

As discussed in the above section, the AgBio cluster is deemed a competitive cluster, owing to the competitiveness of Hamilton, the Waikato region, and the innovativeness of the cluster members. The intermediaries of the cluster contribute further to its competitiveness. The following chapter details the strengths of the AgBio cluster.

8.3.1. The AgBio cluster

The AgBio cluster is a diverse cluster. Past studies show that the heterogeneity provides opportunities for collaborations, ensures continuous flows and creation of new knowledge (Lindsay, 2005), and helps transform latent groups into functioning or active clusters (Perry, 2007a; Gray, 2002). Although external memberships exist, many of the cluster members locate in Waikato Innovation Park. The Park provides a dynamic business site with attractive and modern amenities and a friendly environment. These state-of-the-art facilities afford a more professional image and reputation, allowing the cluster members to showcase success to customers or business partners.

Furthermore, co-location among the cluster members at Waikato Innovation Park enhances networking and collaborating opportunities. The proximity also allows access to highly competent related and supporting companies located within the same premises. Although the arrival of ICT may attenuate the essence of proximity, the rewards of being in the Park outweigh the choice of locating elsewhere, especially for newly-established companies or start-ups. As a result, the attractive amenities as well as the networking opportunities serve to attract new entrants, including small companies or newly start-ups seeking to build inter-organisational relationships and growth.

Within the AgBio cluster, there is a presence of leading companies or industry leaders. Being central to the cluster development, they help spawn new start-ups and related and supporting companies. According to Perry (2007a), Perry (2005) and Perry (2004), the presence of leading or dominant companies benefits smaller cluster members. While these companies may require the expertise of the latter, they play an important role attracting new entrants and boost the chance of success in exporting activities. Chetty (2004) similarly stresses the important role of entrepreneurial leaders, catalysts for the cluster development. Therefore, these large pillar companies are the critical success factors of clusters (Fraser & Kelly, 2010).

Despite these strengths, the AgBio cluster faces challenges that may undermine its success. In this regard, there have been attempts to instead use the platforms – seminars or social events – designed to promote networking and collaborations as a sales pitch. This divergence diminishes their importance and contributes to the lack of communication among the cluster members. Furthermore, the heterogeneous nature of

the AgBio cluster instead limits common or overlapping areas for collaborations. The heterogeneity also reduces the need for interaction among the cluster members. This is particularly true for the well-established and large companies. As a result, the cluster members may seek external collaborating partners. Nevertheless, there remains an interest in intra-cluster collaborations, especially among the small cluster members.

8.3.2. Competitiveness of location

Competitiveness of clusters depends on competitiveness of regions in which they are based (Lechner & Leyronas, 2012). The findings of this research show that the strengths of Hamilton, the Waikato region contribute to the competitiveness of the AgBio cluster.

First, the key regional strengths include a strong agricultural base with the presence of leading agricultural companies, highly skilled agricultural workforce, as well as renowned education institutes, particularly the University of Waikato. Furthermore, the centrality and proximity to other locations, particularly Auckland together with the efficiency of infrastructure and transportation make the region desirable to particularly agricultural companies and young employees. Local companies also benefit from cost competitiveness, being able to serve the nearby Auckland market at relatively lower running cost in Hamilton. Overall, these regional attributes serve to attract new entrants and external labour forces. The increasing number of the companies and workers further strengthens the existing agricultural base and workforce.

On the financial side, the cluster members and other local companies benefit from government financial assistance including NZTE and Callaghan Innovation for a business skill training and R&D. There is, however, a limited financial availability, particularly from the business side including venture capitalists, angel investors, and banks. The difficulties to obtain fund from the business sides hinder growth of the companies and have a potential negative impact on the regional competitiveness. Nevertheless, the limited financial assistance is not unique the Waikato region but is a national phenomenon challenging particularly small businesses throughout New Zealand.

Second, the agricultural strengths of the Waikato region and the local workforce differentiate from the rest of New Zealand. Within the AgBio cluster, the cluster members and their customers are, in general, deemed sophisticated. According to Porter (1998c),

sophisticated customers pressure companies to make improvement to their products and to innovate. Nevertheless, the cluster members also serve national and overseas markets. Therefore, the sophisticated local demand is not the only factor influencing the competitiveness. Overall, the customers located in the Waikato region and the rest of New Zealand are relatively more sophisticated than those abroad, particularly in South America and China.

The findings on customer sophistication have two-fold implications. First, there is an indication that the lack of financial capital among customers from developed or developing countries, for instance, in South America limits the level of their sophistication. This, however, also hold true among those of New Zealand having limited capital, although they are relatively more sophisticated than their overseas counterparts. Second, the finds indicate a relationship between the level of knowledge possessed and the extent of sophistication. For instance, New Zealand companies, known as specifiers, tend to possess a larger reservoir of agricultural knowledge and more sophisticated than knowledge buyers, particularly Chinese companies.

While the lack of financial capital influences the level of sophistication, it also affects firm strategies dealing with competition. For instance, for less-sophisticated customers such as those in South America, engaging in price-based competition offer greater financial rewards, especially if they are price-sensitive. On the other hand, technology-based competition may hamper profits, if early technology adopters are relatively few. In this regard, the research findings show the relationship between customer sophistication and competitive strategies. This research maintains that competitive strategies that lead to innovation and regional competitiveness involve expanding the base of sophisticated customers or transforming less-sophisticated into more-sophisticated ones.

In relation to rivalry, there is a lack of internal competition among potential rivals within the AgBio cluster. The heterogenous nature of the cluster influence this phenomenon. Nevertheless, external competition with non-cluster members may act as a compensating factor and, therefore, pressures the cluster members to innovate. Furthermore, there is also limited collaborations among these rivals, working in partnership to achieve common goals. A sceptical attitude towards business-related collaborations with competitors is the contributing factor. According to Buerkler (2013), successful collaborations require sufficient trust produced through repeated interactions. In this regard, intermediaries help

establish relationships (Verona et al., 2006; Howells, 2006; Hansen, 2002), build trust (Ipe, Raghu & Vinze, 2010; Nooteboom, 2002; Bailey & Bakos, 1997). and prevent opportunism (Janssen & Sol, 2000; Bailey & Bakos, 1997).

Last, the Waikato region is endowed with highly competent agricultural companies, including suppliers or businesses from related and supporting industries. Proximity to these companies allows a quick access to goods and services, a more active involvement in problem solving, and monitoring quality and performance. It also facilitates their inter-organisational relationships. Overall, the local related and supporting businesses contribute to the competitiveness of the Waikato region, as well as that of the AgBio cluster. While local companies also deal with external suppliers, the centrality of location and the efficiency of infrastructure and transportation facilitate their interconnectivity.

8.3.3. Innovativeness of cluster members

An innovative capability is one of the most important competitive components for clusters (Mason et al., 2008). Overall, the cluster members possess this innovative capability. It is manifested in their involvements in product and process innovations and other innovation-related activities. These companies undertake product innovation that potentially leads to the introduction of innovative products new to market. The introduction may stimulate competition in that market and subsequently further innovation leading to competitiveness. Nevertheless, the product innovation may not eventuate in larger turnovers, in the short run. In this regard, this research suggests marketing strategies involving intermediaries, particularly Waikato Innovation Park to help increase customer responsiveness.

In comparison, fewer businesses are involved in process innovation. According to Statistics New Zealand (2010), process innovation tends to be a less visible type of innovation to customers and is less likely to result in changes in sales and incomes. Besides product and process innovations, the cluster members also engage in other innovation-related activities such as R&D, design, training, and prototyping. The training and prototyping activities contribute to the creation of knowledge (Nonaka, 1994; Nonaka et al., 1994; Nonaka & Konno, 1998; Harryson, 2002), a source of competitiveness (Nonaka, 1991, 2007).

As discussed earlier, the cluster members are involved in innovation through own capabilities and working in partnership. They are more likely to collaborate with customers nationwide, as well as in Australia and overseas, but with suppliers based locally or regionally. This indicates that the companies serve national-based customers and export, in addition to local or regional customers. Their involvement in exporting activities and cooperation for innovation with the overseas customers suggest competitiveness (Ketels, 2006). On the other hand, the cooperative arrangement with the local or regional suppliers suggests the influence of proximity.

Besides the market side, the cluster members are also involved in a cooperative arrangement with New Zealand-based partners such as universities or higher education institutes; science, industrial or innovation parks; centres or institutes embedded in universities; and consultants or private agencies. Nevertheless, fewer of these companies engage with the same types of partners located locally or regionally. This phenomenon is explained by the centrality and proximity of Hamilton, the Waikato region to nearby locations, particularly Auckland. As a result, these regional strengths facilitate cooperation on innovation with and allows further expansion of national partners, furthering the competitiveness of the Waikato region.

Overall, more of these companies consider information from within their businesses being most important for innovation, compared with that from customers, suppliers, businesses from related industries, and competitors. While the findings indicate their high level of competencies, the cluster members also value and benefit from inter-organisational relationships. According to Porter (1998a), close working relationships with local related and supporting industries allow a readier access to components and machineries, as well as information and ideas that lead to innovation. Furthermore, Lanza (2005) stresses that working in partnership with competing companies is no longer seen as a threat but an effective way to tackle a high cost of innovation or technological change.

While being a central point of contacts and an information provider, Waikato Innovation Park also organises and runs seminars, social activities, or events. Nevertheless, the cluster members do not consider information from science, industrial or innovation parks and that available through forums, conferences, or social events to be the most important sources for innovation. This may be explained by the difference in perception between newly-established companies or start-ups and more established businesses. For instance,

the established cluster members that are more readily to innovate or in the process of innovation may consider the information from these sources generic or less relevant and, therefore, less important. Therefore, they are relatively less dependent on intermediaries and rely largely on own capabilities, as well as their inter-organisational networks.

Despite their efforts, the cluster members are challenged by different factors hampering innovation activities. Knowledge factors are deemed the least restricting. This indicates their high level of competencies as innovators. On the other hand, costs are the most hampering factors. It is, however, generic among New Zealand businesses, especially small companies. In this regard, the cluster members may seek financial assistance from both the central government and the local or regional government. Such support influences innovation of the cluster members, as well as their success and growth. As the intermediary, Waikato Innovation Park connects the cluster members with needed resources, including those from NZTE and Callaghan Innovation.

8.3.4. Influence of intermediaries on competitiveness

The ability to create and acquire new knowledge and learn continuously constitutes competitiveness (Zack, 1999; Sharkie, 2003, Asheim & Coenen, 2005; Dyer & Nobeoka, 2000). In this regard, knowledge creation involving four modes: socialisation, combination, externalisation, and internalisation (Nonaka, 1991, 1994, 2007; Nonaka, Byosiere, Borucki & Konno, 1994; Nonaka & Konno, 1998; Harryson, 2002). Overall, the intermediaries at Waikato Innovation Park play different roles, in relation to these modes of knowledge creation. Their action contributes to knowledge creation, transfer, and implementation, subsequently influencing the cluster competitiveness.

First, the intermediaries facilitate inter-organisational relationships, face-to-face interactions, and collaborations. In this regard, they promote dialogues and provide a platform promoting trust. They connect the cluster members with experts, organisations, and other like-minded businesses. As infomediaries, the intermediaries share invaluable experiences, information, and knowledge. Second, the intermediaries are more directly involved in the process of product development trials, small-scale manufacturing, and prototypes or models. These enable the articulation of tacit experiences, perspectives, and knowledge, making them more explicit for better shareability.

Third, the intermediaries help reduce, analyse, and transform data into a more easily understandable format such as reports with graphs and metrics. The reports are useful means for improving decision making and achieving positive commercial outcomes. Last, this research identifies the involvement of the intermediaries in knowledge implementation through education and training services such as spray drying and practical R&D training. These activities help broaden and extend skill and knowledge. As a result, the action of these intermediaries amount to the creation, transfer, and implementation of knowledge.

In addition, the findings of this research show that the intermediaries help reduce transaction costs and add new memberships into the AgBio cluster. According to past studies, intermediaries minimise information costs (Spulber, 2009) and search costs (Spulber, 2009; Feller, Finnegan, Hayes & O'Reilly, 2009; Hartman et al., 2000), subsequently bringing down transaction costs (Spulber, 2009; Feller et al., 2009; Nooteboom, 2002; Hartman et al., 2000). They also support new entrants (Baxter & Tyler, 2006). Furthermore, these organisations lead the cluster members accessing overseas markets. In this regard, Perry (2007a; 2005; 2004) argue that the presence of leading or dominant companies benefits smaller cluster members.

While the intermediaries are found to respectively influence knowledge creation, transfer, and implementation, the heterogeneous nature of the AgBio cluster contributes to the lack of business relations among the cluster members. The limited internal interactions, however, creates opportunities for external relationships and collaborations. In this regard, the intermediaries at Waikato Innovation Park also deal with non-cluster members based externally. As a result, the knowledge may not only disperse throughout the cluster but also transfer to these external entities. This suggests that the intermediaries influence the cluster competitiveness, as well as that of the non-cluster members. The following section details the contributions of this research to theory, policy and practice.

8.4. Research contributions to theory, policy and practice

The findings of this research reveal different contributions, particularly to theory, policy, and practice. The following section discusses the contribution of this research to theory.

8.4.1. Contribution to theory

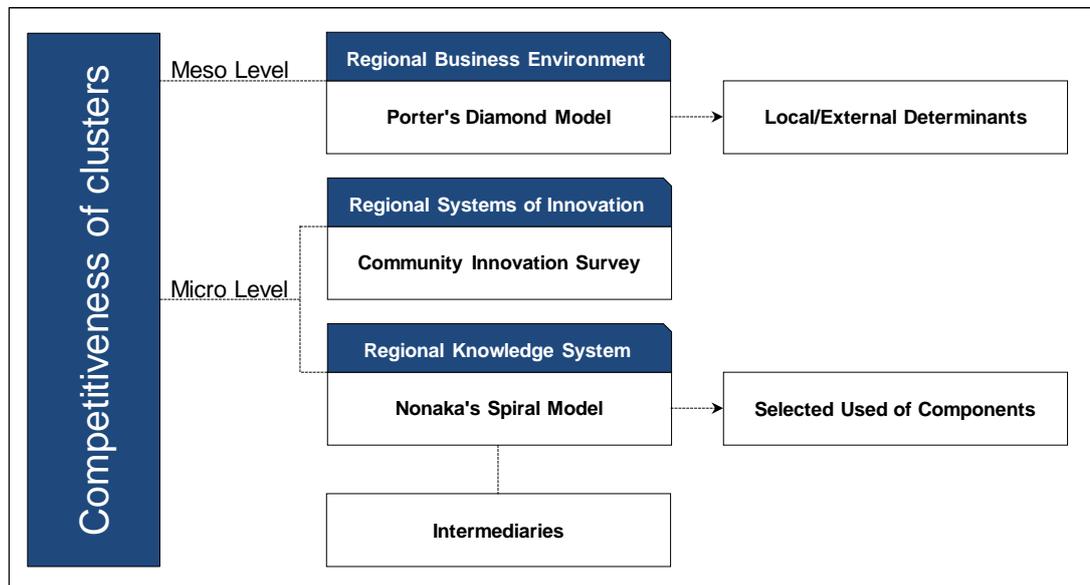


Figure 26: Research contributions to theory

Source: Own creation

At the meso and micro levels, this research adds to the literature by combining different theoretical approaches, to examine how competitiveness is created in clusters using a New Zealand example, the AgBio cluster (Refer to Figure 26). This multi-level research provides a more complete picture of the competitiveness creation, as well as the cluster operations. According to Greve (2009) a combination of different theoretical mechanisms renders a better understanding to phenomena.

At the meso level, Porter's Diamond model presents four broad determinants that form an environment promoting a cluster of competitive industries and companies (Porter, 1998a). These determinants are factor conditions, demand conditions, related and supporting industries, and firm strategy, structure and rivalry (Porter, 1998a, 2000; Crocombe et al., 1991). They determine whether a particular location provides an environment that allows locally-based companies to successfully compete (Clark & Guy, 1998). In this regard, the Diamond model exclusively focuses on home-base markets (Dörrenbächer & Wortmann, 1991; Bellak & Weiss, 1993; Dunning, 1993; Moon & Lee, 2004; Bowen Jr & Leinbach, 2006; Kim, 2006; Lagrosen, 2007; Sardy & Fetscherin,

2009; Liu & Hsu, 2009). At the micro level, Nonaka's Spiral model of knowledge creation involves four modes: socialisation, combination, externalisation, and internalisation. A dynamic interaction between all four allows a more comprehensive knowledge creation (Nonaka, 1991, 1994, 2007; Nonaka, Byosiere, Borucki & Konno, 1994; Nonaka & Konno, 1998; Harryson, 2002).

Overall, the research findings provide new insights into the applicability of Porter's Diamond model at the regional instead of national level, as well as that of Nonaka's Spiral model at the inter-organisational rather than organisational level. In relation to the research question one, the findings show that the cluster members draw on of both local and external determinants, nationally and globally. As a result, the local and external Diamonds respectively influence the regional competitiveness. Furthermore, the findings also indicate that the Diamond model is less appropriate for assessing competitiveness of small geographic locations with limit local determinants. Kim (2006) similarly claims that the Diamond model is a less applicable model for small economies. These economies are less likely to achieve economies of scale or build up 'broad and deep clusters' (Grunsven & Egeraat, 1999, p. 146). Therefore, this study suggests an adjustment to the Diamond model, to address the domestic and global determinants as contributing factors influencing the competitiveness, as explained in Chapter Seven (Adjustment to Porter's Diamond model).

Although helping answer the research question two, the findings indicate that not every component of Nonaka's Spiral model is relevant, to examine how knowledge is created and dispersed through the AgBio cluster. For instance, within the externalisation mode, metaphors and analogies as well as self-transcendence of the socialisation are found to be less relevant concepts to this research. Furthermore, the Spiral model may not be entirely applicable to examine heterogenous clusters in which intra-cluster collaborations and business relations are minimal. The lack thereof hinders the dynamic interaction between all the four mode that allows a more comprehensive knowledge creation. Therefore, this research suggests a selected use of relevant components constituting the Spiral model, on topics related to knowledge creation, transfer, and implementation at the inter-organisational level.

8.4.2. Contribution to policy

Although holding the key to economic growth, in New Zealand, “business clusters are more of an aspiration than an existing reality” (Perry, 2007a, p. 1). Therefore, this research serves to inform policy makers on areas that may require policy intervention important for the competitiveness of New Zealand clusters. According to previous studies, the heterogeneity helps transform latent groups into functioning or active clusters (Perry, 2007a; Gray, 2002) and contributes to their success (Perry, 2005). It provides opportunities for collaboration leading continuous flows and creation of new knowledge (Lindsay, 2005). The findings of this research, however, suggest that the mix of enterprise types limits common or overlapping areas for intra-cluster collaboration. It also reduces the need for interaction among the cluster members. In this regard, local city councils together with cluster development agencies such as Waikato Innovation Park play an important role, to pay a greater attention to the development of local clusters and true science parks. Such public policy needs to focus on incentives that attract more homogenous new entrants and increasing opportunities for intra-cluster collaborations, for instance, to achieve competitiveness in overseas markets.

Furthermore, a public policy aiming to promote clusters in New Zealand needs to address issues related to financial assistance for further cluster development and for supporting particularly newly-established companies and start-ups. Although the government support from NZTE and Callaghan Innovation assist with a range of business skill training and development of products, further assistance may be required for particularly cluster members having potential for significant growth. Overall, the findings are in line with Moon et al. (1998), which highlight the role of the Korean government to expand global demand and to create science parks by bringing together different entities including private companies, research institutes, and universities.

8.4.3. Contribution to practice

In relation to the practical contribution, the findings of this research suggest that as clusters become more mature, the need for intra-cluster interactions and collaborations may subside. Their heterogenous nature also contribute to this phenomenon. These findings, to some extent, differ from past studies claiming that the heterogeneity provides

opportunities for collaboration (Lindsay, 2005) and helps latent groups transform into functioning or active clusters and contributes to their success (Perry, 2007a; Perry, 2005; Gray, 2002). In this regard, the effort to promote diverse clusters may come with drawbacks limiting opportunities and areas for the collaborations. This may subsequently minimise incentives that entice new entrants and retain existing members. As discussed above, the limitation requires a greater attention from stakeholders such as local city councils and cluster development agencies to include more similar companies. An increased number of homogenous cluster members enhance intra-cluster interactions and collaborations and subsequently competitiveness.

At the micro level, the findings of this research show the influence of intermediaries on competitiveness, knowledge creation, transfer, and implementation. These intermediaries also help reduce transaction costs, add new memberships, lead cluster members in overseas markets, and promote a cluster identify there. According to Dana and Winstone (2008), a reputable identity attracts major companies and organisations. In turn, these companies contribute further to the location and local community, for instance, through employment, financial investment, infrastructure, and research, as well as by spawning related and supporting industries. This results in critical mass that makes possible a cost-sharing practice, for instance, on expensive marketing initiatives. Likewise, the findings of this research also show that critical mass helps improve the chance of success among small cluster members in larger overseas markets. Therefore, the effort to develop successful clusters in New Zealand requires a greater involvement of the intermediaries.

Furthermore, the findings of this research show that many of the cluster members engage in innovations, including product innovation, process innovation, and other innovation-related activities. Nevertheless, investment on innovation may not result in higher turnover. For this reason, appropriate marketing strategies are needed, to make innovative products more well-known to potential customers. In this regard, intermediaries play an important role to carry out a marketing job collectively for all cluster members. While an innovative capability of companies is one of the most important competitive components for clusters (Mason et al., 2008), the intermediaries contribute further to the competitiveness, by helping promote innovations of these cluster members to their target markets.

In this regard, the findings of this research show that intermediaries are relatively more beneficial to newly-established companies or start-ups, for instance, in relation to sources of information for innovation. According to past research, with limited financial resources (Rutashobya & Jaensson, 2004; Kaivanto & Stoneman, 2007; Canepa & Stoneman, 2008, 2005), small companies are hindered in their ability to invest in information and internal technological competencies (Clark & Guy, 1998). As a result, these companies rely on the intermediaries to offset their limitations (Weber & Schnell, 2003; Shohet & Prevezer, 1996; Bessant & Rush, 1995). While the majority of New Zealand businesses are deemed small companies (Ministry of Business, Innovation & Employment, 2017; Ministry of Economic Development, 2011; Chetty & Stangl, 2010; Agndal & Chetty, 2007; Brimblecombe, 2005; Ministry of Business, Innovation & Employment, 2013), there is a great demand for these entities, to assist with innovation activities and achieve competitiveness.

8.5. Limitations of research

This research provides insights into how competitiveness is created in clusters using a New Zealand example, which also adds to our understanding of how clusters operate in the New Zealand environment. Nevertheless, limitations are also evidenced within this study. With the small sample size and the choice of a single case study, the research findings face a challenge to generalisability. According to Maxwell (2013, p. 136), generalisability is referred to “extending research results, conclusions, or other accounts that are based on a study of particular individuals, settings, times, or institutions to other individuals, settings, times, or institutions than those directly studied”. In particular, external generalisability poses a great challenge to this research, as it extends the findings beyond the case, setting, or group. Therefore, instead of generalising to a larger population, this research seeks transferability of the findings to other similar cases. These include clusters that are, either within the same region or other locations, endowed with similar environments and attributes. It is also crucial for intermediaries to be present in these clusters.

Besides the interviewees and questionnaire respondents, the cluster under study comprises external memberships outside Waikato Innovation Park. The omission of these companies from the study, together with the small sample size and the single case study,

limits the validity of the research findings. Maxwell (2013, p. 122) refers validity to “the correctness or credibility of a description, conclusion, explanation, interpretation, or other sort of account”. Trochim and Donnelly (2007) similarly emphasise that validity represents the best available estimate of the truth of an inference, proposition, or conclusion. In this regard, validity requires research results to accurately reflect a phenomenon under study (Morse & Richards, 2002). Nevertheless, the sample chosen covers all aspects of business that constitute the cluster: agricultural technology, food and beverage, R&D services, professional services, and ICT services.

Despite this, the design of this research allows theoretical and data triangulation, to make the threats to validity less plausible. At meso and micro levels, the theoretical triangulation incorporates an approach related to the regional business environment, Regional Systems of Innovation (Peters, 2006, p. 21; Lundvall, 1992, 2007; Roelandt & den Hertog, 1999), and Regional Knowledge System (Smedlund, 2006). This two-level theoretical foundation is particularly informed by Porter’s Diamond model (Porter, 1998a, 2000), the Community Innovation Survey (Smith, 2005; Inzelt, 2003), and Nonaka’s Spiral model (Nonaka, 1991, 1994, 2007; Nonaka & Konno, 1998). It also relies on existing literature on intermediaries. Likewise, the data triangulation entails qualitative and quantitative data collected through semi-structured interviews and CIS-style questionnaires respectively, as well as data from secondary sources.

According to Graneheim and Lundman (2004), Elo and Kyngäs (2008), and Elo et al. (2014), researchers need to pay attention to sampling strategies or the selection of participants, to achieve credibility. In this regard, the participants with heterogeneous backgrounds contribute to a better understanding of phenomena under study from different perspectives and experiences. Nevertheless, the heterogeneity of the cluster under study does not allow a uniform set of questions in the semi-structured interviews. For this reason, some interviewees were asked with different questions that conform to the types of their businesses. For instance, questions related to intermediating roles are deemed irrelevant to non-intermediaries and, therefore, were not being asked. In addition to the small sample size, this inconsistency challenges the credibility of the research findings.

8.6. Scope for future research

The limitations discussed in the above section form the basis for future research, especially on topics related to business clusters and competitiveness. First, an improvement to this research demands a larger sample size for semi-structured interviews and CIS-style survey. In particular, the improved research should consider an equally larger sample size for each aspect of business that constitute the cluster under study: agricultural technology, food and beverage, R&D services, professional services, and ICT services. This measure allows a better representation of these aspects and, therefore, the cluster. Likewise, there is a need to include external memberships outside Waikato Innovation Park. Overall, an increased number of participation help address the threats to validity (Maxwell, 2013; Trochim & Donnelly, 2007; Morse & Richards, 2002), transferability (Hesse-Biber & Leavy, 2011; Trochim & Donnelly, 2007; Lincoln & Guba, 2000), and generalisability (Maxwell, 2013).

Second, the two-level theoretical approach, theoretical and data triangulation adopted in this research may be used in a future study on a different New Zealand cluster. For the purposes of transferability, it is essential that this cluster possess similar attributes to the cluster chosen for this research. In terms of methodology, the future study may adopt a different statistical approach, for instance, econometrics to analyse quantitative data collected through CIS-style survey. In this regard, a larger sample size is needed. Third, further research aiming to examine how competitiveness is created should involve more than one cluster or multiple case studies. These clusters may locate in the same or different regions. The multiple case studies allow a larger sample size for the qualitative side of the research and especially for quantitative side. In this regard, this future study may also involve the econometric analysis for the survey data. As discussed earlier, the use of multiple case studies helps tackle issues related to validity and generalisability.

Third, the findings of this research indicate that the Diamond model is less appropriate for assessing competitiveness of small geographic locations with limit local determinants. Likewise, Kim (2006) claims that the Diamond model is a less applicable model for small economies. These economies are less likely to achieve economies of scale or build up 'broad and deep clusters' (Grunsven & Egeraat, 1999, p. 146). In this regard, the findings pave the way for a future study involving this model. As discussed earlier, the cluster

members and local companies mainly draw needed resources from the regional and national Diamonds. For this reason, the future research should to incorporate the relevant Diamonds, to assess the competitiveness of a region by analysing the regional and national Diamonds. This measure allows a fuller understanding of contributing factors influencing the competitiveness of regional clusters.

Fourth, in relation to sophisticated and demanding customers, this research identifies two types of customers: specifiers and knowledge buyers. This is emphasised in Chapter Five, the research findings on Demand conditions (Sophisticated and demanding customers). The specifiers – New Zealand companies – tend to possess a larger reservoir of agricultural knowledge and more sophisticated than knowledge buyers, particularly Chinese companies. This finding indicates the influence of knowledge on the extent of sophistication. Within this research, there is also an indication of the relationship between finance and customer sophistication. For instance, that the lack of financial capital results in the limited sophistication, among small companies or farmers both in New Zealand and abroad. Therefore, the findings of this research demand a further investigation into these dual relationships, as the Chinese companies with a large financial capital but lack agriculture-related knowledge, are also deemed relatively less sophisticated.

Last, the scope for further research also includes a relationship between heterogeneity and competitive clusters. The findings of this research suggest that the diversity of the cluster limits common or overlapping areas for collaboration and reduces the need for interaction among the cluster members. Nevertheless, Lindsay (2005) highlights that the diversity of cluster members provides opportunities for collaboration. For Perry (2007a) and Perry (2005), the heterogeneity helps latent groups transform into functioning or active clusters and contributes to their success (Perry, 2007a; Perry, 2005; Gray, 2002). The discrepancy between the findings of this research and those of the previous studies paves the way for a future study on the significance of diversity in New Zealand clusters. This future study may particularly focus on a larger cluster than that used in this research. Likewise, there is an opportunity to further examine a relationship between competition and business growth. While the influence of competition on innovation and competitiveness (Porter, 1998a) is relatively well-studied, competition may also pressure companies to make a strategical change that potentially results in growth.

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Appendices

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Appendix A: Ethics Approval



24 June 2014

Simon Mowatt
Faculty of Business and Law

Dear Simon

Re Ethics Application: **14/162 Firm clustering in New Zealand: The creation of competitiveness of a regional cluster and the influence of intermediaries on the cluster competitiveness.**

Thank you for providing evidence as requested, which satisfies the points raised by the Auckland University of Technology Ethics Committee (AUTE C).

Your ethics application has been approved for three years until 23 June 2017.

As part of the ethics approval process, you are required to submit the following to AUTE C:

- A brief annual progress report using form EA2, which is available online through <http://www.aut.ac.nz/researchethics>. When necessary this form may also be used to request an extension of the approval at least one month prior to its expiry on 23 June 2017;
- A brief report on the status of the project using form EA3, which is available online through <http://www.aut.ac.nz/researchethics>. This report is to be submitted either when the approval expires on 23 June 2017 or on completion of the project.

It is a condition of approval that AUTE C is notified of any adverse events or if the research does not commence.

AUTE C approval needs to be sought for any alteration to the research, including any alteration of or addition to any documents that are provided to participants. You are responsible for ensuring that research undertaken under this approval occurs within the parameters outlined in the approved application.

AUTE C grants ethical approval only. If you require management approval from an institution or organisation for your research, then you will need to obtain this. If your research is undertaken within a jurisdiction outside New Zealand, you will need to make the arrangements necessary to meet the legal and ethical requirements that apply there.

To enable us to provide you with efficient service, please use the application number and study title in all correspondence with us. If you have any enquiries about this application, or anything else, please do contact us at ethics@aut.ac.nz.

All the very best with your research,

A handwritten signature in black ink, appearing to read 'K O'Connor', written in a cursive style.

Kate O'Connor
Executive Secretary
Auckland University of Technology Ethics Committee
Cc: Sobandith Pan span@aut.ac.nz

Participant Information Sheet



Date Information Sheet Produced:

18 May 2014

Project Title

Firm clustering in New Zealand: The creation of competitiveness of a regional cluster and the influences of intermediaries on the cluster competitiveness

An Invitation

Sobandith PAN, a PhD candidate at AUT University, would like to invite you to contribute to a research on the competitiveness of a regional Cluster. This research will contribute to my PhD qualification. Participation in this research will be voluntary and based on informed consent and, therefore, you may withdraw at any time prior to the completion of data collection.

What is the purpose of this research?

The purpose of this research is to examine the competitiveness of a regional cluster and the influences of intermediaries on the cluster competitiveness. The aim of this research is to create new insights into how competitiveness is created in clusters using a New Zealand example, which will also add to our understanding of how clusters operate in the New Zealand environment. It also aims to contribute to knowledge within the literature on clusters, regional and national competitiveness.

This research will produce a thesis as well as a conference paper and journal article. It will allow me to obtain a PhD qualification.

How was I identified and why am I being invited to participate in this research?

You have been chosen for this research because your organisation is a member of a regional cluster. Your contact details were obtained via secondary research for publicly available information such as a trade directory, cluster website, as well as from third parties including public institutes with knowledge of your cluster.

What will happen in this research?

First, you need to give consent to this research in writing – the Consent Form will be provided to you. Second, you will participate in an interview and/or complete a questionnaire. The interview will be held at your workplace. It will be recorded using a voice recorder and by note-taking. Third, you will receive copies of any conference paper or research article that identify your organisation.

What are the discomforts and risks?

It is anticipated that you will not experience discomforts and, with the nature of this research, be at risk.

How will these discomforts and risks be alleviated?

The discomforts, if occurred, may be the result of your participation in the interview and/or the questionnaire at any inconvenient time. For this reason, you will be allowed to choose a date and time for the interview. Furthermore, the questionnaire is designed to be as simple and short

as possible and instructions and questions are clearly formulated. You will also be able to choose when to complete the questionnaire at your own convenience.

What are the benefits?

The anticipated benefits for you and your organisation will be to identify strengths and weaknesses of the a regional cluster. This information may help improve the cluster competitiveness, as appropriate measures can be taken to capitalise and alleviate the positive and negative aspects respectively. It may potentially make the cluster better known domestically and internationally and attract new entrepreneurs and investments. This research also has potential policy implications for promoting the sustainable competitiveness of your cluster. It will assist me in obtaining a PhD qualification.

How will my privacy be protected?

This research does not seek to collect personal information and, therefore, you will not be named. However, a name of your organisation may appear in the final research. You must give consent in writing to release any conference paper or research article in which your organisation are identified or potentially identifiable. I will seek written permission in advance, if your organisation is to be mentioned by name. You have the right to withhold permission or withdraw from this research at any time up until the end of the data collection period should you feel that you wish to withhold any information of commercial sensitivity from the public.

What are the costs of participating in this research?

There are no direct financial costs for participating in this research. You will participate in the interview and/or complete the questionnaire, which approximately take one hour and half an hour in length respectively.

What opportunity do I have to consider this invitation?

You will be contacted by phone or e-mail within ten working days of receipt of this invitation to ascertain whether or not you wish to participate in this research.

How do I agree to participate in this research?

Please contact me, the researcher via the contact details below. You will need to sign the Consent Form.

Will I receive feedback on the results of this research?

You will be offered the opportunity to receive and edit transcripts of interviewed data on request. Copies of a summary of research findings will also be made available to you when completed.

What do I do if I have concerns about this research?

Any concerns regarding the nature of this project should be notified in the first instance to the Project Supervisor, Associate Professor Dr Simon Mowatt, simon.mowatt@aut.ac.nz, 09-921 9999 ext. 5424 or 021 631 009.

Concerns regarding the conduct of the research should be notified to the Executive Secretary of AUTEK, Kate O'Connor, ethics@aut.ac.nz, 09-921 9999 ext. 6038.

Whom do I contact for further information about this research?

Researcher Contact Details:

Researcher: Sobandith Pan, PhD candidate, AUT University
E-mail: span@aut.ac.nz
Tel: 021-294 9852

Project Supervisor Contact Details:

Project supervisor: Associate Professor Dr Simon Mowatt, Management, Faculty of Business, AUT University.

E-mail: simon.mowatt@aut.ac.nz

Tel: 09-921 9999 ext. 5424 or 021 631 009

Approved by the Auckland University of Technology Ethics Committee on 24 June 2014, AUTEK Reference number 14/162.

Appendix C: Consent Form

Consent Form



Project title: Firm clustering in New Zealand: The creation of competitiveness of a regional cluster and the influences of intermediaries on the cluster competitiveness

Project Supervisor: Associate Professor Dr Simon Mowatt

Researcher: Sobandith Pan

- I have read and understood the information provided about this research project in the Information Sheet dated 18 May 2014.
- I have had an opportunity to ask questions and to have them answered.
- I understand that notes will be taken during the interviews and that they will also be audio-taped and transcribed.
- I understand that I may withdraw myself or any information that I have provided for this project at any time prior to completion of data collection, without being disadvantaged in any way.
- If I withdraw, I understand that all relevant information including tapes and transcripts, or parts thereof, will be destroyed.
- I agree to take part in this research.
- I wish to receive a copy of the report from the research (please tick one): Yes No

Participant’s signature:

.....
.....

Participant’s name:

.....
.....

Participant’s Contact Details (if appropriate):

.....
.....
.....
.....

Date:

Approved by the Auckland University of Technology Ethics Committee on 24 June 2014 AUTEK Reference number 14/162

Note: The Participant should retain a copy of this form.

Appendix D: Transcriber confidentiality agreement

23 December 2014

page 1 of 2

Confidentiality Agreement



Project title: *Firm clustering in New Zealand: The creation of competitiveness of a regional cluster and the influences of intermediaries on the cluster competitiveness*

Project Supervisor: *Associate Professor Dr Simon Mowatt*

Researcher: *Sobandith Pan*

- I understand that all the material I will be asked to transcribe is confidential.
- I understand that the contents of the tapes or recordings can only be discussed with the researchers.
- I will not keep any copies of the transcripts nor allow third parties access to them.

Transcriber's *Debra Pugh* signature: _____

Transcriber's *Debra Pugh* name: _____

Transcriber's Contact Details (if appropriate):

907 Waingaro Road,
P.O. Box Ngauruaohia 3793
Phone 07 824 9301
Email debra.pugh@xtra.co.nz

Date: *24.12.14*

Project Supervisor's Contact Details (if appropriate):

Associate Professor Dr Simon Mowatt of Management, Faculty of Business, AUT University

simon.mowatt@aut.ac.nz

09-921 9999 ext. 5424 or 021 631 009

Approved by the Auckland University of Technology Ethics Committee on 24 June 2014 AUTEK Reference number 14/162

Note: The Transcriber should retain a copy of this form.

This version was last edited on 8 November 2013

Appendix E: Interview protocol

Details of interviews

Company: -----

Interviewee: -----

Job title: -----

Location: -----

Date/Time: ----- / -----

Introduction

Thank you for agreeing to meet with me. I am Sobandith Pan, a PhD student at AUT University in Auckland.

This research examines how competitiveness is created in clusters using a New Zealand example and the influence of intermediaries on the cluster competitiveness through knowledge creation, transfer and implementation. A review of the extant literature shows that the competitiveness of firms depends on their ability to create and acquire new knowledge and learn continuously and also on the competitiveness of the regions where they are based.

This interview is made up of two sections. The first section covers questions that are based on Porter's Diamond model and those in the second sections are based on Nonaka's Spiral model. The Diamond model has four broad determinants that help explain competitiveness of a particular location. The Spiral model has four modes of knowledge conversion, from tacit knowledge into explicit knowledge and from explicit knowledge back into tacit knowledge. The conversion allows a comprehensive knowledge creation.

Section One

Factor conditions

<i>Financial institutions</i>	<i>Probes</i>	<i>Prompts</i>
1. Please give examples of how financial institutes and venture capitalists in Waikato <u>meet the needs of your organisation?</u>	Please tell me about the variety of financial services they provide?	<i>Grant funding, short-term/long-term loans?</i>
	How assessable is a financial assistance from the local government?	<i>Grant funding, tax credits/deductions, loans?</i>
2. Please describe any <u>constraint</u> created by the financial institutes and venture capitalists that may influence the operation of your organisation?	Please give examples of any difficulties to obtain bank loans/venture capitals in Waikato?	<i>Innovators, entrepreneurs or businesses with only a good business plan but no collateral?</i>
3. In your opinion, how could the financial institutes and venture capitalists have <u>served your organisation better?</u>		
<i>Education and human capital</i>	<i>Probes</i>	<i>Prompts</i>
4. Please give examples of how the workforce in Waikato <u>meet the needs of your organisation?</u>	Do you consider them to be well-qualified employees [for your organisation]? Why?	
5. Please give examples of any difficulties [for your organisation] to <u>access skilled or well-qualified workforce</u> in Waikato?	How long does it usually take to fill job vacancies in your organisation?	<i>Researchers, scientists, engineers, technicians, or managers?</i>
	How does it [duration to fill the job vacancies] influence the operation of your organisation?	
	How does your organisation overcome the shortages of skilled or well-qualified workforce in Waikato?	<i>Hiring employees from: other parts of the region, overseas?</i>

Demand conditions

<i>Demand conditions</i>	<i>Probes</i>	<i>Prompts</i>
6. Please give examples of what clients in Waikato normally <u>expect from your services?</u>	Please tell me more about their specific requirements?	<i>Price vs Innovation, performance, quality, reliability, delivery times?</i>
	Please give examples of how your services are differentiated from those of other similar organisations in Waikato?	<i>Performance, quality, reliability?</i>
	Do you consider the clients to be those who are keen to adopt or purchase latest or innovative goods or services? Why?	<i>Performance, quality, reliability vs Price</i>
7. Please give examples of times when the clients <u>put pressure on your organisation</u> to meet their specific needs and expectations?	What did your organisation specifically do to comply with the demanding clients?	
	Overall, do you consider them to be demanding customers? Why?	

Context for firm strategy and rivalry

<i>Domestic rivalry and threat of new entrants</i>	<i>Probes</i>	<i>Prompts</i>
8. Please give examples of times when your organisation <u>competed for or was after the same clients</u> with other organisations in Waikato?	Please describe the intensity of the competition?	
	Please explain in what way did your organisation compete with them?	<i>Price vs Innovation, performance, quality, reliability, delivery times?</i>
	What did your organisation specifically do in order to secure orders from the clients?	
9. Do you consider them to be <u>potential partners</u> working together to achieve common goals, if there has not been previous cooperation? Why?	Please identify potential areas for cooperation?	<i>R&D, innovation, product development, process development, equipment usage, projects, prototypes?</i>

Related and supporting industries

<i>Suppliers and related firms</i>	<i>Probes</i>	<i>Prompts</i>
10. Please tell me about <u>your suppliers/firms</u> from related industries in Waikato?	Which are your main suppliers and related industries?	<i>Suppliers: Machine spare parts for companies</i>
	What other markets do they serve besides Waikato?	<i>National and overseas markets?</i>
	Do you consider them to be reliable and competent organisations? Why?	<i>How do they perform compared with those in other parts of New Zealand and overseas?</i>
11. Please give examples of how the local suppliers/firms from related industries <u>influence the operation of your organisation</u> ?	Please tell me about the benefits of close proximity to them?	<i>Readily access services, information, knowledge and facilitating interactions, collaboration</i>
	Please give examples of any constraint created by them?	
12. Please give examples of situations that your organisation <u>worked closely with</u> the local suppliers/firms from related industries to achieve common goals?	What did your organisation collaborate with them on?	<i>R&D, innovation, product development, process development, equipment usage, projects, joint training?</i>
	For how long has the collaboration taken place?	
	How often does the collaboration take place?	<i>Do you consider working with them in the future? Why?</i>
<i>Sophisticated and demanding customers</i>	<i>Probes</i>	<i>Prompts</i>
13. Please give examples of what your organisation normally <u>expects from goods or services</u> offered by the local suppliers?	Please tell me more about your organisation's specific requirements?	<i>Price vs Innovation, performance, quality, reliability, delivery times?</i>
	Please give examples of how their goods or services are differentiated from those of their competitors?	<i>Performance, quality, reliability?</i>
	How keen is your organisation on adopting or purchasing latest or innovative goods or services?	<i>Performance, quality, reliability vs Price</i>
14. Please give examples of times when your organisation <u>put pressure on the local suppliers</u> to meet specific needs and expectations?	What did they specifically do to comply with your organisation's demand?	
	Overall, do you consider your organisation to be a demanding customer? Why?	
15. In your opinion, how could the local suppliers have <u>served your organisation better</u> ?		

Section Two

Socialisation

<i>Collaborations – 3rd party</i>	<i>Probes</i>	<i>Prompts</i>
1. Please give examples of times when your organisation was involved in <u>facilitating a collaboration</u> among the cluster members//between the cluster members and other organisations [regionally, nationally & globally]?	Please tell me more about your organisation's role?	<i>As a 3rd party intermediary?</i>
	What did they collaborate on?	<i>Exports, R&D, innovation, product development, process development, equipment usage, projects, prototypes?</i>
	For how long have they been collaborating with each other?	
	How often do they collaborate with each other?	
2. What does your organisation specifically do to <u>help promote more collaborations</u> among/between them in the future?		<i>Ensure long-term relationships, frequent face-to-face interactions, on-going communication, trust, tension/conflicts-free</i>
<i>Collaborations – 2nd party</i>	<i>Probes</i>	<i>Prompts</i>
3. Please give examples of times when your organisation <u>worked together with</u> other organisations <u>in/outside</u> the cluster/the Park to achieve common goals?	What did your organisation collaborate with them on?	<i>Exports, R&D, innovation, product development, process development, equipment usage, projects, prototypes?</i>
	For how long has the collaboration taken place?	
	How often does the collaboration take place?	
	Do you consider working with them in the future? Why?	
4. What does your organisation specifically do to <u>promote more collaborations in the future</u> ?		<i>Ensure long-term relationships, frequent face-to-face interactions, on-going communication, trust, tension/conflicts-free</i>
<i>Inter-organisational relationships – 3rd party</i>	<i>Probes</i>	<i>Prompts</i>
5. Please give examples of times when your organisation was involved in <u>promoting relationships</u> among the cluster members/between the cluster members and other organisations [regionally, nationally & globally]?	Please tell me more about your organisation's role?	
	Who engaged in the relationships?	<i>Cluster members/Park tenants, external businesses, technical, business and market specialists, research centres, universities?</i>

	How did they normally interact or communicate with them?	(1) <i>Face-to-face and/or non-face-to-face?</i> (2) <i>Social events or activities: workshops, conventions, seminars, symposia, conferences?</i> (3) <i>Informal meetings i.e. inter-personal relationships</i>
6. What does your organisation specifically do to <u>help ensure long-term relationships</u> among/between them?	How does your organisation help promote frequent interactions or on-going communication among/between them?	<i>Organising social events or activities: workshops, conventions, seminars, symposia, conferences?</i>
<i>Inter-organisational relationships – 2nd party</i>	<i>Probes</i>	<i>Prompts</i>
7. Please give examples of times when your organisation was involved in <u>building relationships</u> with other organisations <u>in/outside</u> the cluster/the Park?	Please tell me about the relationships?	<i>Good or bad?</i>
	Who engaged in the relationships?	<i>Cluster members/Park tenants, external businesses, technical, business and market specialists, research centres, universities?</i>
	How did your organisation normally interact or communicate with them?	(1) <i>Face-to-face and/or non-face-to-face?</i> (2) <i>Social events or activities: workshops, conventions, seminars, symposia, conferences?</i> (3) <i>Informal meetings i.e. inter-personal relationships</i>
8. What does your organisation specifically do to <u>ensure long-term relationships</u> with them?	How does your organisation promote frequent interactions or on-going communication with them?	<i>How often does your organisation interact or communicate with them?</i>
<i>Face-to-face interactions and social activities</i>	<i>Probes</i>	<i>Prompts</i>
9. Please give examples of times when your organisation was involved in <u>promoting face-to-face interactions</u> with/between other organisation?	Please tell me more about your organisation's role?	<i>As 2nd or 3rd party?</i>
	Please tell me about the interactions?	<i>Good or bad?</i>
	How did the interactions take place?	(1) <i>Face-to-face and/or non-face-to-face?</i> (2) <i>Social events or activities: workshops, conventions, seminars, symposia, conferences?</i> (3) <i>Informal meetings i.e. inter-personal relationships</i>
	Who engaged in the interactions?	<i>Agricultural producers/suppliers, policy makers, leaders, investors, farmers, stakeholders?</i>
10. What does your organisation specifically do to <u>ensure frequent face-to-face interactions</u> ?	How often does the face-to-face interactions usually take place?	<i>How often does your organisation help organise the face-to-face interactions?</i>

<i>Trust</i>	<i>Probes</i>	<i>Prompts</i>
11. Please give examples of times when your organisation was involved in <u>establishing trust</u> with/between other organisation?	Please tell me more about your organisation's role?	<i>As 2nd or 3rd party?</i>
	How did your organisation help develop positive attitudes among those involved in the relationships towards each other?	
12. Please give examples of times when your organisation was involved in <u>resolving tension or conflicts</u> with/between them?	Please tell me more about your organisation's role?	<i>As 2nd or 3rd party?</i>
	How did your organisation help build consensus with/between them?	
13. What does your organisation specifically do to <u>maintain trust</u> in the relationships with/between them?	What does your organisation specifically do to help prevent tension or conflicts that may arise in the future?	<i>Ensure long-term relationships, on-going communication, frequent face-to-face interactions</i>
<i>Waikato Innovation Park</i>	<i>Probes</i>	<i>Prompts</i>
14. How does <u>being in the Park</u> help your organisation build relationships and promote collaborations with other organisations <u>in/outside</u> the cluster/the Park?	How does the Park's management team help your organisation build relationships and promote collaborations with other organisations in/outside the cluster/the Park?	
15. How does <u>being in the Park</u> allow your organisation to <u>help connect your clients with</u> technical, business and market specialists across the country and beyond?		
16. What are <u>other reasons</u> for your organisation to <u>locate in the Park?</u>		<i>Sharing information and knowledge, entering overseas markets?</i>

Combination

<i>Capturing and editing information or knowledge</i>	<i>Probes</i>	<i>Prompts</i>
17. Please give examples of times when your organisation helped clients <u>collect different pieces of data or information?</u>	Please tell me more about your organisation's role?	
	Where were the sources of those data or information?	<i>Internal or external to client firms?</i>
18. Please explain what did your organisation specifically do to help turn clients data or information into <u>an easily understandable format</u> for decision making?	Please explain what did your organisation specifically do so that the data or information are in an easily understandable format?	<i>How did your organisation aggregate and process the different pieces of data or information?</i>

Externalisation

“Dialogue, in the form of face-to-face communication between persons, is a process in which one builds concepts in cooperation with others”

<i>Prototypes or models</i>	<i>Probes</i>	<i>Prompts</i>
19. Please give examples of times when your organisation was involved in the process of <u>building prototypes or models</u> ?	Please tell me more about your organisation’s role?	<i>On behalf of or in cooperation with users/clients?</i>
	Please tell me about the prototypes or models?	
20. Please explain what did your organisation specifically do to <u>make users/clients more articulate</u> about their specific requirements for the prototypes or models?		<i>Promoting dialogues between different parties involved?</i>
21. How did your organisation determine <u>whether the original requirements were met</u> ?		<i>Gathering feedbacks from the users/clients to validate the prototypes or models under development?</i>
	Please explain what would your organisation specifically do if there was a need for further improvement or modifications?	
<i>Dialogues or brainstorming</i>	<i>Probes</i>	<i>Prompts</i>
22. Please give examples of times when your organisation was involved in <u>facilitating forums of dialogues or brainstorming sessions</u> for exchanging ideas or experiences?	Please tell me more about your organisation’s role?	
	Please tell me about the dialogues or brainstorming sessions?	<i>Constructive vs Impractical ideas?</i>
	How did the dialogues or brainstorming sessions take place?	
	Who engaged in the dialogues brainstorming sessions?	<i>Internal and external innovators, businesses, industry, research centres, universities?</i>
23. Please explain how did your organisation help <u>promote constructive dialogues or brainstorming sessions</u> ?	How did your organisation help encourage a free and candid expression of ideas or experiences during the dialogues or brainstorming sessions?	<i>Participants are motivated, good ideas are extracted</i>
	How did your organisation help encourage constructive arguments or criticism during the dialogues brainstorming sessions?	<i>Avoiding groupthink that results in unchallenged, poor-quality decision-making</i>

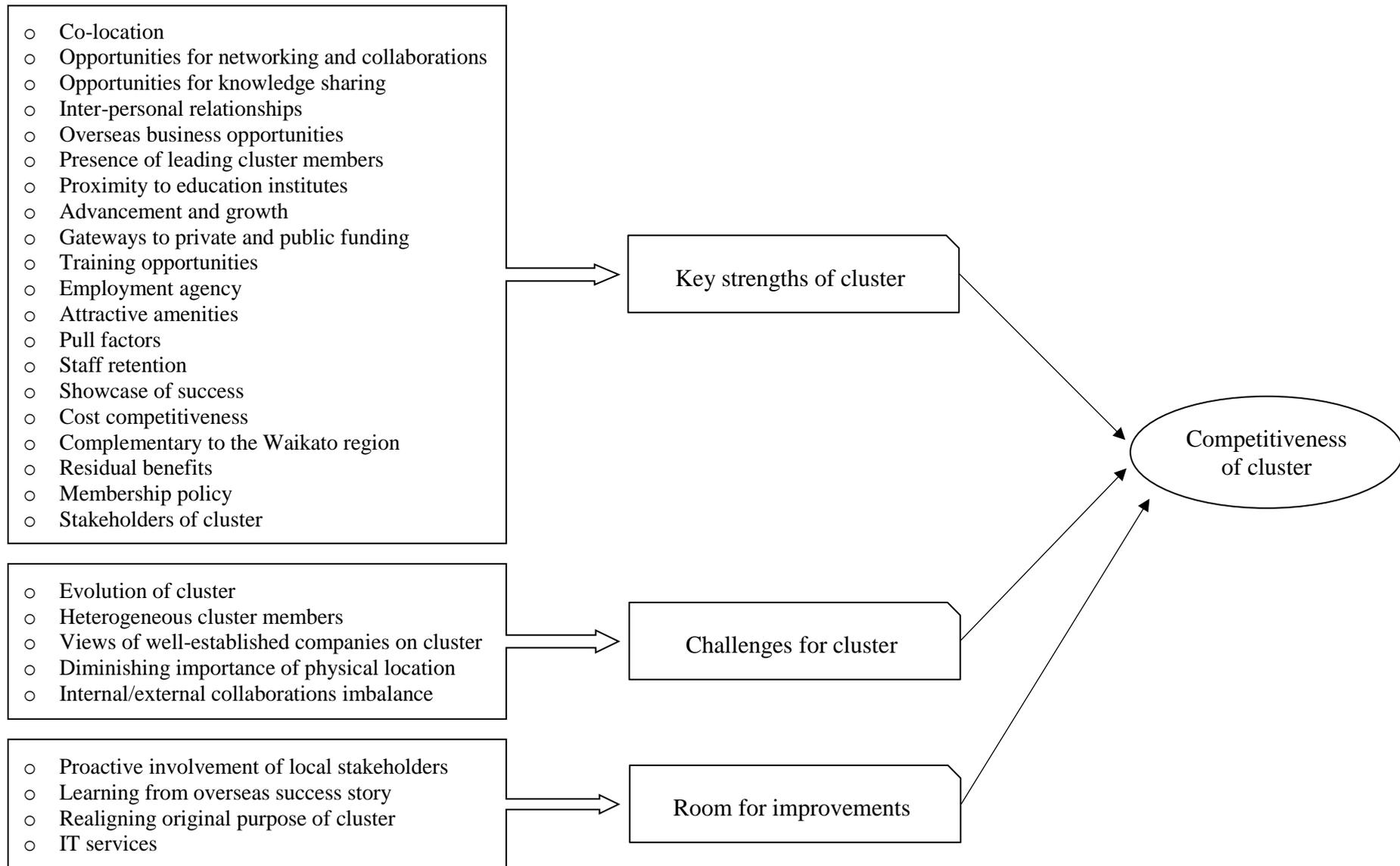
Internalisation

<i>Training services</i>	<i>Probes</i>	<i>Prompts</i>
24. Please give examples of times when your organisation was involved in <u>providing training services</u> to clients?	Please tell me more about your organisation's role?	<i>On behalf of or joint training with the clients?</i>
	Please tell me about the training?	<i>On-site, off-site, on-line, off-line, on-the-job, off-the-job, in-house, joint trainings, small groups, big groups?</i>
25. How did the training meet the <u>needs and expectations of the clients and their employees?</u>	In your opinion, how did the training help broaden and extend their employees' knowledge?	<i>How did the training help improve the competence and performance of their employees?</i>

Final thoughts

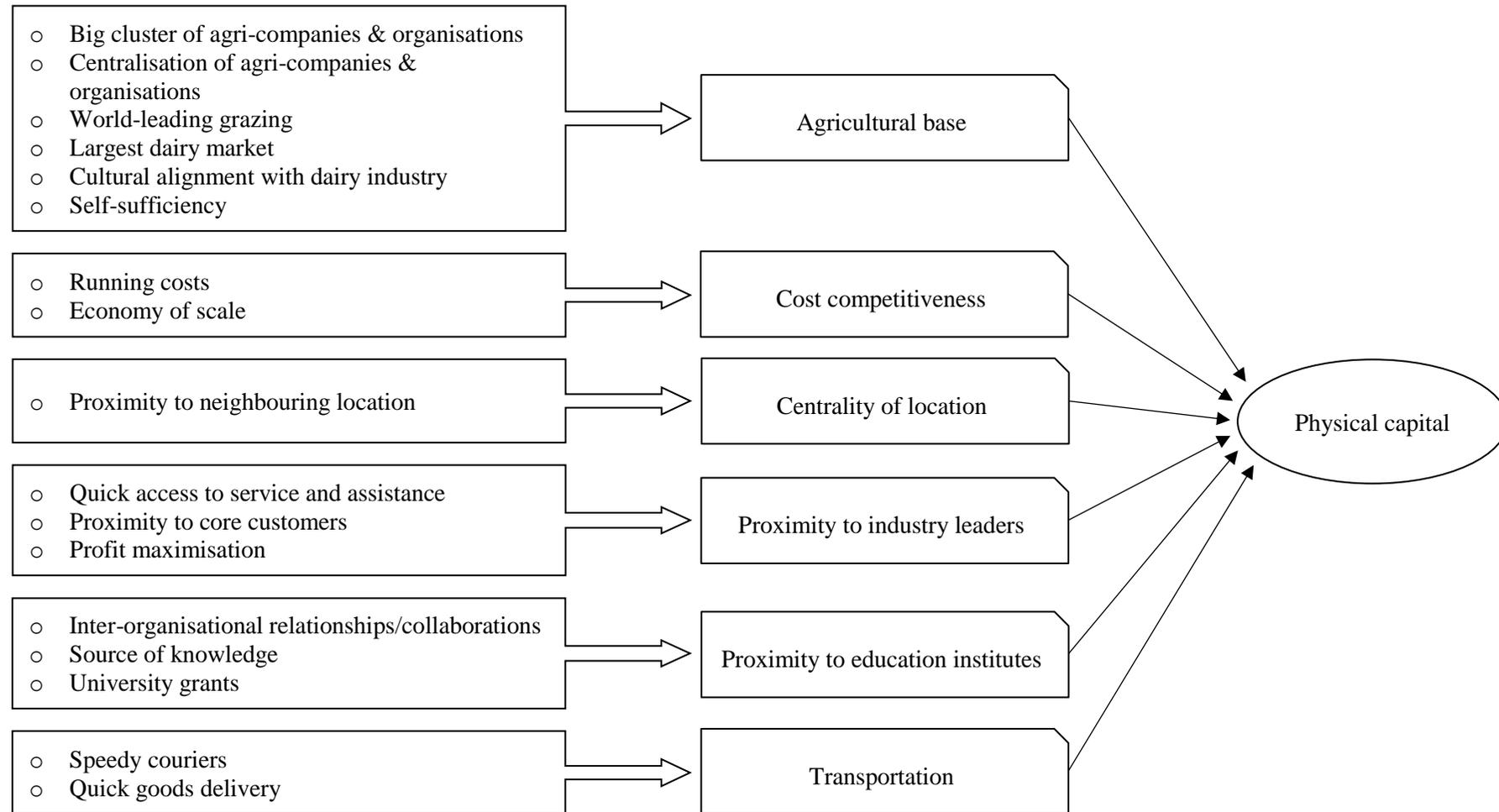
Those were all the questions I wanted to ask. Do you have final thoughts or questions about this research that you would like to add? Thank for your time.

Appendix F: Sample of coding for Waikato Innovation Park

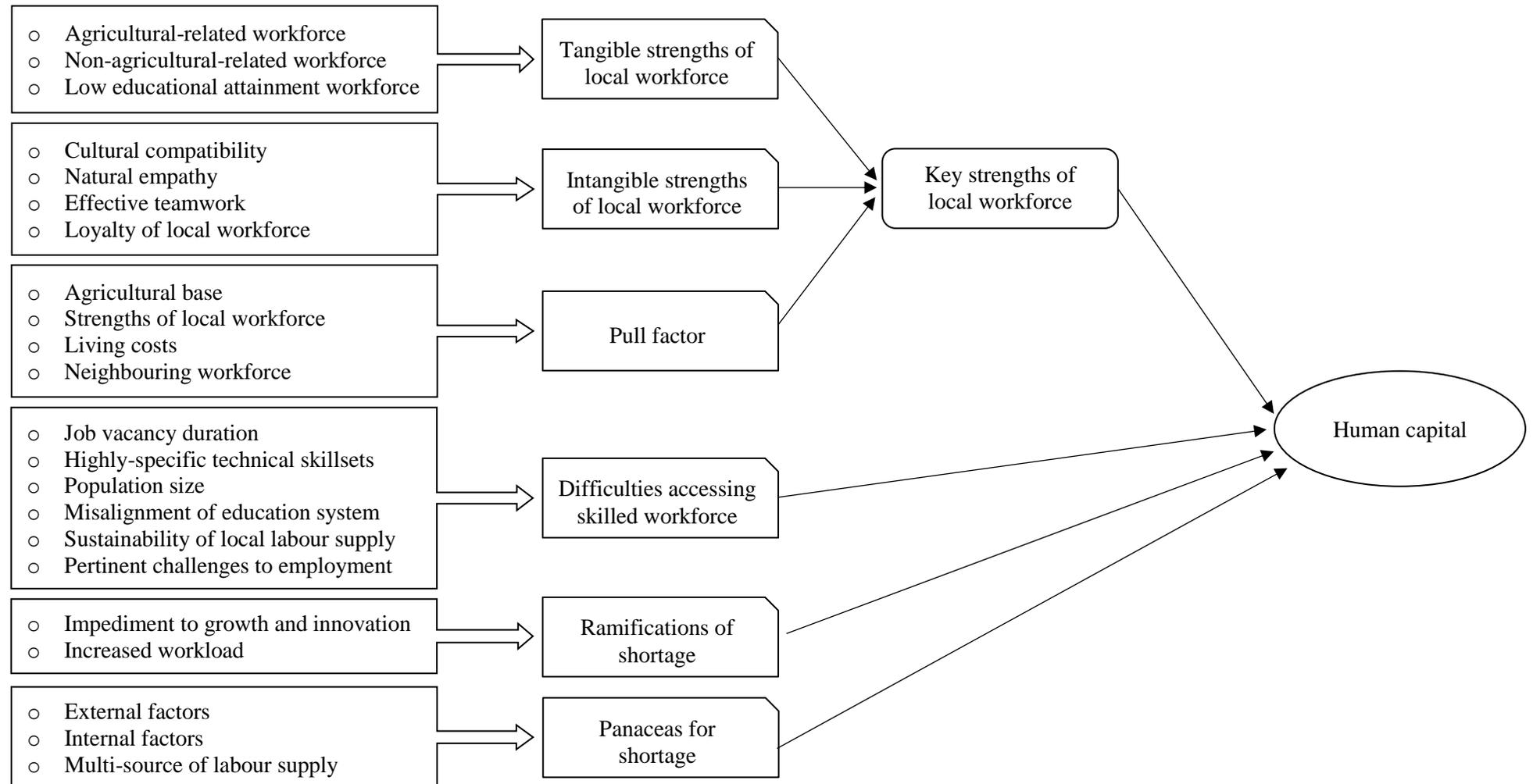


Appendix G: Sample of coding for Porter's Diamond model

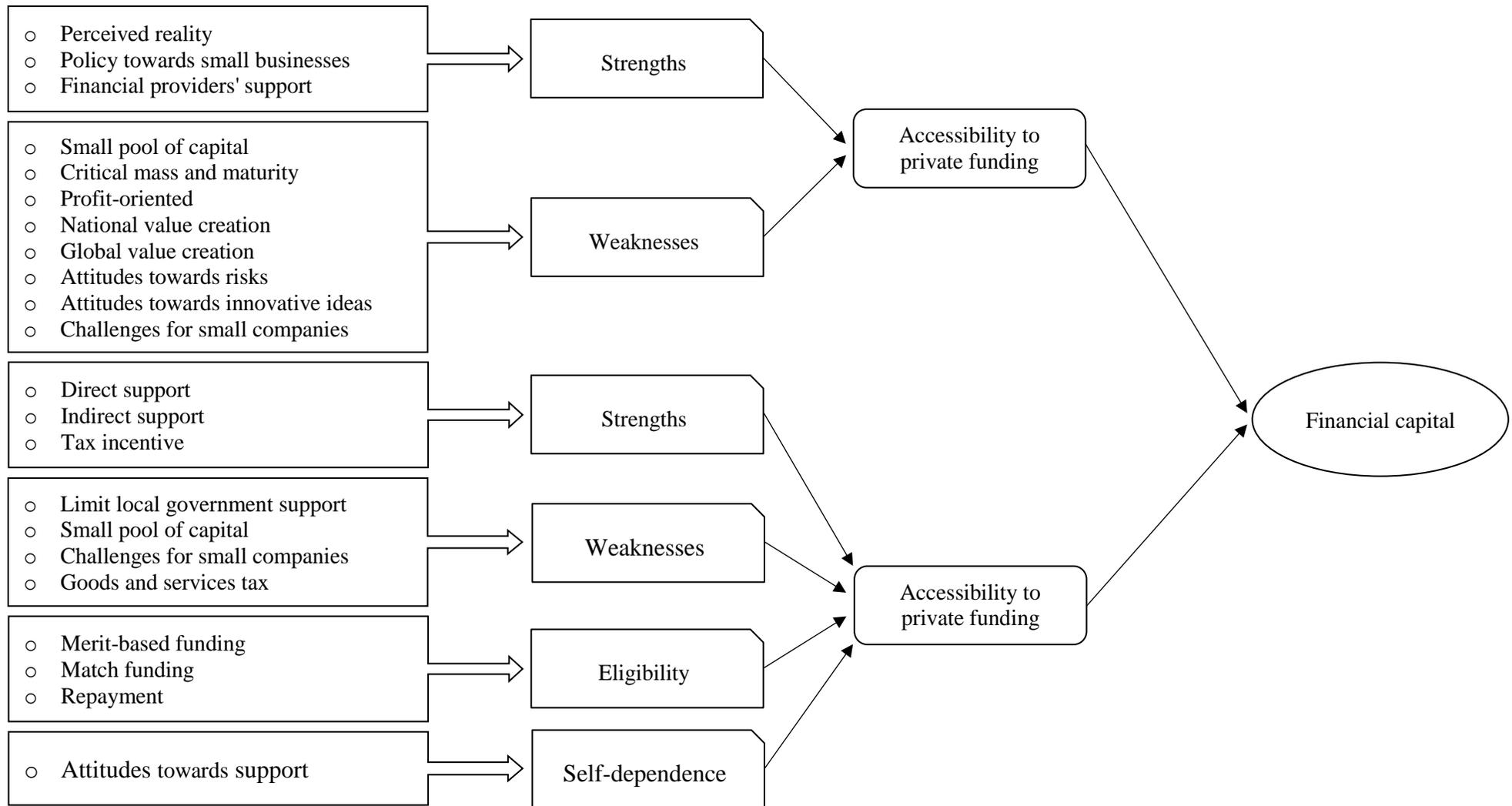
Factor conditions: Physical capital



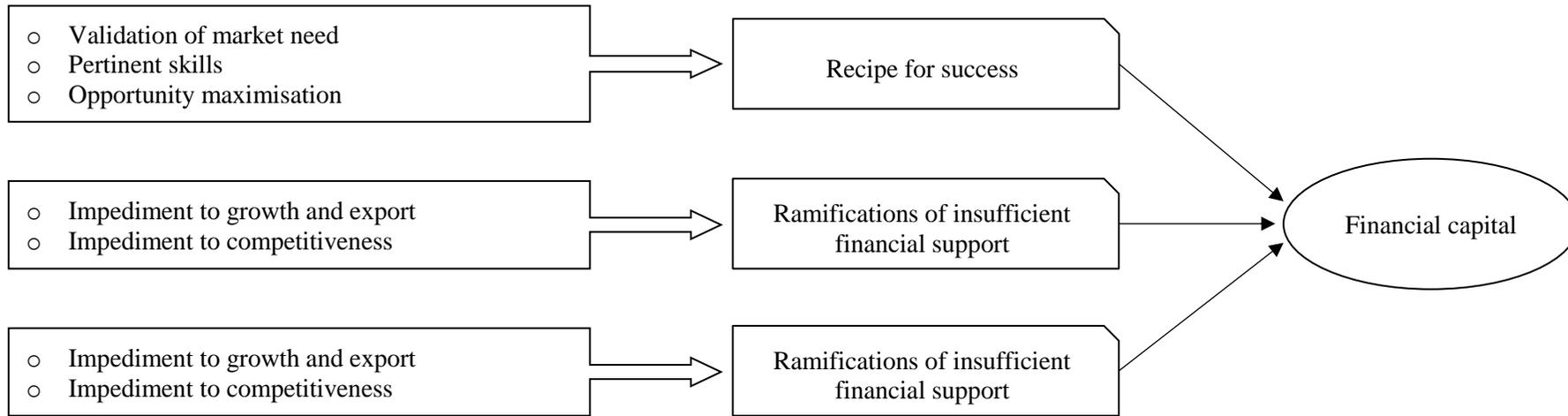
Factor conditions: Human capital



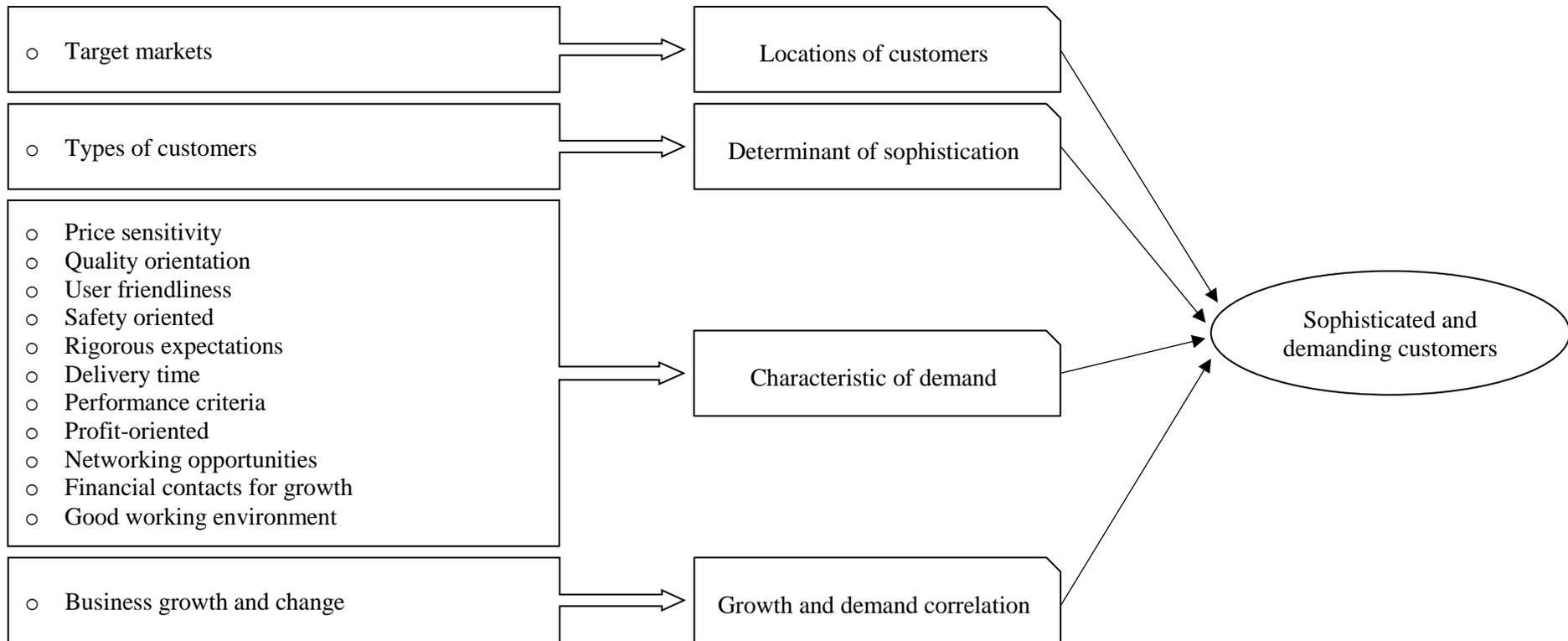
Factor conditions: Financial capital



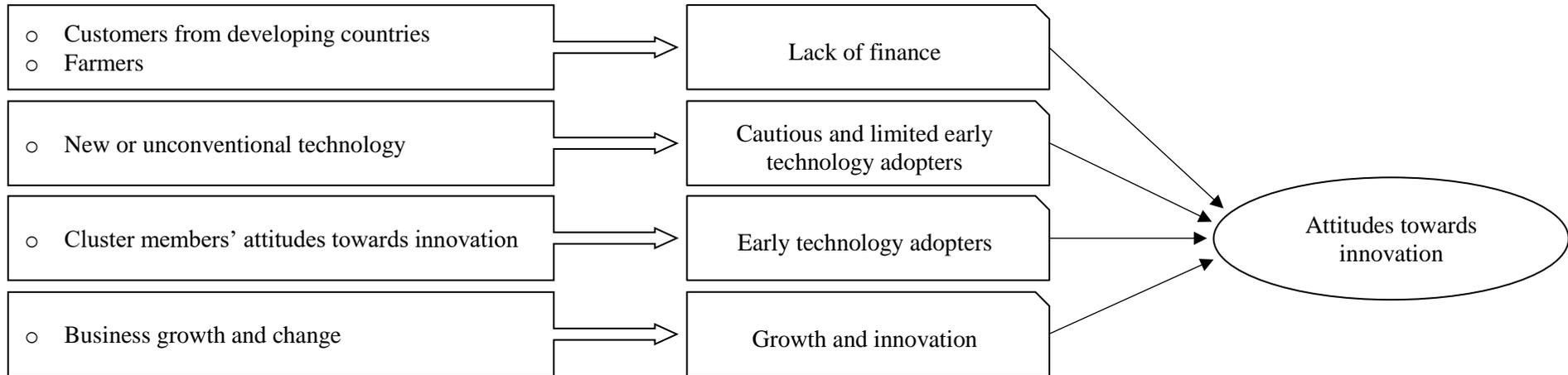
Factor conditions: Financial capital cont.



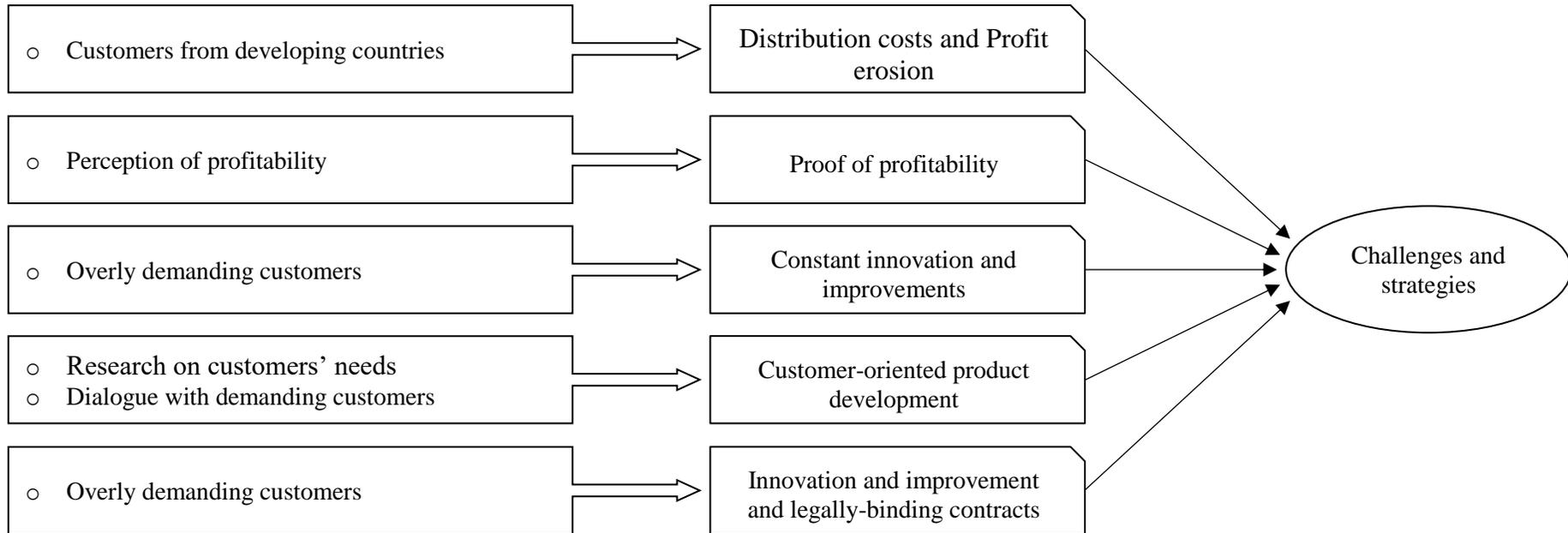
Demand conditions: Sophisticated and demanding customers



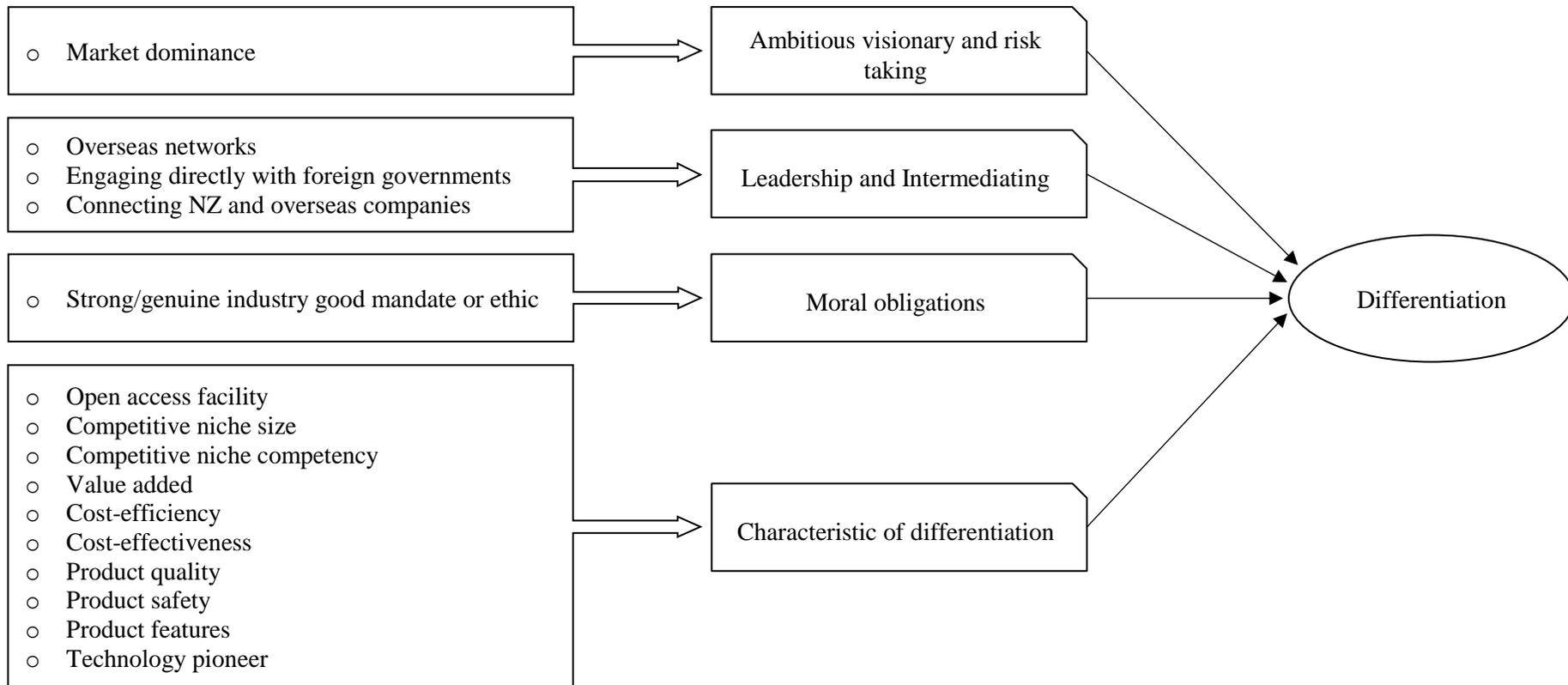
Demand conditions: Attitudes towards innovation



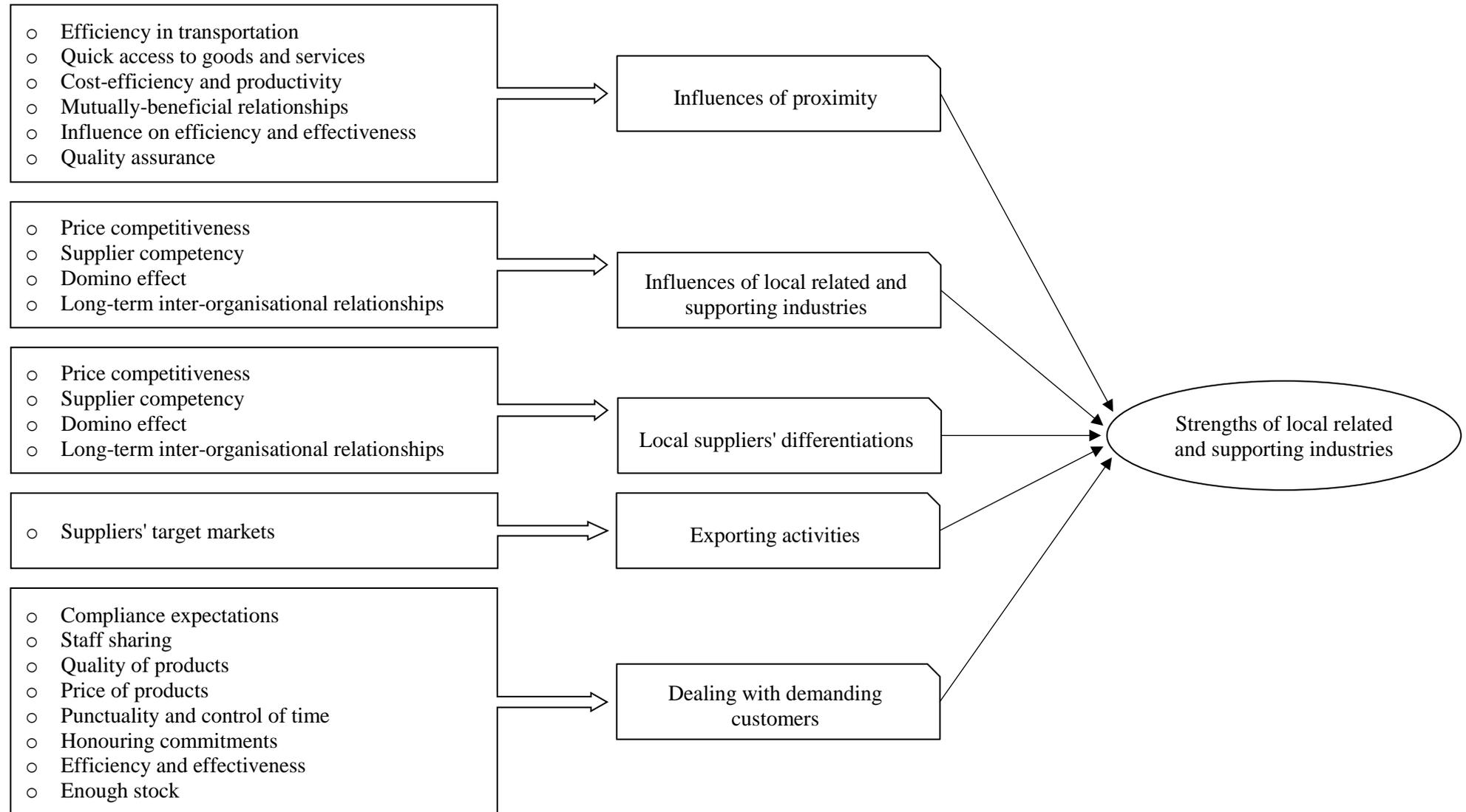
Demand conditions: Challenges and strategic approaches to sophistication



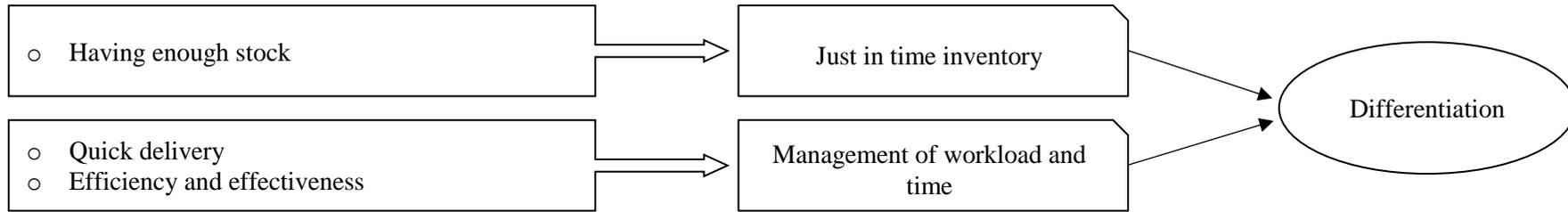
Demand conditions: Differentiation



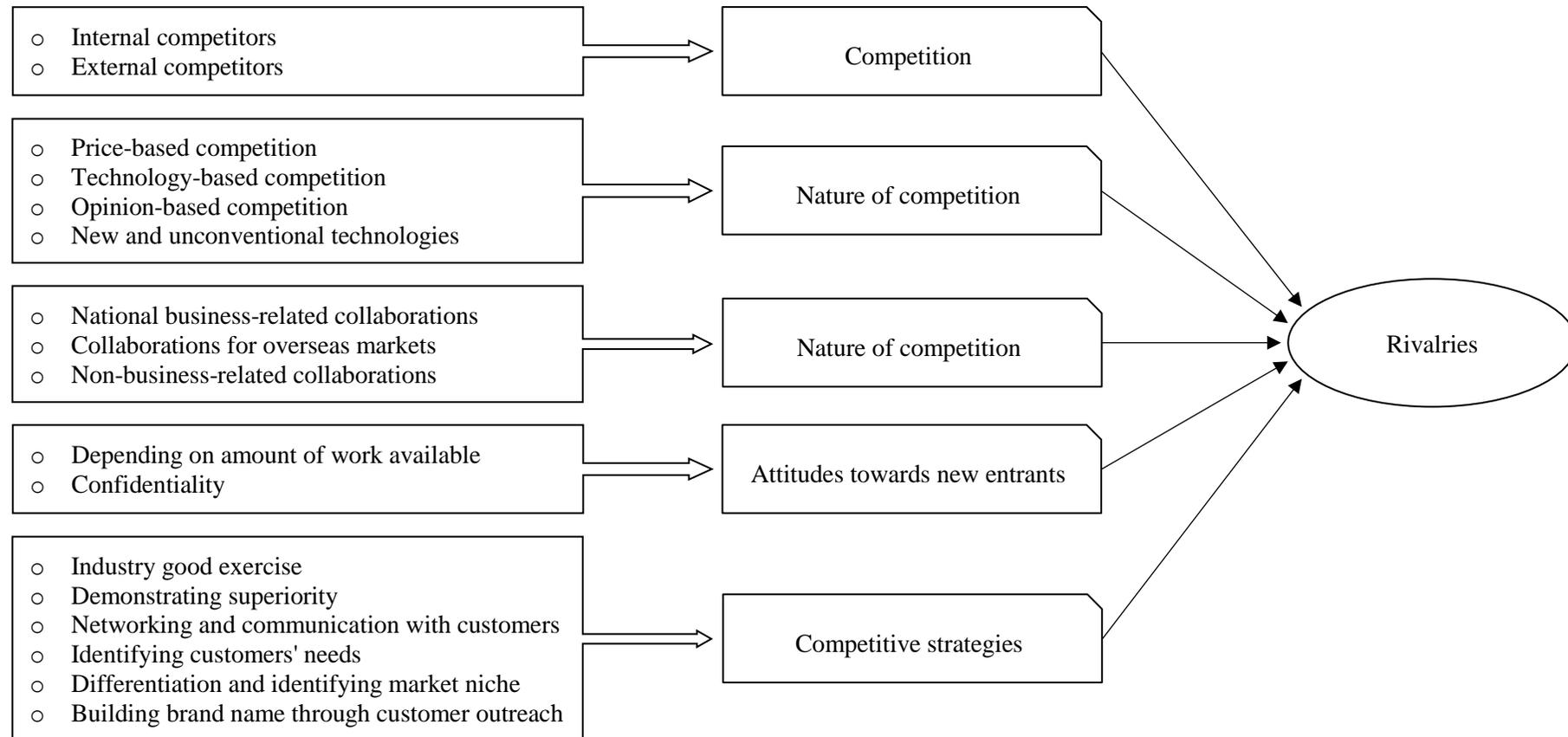
Related and supporting industries: Strengths



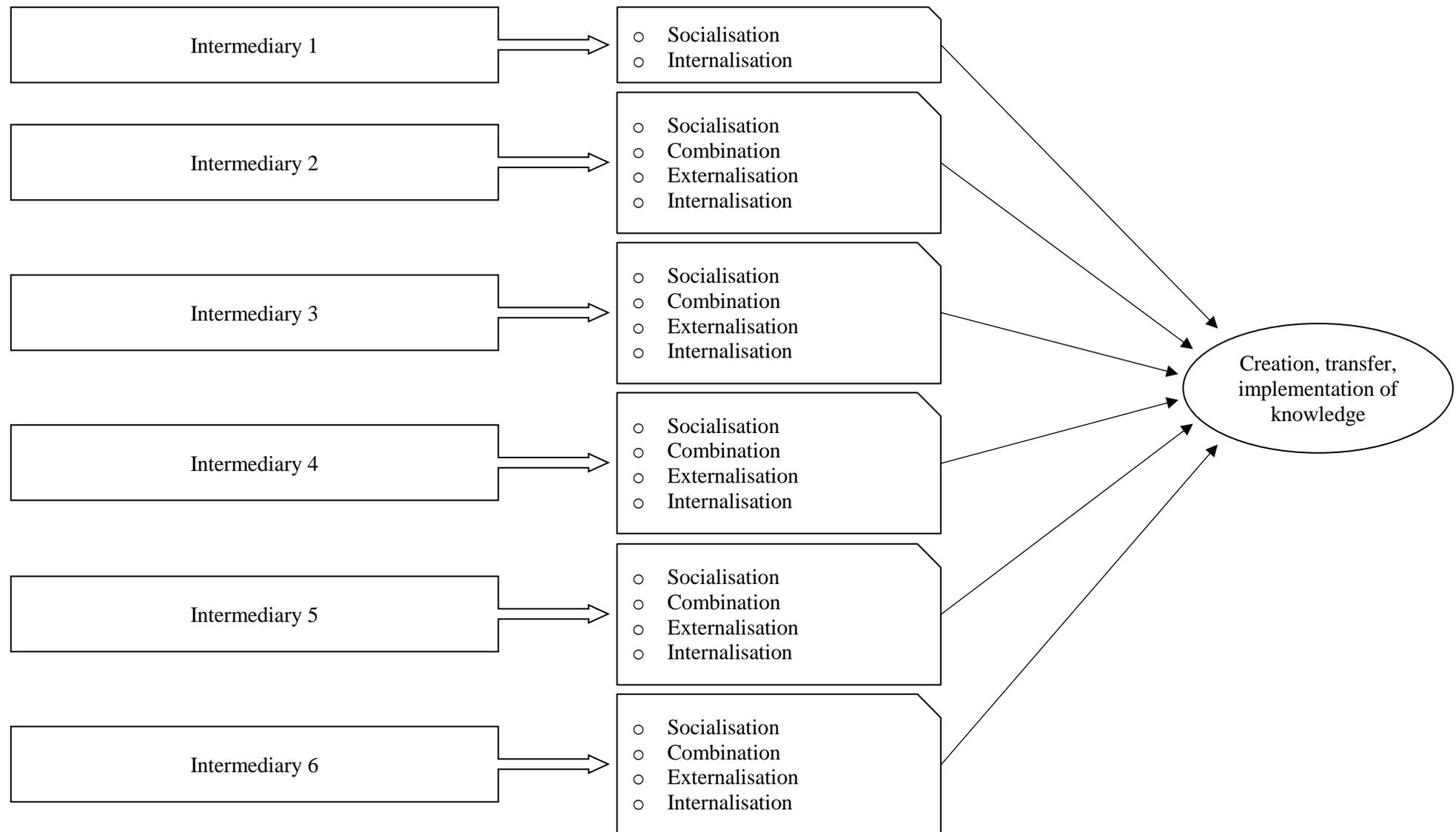
Related and supporting industries: Improvements



Context for firm strategy and rivalry



Appendix H: Sample of coding for knowledge



Appendix I: Cluster Innovation Survey

Cluster Innovation Survey

Details of the person completing this questionnaire:

Details of the business, organisation or institute:

Name: -----

Name: -----

Job title: -----

Phone: ----- Ex. -----

Address: -----

Fax: -----

E-mail: -----

Details of the person conducting this questionnaire:

Name: Sobandith Pan

Job title: PhD candidate

Organisation: AUT University

Phone: 021-294 9852

E-mail: span@aut.ac.nz

Purpose of this survey: *This survey collects information about innovation in the AgBio Cluster during the 3 year period, 1 April 2011 - 31 March 2014. To be able to examine the innovativeness and competitiveness of the cluster, we request all respondents to answer all questions, unless otherwise instructed.*

Information required: *Section A: Product (good or service) innovation
Section B: Process innovation
Section C: Innovation-related activities
Section D: Sources of information and co-operation for innovation
Section E: Constraints on innovation
Section F: General information about this business*

Definition of innovation: *Innovation, for the purpose of this survey, is defined as new or significantly improved goods or services and/or processes used to produce or supply all goods or services that this business has introduced, regardless of their origin. These may be new to the business or new to the market. Other innovation-related activities such as purely organisational or managerial changes are also covered.*

Sources: *This survey is based on a combination of the Community Innovation Surveys (CIS3-CIS7) of the European Commission.*

For your information: *It is illegal for us to reveal your data or identify this business to unauthorised persons.*

Section A: Product (good or service) innovation

Include all new or significantly improved goods or services e.g. improvement in quality or distinct user benefits. The innovation, although new to this business, does not need to be new to the market. Include all product (good or service) innovations, regardless of their origin.

During the 3 year period, 1 April 2011 - 31 March 2014,

1. Did this business introduce? *(Please tick one box for each category)*

- | | Yes | No |
|----------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| a. New or significantly improved goods | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>(Exclude the simple resale of goods purchased from other businesses and changes of a solely aesthetic nature)</i> | | |
| b. New or significantly improved services | <input type="checkbox"/> | <input type="checkbox"/> |

→ *If No to both options above, please go to Section B. Otherwise, continue with the below questions*

2. Were these new or significantly improved goods and/or services developed mainly by?

(Please tick all that apply)

- | | |
|------------------------------------------------------------------------------------------|--------------------------|
| a. This business | <input type="checkbox"/> |
| b. This business in co-operation with other businesses, organisations or institutes..... | <input type="checkbox"/> |
| c. Other businesses, organisations or institutes..... | <input type="checkbox"/> |

3. Were any of your good and/or service innovations? *(Please tick one box for each category)*

- | | Yes | No |
|-----------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| a. New to your market | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>(Introduced a new or significantly improved good or service to the market before competitors)</i> | | |
| b. Only new to this business..... | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>(Introduced a new or significantly improved good or service that was essentially the same as a good or service already available from competitors)</i> | | |

4. Please estimate the percentage of this business's total turnover in 2014 (1 April 2013 - 31 March 2014) from goods and/or services that were?

- | | |
|-----------------------------------------------------------------------------------|---------|
| a. New to your market during 1 April 2011 - 31 March 2014 | □ □ □ % |
| b. Only new to this business during 1 April 2011 - 31 March 2014 | □ □ □ % |
| c. Significantly improved but not new during 1 April 2011 - 31 March 2014..... | □ □ □ % |
| d. Unchanged or only marginally modified during 1 April 2011 - 31 March 2014..... | □ □ □ % |
| <i>(Include the resale of goods or services purchased from other businesses)</i> | |

Total turnover 2014 □ □ □ %
1 0 0 %

Section B: Process innovation

All new or significantly improved methods for the production or supply of goods or services. The innovation, although new to this business, does not need to be new to the industry or market. Include all process innovations, regardless of their origin. Exclude purely organisational or managerial changes – these are covered in Section C.

During the 3 year period, 1 April 2011 - 31 March 2014.

5. Did this business introduce any new or significantly improved? *(Please tick one box for each category)*
- | | | |
|------------------------------------------------------------------|--------------------------|--------------------------|
| | Yes | No |
| a. Methods of manufacturing or producing goods or services | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Logistics, delivery, or distribution methods | <input type="checkbox"/> | <input type="checkbox"/> |

→ *If No to both options above, please go to Section C. Otherwise, continue with the below questions*

6. Were these process innovations developed mainly by? *(Please tick all that apply)*
- a. This business
 - b. This business in co-operation with other businesses, organisations or institutes.....
 - c. Other businesses, organisations or institutes

7. Were any of your process innovations? *(Please tick one box for each category)*
- | | | |
|----------------------------------------|--------------------------|--------------------------|
| | Yes | No |
| a. New to your industry or market..... | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Only new to this business | <input type="checkbox"/> | <input type="checkbox"/> |

Section C: Innovation-related activities

During the 3 year period, 1 April 2011 - 31 March 2014.

8. Did this business make major changes in the following areas? *(Please tick one box for each category)*
- | | | |
|----------------------------------------------------------------------------------------------------------------------------------------------------------------------------------|--------------------------|--------------------------|
| | Yes | No |
| a. New business practices for organising procedures..... | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>(i.e. supply chain management, business re-engineering, knowledge management, lean production, quality management etc.)</i> | | |
| b. New methods of organising work responsibilities and decision making | <input type="checkbox"/> | <input type="checkbox"/> |
| <i>(i.e. first use of a new system of employee responsibilities, team work, decentralisation, integration or de-integration of departments, education/training systems etc.)</i> | | |

c. New methods of organising external relationships with other businesses,
organisations or institutes
(i.e. first use of alliances, partnerships, outsourcing or sub-contracting etc.)

d. Implementation of changes to marketing concepts or strategies
(i.e. packaging or presentational changes to a product to target new markets, new support services to open up new markets etc.)

9. Did this business engage in the following activities? *(Please tick one box for each category)*

Yes No

a. All forms of design
(All design activities for the development or implementation of new or improved goods or services and processes)

b. Training
(Internal or external training for this business's personnel specifically related to product innovation, process innovation and innovation-related activities)

c. Prototyping
(Include prototypes or models developed in-house by this business, in co-operation with external experts or solely contracted out to external experts)

d. Internal Research and Development
(Creative work undertaken within this business that increases knowledge for developing new and improved goods or services and processes)

e. Acquisition of external Research and Development
(Same activities as above, but performed by other businesses or by public or private research organisations or institutes and purchased by this business)

f. Acquisition of advanced machinery, equipment, and/or software
(Equipment includes computer hardware)

g. Acquisition of intellectual property rights
(Purchase of rights to use intellectual property e.g. patents, copyright, trademarks, and know-how from other businesses, organisations or institutes)

→ ***If No to all options in Section A, B, and C, please go to Section E. Otherwise, go to section D***

Section D: Sources of information and co-operation for innovation

During the 3 year period, 1 April 2011 - 31 March 2014,

10. How important to this business's innovation was information or knowledge from?

(Sources that provided information or knowledge for new innovation projects or contributed to the completion of existing innovation projects)

(Please tick one box for each category)

	High	Medium	Low	Not applicable
a. Internal source				
○ Within this business.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Within your consortium or enterprise group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Market sources				
○ Suppliers of equipment, materials, components, services or software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Clients or customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Competitors or other businesses from the same industry or market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Businesses from related industries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Intermediaries				
○ Science, industrial or innovation parks.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Universities or other higher education..... institutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Centres or institutes embedded in..... universities	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Consultants or private agencies	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Private research institutes or commercial laboratories	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Government or public research institutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
○ Government agencies or ministries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

o Non-governmental organisations or
 non-profit organisations

o Other professional or specialised.....
 knowledge-based businesses,
 organisations or institutes

d. Other sources

o Forums of dialogues, conferences,
 trade fairs, exhibitions or other social
 activities or events

11. Did this business co-operate for innovation with other businesses, organisations or institutes?

(Innovation co-operation is active participation in joint innovation projects with other businesses, organisations or institutes. This business and co-operating partners do not need to commercially benefit. Exclude pure contracting out of work with no active co-operation)

Yes

No → *Please go to Section E*

12. Which types of co-operation partner did this business use and where were they located?

(Please tick all that apply)

	Local/Regional	National	Australia	Others
a. Internal				
o Other businesses within your consortium..... or enterprise group	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
b. Market				
o Suppliers of equipment, materials, components, services or software	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o Clients or customers	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o Competitors or other businesses from the same industry or market	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o Businesses from related industries	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
c. Intermediaries				
o Science, industrial or innovation parks.....	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>
o Universities or other higher education..... institutes	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>	<input type="checkbox"/>

- Centres or institutes embedded in.....
universities
- Consultants or private agencies
- Private research institutes or commercial
laboratories
- Government or public research institutes
- Government agencies or ministries
- Non-governmental organisations or
non-profit organisations
- Other professional or specialised.....
knowledge-based businesses,
organisations or institutes

Section E: Constraints on innovation

During the 3 year period, 1 April 2011 - 31 March 2014.

→ *To be answered by all businesses*

- 13. Did this business engage in innovations that were?** *(Please tick one box for each category)*
- | | Yes | No |
|---------------------------------------------------|--------------------------|--------------------------|
| a. Abandoned or suspended before completion | <input type="checkbox"/> | <input type="checkbox"/> |
| b. Still ongoing at the end of March 2014 | <input type="checkbox"/> | <input type="checkbox"/> |

- 14. How important were the following factors in interfering with this business's innovation or influencing its decision not to innovate?**
- (Please tick one box for each category)*
- | | High | Medium | Low | Not applicable |
|-------------------------------------------|--------------------------|--------------------------|--------------------------|--------------------------|
| a. Cost factors | | | | |
| ○ Excessive perceived economic risks..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Direct innovation costs too high..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Cost of finance..... | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |
| ○ Availability of finance | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> | <input type="checkbox"/> |

b. Knowledge factors

- Lack of qualified personnel
- Lack of information on technology
- Lack of information on markets

c. Other factors

- Previous innovations already available
- No demand for or lack of customer
responsiveness to innovative goods
or services

15. Did this business receive any public support (financial and/or non-financial) for innovation from the government?

(Financial support includes grants, tax credits or deductions, and loans. Non-financial support includes non-monetary assistance and advice)

Yes

No → **Please go to Section F**

16. Which levels of government did this business receive the public support from?

(Please tick one box for each category)

Financial Non-financial

a. Local/regional government.....

b. Central government

(Include central government ministries or agencies)

Section F: General information about this business

During the 3 year period, 1 April 2011 - 31 March 2014.

17. In which geographic markets did this business sell products (goods or services)?

(Please tick one box for each category)

- | | Yes | No |
|-------------------------|--------------------------|--------------------------|
| a. Local/Regional | <input type="checkbox"/> | <input type="checkbox"/> |
| b. National | <input type="checkbox"/> | <input type="checkbox"/> |
| c. Australia | <input type="checkbox"/> | <input type="checkbox"/> |
| d. Others | <input type="checkbox"/> | <input type="checkbox"/> |

18. Which of these geographic areas was your largest market?

(Please tick one box only)

- | | |
|-------------------------|--------------------------|
| a. Local/Regional | <input type="checkbox"/> |
| b. National | <input type="checkbox"/> |
| c. Australia | <input type="checkbox"/> |
| d. Others | <input type="checkbox"/> |

19. Please estimate this business's number of employees for the year?

- | | |
|---------------------------------------|----------------------------------------------------------------------------------------------------------|
| a. 2012 | <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| <i>(1 April 2011 - 31 March 2012)</i> | |
| b. 2013 | <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| <i>(1 April 2012 - 31 March 2013)</i> | |
| c. 2014 | <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> <input type="text"/> |
| <i>(1 April 2013 - 31 March 2014)</i> | |

Thank you for completing this questionnaire

Appendix J: Cluster Innovation Survey results

Innovations within cluster

Product Innovation		Number of Respondents	Percentage of All Respondents (%)
Type of Innovation	Goods	8	57.1
	Services	10	71.4
Parties Involved	This Business	8	57.1
	Co-operation with Other	8	57.1
	By Other	1	7.1
Nature of Innovation	New to Market	8	57.1
	New to Business	8	57.1
Non-innovation	Without New or Significantly Improved Goods/Services	1	7.1

Table 1: Product innovation

Percentage of Total Turnover from Products (2014)	Percentage of All Respondents (%)					
	0%	1 to 10%	11 to 20%	21 to 30%	31 to 40%	41 to 100%
New to Market	36.4	16.7	27.3	9.1	0.0	9.1
New to Business	36.4	16.7	36.4	0.0	0.0	9.1
Significantly Improved but Not New	27.3	16.7	18.2	18.2	0.0	18.2
Unchanged/Only Marginally Modified	18.2	16.7	0.0	9.1	0.0	54.5

Table 2: Percentage of total turnover from products in 2014 (%)

Process Innovation		Number of Respondents	Percentage of All Respondents (%)
Type of Innovation	Methods of Manufacturing or Producing	5	35.7
	Logistics, Delivery, or Distribution Methods	1	7.1
Parties Involved	This Business	3	21.4
	Co-operation with Other	3	21.4
	By Other	1	7.1
Nature of Innovation	New to Market	2	14.3
	New to Business	5	35.7
Non-innovation	Without New or Significantly Improved Methods	7	50.0

Table 3: Process innovation (%)

Innovation-related Activities		Number of Respondents	Percentage of All Respondents (%)
Organisational/Managerial Changes	Organising Procedures	6	42.9
	Organising Work Responsibilities/Decision Making	3	21.4
	Organising External Relationships	7	50.0
	Changes to Marketing Concepts/Strategies	5	35.7
Other Innovation-related Activities	Design	7	50.0
	Training	8	57.1
	Prototyping	6	42.9
	Internal R&D	9	64.3
	Acquisition of External R&D	7	50.0
	Acquisition of External Machinery, Equipment, and/or Software	6	42.9
	Acquisition of IP Rights	2	14.3

Table 4: Innovation-related activities (%)

Innovation Activities		Number of Respondents	Percentage of All Respondents (%)
Product Innovation	Goods	8	57.1
	Services	10	71.4
Process Innovation	Methods of Manufacturing or Producing	5	35.7
	Logistics, Delivery, or Distribution Methods	1	7.1
Organisational/Managerial Changes	Organising Procedures	6	42.9
	Organising Work Responsibilities/Decision Making	3	21.4
	Organising External Relationships	7	50.0
	Changes to Marketing Concepts/Strategies	5	35.7
Other Innovation-related Activities	Design	7	50.0
	Training	8	57.1
	Prototyping	6	42.9
	Internal R&D	9	64.3
	Acquisition of External R&D	7	50.0
	Acquisition of External Machinery, Equipment, and/or Software	6	42.9
	Acquisition of IP Rights	2	14.3

Table 5: All innovation activities (%)

Sources of information for innovations

Sources of Information for Innovations	Number of Respondents				Percentage of All Respondents (%)			
	High	Medium	Low	Not applicable	High	Medium	Low	Not applicable
Internal Sources Within Business	10	2	1	0	71.4	14.3	7.1	0.0
Within Consortium/Enterprise Group	4	3	4	2	28.6	21.4	28.6	14.3
Market Sources Suppliers	3	5	3	2	21.4	35.7	21.4	14.3
Customers	6	6	1	0	42.9	42.9	7.1	0.0
Competitors	1	4	6	2	7.1	28.6	42.9	14.3
Businesses from Related Industries	2	6	3	2	14.3	42.9	21.4	14.3
Intermediaries Science, Industrial/Innovation Parks	1	4	7	1	7.1	28.6	50.0	7.1
Universities/Higher Education Institutes	2	5	5	1	14.3	35.7	35.7	7.1
Centres/Institutes Embedded in Universities	1	2	8	2	7.1	14.3	57.1	14.3
Consultants/Private Agencies	1	6	2	4	7.1	42.9	14.3	28.6
Private Research Institutes/Labs	1	6	3	3	7.1	42.9	21.4	21.4
Government/Public Research Institutes	3	3	5	2	21.4	21.4	35.7	14.3
Government Agencies/Ministries	1	4	4	4	7.1	28.6	28.6	28.6
NGOs	0	0	7	6	0.0	0.0	50.0	42.9
Knowledge-based Businesses, Organisations/Institutes	0	6	4	3	0.0	42.9	28.6	21.4
Others Forums, Conferences, Trade Fairs, Exhibitions/Social Events	1	3	6	3	7.1	21.4	42.9	21.4

Table 6: Sources of information for innovations (%)

Cooperation for innovation

Types of Co-operation	Number of Respondents	Percentage of All Respondents (%)
Co-operation on Product Innovation	8	57.1
Co-operation on Process Innovation	3	21.4
Co-operation on Joint Innovation Projects	7	50.0

Table 7: Types of co-operation on innovation (%)

Co-operating Partners on Joint Innovation Projects		Location of Co-operating Partners				Location of Co-operating Partners (%)			
		Local/Regional	National	Australia	Others	Local/Regional	National	Australia	Others
Internal	Within Consortium/Enterprise Group	4	5	1	1	57.1	71.4	14.3	14.3
Market	Suppliers	3	1	0	1	42.9	14.3	0.0	14.3
	Customers	1	4	2	2	14.3	57.1	28.6	28.6
	Competitors	2	2	0	0	28.6	28.6	0.0	0.0
	Businesses from Related Industries	0	2	0	1	0.0	28.6	0.0	14.3
Intermediaries	Science, Industrial/Innovation Parks	2	3	1	0	28.6	42.9	14.3	0.0
	Universities/Higher Education Institutes	2	4	1	2	28.6	57.1	14.3	28.6
	Centres/Institutes Embedded in Universities	0	3	0	2	0.0	42.9	0.0	28.6
	Consultants/Private Agencies	2	3	0	1	28.6	42.9	0.0	14.3
	Private Research Institutes/Labs	2	2	0	0	28.6	28.6	0.0	0.0
	Government/Public Research Institutes	1	3	0	1	14.3	42.9	0.0	14.3
	Government Agencies/Ministries	1	3	0	0	14.3	42.9	0.0	0.0
	NGOs	0	1	0	0	0.0	14.3	0.0	0.0
	Knowledge-based Businesses, Organisations/Institutes	1	2	1	0	14.3	28.6	14.3	0.0

Table 8: Co-operating partners on joint innovation projects (%)

Constraints on innovation

Constraints on Innovation	Degree of Hampering				Degree of Hampering (%)				
	High	Medium	Low	Not applicable	High	Medium	Low	Not applicable	
Cost factors	Excessive Perceived Economic Risks	1	5	3	3	7.1	35.7	21.4	21.4
	Direct Innovation Costs too High	3	4	3	2	21.4	28.6	21.4	14.3
	Cost of Finance	2	3	4	3	14.3	21.4	28.6	21.4
	Availability of Finance	4	4	1	4	28.6	28.6	7.1	28.6
Knowledge factors	Lack of Qualified Personnel	1	2	6	3	7.1	14.3	42.9	21.4
	Lack of Information on Technology	0	3	6	3	0.0	21.4	42.9	21.4
	Lack of Information on Markets	0	7	5	1	0.0	50.0	35.7	7.1
Other factors	Previous Innovations Already Available	2	2	3	4	14.3	14.3	21.4	28.6
	No Demand/Lack of Customer Responsiveness	2	5	3	1	14.3	35.7	21.4	7.1

Table 9: Constraints on innovation (%)

Status of Innovations	Number of Respondents	Percentage of All Respondents (%)
Abandoned/Suspended	4	28.6
Ongoing (Until 2014)	11	78.6

Table 10: Status of innovations (%)

Government Assistance	Number of Respondents	Percentage of All Respondents (%)	
Local/Regional Government	Financial	2	14.3
	Non-financial	1	7.1
Central Government	Financial	7	50.0
	Non-financial	1	7.1

Table 11: Government assistance (%)

Business growth

Cluster Members	Company Size			Growth (%)		
	2012	2013	2014	2012-2013	2013-2014	2012-2014
Respondent A	11	14	16	27.3	14.3	45.5
Respondent B	4	7	8	75	14.3	100
Respondent C	1	1	1	0	0	0
Respondent E	1	1	1	0	0	0
Respondent F	2	2	2	0	0	0
Respondent H	11	16	20	45.5	25	81.8
Respondent J	3	3	3	0	0	0
Respondent K	2	4	5	100	25	150
Respondent L	18	20	25	11.1	25	38.9
Respondent M	2	5	8	150	60	300
Respondent N	5	6	17	20	183.3	240
Respondent O	280	300	350	7.1	16.7	25
Respondent S	150	180	205	20	13.9	36.7

Table 12: Business growth between 2012-2014 (%)

Appendix K: Waikato Innovation Park survey 2014

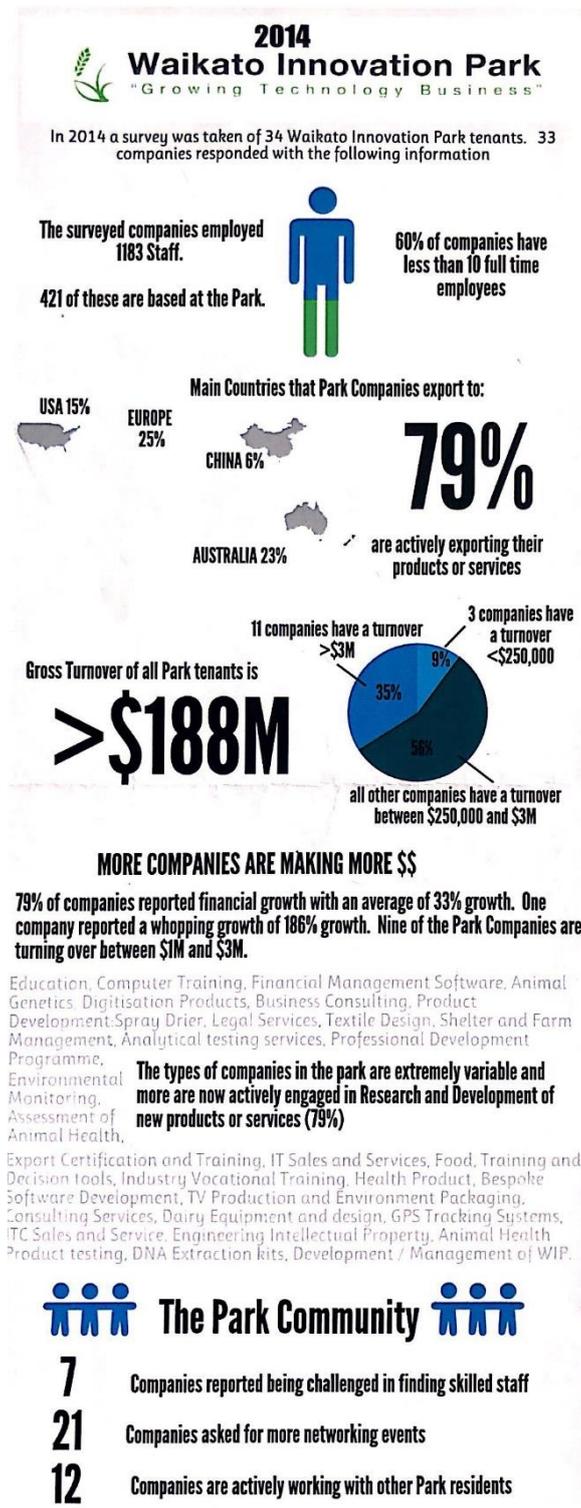


Figure 27: Waikato Innovation Park survey 2014
Source: Waikato Innovation Park