

Learning in Developing Economy Clusters: The Role of Intermediary Organisations

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Abstract

Intermediary organisations play a distinctive, yet underestimated, role in the learning processes of developing economy clusters. This study situates itself in a new way of thinking about knowledge and innovation; one that emphasises learning as a social process, within communities that emerge through the development of shared practice. It finds that, while previous formulations of intermediaries have emphasised linking and accessing, in some contexts their roles are more fundamental and include community-building and coordinating common strategies.

For many agricultural clusters, reflecting a move in developing economies from ‘import-substitution’ towards a focus on exports, learning and innovation have become central. Facing challenges in knowledge generation and transfer (Bessant et al, 2003), clustering aids knowledge diffusion amongst producers and stimulates the learning necessary to penetrate international markets (Schmitz and Nadvi, 1999; Humphrey and Schmitz, 2000). While opportunities sometimes exist for learning from global buyers, however, it is more common in natural-resource based clusters for the onus to be on producers to develop their own capabilities (Gomes, 2006). This study examines the contribution a diverse group of actors, categorised as intermediary organisations, make to this process.

The practice-based perspective (Amin and Cohendet, 2004) provides a framework through which the intermediary role is conceptualised, alongside insights from the innovation and network literatures (Howells, 2006; Burt, 2005). While these literatures predominantly focus on linking and accessing, however, intermediaries’ roles are found, in certain developing economy contexts, to stretch wider. Through a case study of a Peruvian agricultural cluster, they are identified as performing a cluster-building role, by providing a platform for inter-firm cooperation. They also, through their ability to coordinate firm actions, facilitate opportunities for value chain learning. In addition, they provide new knowledge inputs to cluster actors, either through their own knowledge creation capabilities or their ability to translate and adapt existing knowledge.

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Chapter 1: Introduction: Why Intermediary Organisations?

Intermediary organisations play a distinctive, yet underestimated, role in the learning processes of developing economy clusters. While previous formulations have focused primarily on their linking and accessing role, this study identifies how intermediaries can in some contexts fulfil a wider ranging role that incorporates community-building and coordinating common strategies. Using as a case study a Peruvian agricultural cluster, the study situates itself in a new way of thinking about knowledge and innovation; one that emphasises learning as a social process, within communities that emerge through the development of shared practices.

The study finds that, in a developing economy cluster context, intermediaries perform a cluster building role, through encouraging inter-firm cooperation and the establishment of common practices. Secondly, they are found to facilitate value chain learning, through encouraging increased vertical integration. Finally, they provide new knowledge inputs to cluster firms, through either their own knowledge creation capabilities or their ability to translate and adapt existing knowledge and make it accessible to cluster actors. A diverse group of organisations have been identified as performing such intermediary roles, and the distinctive way in which they access and diffuse knowledge is crucial to their contribution.

Such roles are performed in the context of a global economy where knowledge and learning are vital to competitiveness (Foray, 2004; Lundvall et al, 2002). New technology has meant that not only is knowledge more complex and more distributed but, through increased codification, it is potentially more accessible for developing economy firms. Knowledge transfer is by no means straightforward, however, and the practice-based perspective stresses that what is of most importance is not what knowledge is possessed, but how it is practiced (Amin and Cohendet, 2004). Knowledge flows best when there is a common understanding of the values and assumptions underpinning it, within communities where shared identity and common interests develop (Lave and Wenger, 1991; Amin and Roberts, 2008).

As interest in the knowledge economy has grown, there has been a closer examination of the processes through which firms learn (Lam, 2005). It has been recognised that firms need to adjust their core competences, assimilate new technologies and develop their managerial and organizational capabilities (Archibugi

and Lundvall, 2001). In developing economies, however, this process of acquiring and using new technology is hindered by limited technological creation capabilities (Bessant et al, 2003), and the resulting reliance on external source for technology raises difficulties of contextuality, complexity and maintenance (Lundvall and Johnson, 2001).

Clustering is a route through which developing economy firms can overcome some of these difficulties (Schmitz and Nadvi, 1999). Here also, the importance of knowledge is recognised through the assertion that cluster knowledge systems, the way in which the stocks of knowledge within a cluster are managed, are as important to a clusters success as the traditional focus on production systems (Bell and Albu, 1999). It has also been recognised that firms contribute in heterogeneous ways to learning within clusters, with some firms playing an important lead role in accessing knowledge from external sources and in the general promotion of cluster learning (Giuliani and Bell, 2005).

How clusters interact with the global economy is also increasingly considered (Humphrey and Schmitz, 2000; Hakanson, 2005). The Global Value Chains (GVCs) literature has highlighted how a more fragmented mode of global production has prompted a move away from vertically integrated firms to a variety of more flexible, network-orientated, models (Gereffi et al, 2005). Increased opportunities for developing economy clusters to penetrate world markets are presented, but only if they develop the learning capabilities as GVCs are increasingly competitive environments (Pietrobelli and Rabellotti, 2006). The way in which GVCs are governed also has implications for how learning takes place, and the contributions which different actors make to this process (Gereffi et al, 2005).

This new approach to knowledge and learning has a number of implications for developing economies, many of which have moved away from the post-war 'import-substitution' model which, in the case of countries with a high dependence on natural resources, led to damaging price instability and few incentives for learning (Katz, 2006). Now, with an export-led focus and inserted into the global economy, knowledge and innovation are central and a focused examination of the mechanisms through which developing economy clusters learn has been prompted. Consideration of learning via global buyers (Schmitz and Knorrninga, 2001) has been productive, but has failed to provide a full picture as in natural resource-based clusters buyers are less important (Gomes, 2006). Similarly, lead firms promote learning in some

contexts (Giuliani and Bell, 2005), but in many developing economy clusters such stable and well-resourced firms that are willing to share their knowledge are lacking.

This study, drawing on network concepts of innovation which suggest focus on one type of actor is too limited, argues that a more diverse range of organisations should be examined. It groups together trade associations, private organisations, government agencies, research bodies and NGOs, categorising them as intermediary organisations to initially emphasise the links they stimulate between cluster actors. The study argues that the role of such intermediary organisation as facilitators of knowledge and learning has been underestimated, and that their activities closely parallel the route to learning theorised as joint action, whereby firms seek an active advantage through cooperation (Schmitz, 1995b; Morris and Barnes, 2006).

The encouragement that intermediaries give to joint action is investigated within two contexts, within the cluster where they encourage cooperation between firms, and within the value chain where they encourage greater vertical integration. Their provision of new knowledge inputs for cluster actors is also recognised. A variety of roles, centred around accessing, diffusing, coordinating and enabling, are identified in a taxonomy that forms a part of the study. It is also argued that, as a cluster develops, the roles intermediaries play adapt and develop in response to changes in firm size and cluster structure.

The study is structured as follows. Chapter 2 will present a detailed examination of the literature on knowledge, learning and innovation, will review the particular contribution of the practice-based perspective of knowledge and will consider the issue of learning and development. It will also consider how intermediary organisations have been conceptualised in a variety of different literatures. Chapter 3 will introduce two propositions, and accompanying research questions, which will provide a focus for the way in which intermediary roles will be examined. It will also introduce and explain the case study methodology that will be used in this study and present a taxonomy of intermediary roles.

Chapter 4 will introduce the case study of a Peruvian mango cluster, placing it in its wider context by considering the history and potential of agricultural exports in Latin America. It will also look at some of the specific features of the mango industry, and identify some of the knowledge challenges that are faced. Chapters 5-8 then presents the empirical evidence, obtained through semi-structured interviews, observation of industry events and network analysis using survey data, that has been

gathered on a number of intermediary organisations. Chapter 9 will, in the light of the empirical evidence presented in Chapters 4-8, assess the studies two propositions before continuing by outlining the main conclusions of the study. Some of the studies strengths and weaknesses, and some suggestions for future research and policy implications, will also form part of Chapter 9.

Chapter 2 Knowledge, Intermediaries and Clusters: A Review of Concepts

This chapter will present and examine the literature that is relevant for this study. It will outline in Section 2.1 the view of knowledge that underlines this study, the practice-based perspective. Some of the assumptions of this approach are knowledge's collective nature, and how it is embedded in practice. The implications of this for knowledge flows, in terms of communities that share common identities and common practices, are of crucial importance. This approach will be specifically applied later in the study as a way to understand the way in which intermediary organisations work, and their roles in knowledge generation and transfer within clusters.

Section 2.2 will introduce the specific context in which the study is situated, learning in developing economy clusters. A consideration will be made of a number of different routes to learning that can be identified in such clusters, and the importance of intermediary organisations to the learning process will be highlighted.

Finally, Section 2.3 will examine how the subject of intermediary organisations has been conceptualised in a number of different literatures, in particular the practice-based, innovation and network literatures. While not all of these literatures will feature equally centrally as the study progresses, their inclusion allows the intermediary role to be considered from a number of different angles, and also facilitates the identification of areas where comparisons and cross-fertilization can beneficially take place.

Section 2.1 Understanding Knowledge and Learning: The Practice-Based Perspective

2.1.1 Knowledge and Competitiveness in the Global Economy

The importance of knowledge and learning for success in the global economy has become increasingly clear, creating many new challenges for businesses (Foray, 2004; Archibugi and Lundvall, 2001). Having access to relevant knowledge becomes increasingly important to firms in maintaining competitive advantage but, once they have accessed this knowledge, the capacity to manage it efficiently must also be developed. Businesses, therefore, need to turn themselves into learning organizations

through adjusting their core competences, assimilating new technologies and developing their managerial and organizational capabilities (Lam, 2005; Archibugi and Lundvall, 2001).

Attempts to define knowledge have tended to draw a distinction between data, information and knowledge. Data is the rawest of these three categories, referring to an unstructured and unorganised collection of either quantitative or qualitative material. Information, by contrast, can be defined as data that has been given a structure. Knowledge, however, can be seen as information that has been given a meaning by an organisational or individual interpretation process (Glazer, 1998; Huber, 1991).

Arising from debates about defining knowledge has been a focus on the differences between codified, or explicit, knowledge, and tacit knowledge (Cowan, David and Foray, 2000; Lundvall et al, 2002). Explicit knowledge refers to knowledge that can be codified and commodified and it is generally agreed that, with the development of ICT in recent years, it is now possible to codify a much wider range, and complexity, of knowledge. Codified knowledge is searchable, identifiable, accessible, transferable, reproducible and storable and, because of these factors, knowledge codification reduces the cost of knowledge acquisition (Cowan and Foray, 1997).

Tacit knowledge, whose importance was first recognised by Polanyi (1983), is, in contrast to codified knowledge, context specific and difficult to share. While early studies of knowledge, often within neo-classical economics, viewed it as similar to any other economic good, and therefore codifiable and commodifiable, this view has become increasingly challenged. Tacit knowledge has been located in people's beliefs, experiences, values, and through the routines that organisations establish and the institutions that they interact with and shape. The combination of these factors ensures that it is more difficult to formalise, impart, exchange, or purchase (Inkpen, 1998).

While the codified / tacit debate is an important one, however, within the practice-based perspective of knowledge the distinctions between these two forms of knowledge are seen as being less clear-cut. Instead, a more important distinction is identified, the one between knowledge that is possessed and knowledge that is practiced (Amin and Cohendet, 2004). The practice-based view of knowledge will be

central to the analysis of this study, and for this reason the main elements of this approach will now be outlined.

2.1.2 The Practice-Based Perspective of Knowledge

The practice-based perspective of knowledge provides the theoretical framework for this study and, through its emphasis on how knowledge is collectively practiced, a number of important concepts emerge. These include communities of practice, where the importance of common identity and common practices is recognised, and networks of practice, where links are weaker but are still significant for knowledge exchange. The role of boundary objects, and the processes of perspective-making and perspective-taking, are also of importance for understanding knowledge exchange.

These concepts have important implications for understanding the role played by intermediary organisations, something that will be examined further in Section 2.3.1. The concepts will also be referred to throughout this study, for example in interpretations of the empirical material that are presented in Chapters 5-8, and in the synthesis of this material that is made in Chapter 9.

Amin and Cohendet argue that the distinction between possessed and practiced knowledge is the key to understanding how knowledge flows both within and between organisations. (2004). Firms possess knowledge in many different ways: through competences that they have established, through stored memory, through established routines, through knowledge they have codified, through designated knowledge units such as R+D labs, through designated knowledge workers and through explicit knowledge management practices (ibid.). The result of recent developments in the world economy, in particular the expansion of ICT, has been a significant increase in the amount of knowledge that firms can possess.

While the possession of knowledge is important, however, a true assessment of organizational knowledge needs to take into account not just organizational know-what but also organizational know-how (Brown and Duguid, 1998). Know-how, the ability to use knowledge, is identified as being a situated and a social activity. It is a disposition bought out in practice and is the product of experience and the kind of insights which experience brings. Most know how, or dispositional knowledge, is a collective and cooperative venture and is generally held by groups rather than individuals. A study conducted amongst photocopy repair reps at Xerox, for

example, (Orr, 1990) showed that, despite the extensive documentation that each rep carries on their machines, they still find it very important to meet regularly with colleagues and go out of their way to arrange these occasions where, through the telling and analyzing of work stories, the reps feed into and draw upon the groups collective knowledge.

Know how, therefore, is knowledge that is practiced, through the daily interactions and practices of distributed groups of actors. Actors that have developed a shared identity, and participate regularly in activities that connect them, encourage the flow of knowledge, as Brown and Duguid argue ‘collective practice leads to forms of collective knowledge, shared sensemaking, and distributed understanding that doesn’t reduce to the content of individual heads’ (1998).

2.1.3 Communities and Knowledge Flow

Central to the practice based approach to knowledge is a focus on communities (Amin and Cohendet, 2004). Learning and knowledge flows are identified as taking place within a social context, between actors that have an activity that connects them. The extent to which a group of people share a common identity can, for example, affect how successfully knowledge flows between them. In addition, the values and assumptions underlying the knowledge they possess can also be an influence.

Amin and Cohendet argue that communities are “the all-important site of knowledge formation: the site where hybrid knowledge inputs meaningfully interact” (2004: 9). They are places where interpretative sense making, congruence finding and adapting are all identified. The process of generating, accumulating and distributing knowledge is seen, therefore, as being achieved through the functioning of informal groups of people, acting under conditions of voluntary exchange and in respect of social norms that are defined within the group (ibid.).

The concept of communities of practice, whose origins lay in the organizational learning literature (eg Lave and Wenger, 1991), has gained particular attention. Communities of practice are informal groups of people who have some work related activity in common. They tend to share similar backgrounds and skills, use the same jargon and technical language and also have a common understanding and viewpoint of the activity / organization of which they are a part. They also often share a common viewpoint of those outside of their group. Lave and Wenger (Ibid.)

identified communities of practice as important in the learning process, using the concept of situational learning. Through a process of ‘legitimate peripheral participation’ people learn and become socialized into being a member of the community. New members of the community gradually, through their contact with other group members, learn the language and routines of the group and gradually move from the periphery to a more central role in the group (ibid.).

Amin and Roberts (2008) note how the concept of communities of practice has increasingly received attention in both academic and organizational circles, and has been identified as a driver of learning and knowledge generation across a variety of working environments. They take a critical view of some of the literature, however, and argue that ‘as communities of practice’s thinking proliferates the original emphasis on context, process, social interaction, material practices, ambiguity, disagreement – in short the frequently idiosyncratic and always performative nature of learning – is being lost to formulaic distillations of the working of communities of practice’ (2008: 353).

In response to this trend Amin and Roberts attempt to re-insert more precision into the debate by developing a typology of different types of communities of practice. They develop this typology through a review of the extensive communities of practice literature, and note the differences in organisation, spatial dynamics, innovation outcomes, and knowledge processes between four different modes of communities of practice. Their resulting typology identifies craft or task-based learning, professional knowing, epistemic or high-creativity knowing and virtual knowing.

Considering craft/ task based activities first, a number of characteristics of learning within this mode can be identified. Firstly, though elements of knowledge may be codified, most knowledge is embedded within individuals and their socio-cultural context. Secondly, there is a high degree of mutuality amongst the communities’ members due to shared work. Thirdly, craft/ task based activities are primarily concerned with replicating and preserving existing knowledge rather than with radical innovation. Fourthly, knowing in action within craft-task-based activity occurs within a community organisational dynamic characterised by hierarchy. These communities are open to newcomers as long as they are willing to engage in a period of apprenticeship through which they learn to master the community’s knowledge

base. To summarize, knowledge transfer within this mode requires co-location, face to face communication and the importance of demonstration.

Four characteristics of learning can be identified within the professional knowing mode. The first of these relates to the type of knowledge acquired, generated and disseminated by professionals, which requires the mastery of both tacit and codified knowledge. The second common characteristic of professional communities is that apprenticeship-style learning is necessary for the development of professional competences, involving the co-location of a newcomer with experienced members of the community. The third characteristic is the nature of innovation, which tends to be incremental rather than radical, and reliant on cross-community links. A final distinctive feature of professional communities is that the protectionist role of professional associations can act as a barrier to radical change.

The epistemic/creative knowing mode refers to the dynamics of collaboration among experts, who are brought together explicitly to experiment with new knowledge of a path-breaking nature. These are commonly described as epistemic communities, they are likely to be highly creative and creativity in such collaborations thrives on the juxtaposition of variety. Finally, the virtual knowing mode is identified. Until recently, it has been assumed that virtual space cannot be considered as a site of situated practice. However, the proliferation of on-line communities has begun to change this view and as an example the significant role that such communities have played in many innovation projects must now be recognised (*ibid.*).

Amin and Roberts (2008) argue that there is a difference between each mode in terms of the nature and centrality of innovation. In craft/task based activities the type of innovation is customised and incremental. Amongst professional communities the possibility of either incremental or radical innovation is identified, but is strongly bound by institutional and professional rules. Within this mode radical innovation is most likely to be stimulated through contact with other communities. Epistemic communities, which explicitly bring together experts to develop new knowledge, display a high propensity to innovate, innovation characterised as being high energy and radical. Within virtual communities the authors identify that either incremental or radical innovation can take place (*ibid.*).

2.1.4 Intra and Extra Community Knowledge Flows

A number of contrasts can be drawn between the ways in which knowledge flows within and between communities. Within communities of practice the shared understandings between their members means, argue Brown and Duguid, that knowledge is able to circulate more freely (1998). People are more likely to negotiate tacitly, a large amount of negotiation that takes place happens implicitly, and the need for direct formal requests and insistence on rights and duties is negated (ibid.).

An issue that is both implicitly and explicitly explored when the concept of communities is considered is the implications of community development for levels of trust. This is an asset that has been shown to be lacking in many studies of developing economy clusters, for example Schmitz and Nadvi's consideration of a diverse range of studies from Brazil, Pakistan and Mexico (1999). In their analysis of the case studies Schmitz and Nadvi (ibid.) identify a number of consequences that can arise from a lack of trust. One of these that it can hinder the move towards greater specialization, as firms are wary of the greater amount of interdependence that such specialization would bring. Linked to this point an effect can be had, in some cases, on the firm structure that emerges within the cluster. Lack of trust can also, argue Schmitz and Nadvi (1999), be a contributory factor to learning discontinuities within the cluster.

When trust and cooperation does increase, Schmitz and Nadvi (1999) found that the benefits can be marked. The case studies previously mentioned focused on challenges associated with liberalization and globalization, and joint action was a strategy identified in several cases as a means to meet the new requirements of increased quality and speed. Schmitz and Nadvi found that, although responses were highly differentiated within the clusters, a common finding amongst these studies was that firms that increase their cooperation show a greater increase in performance (ibid.).

The previous discussion underlines that the development of the communities can be a dynamic and contested process. Questions will arise as to who sets the community's agenda and resistance is possible to the common understandings and practices that begin to emerge. Possible conflicts between the interests of individual members and the community as a whole mean will mean, therefore, that there is likely to be a limit to the commonality achieved.

In addition to the question of how communities form, how knowledge flows between communities is also of crucial importance and a number of potential barriers to knowledge flows between communities can be identified. Situations often arise, for example, where there is little shared knowledge between the two communities and, when the knowledge shared has epistemological differences, its flow will also be difficult. In addition, more explicitness and formality is seen to be required for knowledge flows between communities as the benefits of trust and shared understanding found in communities of practice are not in evidence.

An assumption is also sometimes made that explicit knowledge moves more easily between communities and tacit is difficult to transfer between different communities because it is difficult to articulate. However, as discussed earlier, this view is challenged by the practice based perspective of knowledge that emphasises that knowledge is socially embedded, and it is its embeddedness that determines how easily it flows (Brown and Duguid, 1998). Von Hippel used the phrase 'sticky' to describe this type of situation, and drew attention to how knowledge becomes difficult to share in these circumstances (1994).

Another reason why knowledge flows between communities can be difficult is that communities can become inward-looking, resistance to change and to ideas from outside. Leonard-Barton (1995), for example, has identified the process through which a firm's core competences can become core rigidities, and a tendency to be inward-looking is a key part of this process. Burt's (2005) concept of structural holes is also relevant here. He identifies how very dense channels of communications can develop between the members of a community, but how this is often accompanied by weak links outside of it, meaning that little communication with other communities takes place.

It has also been debated to what extent technology has the potential to overcome the difficulties identified in knowledge flow between communities. Within the practice based perspective it is argued that such potential should not be overestimated. Brown and Duguid, for example, argue that while new knowledge is constantly being produced by the different communities of practice in an organization, it cannot be assumed that IT developments will ensure its circulation (1998). While information might be able to move friction-free, via IT, the challenge with knowledge, they argue, is evaluating it and moving it. They also make the point that different technologies have different degrees of formality and trust, and that this

can affect their usefulness for knowledge exchange. They cite the negotiations that have taken place on the status of emails as an example (ibid.).

A further point for consideration is the ease, or difficulty, with which knowledge can span organizational borders. While traditionally the organizational border might be seen as a barrier to knowledge flow, Brown and Duguid make the point that communities of practice can sometimes span organizational borders, and that in this case knowledge flow might be freer than it is within the same organisation. Brown and Duguid have developed the concept of networks of practice which helps to illuminate this point, a concept used to describe relations among group members which are significantly weaker than those in a community of practice (2001).

Networks of practice are extended epistemic networks (ibid). They extend far beyond the boundaries of an organization and play an important role in spreading knowledge among practitioners. Relations amongst network members are considerably weaker than those which exist within a community of practice. Most of the people in a network of practice will never know, know of, or come across one another and yet they are capable of sharing a great deal of knowledge. Examples of networks of practice include academic disciplines that have groups of members around the world who, because of their common practices, are able to read and understand one another's work.

Professions also make up networks of practice and similar practitioners, because of their practice, are able to share professional knowledge through conferences, workshops, newsletters and web contact, for example. Managers are also members of networks of practice with other managers; they have high levels of shared practice leading to much shared know-how which, despite the fact they are competitors, allows extensive circulation of managerial knowledge. Brown and Duguid (2001) outline, therefore, how networks of practice provide a route through which a much wider range of knowledge can be accessed than exists within a community of practice.

2.1.5 Developing Effective Knowledge Communities

The implication for innovation of the increased knowledge flows that communities bring have been examined by Boland and Tenkasi (1995). They outline how there is

an increasingly proliferation of specialized and distinct knowledge communities and an increasing need for these to become integrated. They also identify how a trend from hierarchical and vertical organizational structures to more lateral-flexible forms of organization has been the result of these processes. The concept of ‘communities of knowing’ is used, these being defined as communities of specialized knowledge workers. Boland and Tenkasi’s immediate concern is the design of communication systems to encourage effective knowledge flow (ibid), but the concepts of ‘perspective making’ and ‘perspective taking’ they develop as part of this process have proved to be relevant in wider debates on knowledge and learning (eg Gherardi and Nicolini, 2002; Hislop, 2004).

Perspective making is the process through which a community of knowing develops and strengthens its own knowledge domain and practices. As this process takes place, shared values are developed and maintained. A number of factors, including the refining of the communities vocabulary and methods, its theories and values and its accepted logics through language and action, contribute to the process of perspective making. As a perspective strengthens, it becomes more complex and becomes more able to do knowledge work. Perspective taking is the process through which people develop an understanding of the knowledge, values and worldviews of other, and through this a community of knowledge improves its ability to take the knowledge of other communities into account. Dialogue and language is important to this process, and as it deepens, appreciation of the tacit assumptions and underlying values of the other party will develop (Boland and Tenkasi, 1995).

Hislop argues that perspective making and perspective taking typically require an extensive amount of social interaction and face-to face communication and that the acquisition and sharing of knowledge typically occur through two distinct, but closely interrelated processes (2004). The first of these is immersion in practice, learning by doing or learning by watching for example. The second is ‘rich’ social interaction, through which people begin to develop trust in each other, and also some understanding of the knowledge, values and assumptions which guides the behaviour of others. These processes are linked because the performance of either encourages the other (ibid).

In conclusion, both perspective making and perspective taking are seen as essential for effective communication to take place and are seen as ‘the basis for transformations within and between communities of knowing’ (Boland and Tenkasi;

1995: 352). They are identified as being of crucial factors in any innovation process, and Boland and Tenkasi argue that in all industries where knowledge is important these are ‘the means by which more complexified knowledge and improved possibilities for product and process innovation are achieved’(1995: 369). Both of these concepts also have implications for the role of intermediary organisations, whose skills and capabilities might allow such processes to be encouraged.

2.1.6 Conclusion

Consideration of the practice-based perspective of knowledge has, therefore, shown the close relationship between learning and practice, and how this has important implications for the way in which knowledge flows within and between communities. The concept of communities of practice has been examined, and distinctions between different modes of operation of communities of practice have been identified. The concepts of networks of practice, and perspective making and perspective taking, have also been outlined. These concepts will be referred to throughout the study, helping to illustrate the way in which intermediary organisations carry out their roles.

The following section will examine the specific context within which this study will take place, the role played by intermediary organisations in learning in developing economy clusters. Despite some optimistic predictions about how the increased codification of knowledge would allow developing economies to access international sources of knowledge unproblematically, the practice based perspective suggests that knowledge is not something that is easy to transfer. A number of routes to learning for developing economy clusters are identified in the following section, and the role that intermediary organisations play in each is identified.

Section 2.2: Knowledge and Learning in Developing Economy Clusters

The context in which knowledge and learning will be approached within this study is developing economy clusters, reflecting the fact that clustering has been identified as a potentially successful route for the development of firms in such economies (Schmitz and Nadvi, 1999). The following section will consider the history of intellectual interest in the concept of clusters, how the concept has been defined and

the debate on the benefits of clustering. It will also look at this debate in the specific context of developing economy clusters, and why they present a challenging environment for knowledge work.

A variety of possible routes to learning for developing economy clusters will then be identified. In two of these in particular, learning via joint action and value-chain learning, the important role played by intermediary organisations will be identified. The reasons why intermediary organisations are significant will be outlined, considering why they can make contributions that firms could not, for example. Some concrete examples of the way in which they have worked will also be presented.

2.2.1: Analysing Clusters

Interest in the concept of clusters has a long intellectual history. Marshall (1920), for example, identified the importance of industrial districts and how these became a crucial element in the rapid economic growth that took place during the British Industrial Revolution. Specialized craft labour was one of the explanations of the success of these industrial districts, and skill-formation was localized and on-the-job as craft workers passed on their skills to the next generation. As Marshall put it “mysteries of the trade become not mysteries; but are as it were in the air ... if one man starts a new idea, it is taken up by others and combined with suggestions of their own; and thus it becomes the source of further ideas ” (1920: 271). The special nature of “the air” encouraged new firms to form and locate themselves in the relevant district, helping to create a competitive and dynamic local economy.

Schumpeter, a pioneer of innovation studies, was influenced by Marshall’s ideas and noted during the 1930s that “Innovations are not evenly distributed over the whole economic system at random, but tend to concentrate in certain sectors and their surroundings” (1934: 111). In the immediate post war period, however, there was a decline in interest in Marshall’s ideas as industrialisation was seen through the lens of mass production, where regions were considered as cost centres rather than as a focus of knowledge. From the late 1970s, however, the identification of the ‘Marshallian industrial district’ as a location for innovation began to receive renewed attention.

Central to this resurgence was the extensive literature that emerged on the success of Italian industrial districts. Pyke and Sengenberger (1996), in reviewing this literature, note how these districts have been able to combine effective productive efficiency with the ability to be flexible and respond effectively to changing market conditions. They identify a number of reasons for this success in developing competitive advantage. One reason is that, in a similar way to that identified by Marshall, an atmosphere develops in the district through which ideas spread quickly, and this links closely to the entrepreneurial culture which prevails. The districts are also able to achieve efficiency and expertise through specialization, and have access to a wide range of such specialisms in the production chain. The skills that are needed, therefore, are invariably available locally. Also of importance is the fact that a consensual environment often emerges in the cluster, and in many cases family ties have a role in reinforcing this. This contributes to an effective overall mix of cooperation and competition (*ibid.*).

Pyke and Sengenberger (1996) point out how the Italian industrial districts are evolving phenomena and how they have had to respond to a number of internal and external factors. Some of the influences internal to districts include scale and coordination problems associated with heightened needs to innovate, to raise quality, to become more productive, and to access export markets. Other problems include inadequate finance, relatively high labour costs, shortages of technical, specialized and entrepreneurial skills and succession problems where the offspring of retiring entrepreneurs are sometimes unwilling to continue family business. Externally, the districts have had to respond to heightened levels of competition as globalisation has taken hold of the world economy (*ibid.*).

Finally, an issue of particular importance for this study that is identified by Pyke and Sengenberger (1996) is the existence of a broad array of supporting institutions, similar to the range of intermediary organisations that are being considered in this study. These are able to complement the skills that exist within firms and also help in providing knowledge of wider market conditions. These bodies are also important in helping to face up to the internal and external challenges identified by Pyke and Sengenberger. They can, for example, provide links to the external sources of knowledge that are increasingly necessary in a global economy.

The success of Italian districts is also examined by Piore and Sabel in their analysis of the second industrial divide (1984). They define an industrial divide as

‘the brief moment when the path of technological development itself is at issue’ (ibid: 5). They use the concept of flexible specialization to refer to a strategy of permanent innovation, the necessity to accept and adjust to ceaseless change rather than attempt to control it. For Piore and Sable Italian districts, the networks of technologically sophisticated manufacturing firms in central and north-western Italy which developed during the 1950s onwards and became known as “the Third Italy”, provide a clear example of flexible specialisation.

Prato, for example, was a group of textile producing towns in the provinces of Florence and Pistoia in central Italy. Two factors are identified as being crucial to the success of this region, a long-term shift from standard to fashionable fabrics and an accompanying reorganization of production from large, integrated, mills to technologically advanced shops specializing in discrete phases of production. During the 1950s a vast network of these small shops emerged, they possessed an extensive knowledge of materials and machines and would usually employ from one to twenty workers. As these shops sprung up they began to form a network, and the success of this network spelt the end for all but one of the integrated firms. Thus a strong regional economy emerged based on technological innovation, constant subcontracting arrangements and the search for new products.

Prato is just one example of a trend that Piore and Sabel note as repeated in many other places. Four factors are identified as important by Piore and Sable as crucial to the success of the Italian districts and their ability to be innovative. These are the existence of the extended Italian family, the view of artisan work as a distinct type of economic activity, the existence of merchant traditions connecting the Italian districts to world markets and the willingness of local and municipal governments to help create the infrastructure that the firms required but could not themselves provide (ibid.).

Becattini and Rullani (1996) also consider the experience of Italian clusters, their study being of particular interest to this study as they look specifically at the importance of knowledge to economic competitiveness and success. They argue that differences in local systems have been overlooked and that, because production is a process that is intrinsically placed, understanding local systems is crucial to understanding industrial organization and complexity.

Becattini and Rullani look in particular at the importance of the local system in the processes of knowledge circulation and new knowledge production. They

argue that the production of knowledge is a situated process and that the local system is both a place of accumulation of productive and life experiences and a place of new knowledge production, both crucial resources in contemporary industrial capitalism. The authors also consider the issue of codified and tacit knowledge, arguing that in each local system an integration between codified knowledge and contextual knowledge is sought about (ibid.).

Within their work Becattini and Rullani are not only concerned with differences in knowledge production within between different local contexts, but are also interested in the ways in which knowledge can be transferred outside of its context. The authors argue that it is important not to view local systems as being closed in on themselves. Conversely, they should be seen as active elements of a learning circuit, and as participators in new knowledge production. In fulfilling this role local systems interact with other local contexts and, ultimately, with worldwide knowledge processes. For this to take place successfully, however, knowledge needs to be de-contextualized, that is to be translated into a codified form that can be effectively transferred (ibid.).

As a result of these studies on the Italian experience, in combination with studies of other areas, interest in the concept of the cluster has grown substantially and has spread across many disciplines. The concept has emerged as an important focus for debate within the business studies literature (Porter, 1990; 1998), the innovation literature (Malmberg and Power, 2005; Hakanson, 2005) and the development literature (Schmitz and Nadvi, 1999; Humphrey and Schmitz, 2000). One of the issues debated has been how clusters should be defined. A much used definition is provided by Porter who identifies clusters as ‘geographic concentrations of interconnected companies and institutions in a particular field’ (1998: 78). For Porter “Clusters represent a new kind of organizational form in between arm’s-length by markets on the one hand and hierarchies, or vertical integration, on the other. A cluster, then, is a new way of organizing the value-chain” (1998: 79). Definitions of clusters used by Porter tend, however, as Humphrey and Schmitz (2000) point out, to have slight differences. In some cases the term is used to refer to sectoral and geographical concentrations of firms. In other parts of his work, however, the term cluster is used more broadly, referring to a group of industries with strong vertical ties and located in one country, but not always geographically close.

In analysis of developing economies the term cluster has often been operationalised in a looser way. An example is by Gomes (2006), who, in her consideration of an agricultural producers cluster, defines clusters as ‘a spatial agglomeration of firms producing the same crop’. Some of the assumptions that are often applied to the operation of clusters would not apply in this case, for example the assumptions of small-firm dominance and of a particular set of inter-firm relations. As agricultural clusters in developing economies is the context in which this study will be carried out, it provides the most appropriate definition and will be used here.

In addition to debates about how clusters are defined, a lot of work debate has taken place on the nature of the benefits, in terms of competitiveness and growth, to firms situated in a cluster. Porter, for example, argued that the focus for studying economic prosperity should move away from countries and towards clusters, and argued that the later present benefits in terms of both innovation and competitiveness (1990). In the innovation field an extensive literature has emerged on clusters, and Malmberg and Power have carried out a detailed review of this in a special issue of *Industry and Innovation* (2005). They examine the assumed advantages clustering gives in terms of firms being able to exchange, acquire and generate new knowledge and argue that three researchable hypothesis can be deduced from this literature. They then attempt to judge to what extent the empirical evidence supports each of these hypothesis (ibid.).

The first of these arguments is that knowledge in clusters is created through various forms of local inter-organizational collaborative interaction. These can take the form of inter-firm collaborations, but can also involve other actors, for example universities. Malmberg and Power belief is that there is “a mixed and contradictory set of empirical data” in this area and that no firm conclusions can be reached (2005: 418). The second argument, that knowledge in clusters is created through increased competition and intensified rivalry, is particularly associated with Porter. Given that this idea has formed a very important part of the cluster literature, Malmberg and Power find it surprising that there has been so little empirical analysis in this area and conclude that no firm support can be given to the hypothesis as yet.

The third argument is that knowledge in clusters is generated through spillovers following from the local mobility and sociability of individuals. Malmberg and Power argue that while the more common approach to cluster has been to look at

inter-firm and organizational knowledge exchanges, the need to pay more attention to individuals and actors in and around clusters has become apparent. Studies have, for example, shown that local clusters are centres of intense social networking, facilitating informal interactions across networks of local individuals, for example the high-fidelity industry in South-East England (eg May et al, 2001).

Before developing economy clusters are considered more specifically, the question also needs to be considered of how the dynamics of clustering have been affected by the process of globalisation. Hakanson looks at this question and argues that what distinguishes the current epoch of globalization from other historical moments of increased internationalism is the rapid nature of change and the dramatic effects it can subsequently bring (2005). Despite this, however, he suggests that “it is all the more fascinating to note that many of the economic processes underlying the dynamics of industrial districts appear to have changed surprisingly little” (ibid.: 453). As an illustration he notes that studies of the development of Silicon Valley have shown similar processes involved from those that had been noted fifty years previously concerning the founding of new firms in Anderstorp (ibid.).

Hakanson believes that there is no evidence to suggest that globalization has fundamentally altered the salient mechanism of cluster growth; instead it can, in three main ways, be seen to have strengthened the basic processes of agglomeration. Firstly, by enlarging the volume of demand that can be addressed from a single location, it can increase the scope for specialization and division of labour. Secondly, globalization can increase the volume and importance of foreign direct investment and, finally, it can promote immigration of skilled expertise on an increasingly global scale. There are, of course, also potential hazards from globalisation, however, as previously prosperous clusters are potentially confronted with new competition.

2.2.2 Developing Economy Clusters: A Challenging Knowledge Environment

The discussion so far has examined clusters mainly in developed economies. While these ideas will be relevant to developing economy clusters, there will also be some important areas of difference. Some of the specific difficulties which clusters in developing economies face in terms of accessing and using knowledge will now be analysed. Some of the routes through which these difficulties can potentially be overcome, and learning can take place, will then be identified.

Historically, there has been a lack of incentives for firms in developing economies to invest in knowledge creation and develop knowledge capabilities. One of the reasons for this has been that, as a result of protectionism during the era of import substitution, many industries experienced a long period of insulation from overseas competition. This left markets that were often dominated by large conglomerates that tended to have a wide spread of activities, and therefore comparatively low levels of specialization. Political and macro-economic stability also acted as a disincentive for knowledge investments. A lack of transparent government affects the ability to build the trust needed if firms are going to seriously contemplate investing in long-term technological change. Macro instability also creates uncertainty, for example many Latin American countries have experienced shocks to their economies that have wiped out a significant percentage of their GDPs almost instantly (Katz, 2006).

The knowledge environment is also affected by poorly developed national and regional systems of innovation (Melo, 2001). Many developing economy firms face major infrastructure problems and a poorly skilled workforce from which to recruit. The links between universities, research institutes and businesses are often poorly developed and a lack of trust often inhibits firm to firm knowledge exchanges.

Internally, there are other disincentives to technological change. Many developing economy markets tend to be supply constrained and favour low income goods, factors which mean that the incentives for technical change are weak and are biased towards process changes (Bessant, Kaplinsky and Morris, 2003). The process of acquiring new technology is further hindered by the fact that developing economies often have limited technological creation capabilities and therefore are reliant on external source for technology. This is particularly problematic because they often lack early warning systems for picking up signals about the rate, direction and strength of global technological change (ibid.). In addition, as globalization has intensified, developing economies have been affected by a lack of knowledge of potential changes in the world economy, for example, a lack of mechanisms for learning about changes in consumer tastes which would allow them to take advantage of increasingly differentiated rich country markets.

Such challenges are compounded by the fact that, while internal knowledge generation is difficult, acquiring knowledge from the developed economies is also problematic (Lundvall and Johnson, 2001). Firstly, there are problems of

contextuality, the fact that a knowledge sender, while they might have explicit knowledge about the technology they are trying to transfer, are likely to have incomplete and implicit knowledge about the economic and social context in which this technology has developed and is being used, and are likely to ‘even more inadequate knowledge about its context dependency in the receiving country’ (2001: 10). Secondly, there are problems associated with the complexity of knowledge, the more complex the knowledge is the more difficult it will be to transfer. A final, linked, problem is that of maintenance, while knowledge might be received and used for a short period, lack of a sufficient knowledge infrastructure in order to maintain it in the receiving country will often lead to it being forgotten and discarded in the longer term (ibid.).

The combination of the factors discussed has led to a much less optimistic assessment of the consequences of the knowledge economy for developing economies, Lundvall and Johnson argue, for example, that “it seems as if globalisation is as much a process of exclusion from world-wide knowledge intensive networks as it is one of inclusion” (2001: 8). In addition, the knowledge challenges being faced continue to intensify, the entry barriers which a new IPR regime has brought to many industries being just one example. Developments in ICT have only a limited potential to solve these problems. While they have certainly made a great deal more codified knowledge cheaply and easily available the question posed by the practice-based perspective of knowledge is to what extent this knowledge can be effectively used.

In the light of such challenges, clustering has been seen as a possible route through which developing economy firms can overcome these difficulties. It is also viewed as a route through which deficiencies in local infrastructure support can be addressed. Schmitz and Nadvi (1999), for example, refer to a number of studies of clusters, coming from countries as diverse as India, Pakistan, Mexico and Brazil, which have shown that firms that increase cooperation show an improvement in performance. In all of the four studies it was found that relationships between local producers and external buyers had become closer in response to the challenge of upgrading, and the need for greater quality, flexibility and speed. This, along with alternative routes to learning, will now be considered.

2.2.3 Intermediaries and Cluster Learning: An Introduction

The previous section has identified a number of challenges to learning that exist for developing economy clusters. This section examines the framework within which learning in developing economy clusters takes place, and three possible routes to learning have been identified. The first route to learning is through lead firms in the cluster, who are able to access knowledge from outside of the cluster and diffuse it to other firms. The second route to learning is joint action, through which firms in the cluster work more closely together, and the level of horizontal integration within the cluster is increased. Finally, learning from buyers in Global Value Chains is considered, in which the level of vertical integration increases and as a consequence learning opportunities are presented.

Each of these three routes to learning will now be examined. The relevance of each approach to learning to agricultural clusters will be considered and the potential role that might be played by intermediary organisations in encouraging learning will be assessed. In two of these in particular, learning via joint action and value-chain learning, this role is found to be important and the reasons for this will be outlined.

2.2.4 Learning via Lead Firms

In considering the role played by lead firms in cluster learning Giuliani and Bell (2005) argue that knowledge flows within ‘cliques’ of actors and firms within a cluster, characterized by similar absorptive capacity. Firms are characterized as heterogeneous in their absorptive capacities, and are able to absorb intra and extra-cluster knowledge flows differently, and therefore a consideration of firm-level capabilities is important. Using Social Network Analysis in order to examine knowledge flows within the Colchagua Valley wine cluster in Chile, Giuliani and Bell (2005) identify a number of different types of firms which exist within the cluster. They argue that the contrasts between these firms reveal the different ways in which knowledge flows into the cluster from external sources.

The most revealing contrast is between firms Giuliani and Bell describe as ‘technological gatekeepers’ and ‘external stars’. ‘Technological gatekeepers’ show a high degree of intra and extra cluster cognitive interconnection and are vital actors in

the cluster because they bridge knowledge into the local area. They tend to have a high degree of absorptive capacity and to be part of local knowledge cliques. 'External stars' are similar to 'technological gatekeepers' in that they are also extremely well connected to knowledge sources which are external to the cluster. The difference between them, however, is that 'external stars' are not well-connected to other firms within the cluster and therefore do not share the knowledge which they acquire with other firms in the cluster, as well as not benefiting from the knowledge which other firms acquire. In addition to these two types of firms, other firm types are also identified that have very few linkages with external sources of knowledge.

According to Giuliani and Bell, therefore, large firms play an important role in providing new knowledge inputs for smaller clustered firms. Applying this argument specifically to developing economy clusters, however, it can be argued that the existence of such large firms with the capabilities to perform such a role is more likely to exist in mature rather than emerging clusters. Schmitz and Nadvi (1999), for example, identify how clusters in developing economies are often dominated by small firms with low levels of capabilities. There is likely to be a lack of well-resourced firms that can access external sources of knowledge, and subsequently play a lead role in innovation and learning initiatives. In such circumstances, typical in many agricultural clusters where there is a particularly high concentration of small firms, firms will need to seek alternative routes to access knowledge and undertake learning. This prompts a consideration of learning via joint action.

2.2.5 Intermediaries and Learning via Joint Action

The last section has shown how in many developing economy clusters, stable and well-resourced lead firms with the ability to lead cluster learning processes are lacking. In such circumstances joint action provides an alternative route to learning. This section will consider, firstly, the evidence that exists for the benefits for joint action and, secondly, the role that intermediary organisations play in the process.

The Benefits of Joint Action

The concept of joint action was first introduced by Schmitz (1995a; 1995b), it building on pioneering work by Olsen (1965) on the political economy of group formation and operation, and the implications of group existence. At the time of the

publication of Olsen's 'The Logic of Collective Action' there was an assumption from theorists of the day that people that have interests in common will necessarily act collectively and that the operation of interest groups brought benefits to society (ibid.). Olsen's work was important because he prompted a more serious examination and discussion on how interest groups operate, some of the incentives and disincentives of group membership, potential costs associated with interest group operation and the effect that group size can have on interest group operation (ibid.).

One of Olsen's assertions is that it is more difficult for large groups to operate successfully than small groups. While the rise in organisational costs associated with large group size is one of the reasons for this, more important are the fact that in a larger group members actions will have a reduced impact on the whole, the fact that they will receive a lower share of the benefits and also that there are more opportunities for free-loading. Olsen's work has also prompted an interest into how commitment to group objectives can be fostered and how, for example, social pressures are likely to be stronger in small group contexts in which face-to-face contact occurs and the actions and group commitment of each member is more easily demonstrated and recognizable.

Schmitz, similarly concerned with the potential benefits of group membership, identified joint action as one of the competitive advantages that can be enjoyed by firms located in clusters, the other one being external economies as first identified by Marshall. The concept of joint action implies that firms are seeking out an active advantage through cooperation. Morris and Barnes (2006) develop this point further by looking at the issue of horizontal and vertical cooperation and its significance for cluster and firm learning in developing economy clusters. They also draw a distinction between ideas of locational advantages gained passively by firms, and the active advantages that firms seek out through cooperation.

Modern examples of clustering and cooperation, state Morris and Barnes (2006), are found in European small-firm industrial districts such as those found in certain regions of Italy. One of its main benefits is that it allows firms to jointly develop skills and knowledge while remaining independent competitors. Thus common problems that are faced by a number of firms in the cluster, for example on quality or the purchasing of raw materials, have the potential to be solved jointly. However, Morris and Barnes (2006) also draw attention to how successful horizontal clusters are invariably built on foundations of high levels of social capital and trust.

When such levels of trust are absent, questions are raised as to whether it is possible to realize the beneficial aspects of cooperative joint action (ibid.).

The later point is of particular relevance to developing economy clusters where low levels of trust are often a problem (Bessant et al, 2003). Despite this a survey by Schmitz and Nadvi (1999) found that in a range of countries as diverse as India, Pakistan, Mexico and Brazil, there was high potential for successful clustering. In each case it was found that firms that increased cooperation showed greater improvement in performance. In all of the four studies it was also found that relationships between local producers and external buyers had become closer in response to the challenge of upgrading, and the need for greater quality, flexibility and speed (ibid.). Schmitz and Nadvi also argue that joint action is particularly suited to developing economies because, in circumstances where firms have only limited resources and capabilities, innovation needs to take place in riskable steps. Joint action, in these circumstances, 'helps reduce the size of the leap for the individual entrepreneur' (ibid: 1506). This point is particularly important in many agricultural clusters, where there is often a high concentration of small firms.

Specific examples of advantages gained through joint action have been particularly prominent in studies of natural resource based clusters, for example those made by Gomes of fresh fruit clusters in Brazil (2006). Gomes highlighted different levels of joint action in the three different clusters that she considered and a number of different explanations were put forward for these differing experiences. Consideration was given, for example, to the historical development of the industries studied and the resulting differences in the structure of production that had emerged. In the melon producing cluster, for example, that was dominated by large firms, evidence of joint action was considerably less. A further explanation of difference was the complexity of the crop production process.

Intermediaries and Joint Action

One of the features of the literature on joint action is the mention made of the local institutional setting, within which a range of bodies, that are categorised in this study as intermediary organisations, work. In an extensive study of clustering and upgrading in Latin America, for example, Giuliana, Pietrobelli and Rabellotti argue that 'the presence of mainly public-private horizontal joint action positively affects

product and process upgrading, achieved through several channels including the local institutional network, the public support to local joint actions, research centres, Universities, and international competition' (2005a: 19). Gomes (2006), in her study of fresh fruit clusters, also identifies the importance of common institutions and, in their review of evidence from a range of studies of developing economy clusters, Schmitz and Nadvi also argue that 'a strategic response cannot just rely on private joint action but requires public agencies as catalysts or mediators' (1999: 1509).

Intermediary organisations are identified, therefore, as coming from both the private and public sectors and include organisations such as trade associations, government agencies, research centres and universities. These bodies are important because they perform a number of roles within the cluster, one example being that they access knowledge that is useful to cluster members. In her study of fresh fruit clusters, for example, Gomes mentions the role of growers associations (2006). The most influential participants within these associations are the larger growers but, according to Gomes, they also provide both direct and indirect benefits to SMEs. They provide a route, for example, through which SMEs can gain access to relevant and potentially useful research, one area where this is identified as being important being knowledge on new and existing fruit varieties.

Public sector agencies and the associations can also be identified as playing a role in diffusing knowledge to cluster members. In the study by Gomes, for example, growers associations worked in partnership with public sector agencies in an attempt to make research accessible to SMEs. The roles of accessing and diffusing are also evident in the analysis done by Perez-Aleman of trade associations in the Chilean footwear and agro-industrial sectors (2000). Perez-Aleman draws attention to the importance of institutions in encouraging learning and building collective capabilities (2000). She identifies how large firms face the challenge of connecting themselves to external resources and channels of knowledge in order to learn about new practices and improved ways of organising production. There is also the challenge of diffusing knowledge throughout the production network, so that smaller suppliers also have the opportunity to learn and develop. Perez-Aleman notes how it is often assumed that associations aid the learning process but, according to her analysis, there is a long experience with associations in developing countries with mixed results. In her own study, comparing the agro-industry and footwear sectors, she finds that different

associations have responded in different ways to the challenges of market orientation.

Perez-Aleman identifies a number of problems linked to the operation of associations. One of these is that associations can lack flexibility, finding it difficult to adapt to a new, market led, environment. They can also find it difficult to adapt to a new policy regime. This latter problem arises from a complicated relationship that associations have sometimes developed with the state. This is particularly true of the older associations that have grown accustomed to being the representatives of firms in their relationship with the state. In addition, these older bodies have often secured legal arrangements where it was compulsory for firms to be a part of their organisation. In many cases these older associations are reluctant to change, and are slow to initiate, or even positively resist, the learning that is needed to survive in a more competitive market environment (*ibid.*).

Perez-Aleman illustrates these issues with some examples that she draws from different industries. She finds that in the footwear industry there are a number of associations but that these have been slow to change, and slow to work in cooperation with the state. In agro-industry, however, newer associations have arisen and these have been far more effective in supporting improvements in the performance of firms. They have supported firms in re-examining production processes, including supporting developments in product and process standards, and in improving quality control methods (*ibid.*).

The work of Perez-Aleman illustrates, therefore, that the role played by intermediary organisations can be a complex one. As the earlier work of Olsen identified (1965), their operation can have political costs to society. They can also lack flexibility and be resistant to, rather than supporting, the technological and organisational change that is necessary for success in new competitive circumstances.

Another role that can be identified as being played by intermediary organisations is encouraging cooperation, through the gradual process of building trust in an industry. In their study of the South African timber products industry, for example, Bessant, Kaplinsky and Morris (2003) identified how both local and external intermediaries were required to overcome historically low levels of trust in the industry, which had resulted in an individualist business outlook. They worked in collaboration with internal-change agents, many of whom had been unsuccessfully

arguing for changes and collaboration for some time. An important factor in the success of the intermediaries was that they were seen by the parties involved to be neutral, not there to favour a particular stakeholder. This was particularly important due to the power dynamics within the industry, more specifically a feeling by small businesses that initiatives promoted by larger firms would bound to be weighted in their interests.

Finally, evidence also exists for how the role of intermediary organisations adapts and develops as the cluster develops. Drawing on the work of Maggi (2003), Pietrobelli and Rabellotti outline how the Chilean salmon industry has gone through three main stages (in Giuliani et al; 2005b). The stages are identified as those of ‘initial learning’, which took place in the late 1970s and early 1980s, ‘maturing’ from the mid 1980s to the mid 1990s, and ‘globalising’, from the mid 1990s onwards. During the initial stage the most important organisations were public bodies and international development cooperation agencies. Public bodies remained significant during the second stage, there being a rise in public/private partnerships that were concerned with technological developments for example. There were several examples of joint actions during this period as producers worked together as a strategy to improve quality and to gain access to new markets.

During the third phrase the technological developments had become more complex, and a particular effort was been made to access foreign expertise. In addition, producer associations were involved in an initiative to reach common standards amongst firms on clean production. Overall, according to Pietrobelli and Rabellotti ‘The experience of this cluster has been characterized by remarkable joint actions involving a variety of private and public firms and institutions throughout all these phases’ (in Giuliani et al; 2005b). In her analysis of the same industry Iizuka makes a similar point, identifying how common institutions have been established for learning and negotiations, and how this has helped to enhance the collective capabilities within the industry and helped it to maintain international competitiveness (2006).

In conclusion, the joint action concept illustrates that clusters can undertake learning even in circumstances where there is a lack of strong lead firms. An important role has been identified for intermediary organisations in pushing this process forward, helping build the cluster through encouraging increased cooperation between cluster firms. In carrying out this role intermediaries will use their skills in

accessing knowledge from a variety of sources, and will also ensure that is diffused amongst cluster actors.

Despite the identification of intermediary organisations in the studies mentioned, a systematic and detailed examination of the roles that they play, and what organisations out as intermediaries, has not been attempted. An aim of this study will be providing a fuller understanding of the roles played by intermediary organisations. In Chapter 3, for example, a taxonomy of intermediary roles will be presented and, in Chapters 5 to 9, this will be applied empirically in the study's case study.

2.2.6 Intermediaries and Value-Chain Learning

So far in this section two routes to learning for developing economy clusters, via lead firms and joint action, have been considered. A third route, value chain learning, will now be examined, consideration being given to its importance within agricultural clusters and the role that intermediary organisations play in its operation.

The participation by clusters within Global Value Chains (GVCs) has important implications for learning (Humphrey and Schmitz, 2000; Gereffi et al, 2005). The GVCs concept draws on the idea that the design, production and marketing of products involve a chain of activities divided between different enterprises that are often located in different places. Single companies, therefore, rarely turn raw materials into finished products and then sell them to customers. Humphrey and Schmitz look at the question of whether insertion in GVCs enhances or undermines local upgrading strategies (2000) and an important question is in what circumstances, and to what extent, global buyers can facilitate learning within developing economy clusters. Schmitz and Knorringa (2000) also look at this issue, examining it this through a study of the shoe industry in South Africa and Brazil. They identify a number of factors that can affect the extent of buyer involvement. One of these is whether producers are in an incipient or an advanced stage. During an incipient stage it is often the case that buyers are in a position of needing to offer extensive support often through necessity. Once a more advanced stage has been reached by producers, however, there is evidence that buyer involvement decreases to a more limited involvement.

There is evidence that in the agricultural sector value chain relationships have become increasingly important. Humphrey and Memedovic (2006), for example, identify how supermarkets, from the early 1990s onwards saw fresh fruit and vegetables as a more important point of competition with their rivals. To compete on this basis, however, supermarkets needed more influence on the type and quality of goods produced. In the 1990s a major process of restructuring took place, and the previous arm's length between producers and buyers was replaced by more fixed, durable relationships. Complex contractual arrangements have arisen and the sale of goods on spot markets has declined. The supply chain has become more vertically integrated as a result of this process and the effective flow of knowledge along the chain has become increasingly important. Growers, packagers/exporters, transport companies and importers need to communicate more than ever before (ibid.).

Gomes notes how within the literature on GVCs buyers, in addition to being more powerful, have also been identified as a significant source of learning. She argues, however, that in natural resource-based clusters buyers are less important as a source of knowledge (2006). She observes how, in the fresh fruit clusters she studied, buyers are in a position where they do not need to assist SMEs to meet the more demanding standards, as they have a choice of suppliers and can therefore select ones that currently comply with these standards. Apart from pointing the suppliers in the direction of relevant markets, therefore, buyers play very little role in the upgrading processes of local clusters.

Because of the limited involvement of buyers in natural resource based clusters, the role for intermediary organisations in accessing knowledge internationally, and encouraging value chain learning, is of particular importance. Intermediaries are important because they develop the specific skills needed to provide a link between the different practices and approaches to knowledge within the value chain. They also play a role in transferring / diffusing knowledge to other actors in the value chain, developing the ability to adapt the knowledge to local conditions. They can also play a role in increasing trust between value chain actors and, in some circumstances, they can initiate and coordinate joint approaches by groups of actors that are seeking to become more integrated in value chains.

An example of intermediary involvement in value chain learning, from a developed economy context, is a report on the UK economy by Bessant et al which examines and compares a number of different supply chains (1990). They argue that

external agencies can play an important intermediary role, carrying out a number of the roles that have been identified (1990). They are able, for example, to promote the diffusion of supply chain learning tools and encourage an increase in trust between parties in the value chain. They identify a number of potential intermediary organisations, government agencies being one example, either acting centrally or thorough their regional operations. Business associations, representing voluntary groups of private sector firms, are another example and a third example is research and academic institutions.

Morris and Barnes also consider the issue of value chain learning, and focus in particular on the potential offered via vertical cooperation (2006). They note how the global value chain literature stresses the importance of the manner in which ‘governance’ (organisational power between links) structures and determines the character of value chains. For a producer to maximise competitive advantage requires integration of activities along the chain. They also point to the linkage role that lead firms play in promoting conformance to specialised standards and assisting firms to engage on upgrading. Morris and Barnes also point to the role for intermediary organisations in encouraging vertical integration. They argue, however, that this area has failed to be adequately examined in the literature, an important weakness considering the increasing importance of value chain relationships in a globalised economy (ibid.).

In conclusion, the opportunities for learning from buyers appear relatively limited within agricultural clusters. Nonetheless, a role for intermediary organisations in encouraging vertical integration can be identified as being significant (Morris and Barnes, 2006). This area is likely to be of particular relevance for larger firms in the cluster, who are either already integrated into GVCs or have the desire to become so, and it is one that will be considered in detail empirically in Chapters 5-9 of this study.

2.2.7 Conclusion

Consideration of the literature on developing economy clusters has, therefore, highlighted the role of intermediary organizations as a potential route to learning. This role has been identified as being linked to learning from joint action, in which they play a role in increasing horizontal cooperation within a cluster. It has also been

identified in value-chain learning, in which intermediaries play a role in accessing knowledge from value chain sources, diffusing it to other actors in the chain and contributing to an increase in trust across the chain.

The role of intermediaries needs, however, to be investigated further so that a fuller understanding can be reached of the mechanisms through which such organizations can encourage knowledge flows and learning. The practice-based perspective of knowledge, which was considered in detail in Section 2.1, provides a route through which these questions can be investigated, especially via its focus on knowledge flowing within communities. Other areas of literature have also, however, considered the intermediary's role in detail, in particular the innovation literature and the network literature. The following section will consider the contribution of these three strands of literature to understanding the role of intermediaries.

Section 2.3 Conceptualising Intermediaries

The following section will consider how the concept of intermediaries has been conceptualised within a range of different literatures. It will begin by considering the practice-based perspective of knowledge, one that will be particularly important for conceptualising intermediaries within this study. Intermediaries and the innovation literature will then be considered, focusing in particular on how it contributes an understanding of what organizations or individuals might be considered as intermediaries, and the roles that they play. The network literature, and in particular the concept of brokerage put forward by Burt (2005), is an important complement to this, however, in that it aids an understanding of how intermediaries come to occupy a strategic position within the network, and what the implications of this position are for how knowledge flows take place.

2.3.1 Intermediaries and the Practice-based Perspective

Section 2.1 of this chapter outlined how, within the practice-based perspective, the collective nature of knowledge is stressed and what is important for knowledge transfer is how knowledge is practiced. Although the role of intermediaries has not been analysed in detail within the perspective, three main ways in which it can be used to understand an intermediary's role can be identified. Firstly, intermediaries are able to play a role in the construction of communities within which knowledge

can flow. Secondly, through the process of perspective-taking, intermediaries are able to play a role in communication between different communities. Finally, intermediaries are able to contribute to the construction, and successful operation, of boundary objects, a useful tool in the encouragement of communication between different communities.

Firstly, intermediaries are able to play a role in the formation and operation of communities within which knowledge can flow. They are likely to be able, for example, to play a coordinating role amongst different members of the community, establishing mechanisms for day to day knowledge flow and encouraging the emergence of common understandings and common practices within the community. In fulfilling this role intermediary organizations can encourage the processes that are needed for perspective making. They can do this by, firstly, encouraging an increase in the social interaction and face-to-face communication that takes place amongst members of the cluster. Secondly, they have the potential to encourage a process through which members of the cluster can learn through the observation of others. Thirdly, the work that they do can contribute to a rise in the levels of trust amongst the communities' members.

The role of intermediaries can also be highlighted in contributing to the resolution of conflicts within a community. Questions can arise within a community as to who sets its agenda, and resistance is possible to the common understandings and practices that emerge within the community. In circumstances such as these the manner in which the intermediary carries out its role is of crucial importance. One of the methods that make help to resolve such conflicts could be the establishment of boundary objects, which will be considered in more detail below.

A second role played by intermediary organizations is helping different communities communicate with each other. This is an essential process within the firm where, as Brown and Duguid identify, 'communities of communities' exist (1998). It is also relevant in regards to communication between communities across organisational borders. Brown and Duguid use terms originally developed by Leigh Star and Griesemer (1989) to describe different ways in which intermediation might take place, that is the role of translators, brokers and boundary objects. Translators are defined as those who are not members of either of the two groups concerned but who manage to translate between them, having the ability to frame the interest of one community in terms of another community's perspective. As well as being mutually

intelligible to both groups, a translator must also maintain the trust of both parties if they are to carry out their role successfully. Brokers are defined as people who are members of the overlapping communities, and help to create communication between them (ibid.).

Translation is a useful concept for understanding how communication between different communities of practice can be facilitated. For a number of reasons such communication is seen to be difficult. Communities of practice have, for example, the tendency to become inward-looking, a point Leonard-Barton drew attention to in describing how core competences can potentially turn into core rigidities (1995). University campuses provide an example of how divisions between communities can encourage isolation. They are places where disciplines can be observed to increasingly divide, rather than combine, and where even very similar disciplines only very rarely, if at all, cooperate (Brown and Duguid, 1998).

Communication is also difficult because communities of practice have different standards, different views of what is significant, different priorities, different evaluating criteria and different agendas. Examples of this include the experience of computing firm HP, which found that what looked like best practice in California didn't look that way in Singapore (Brown and Duguid, 1998) and from the Colchagua Valley wine cluster in Chile while disagreements and misunderstandings have been identified between two communities of practice, professional winemakers whose main focus was on quality and entrepreneurs whose main focus was on profits (Hojman, 2005).

The concept of perspective taking is useful for understanding how such difficulties can be overcome, and how differing communities can start to communicate with each other (Boland and Tenkasi, 1995). Perspective taking is the process through which people develop an understanding of the knowledge, values and worldviews of others, and through this a community of knowledge improves its ability to take the knowledge of other communities into account. Dialogue and language is important to this process, and as it deepens, appreciation of the tacit assumptions and underlying values of the other party is will develop.

Intermediary organizations can play a role in encouraging the processes that are needed for perspective taking to take place. Firstly, intermediaries can provide a means through which the social interaction and face-to face communication with organisations outside of the cluster increases. They are able to do this by forming

links with outside organisations, through the attendance at conferences, meetings and workshops for example. Through the opportunities bought by face to face interaction, personal contacts can be made and trust can developed. Secondly, through the social interaction which they are involved in, intermediary organisations can develop an understanding of knowledge, values and assumptions which guides the behaviour of others. Where relevant, they will be able to pass on this understanding to their own members. Thirdly, the wider range of social interaction which they become involved in will provide intermediary organisations a route through which they can learn by either doing or via observation. Through observing the way in which other organisations do things they are able apply some of the successes of this approach to their own organization, as well as learning from those strategies that have not worked.

Finally, intermediaries are identified as being able to contribute to the construction of 'boundary objects' and to their successful operation. Boundary objects are a mechanism for establishing links between communities and consist of objects which are of interest to each community involved, but which are viewed and used in a different way by each community. A number of objects, technologies or techniques can potentially act as boundary objects, examples include lists, forms and administrative routines that pass between different communities. Plans and blueprints are another form of boundary object. Brown and Duguid (1998), for example, identify the way in which architectural plans can become a focus for a range of different communities, including architects, contractors, engineers, city planners, cost estimators, suppliers and clients. Another example of boundary objects which is commonly quoted is that of contracts, which develop through a sometimes lengthy process of negotiation between different groups, who recognise their importance and reach a shared understanding of their meaning.

A number of roles can be carried out by boundary objects, and these can be related to the concepts of perspective making and perspective taking that have previously been outlined. Hislop argues, for example, that contracts can 'help provide an initial stimulus to a process of perspective making and perspective taking at an early stage in the working relationship of an intercommunity work group' (2004: 83). Gherardi and Nicolini also acknowledge that boundary objects have the potential to mediate the processes of perspective making and perspective taking, to allow these to take place (2002). In terms of perspective making boundary objects

can help to improve the mutual understanding between groups of people and, through this process, more effective working relationships can be developed. Brown and Duguid (1998) point out, for example, how they can help to make a community's pre-suppositions apparent to itself, thereby encouraging a process of reflection. Boundary objects can also help to clarify the attitudes of other communities, and therefore contribute to a process of perspective taking. Through them, suggest Brown and Duguid, a community can come to understand what is common and what is distant about another community, its practices and its world view (ibid.).

Intermediary organizations can play a role in encouraging the processes that are needed for boundary objects to be put in place and to operate. Firstly, they can take part in the construction of objects that could possibly work effectively as boundary objects. Secondly, they can take steps to ensure that the organisations that come together to share boundary objects do so effectively. Finally, they can help to provide opportunities for resolution when disagreements or points of conflict arise.

2.3.2 Intermediaries and the Innovation Literature

The way in which the role of intermediaries has been conceptualised within the innovation literature will now be considered. As the innovation literature has challenged some of the assumptions of neo-classical economics a brief consideration will firstly be made to how intermediaries have been considered within this tradition, and also to how this was challenged from the perspective of institutional economics.

From a neo-classical economics perspective an intermediary is viewed as someone who takes advantage of monopoly rents on the information they have and control, without providing any value added themselves. Popp (2000), for example, has identified how traditional economic theory on supply chains has theorized that the role of the intermediary will eventually disappear. Casson (1997), however, from an institutional economics viewpoint, has challenged this view of intermediaries. His work draws attention to the positive aspects of knowledge creation, seeing it as being a creative process, in contrast to the negative view of intermediaries put forward within traditional supply side theorizing (Ibid). In his work on clothing supply chains Popp (2000) looks at the role of intermediaries as specialists in handling information, stating that "we are here using intermediaries and intermediation to refer specifically to firms whose principle role is to handle information flows rather than material

flows' (2000: 155). Examples of intermediaries identified include import and export agencies, freelance agents and brand owners/managers.

Two principle sources of information costs are identified by Popp (2000), in a case study of international markets for clothing. The first is distance, both geographical and cultural. The second is volatility, occurring in the short, mid or long-term and refers in particular to issues of supply and demand. Popp concludes that intermediaries can lower the information costs caused by both of these sources. He argues that intermediaries can improve supply chain transparency, lowering costs and adding-value, a conclusion which challenges the assumptions derived from the supply chain literature. In addition, Popp argues that internationalization is likely to increase the scope of the role played by intermediation in supply chains (2000). Popp's study, therefore, confirms the importance of the intermediaries' role, something which is not recognized within traditional economic theory. It also stresses how this role increases in importance as production becomes increasingly international and complex in nature.

In the innovation literature, the concept of intermediaries has been examined in a much broader sense than that used by Popp, and the analysis takes forward the analysis of intermediary organisations. An early attempt to look at intermediaries within this literature was made by Mantel and Rosegger (1987). They used the term of 'third-parties' and looked at the importance of their role in the spread of new technologies. 'Third parties' could, for example, act as expert decision makers, providing advice on whether to adopt a technology or not, standard setting agencies or as evaluating agencies (Ibid.).

Since this study other writers have looked at the role of intermediaries in different ways, variously describing the role as 'bridgers' (Bessant and Rush, 1995) or 'brokers' (Provan and Human, 1999). Howells has attempted to categorize this literature, in what he describes as "a burgeoning but surprisingly disparate field" (2006). In doing so he provides a definition of an innovation intermediary and a typology of the roles that such individuals and organizations carry out. He also tests this typology against a case study of 22 firms in the UK. The definition for an innovation intermediary which Howells uses is:-

"An organization or body that acts as an agent or broker in any aspect of the innovation process between two or more parties. Such intermediary activities

include: helping to provide information about potential collaborators; brokering a transaction between two or more parties; acting as a mediator, or go-between, for bodies or organizations that are already collaborating; and helping to find advice, funding and support for the innovation outcomes of such collaborations” (2006: 720).

Howells (2006) acknowledges, however, the difficulties in providing a satisfactory definition for the role. Organizations involved in such work are usually complex and multiple entities, he states, and there is no formal recognition of the sector by government or statistical bodies. Intermediaries, for example, are often involved in other, often more traditional roles, apart from that of being an intermediary. They are also involved in a number of complex relationship patterns, not just triadic, one-to-one relationships between supplier and customer.

Howells completes a review, and categorization, of the literature on innovation intermediaries and identifies four main approaches to the subject. Within the diffusion and technology transfer approach the focus is on how intermediaries can influence the speed of diffusion and uptake of new products and services. Within the innovation management approach the focus is more on intermediaries as organizations and what type of activities they are involved in. Within the systems and networks approach the focus is on intermediary firms that help adapt specialized solutions to the needs of individual user firms. Finally, the intermediaries as service organizations approach focuses on service activity and service innovation, particularly in relation to the growth of KIBS.

Howells looks at the roles, or functions, which intermediaries play and produces a typology of ten different functions. Several of these are of direct relevance to knowledge issues. One of the functions concerns the role of scanning and information processing, for example, while another is concerned with the issue of knowledge processing, generation, combination and recombination (Ibid.). Howell’s analysis provides, therefore, a useful framework for understanding the roles carried out by intermediaries.

2.3.3 Intermediaries and the Network Literature

Another approach to intermediaries that can help to conceptualise their role has been made within the network literature. Network analysis can provide an explanation of how intermediaries come to occupy strategic positions within the value chains in which they operate. One of the most significant changes in the global economy is that networks have become increasingly important as a means for a business to gain, and maintain, competitive advantage. Organizations have become increasingly dependent on informal, discretionary relationships and in many areas, innovation being an example, developing such relationships is seen as increasingly crucial for success (eg Castells, 1998; Jones, Conway and Steward, 2001; Burt, 2005; Thompson, 2003). Within network analysis Burt's (2005) concept of brokerage provides a useful framework for understanding how intermediaries come to occupy a strategic position within the networks in which they operate, and Gould and Fernandez have developed a systematic analysis of different types of intermediary roles (1989).

Lesser (2000) identifies two different ways of understanding networks. The first of these, referred to as the egocentric perspective, considers the connections which individual actors have with one another. These can be both strong ties or, as identified by Granovetter (1974), weak ties, both of which can be of potential value to individuals. By contrast the sociocentric approach argues that social capital is based on a person's relative position within a given network rather than their individual direct relationships with people in that network. The concept of brokerage put forward by Burt (2005) arises from the second perspective, and is developed from his analysis of how networks work. He believes that the idea can help to illustrate the importance of social capital and how, in the business world, reputation has come to replace authority. Burt sees social capital as a contextual complement to human capital and argues that it "explains how people do better because they are somehow better connected with other people" (2005: 4).

One of the defining features of networks is that they consist of clusters of dense connections linked by occasional bridge relations (Burt, 2005). The concept of 'small worlds' illustrates this, that is, the fact that in any small group it is interesting how quickly a pattern of knowing others emerges and is recognized by members of the group. This is a phenomenon which occurs in many different areas, not just

business. Between these clusters of dense connections, however, effective communication is problematic and here the concepts of 'brokerage' and 'structural holes' are developed by Burt in order to provide an explanation. Structural holes are empty spaces which exist between groups of people who, although densely connected within their own group, have no bridge between them (ibid.).

Brokerage can be defined as the activity of people who live at the intersection of social worlds (Burt, 2005). Through their ability to see and develop good ideas, brokers are able to fill structural hole. By bridging gaps, brokers increase their level of social capital, illustrated by the compensation and recognition they gain, and the responsibility with which they are entrusted in comparison to their peers. They have access to increased levels of information and can also control how information flows between people who are otherwise disconnected. It is the broker's position in the network, rather than any individual relationships which they establish, which gives them a certain level of power. The advantages outlined give the person occupying that position opportunities for information arbitrage. The broker will be motivated to an extent by self-interest but also by the fact that they share a shared language with those with whom they work within the network. Burt also, for example, in places describes brokers as 'network entrepreneurs', people that operate somewhere between the force of corporate authority and the dexterity of markets and who build bridges between disconnected parts of markets and organization where it is valuable to do so (ibid).

Another examination of the role of a broker within the network literature has been made by Gould and Fernandez (1989). They define a broker as an actor who facilitates transactions or resources flows, whether or not the actor attempts to extract a direct reward. They examine brokerage behaviour in social systems characterized by the exchange or flow of resources, and argue that a more systematic look needs to be taken at brokerage as, while related, it is not synonymous with centrality. Having defined brokerage theoretically they also outline a set of quantitative measures, and they apply these to data collected from a survey on access to knowledge in a local community.

Gould and Fernandez (ibid.) argue that any set of actors can be divided into a set of mutually exclusive subgroups. They then identify structurally distinct types of brokers, or types of brokerage relations, that follow from such a partitioning of actors into non-overlapping subgroups. These five types of brokers are coordinator,

itinerant, gatekeeper, representative and liaison. For the first type of broker, the coordinator, each of the three actors involved belongs to the same group. In the second type, the itinerant, the two principal actors belong to the same subgroup while the intermediary belongs to a different group.

In the case of the gatekeeper and representative roles the broker is defined through their membership of a group that helps in some way to provide access. An example of the gatekeeper role would be that if you wished to approach a member of a political party, and decided to approach them via another member of the party, then that member would be acting as a gatekeeper. The final brokerage role, that of liaison, is one where the broker is independent from both of the other actors. Overall, these five brokerage types can be seen to represent specific structural positions, and they provide a useful tool in considering the complexity and potential variety in a broker's position. Alternatively, argue Gould and Fernandez, they can also be viewed as concrete social roles occupied by actors in systems of exchange or networks of resource flows (ibid.).

Finally, the issue of how brokers choose to carry out their roles has also been considered in a study by Provan and Human (1999) of brokerage behaviour within small-firm manufacturing networks. Their work shows that how a broker chooses to carry out their role within a network can affect the learning that takes place within it. In their study they look at two different networks of SMEs within the wood-processing industry, and argue that inter-firm networks present opportunities for learning for SMEs that are not available in market networks. They consider the ways in which each network developed network membership and facilitated network exchange (Ibid.).

Both networks studied were similar in that they each had an autonomous broker, but the study found that there were important differences in the way in which the broker operated and that this significantly affected the learning process that the individual firms within the networks undertook. Provan and Human (1999) found that in one of the networks studied the broker became the repository for network knowledge and opportunities. In this network, therefore, communication became centralized through the broker and the effect of this was that the learning that took place within the network also became very centralized. In the other network, however, communication flows were found to be far more dispersed. The broker encouraged network members to communicate directly amongst themselves, as well

as through him, and this lead to a more productive environment for learning to take place.

Conclusion

This chapter has identified the importance of knowledge and learning to global competitiveness, examining the question of how developing economy clusters can access the knowledge required to consolidate a position in global markets. Consideration has been given to joint action, value-chain learning through participation in GVCs and leadership from lead firms as potential routes to learning. Arising from these literatures, in particular those on joint action and value-chain learning, the importance of the role played by intermediary organisations has emerged.

The practice-based perspective of knowledge, with its emphasis on knowledge flowing within communities, has been identified as a relevant one for providing an understanding of the way in which intermediary organisations carry out their role. Insights into the intermediary role have, in addition, also been provided through consideration of the innovation and network literatures. The following chapter will outline how these roles will be investigated empirically. It will begin by outlining the propositions and research questions that will provide the focus for the study, before providing an outline of the case study methodology that will be employed in the study.

Chapter 3: Research Questions and Methodology

Chapter 2 provided a preliminary review and interpretation of the roles played by intermediary organisations in developing economy clusters, and the importance of knowledge and learning to global competitiveness was stressed. This chapter will present the propositions and research questions that arise from this review and will be addressed in this study. It will outline the case study methodology that will be used to address these questions, and it will also consider some of the challenges that will be faced in employing this methodology.

3.1 Propositions and Research Questions

Despite the early optimism that the knowledge economy would provide opportunities for developing economies, through the increasing availability of codified knowledge for example, it has been recognised how they still face significant challenges in accessing global knowledge flows and knowledge management. These include limited technological creation capabilities, problems with basic infrastructure, limitations in key skill areas and a lack of early warning signals on worldwide technological and commercial developments (Bessant et al, 2003). Moreover, according to the practice-based perspective of knowledge (Brown and Duguid, 1998; Amin and Cohendet, 2004), without an understanding of how knowledge is practiced developments associated with the knowledge economy such as increased codification will have only limited effects. Recognising that knowledge resides in communities is particularly important for understanding the specific conditions under which it is shared (Lave and Wenger, 1991; Amin and Roberts, 2008).

As knowledge is situated and embedded, therefore, knowledge transfer remains complex and problematic, and suggests the need for intermediary organisations that encourage knowledge flows. Such organisations, through their knowledge of the giver and receiver, their abilities to build bridges and their building of common practices, are identified as being able to aid the process of knowledge flow. Within the specific context of developing economy clusters it has been identified how intermediary organisations can help increase cooperation within clusters and create opportunities for value chain learning through increased vertical integration. Whilst the literature has drawn some attention to the activities of such organisations (eg Gomes, 2006; Bessant et al, 2003), there has been a lack of in-

depth analysis. Morris and Barnes, for example, argue that “there are...few studies that record, analyse and draw lessons on the role of intermediaries and local champions in facilitating processes of horizontal and vertical cooperation” (82, 2006). This study will analyse intermediaries’ roles in depth, investigating what it is about such organisations that allows them to carry out such tasks.

3.1.1 Knowledge Flows and Intermediaries: Propositions

Two propositions will be identified and presented, it being explained how they will form the basis for the empirical work that will be done in this study. The process of identifying propositions is an important stage in the design of any research project and they are identified by Yin as one of the five essential components of successful case study design (2003). Clear propositions are, he states, one of the factors that ensure that the case study develops as a comprehensive research strategy, not merely a design feature or a data collection tactic. Once the propositions have been outlined a series of research questions will be posed. These will provide a specific focus for the study, and will reveal how the role of intermediary organisations will emerge as the main focus of the study.

Proposition 1

This study’s first proposition is:-

Intermediary organisations provide an important route to knowledge and learning for developing economy clusters, a factor that has been underestimated by previous studies.

This proposition will allow an investigation to be made into what contributions intermediary organisations make to learning, both within the cluster and in the way that the cluster interacts with international value chains. It arises from the recognition made in Chapter 2 that too little attention has been given in previous studies to the their activities. The proposition will also prompt an investigation of what it is about intermediary organisations that allows them to carry out these roles.

Proposition 2

This study's second proposition is:-

Intermediary organisations carry out four distinct knowledge and learning roles, accessing, diffusing, coordinating and enabling, in developing economy clusters.

This proposition arises from the recognition that existing studies of intermediaries have tended to do so within the context of developed economies, within clusters that have achieved a certain level of success and maturity. Innovation and learning in developing economy clusters has been inadequately examined and a mechanism for understanding what intermediaries do in such clusters is needed. This is likely to involve playing a role in the formation of links within these clusters through which knowledge can be diffused. In the agricultural sector, for example, such links might focus on issues such as quality, certification and technology. A certain level of coordination will also be needed in order to achieve success in these areas.

In examining this proposition this study will refer to the practice-based, innovation and network literatures. The practice-based perspective, and in particular the idea of knowledge flowing within communities, provides an insight into how learning takes place. The innovation literature provides an insight into how intermediary organisations operate, and the capabilities that they develop in carrying out their activities. The network literature, meanwhile, provides an insight into how an intermediary organisation's position in the network can affect the way in which they interact with other members of the network. The insights provided by the three literatures will allow, therefore, an identification of the types of organisations that can act as effective intermediaries, the roles such intermediary organisations play and the capabilities that they develop while carrying out these roles. A role for public policy, and for public/private collaborations linked to learning, is also likely to be identified.

3.1.2 Knowledge flows and Intermediaries: Research Questions

Question 1

What role do intermediary organizations play in accessing knowledge from both intra and extra-cluster sources?

This research question provides a means for examining this study's second proposition, which is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. In particular it focuses on the role of accessing, as outlined in the taxonomy presented in this chapter. How intermediary organisations contribute to a process of perspective taking while carrying out this role and, if so, how this shapes the learning that takes place within the cluster, will also be relevant.

Question 2

What role do intermediary organisations play in the formation, amongst previously fragmented actors, of cluster communities through which common understandings, practices and learning perspectives emerge?

This research question provides a means for examining the study's first proposition, which is that intermediary organisations provide a route for learning for developing economy clusters. The practice-based perspective of knowledge, in particular the role of intermediaries in the formation of communities of practice and networks of practice, will be used to examine this proposition. The question is also relevant to the study's second proposition which is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. For this question the roles of diffusing and coordinating, as outlined in the taxonomy in Section 3.2.2 of this chapter, will be of most relevance.

Question 3

What role do intermediary organisations play in the emergence, and coordination, of common strategies amongst actors within developing economy clusters?

This research question will allow consideration of both of the study's propositions. Mostly importantly, in relation to the second proposition, it will allow a detailed consideration of the role of coordination, as outlined in the taxonomy in Section 3.2.2 of this chapter. The concept of perspective making, the way in which a community makes sense of a knowledge challenge and plans a response to it, will be of relevance in answering this question.

Question 4

What role do intermediary organizations play in providing new knowledge inputs for cluster actors, and/or adapting existing knowledge to make it understandable and usable?

This research question will allow a discussion of the enabling role as outlined in the taxonomy presented in this chapter and it will, therefore, assist in the assessment of the second proposition. Both parts of the role, that is the provision of new knowledge inputs and the translation of existing knowledge, will be considered. The role of intermediary organisations in the establishment and functioning of boundary objects, which provide a means through which different communities can communicate with each other, will also be of relevance.

Section 3.2 Operationalising Concepts

This section will operationalise the most important concepts that will be used in this study. It will begin by outlining the definition of intermediary organisations to be used, and will then present a taxonomy of roles that are carried out by intermediary organisations. Section 3.2.3 will then outline the way in which ‘cluster’ will be defined in this study, and will also outline the approach that will be taken to cluster learning.

3.2.1 Defining Intermediary Organisations

The role of an intermediary has been approached and conceptualized in a number of different literatures and three main terms, intermediaries, bridgers, and brokers are used more than others to describe it. The term intermediary has been used in a variety of settings and forms, including innovation intermediaries (Howells, 2006; Stewart and Hyssalo, 2008) and knowledge intermediaries (Miller and Choi, 2003). The term ‘bridgers’ has also been used in the innovation literature (Bessant and

Rush, 1995; Sapsed, Grantham and DeFillippi, 2007). The term broker is also commonly used, for example in the knowledge literature (Gherardi and Nicolini, 2002), the network literature (Burt, 2005; Provan and Human, 1999; Gould and Fernandez, 1989) and in the innovation literature (Hargadon, 1998).

There is a great deal of overlap in the way that these terms have been used. A distinction does, however, need to be drawn at this point between different concepts of intermediaries. One commonly used reference intermediaries is as trading bodies, with predominantly commercial aims, that form a part of many value/supply chains (Gereffi et al, 2005). Intermediaries in the sense of trading companies, while relevant for this study, are not its main focus for although they might be involved in some knowledge transfer, this aspect is not central to its function as a trader.

Instead, this study will focus on intermediaries as an entity whose principle function is in generating and mediating flows of knowledge. Therefore, an intermediary organisation will be defined as:-

“An organisation that promotes and facilitates knowledge flows between two or more parties, contributing to a process of learning and capability building amongst the firms and/or clusters with whom they work”.

Considering the above definition a wide range of organisations, coming from both the public and private sectors, can potentially play the intermediary role. Amongst these are individual entrepreneurs, business associations, professional bodies, consultants, research councils, knowledge intensive business services (KIBS) and non-governmental organisations (NGOs). For many of these organisations their role as intermediaries will often be only part of what they do as multi-task organizations, sometimes not even the most significant part.

It will not be possible to consider all of these bodies within the parameters of this study, which will concentrate on examining the role played by two business associations, by a number of government organisations and by three research bodies. The reasons for this focus will be outlined in Section 4.3.5, where the criteria whereby bodies were selected for inclusion in this study will be fully explained.

Finally, most of the literature on intermediaries and innovation has been produced within the context of developed economies. It has looked at industries

where the firms involved typically have an access to a relatively high level of resources and, in general, the innovation in which they are in the process of undertaking is at a high level. With its concentration on an agricultural cluster within a developing economy this study will be looking at the role of intermediaries in different circumstances.

It can be hypothesised that, due to financial constraints, firms will have less access to the services of private consultants, or to organizations such as KIBS, for example. It will consider a setting where the level of innovation is at a lower level, and the capabilities of firms are generally lower. The argument will be made, however, that knowledge within this industry is still important, and that the intermediary's role is potentially more important precisely because of the low level of firm capabilities and the fact that knowledge is so important to success within GVCs. The following section will look specifically at what roles intermediary organisations might play in such circumstances, and what skills and capabilities they need to develop in order to carry out such roles successfully.

3.2.2 The Roles of Intermediary Organisations: A Taxonomy

The following roles for intermediary organisations have been identified:-

- accessing
- diffusing
- coordinating
- enabling

These roles have been presented in Table 3.1, and are also analysed below.

Accessing

The first role carried out by intermediary organisations that can be identified is accessing new knowledge. This role has been identified in work undertaken on firms that are knowledge brokers (Hargadon, 1998). This focuses on how intermediaries expose other organizations to a wide range of industries and the valuable knowledge residing in each. Howells (1986) also identifies a similar role, identifying the categories of scanning and information processing. For Howells scanning involves tasks such as information gathering, technology intelligence and identification of potential collaborative partners (ibid).

Table 3.1: Intermediary Organisation Roles in Developing Economy Clusters: A Taxonomy

Role	Description	Similar Role in-	Skills needed	Examples
Accessing	<p>Scanning a wide range of national and international sources</p> <p>Accessing knowledge on new technologies, new markets and potential trading partners</p>	<p>Howells (2006)</p> <p>Hargadon (1998)</p> <p>Bell and Albu (1999)</p> <p>Boland and Tenkasi (1995)</p>	<p>Ability to build networks</p> <p>Ability to maintain 'weak' links (Granovetter, 1974)</p> <p>Understanding of markets + technology</p>	<p>Firms acting as 'technological gatekeepers' in a Chilean wine cluster (Giuliani and Bell, 2005)</p> <p>Growers associations accessing production knowledge in Brazilian fresh fruit clusters (Gomes, 2006)</p> <p>International development agencies accessing market knowledge in a Chilean salmon cluster (Maggi, 2003)</p>
Diffusing	<p>Facilitating the spread of knowledge/ good practice amongst actors within cluster</p> <p>Simplifying knowledge for non-specialist audiences</p>	<p>Brown and Duguid (1998)</p> <p>Provan and Human (1999)</p> <p>Perez-Aleman (2000)</p>	<p>Building trust</p> <p>Development of effective networks</p> <p>Interpretation and communication skills</p>	<p>Diffusion of knowledge to small producers in Chilean agro-industrial sector (Perez-Aleman, 2000)</p> <p>Producer Associations diffusing good regulatory practice within a Chilean salmon cluster (Maggi, 2003)</p> <p>Oenologists diffusing innovation and good practice within a Chilean wine cluster (Giuliani, 2003)</p>
Coordinating	<p>Facilitating joint initiatives (commercial or technological)</p> <p>Establishing legitimacy of industry practices/ procedures</p>	<p>Schmitz (1995b)</p> <p>Boland and Tenkasi (1995)</p> <p>Perez-Aleman (2000)</p>	<p>Building trust + partnerships</p> <p>Devising / implementing plans</p> <p>Knowledge of international standards etc</p>	<p>Coordination by Benchmarking Clubs in the South African auto cluster (Morris and Barnes, 2006)</p> <p>Coordination by a range of organisations in Brazilian fresh fruit clusters (Gomes, 2006)</p> <p>Trade associations facilitating collective learning in Chilean agro-industrial sector (Perez-Aleman, 2000)</p>
Enabling	<p>Providing new knowledge inputs</p> <p>Translating knowledge to make it usable in another context (adaptive innovation)</p>	<p>Howells (2006)</p> <p>Brown and Duguid (1998)</p> <p>Boland and Tenkasi (1995)</p>	<p>Ability/resources to conduct original research</p> <p>Knowledge management skills</p>	<p>Consultants role in technology transfer (Bessant and Rush, 1995)</p> <p>Research group translating knowledge in a South African furniture cluster (Bessant, Kaplinsky and Morris, 2003)</p> <p>Technological consultants advice on upgrading of production facilities in the Chilean wine industry (Gwynne, 2006)</p>

The importance of accessing new knowledge can also be identified in the network literature, through Granovetter's identification of 'the strength of weak ties', a concept he illustrates through a study of individuals searching for new employment (1974). Granovetter identifies how an individual's contact with their immediate friends and family often lead them to redundant knowledge, that is information of which they were already aware. Having a much wider set of much weaker ties is, however, of potentially greater use because it can bring to the person's attention new knowledge. In a similar fashion an intermediary will need to have access to new knowledge if they are going to be of value to the firm or cluster they are working with.

Some of the capabilities needed to carry out the role of accessing knowledge are good communication skills, the ability to participate in, and develop, networks, the ability to spot and understand market and technological opportunities, and other more general knowledge competences. Accessing new knowledge can present a particular challenge for firms in developing economies, they are often excluded from worldwide knowledge networks and lack of resources can mean that international travel for representatives from firms, to trade events or training opportunities for example, can be limited.

Examples of the importance of intermediary organisation accessing knowledge can be found in a number of industries. Maggi (2003) identifies how at different stages of the development of the Chilean salmon industry different kinds of knowledge needed to be accessed, and how different intermediary organisations, some public, some private and some a public/private mix, arose that were able to develop the capabilities to access the knowledge needed. In their South African furniture industry Bessant et al (2003) point to how the Industrial Restructuring Project (IRP) filled the role of an intermediary organisation, being able to access important sources of knowledge that helped to bring the industry international status and esteem.

Diffusing

The second role carried out by intermediary organisations is diffusion, referring to the way in which they facilitate the spreading of knowledge amongst different actors within an industry. This role can be identified, for example, in the work of Bessant and Rush (1995) who discuss how consultants fulfil, either implicitly or explicitly,

the role of experience sharing. Their role in this context is compared to that of bees, as they cross-pollinate between firms and carry experiences and ideas from one location to another. There are a number of ways in which this role can be carried out. It can encompass, for example, the relatively straightforward process of the intermediary diffusing the knowledge they have to the other members of the cluster, but it can also involve a process through which the intermediary organization plays a role in encouraging a diffusion process directly between the actors in the cluster.

There are certain formal mechanisms that can aid the diffusion of knowledge. Organisations such as trade associations, for example, often host websites, distribute newsletters, and arrange meetings or conferences. They might also, either directly or in collaboration with other organisations, be involved in arranging training initiatives. In addition, it should also be noted that diffusion often takes place informally. Gomes, for example, in her study of three fresh fruit clusters in Brazil, noted how a great deal of diffusion took place amongst the agricultural producers she studied when ‘growers meet socially and informally throughout town, while waiting for services in banks, shopping for agricultural inputs, and having drinks at the bar’ (2006; 95). She argues that ‘engagement in this broader context had undoubtedly contributed to upgrading by SMEs’ (2006; 95).

An example of diffusion in practice can be illustrated through the work of oenologists (ie winemakers), identified by Giuliani in her study of a Chilean wine cluster (2003). Using the concept of knowledge flowing within communities, as emphasised by the practice-based perspective on knowledge flow, Giuliani defines the oenologists as an epistemic community, that is a group of highly skilled knowledge workers who share a common technical language and the basis of a common scientific background. Giuliani identified how the work of the oenologists was a particularly important source of knowledge for the Chilean wine cluster being studied. These people, who were often foreign advisors, made regular visits to the wine producers and were labelled by Giuliani as ‘flying winemakers’. Amongst themselves they developed a common understanding of the problems facing the wine producers, and how these could be approached. In this way they can be seen as contributing to a process of perspective making (Boland and Tenkasi, 1995) within the industry. As a result of this shared understanding, during their regular visits to the wine producers they passed on a much wider range of knowledge than that which was part of their job description (ibid.).

The capabilities needed for diffusion include the ability to communicate effectively and to build and maintain a workable network. When attempting to diffuse an element of good practice, for example, it is important that the intermediary organisation is seen, as far as is possible, as being neutral, not favouring certain members of the industry above, a viewpoint that is commonly held by smaller firms within a cluster, for example.

The success of diffusion initiatives is also likely to be affected by the way in which the intermediary choose to carry out their role. This point is illustrated by a study conducted by Provan and Human of two different networks of SMEs within the wood-processing industry (1999). Within each of the two networks studied an individual playing the role of a broker could be identified, but Provan and Human identified important differences in the way that they carried out their role and this led to differences in the patterns of learning that emerged. In one of the networks studied the broker became the repository for network knowledge and opportunities. In this network, therefore, communication became centralized through the broker and the effect of this was that the learning that took place within the network also became very centralized. In the other network, however, communication flows were far more dispersed. The broker encouraged network members to communicate directly amongst themselves, as well as through him, and this lead to a more productive environment for learning to take place (ibid.).

Coordinating

The third role performed by intermediary organisations is that of coordination. Organisations that encourage cooperation and collaboration amongst a group of previously diverse actors can play this role. A part of this role is the linking of different actors within the cluster. This is important for developing economy clusters, particularly emerging ones, where there is often a high level of fragmentation and a lack of lead firms. In a developing cluster context firms are often unstable, have few resources to take on risky investments and lack the collateral to gain credit. There is also often a lack of trust or cooperation and organisations that can help facilitate links between firms, even if they are at quite a basic level, can therefore be of value.

In addition the coordination role can also encompass the formulation and implementation of common strategies amongst the members of a cluster. This takes the coordinating role to a deeper level, and to carry out this role a certain level of

trust is needed, in addition to a certain level of knowledge of the opportunities that are available and the different options that could be followed. In order to achieve this second stage it is an advantage if the bodies with whom the intermediary organisations are working with go through a process of perspective making. As a part of this process the community will develop and maintain, at least to some extent, a core of shared values. These will help the community to develop a shared appreciation of some of the ways in which it might move forward together, and the kind of innovatory projects that they might choose to undertake together.

An important part of the coordinating role involves establishing legitimacy to industry practices and procedures. This is a role that is of particular relevance to developing economy clusters who are seeking to establish a reputation for quality and reliability. For this part of the coordination role the organisation needs to show the ability to gain the trust and respect of national and international bodies. It will need to show an ability to access information on international standards and certification processes, be able to interpret this information and finally have the ability to pass it on in an effective way to the different actors within the cluster to whom it is relevant.

Examples of coordination that can be identified amongst SMEs are the establishment of trade associations or cooperatives. Gomes (2006), for example, identifies the importance of coordination in her study of three fresh fruit producing clusters in Brazil. In the apple producing region of Santa Catarina, Brazil, for example, she notes the existence of ‘SME participation in cluster-wide upgrading efforts coordinated by the sector association (Brazilian Apple Growers Association), along with EPAGRI (the state’s Agricultural and Research Agency)’ (2006, p80). EPAGRI, the latter organisation, helped small growers organize into cooperatives that enabled growers to process and market their apples collectively. Another example of coordination is the facilitating of joint projects, for example, joint research projects or joint commercial ventures. The importance of the latter point can be illustrated through the work of Schmitz and Nadvi (1999) who note how in clusters dominated by SME taking initiatives in ‘riskable steps’ is of importance. For such initiatives to become established and gain support, an important role for intermediary organisations such as trade or producer organisations can be identified.

Coordination will generally lead to a longer-term relationship between the intermediary organisation and the parties with whom they are working. Furthermore,

one of the most important capabilities an intermediary organisation needs in order to encourage coordination is the ability to assert their neutrality and to build trust. An example is evident in Bessant et al's study of the South African furniture industry (2003). Intermediaries were required to overcome historically low levels of trust in the industry which had resulted in an individualist business outlook. They worked in collaboration with internal-change agents, many of whom had been unsuccessfully arguing for changes and collaboration for some time. An important factor in the success of the intermediaries was that they were seen by the parties involved to be neutral, not there to favour a particular stakeholder. This was particularly important due to the power dynamics within the industry, more specifically a feeling by small businesses that initiatives promoted by larger firms would bound to be weighted in their interests.

Enabling

The fourth role carried out by intermediary organisations is that of enabling. There are two parts to this role, firstly, providing new knowledge inputs and, secondly, adapting existing knowledge to make it applicable to a new situation. The first part of the enabling role, providing new knowledge inputs, is recognised by Howells (2006) in his taxonomy of intermediaries' roles through a discussion of knowledge generation and recombination. This role can therefore ensure that the generation of in-house research and technical knowledge is combined with knowledge obtained from partners.

In order for this part of the enabling role to be carried out successfully capabilities are required in terms of the possession of some kind of research facilities / infrastructure. Alternatively, contacts must be possessed that enable such facilities to be accessed when required. It is also of importance to have the human resources necessary to achieve the designed innovation, available either in-house or at least easily accessible. All of these factors are likely to be challenging for developing economy clusters where firms have limited resources to invest in research and development, and often operate in uncertain business environments that can discourage long-term investments. There will also be limited resources to invest in such inputs from specialist firms (KIBS), and the supply of such specialist knowledge services is also often very limited.

The second part of the enabling role is that of adapting knowledge and making it applicable to a new situation. This role relates closely to the role of translation that was discussed in Chapter 2. Translation is important in enabling communities that would otherwise find it difficult to communicate to do so. It is useful for understanding how communication can be facilitated in such cases because communities have different standards, different ideas of what is significant, different priorities and different evaluating criteria. They can also develop the tendency to become inward-looking.

Boland and Tenkasi (1995) concept of perspective taking, the process through which people develop an understanding of the knowledge, values and worldviews of others, is useful for understanding how differing communities can start to communicate with each other. Intermediary organizations can play a role in encouraging this process through the interaction they facilitate with a wide range of organisations at both a national and international level. Through these contacts they can achieve an understanding of, and build links with, other communities operating within their own industry, and potentially with communities operating within other industries in similar fields. This is of particular relevance in today's globalised economy, as firms in developing economies must aim to be as close as possible to the global technological frontier.

In order to successfully carry out the enabling role an intermediary organisation will need to develop a set of relevant knowledge and skills. This will involve not only the ability to take on board knowledge, but also having the capabilities to change and adapt it, a particular challenge in developing economy clusters where capabilities in terms of knowledge management are also likely to be less highly developed. There is also likely to be a more limited division of labour, with the range of service firms in existence is likely to be more limited.

An example of the role of enabling being carried out by an intermediary organisation is provided by Bessant et al's study of the South African timber products industry (2003). The research body in question demonstrated the skills which enabled international expertise, status and esteem to be bought to the project. Some features of the organisation, in particular the fact that it combined national and international members, were important in enabling it to carry out this role, which is of particular importance within a developing economy context. In addition the members of the intermediary organisation were able to use their credibility to

leverage top-level government buy-ins from the two key government departments, those of Trade and Industry and Water and Forestry. This strengthened the image of the project amongst those that were potentially interested in becoming involved (ibid.).

3.2.3 Operationalising Learning in Agricultural Clusters

As this study is looking at the issue of learning within clusters how these concepts will be operationalised within the study will now be addressed. As was discussed in Chapter Two, different definitions of clusters have stressed geographical, attribute or shared interest criteria. Often there is an assumption of small-firm dominance, as is the case with the discussion of Third Italy clusters (Piore and Sabel, 1984), and a particular kind of inter-firm relations is also often assumed to exist.

This study will take its lead from similar studies that have been undertaken of clusters in developing economies. These have tended to define clusters in a looser way, and this is particularly true of natural resources based clusters, which are the focus of this study. Gomes (2006), for example, in her consideration of an agricultural producers cluster, defines clusters as a spatial agglomeration of firms producing the same crop. Hojman, in his study of Chilean wine production, uses a similar definition to that used by Gomes, referring to a cluster as a physical concentration or agglomeration of firms in a particular geographical area. As an agricultural cluster in developing economies is the context in which this study will be carried out, the definitions applied by both Gomes and Hojman will be appropriate to use in this study.

The intention in this study is to examine how a cluster learns and this will be done through the identification and consideration of two main areas, firstly, technological capabilities and, secondly, organisational capabilities. The first area, technological capabilities (Morrison et al, 2008; Katz, 2006), has been developed to understand innovation and learning in developing economies, and refers to the skills that firms need in order to undertake any process of technological change. Some examples of where technological capabilities can be relevant in agricultural clusters is in the growing, packing, transporting, and processing of the product. The latter category in particular, that is processing, provides many examples of where

technology can be introduced in the different ways in which the product can be processed, for example, dried, tinned or juiced.

The second area, organisational capabilities, is also one that is relevant for natural resources based clusters and is used by Iizuka, for example, in her study of the Chilean salmon farming industry (2006). An example of where organisational capabilities are important for agricultural products is undergoing the various stages of the certification process, responding quickly and effectively to market changes and developing the infrastructure, and transport arrangements, needed to successfully produce and export the product. An illustration of why organisational capabilities are relevant to the mango industry is that, despite the increasingly attempts to industrialised the product, the premier price for producers remains the production of a high quality fresh mango. This involves as much the organisation of a well-planned production chain as it does the application of sophisticated technological equipment.

In conclusion, the intention in this study is to use the concepts of technological and organisational capabilities flexibly, in order to allow an understanding of knowledge and learning within the cluster to be built up as the research progresses. In this way the actors involved in the industry will help to shape an understanding of the important ways in each the industry is progressing, and areas where it is potentially falling behind. The approach will also allow an appreciation to exist of the potential overlaps in the development of the two types of capabilities.

3.3 The Case Study / Design and Implementation

This section will begin by providing an introduction to the case study methodology, explaining why it is an appropriate methodology to use in order to answer the research questions that have been posed, and drawing attention to how it has been used in other studies of developing economy clusters. Details of how this methodology has been implemented when then be given, before reflection is made on some of the challenges and limitations that exist when this research method is adopted.

3.3.1 The Case Study Methodology and its Appropriateness for this study

The research questions that have been identified will be examined through use of the case study research method. Consideration will now be given to the defining features

of the case study method, issues in case study design and the strengths and limitations it has as a research method. The discussion will be specifically related to the issue of intermediaries and knowledge and learning within developing economy clusters, explaining why the case study is an appropriate research methodology for this study.

One of the main strengths of the case study method is that it allows the collection of rich, in-depth data. Yin (2003), for example, points to how it allows investigators to retain the meaningful characteristics of real life event. Another strength is that it allows evidence to be used from a wide variety of data sources, helping to build up a more complete picture of the phenomenon being studied, the combination of quantitative and qualitative data being a case in point. The weaknesses of the case study method, and in particular the issue of generalisability, will be analyzed in the 'Limitations' section below, as part of a more general discussion of some of the limitations of this study.

The case study method has a long tradition in the social sciences, political science and, to a lesser extent, economics. Within business studies the dominant tradition has been quantitative research but in recent years a change has begun to take place. Collis and Hussey, for example, believe that "It can be argued that the dominant paradigm in business research is the positivistic paradigm... However, a more phenomenological or qualitative approach is becoming more acceptable and, arguably, is more appropriate for many business research studies" (2003). This change has been reflected in an increasing use of the case study method and examples of its use in the context of the business studies context come from the political economy literature (eg Piore and Sabel, 1984) and the innovation literature (eg Saxenian, 1994; Leonard-Barton, 1990).

To be carried out successfully a case study must follow a set of prespecified procedures and five essential components of study design can be identified (Yin, 2003):-

- A study's question
- A study's propositions
- A study's unit or units of analysis
- A study's logic in linking its data to its propositions

- A study's criteria for interpreting its findings

The case study is, therefore, a comprehensive research strategy, not merely a design feature or a data collection tactic (ibid). When a thoroughgoing approach is not followed it can lead to methodological weaknesses, and case studies are sometimes accused of incorporating biases, and applying equivocal evidence in unjustifiable ways. Yin postulates that, despite widespread adoption of the case study methodology, this is one of the reasons there is still a resistance amongst some scholars to the method (ibid).

A number of assumptions can be identified as being implicit within the case study method. Firstly, those who use the method generally believe that detailed examination of methodological issues is an important part of any study and that this is especially true when the link between empirical data and theory is considered. Yin, for example, argues that “empirical work advances only when it is accompanied by theory and logical inquiry and not when treated as a mechanistic or data collection endeavour” (2003, xv). Secondly, within the case study methodology there is an acceptance of the validity of qualitative data, something denied by purely positivist methodologies.

Linked to this point is the inductive nature of case study methodology, that is, theoretical categories are seen as emerging from the empirical data (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). Nonetheless, the approach remains complementary with deductive approaches, the two can be understood as being “mirrors of one another, with inductive theory building from cases producing new theory from data and deductive theory testing completing the cycle by using data to test theory” (Eisenhardt and Graebner, 2007: 25). Finally, an incremental approach can be identified as an assumption of the case study methodology. This allows for a degree of flexibility during the research process, an ability to respond to data as it becomes available and evaluate how this might affect the overall approach to the research question.

A number of factors make the case study an appropriate research method for studying the role of intermediary organisations in clusters and, as the examples that are included in the following section illustrate, it is an approach that had been used in a large number of studies of developing economy clusters.

Firstly, while case studies can be historical in approach, they are most commonly used to investigate contemporary phenomenon. This is done within a real life context, in situations where the researcher has little control over events. The case study is, therefore, an appropriate method for this study as the issue of knowledge and learning within developing economy clusters is a contemporary and, in response to globalisation, evolving phenomenon, and one which requires investigation in a real life context.

Secondly, case studies can be used to provide description, test theory or generate new theory (Eisenhardt, 1989; Eisenhardt and Graebner, 2007). This is relevant to this study as it argues that intermediaries play an under-theorised and under-studied role in the consolidation of emerging developing economy clusters. It will also seek to make a contribution to the generation of new theory. The case study is considered as an appropriate methodology for subjects that have not been studied in great detail, and the role of intermediaries within developing economy clusters falls into this category.

A third reason for choosing the case study methodology is that it allows data to be gathered on the role of intermediaries from a number of different perspectives. The study will use qualitative analysis and, through the use of semi-structured interviews with a variety of organisations will build up a nuanced picture of firstly, how intermediary organisations see their own role, and secondly, how they are viewed by others within the industry.

This is important because clusters often have very complex structures, with differences in perspective between small, medium and large firms. The case study can lead to an understanding of some of the conflicts this can lead to, and the role played by intermediary organisations within this complex situation. This factor is particularly important for answering research questions two and three. These consider the issue of the formation of communities within the cluster, so it is particularly important to consider different viewpoints when assessing this. The ability to cross check and cross reference is important for establishing the validity of the study. A similar method was used by Gomes in her study of three fresh fruit clusters in Brazil (2006), where her collection of detailed qualitative data led to a rich and multi-faceted study.

A fourth strength of the case study methodology as a means to examine intermediary organisations is that case studies allow a variety of research methods to

be incorporated and therefore for the intermediaries roles to be understood and conceptualised in different ways. Thus, while qualitative data will form a central part of this study, this will be augmented with the insights offered by social network analysis. A similar method was used by Giuliani and Bell in their study of Chilean wine clusters (2005).

A final advantage of the case study methodology for examining intermediaries is that it also allows information to be collected from extra-cluster sources. Some examples of interviews that might be conducted in this case are with promotion bodies in destination countries and with importing firms, ie buyers of the product. These will be of particular relevance in answering the first research question. While it will be difficult because of geographical access issues to do this extensively, it will allow some consideration to be made of the way in which the intermediary organisation interacts with the value chains with which the mango industry is involved. Such an approach has been well-established in the developing economy cluster literature; Pietrobelli and Rabellotti, for example, draw together evidence from a large number of studies examining the participation of clusters in Global Value Chains (2006).

In conclusion, the case study is a well-established and often used methodology within the literature for establishing theoretical links between empirical data. In attention to the studies already mentioned, Giuliani, Rabellotti and Pieter van Dijk (2005b), also draws on a large number of case studies from developing economies. This, in combination with other collections of multiple case studies, has allowed cumulative and comparative evidence to emerge. These studies have also shown that the cluster has proved to be an appropriate unit of analysis.

3.3.2 The Implementation of the Case Study Methodology

One of the strengths of the case study methodology is that a range of data collection methods can be employed as part of an individual study, including documentation, questionnaires, interviews, direct and/or participant observations, archival records and physical artifacts (Yin, 2003; Eisenhardt, 1989). Linked to the above is the fact that case studies can use either quantitative or qualitative data, or a combination of the two (Eisenhardt, 1989).

The case study carried out for this study employed four main data collection methods to be used, these being semi-structured interviews, observation, surveys (the data from which allowed network analysis to be done) and, finally, the use of secondary data sources. The opportunities offered through this methodology allow an in-depth look at the role of the intermediary, employing a combination of qualitative and quantitative data, and thus allowing a consideration of the complexity of the role that they play.

The case study was completed in an agricultural cluster in Piura, in the north of Peru, South America. South America provides a challenging but interesting and relevant area of the world within which to examine the research question. Its economic development has been characterized by periods of boom, usually linked to commodity booms, and periods of great political and economic instability. Most of the region's economies have failed, however, to develop dynamic, innovatory sectors along the lines of countries in East Asia (Gereffi and Wyman, 1990). These issues will be examined in more detail in Chapter 4, which will present a detailed account of the economic context in which the industry is operating.

Peru is one of the lesser-studied countries in Latin America, a fact which presents both challenges and opportunities. Challenges include the difficulties of obtaining reliable statistical data. Nonetheless, there is an interest and an enthusiasm for the research process. An academic culture exists which is correspondingly welcoming and inclusive, and a business culture exists which is also comparatively open compared to many other countries.

Due to the logistical problems associated with studying a geographically-distant country, it was important that the timing of the various stages of the study was planned carefully. Three research visits in total were undertaken. The first, from July to August 2006, allowed preliminary contact to be made with some organisations and individuals involved in innovation in Peru, and in the cluster to be studied. In addition, observation of a congress held by APEM, an important trade association, held in August 2006 was undertaken. A more extended period of field research took place from December 2007 until August 2008. This allowed the substantial part of the data collection tasks to be completed, including the semi-structured interviews, attendance at the congress organised by the trade association Promango, and collection of data for the network analysis to be collected at the same conference. A final visit was undertaken in November 2008, when the APEM

Congress was attended, data for the network analysis was collected and a small number of outstanding semi-structured interviews were conducted.

An explanation will now be given of each of the research methods that have been used in the study. Each research method will be briefly introduced before a detailed explanation is given of how it has been implemented. The aims of using each research method will also be clearly stated.

Semi-structured Interviews

The principle method used for collecting data was semi-structured interviews. This research method was selected because of the opportunity it presents to gather rich, in-depth data, in which the respondents are asked to think and reflect on the answers given and are probed further when issues arise which are of particular relevance to the research questions. While the research method is sometimes criticised as providing data which is open to interpretation, points arising from the interviews made can be immediately checked and clarified, something that is not possible with many research methods.. Semi-structured interviews were carried out with a range of firms within the cluster, with intermediary organizations and a range of other bodies involved in innovation in Peru (See References: Interview List).

Representatives from a diverse range of firms within the cluster were interviewed as a part of the research. An attempt was made to conduct interviews with as many of the larger firms in the cluster as is possible, as these were most likely to have both the resources and the incentives to be involved in innovation initiatives. Large firms in the cluster tend to be either purely exporting firms, processing firms or a mixture of the two roles. There are also several large firms that are large scale producers. The aims of the interviews with large firms were to gain an insight into the sources of knowledge that these firms have, to learn about the relationships that they have with intermediary organizations, to learn about any process or product innovation that they are involved in and to learn about how they interact with other firms inside and outside the cluster. In particular, these interviews contributed to answers being formulated for research questions two and three.

Medium sized firms within the cluster, that are mostly producer firms, were also interviewed, as were a selection of smaller producers and representatives from the associations that they have formed together. The aims of these interviews were similar to the aims of the interviews with the larger firms, although there was more

of a focus in this sector on the ways in which firms interacted, and in many cases, cooperated with each other.

Semi-structured interviews were also carried out with the intermediary organizations that were identified within the cluster. These included interviews with representatives and members from the two important producer associations in the cluster, APEM and Promango. It was also possible, in some cases, to re-interview some of the respondents as a clearer picture began to emerge of some of the important trends in the industry. The aims of the interviews with the producer associations were to understand the roles that they play in encouraging knowledge flows and learning within the cluster, to understand the way in which they interact with firms in the cluster and to learn about the links that they maintain, both nationally and internationally, with sources of knowledge outside the cluster. These interviews contributed towards addressing all four of the research questions.

Semi-structured interviews were also carried out with government agencies that work with firms from the cluster, some of which were specifically concerned with encouraging innovation and others that are primarily service providers. Two of these, INIA and Incagro, are agencies of the Peruvian Ministry of Agriculture and interviews were conducted with representatives of these organizations at both the national and international level. The network of CITEs, that work with SMEs, is an agency of the Ministry of Production and interviews were also conducted with this organization at a national and international level. Three interviews were carried out with representatives of Promperu, an agency that is part of and is concerned with encouraging Peruvian exports. Two interviews were also carried out, one locally and one nationally, with representatives from Senasa, an agency that is responsible for phytosanitary regulations but also plays a wider role in the development of the cluster. The aims of the interviews with the government agencies were to understand the extent to which they fulfil the role of intermediary organizations, to understand the approaches to public policy that have been taken and to reach a judgment on the extent to which public policy could be made more effective.

Interviews were also carried out with representatives from four certification companies, to discover the extent to which their activities promote learning within the cluster. Finally, an interview was also carried with a representative from a producer association from another industry, asparagus, which has similarities to the mango industry in that it has been a very successful exporter. The aim of this

interview was to provide some comparisons with the main study of the mango cluster.

In conclusion, despite some initial problems with access, it was possible to conduct semi-structured interviews with a wide range of actors associated with the mango cluster. The table presented in Section 4.3.5 of Chapter 4 gives a clear outline of the main organisations interviewed, and how the data collected has fed into subsequent chapters. With only a very few exceptions respondents were open to the research process and willing to give their time and to recommend other interviewees, which meant that the research benefited greatly from the snowball effect. More than forty in-depth semi-structured interviews were conducted, with an average length of between 1 and 1 ½ hours. In addition further, shorter, interviews were also conducted when the opportunities arose.

Once each interview had been completed either a full or partial transcript of the interview was made, depending on its relevance. These transcripts were then organised depending on the type of organisations concerned. Comparisons between the answers given were made, and common themes and common phrases were also highlighted. Overall, these interviews allowed a variety of viewpoints to be collected on developments within the industry, and valuable cross-referencing to be undertaken.

Observation

The second research method used in this study was observation. The main strength of this research method is that it allows collection data in a real-life context, observing events as they really are. A challenge in this research method is gaining access to events where observation can be employed as a research method, requiring the development of a certain level of trust. A further challenge is that it is reliant on interpretations made by the researcher. In addition observation has the disadvantage in that it is time-consuming, and this means that it is relatively rarely used. An opportunity arose as part of this case study, however, to employ this research method, in the case of attendance at the congresses the time spent was justified as this allows an opportunity to complete the surveys for the network analysis which has been previously mentioned.

Observation was conducted through attendance at three congresses. Two of these congresses were The International Congress of Mangos organized by APEM,

which acts as the main meeting point of the industry. This was first attended in July 2006 which served as a useful introduction to some of the main issues faced by the industry. The second congress attended was one organized by Promango, an association of mainly medium sized producers, in August 2008. Finally, in November 2008 The International Congress of Mangos organized by APEM was attended for a second time. By the time of the third conference contacts had been made with a number of actors within the industry and this allowed conversations to be held with participants about some of the wider significance of proceedings in the conference. It became possible to observe informal contacts between firms in a more informed way, and to understand more fully the way in which representatives from large, medium and small firm interacted. This also led to a realisation of how many important decisions were made informally, often between some of the larger and more powerful firms within the cluster.

A number of different areas were focused upon as part of the observation work that was carried out. Firstly, the focus of each of the congresses attended was noted, an analysis being made of what kinds of issues were being discussed and the level of the discussion that was taking place. This helped to give an indication of the stage that an industry was at, and to what extent it is looking towards national or international markets. Secondly, it provided information on the range of organisations who attended the conference, including international speakers and delegates, and representatives from various sections of the domestic industry. This assisted in answering research question one, which is concerned with how organisations access knowledge from intra- and extra-cluster sources. It also assisted with answering research question four, concerned with what organisations exist that are able to provide new knowledge inputs to the cluster.

Finally, observation was made of the culture of the congresses, considering the way in which they were organized and led, and the extent to which they were inclusive in terms of representing interests from all sections of the industry. This helped to establish how members viewed the organisation, and the resources and authority which both organisations have to coordinate joint projects, which is of use in approaching research question three.

In conclusion, the use of the observation method at the three congresses attended allowed some very useful data to be collected, data which complemented that obtained through the interviews and network analysis. In addition, it allowed

some comparisons to be made between the two organizations whose congresses were attended, that is APEM and Promango.

Firm Survey and Social Network Analysis

The third research method that has been used in this study is a firm survey. The data gathered from this survey was used in two ways, firstly it allowed quantitative analysis to be made of the intermediary organisations examined in the study. This is a research method that has been employed successfully in a number of different studies of developing economy clusters, as example being the study by Quadros of the Brazilian auto-components industry (2004).

Secondly, the data was used for completion of network analysis, which has a number of strengths as a research method, to be carried out. Network analysis allows information to be gained on the characteristics of the overall network, whether it is densely or loosely connected, for example (Scott, 2000). Through network analysis it is also possible to learn about the relations between different actors within a network, and the strength of these relationships can also be compared and represented. In the literature on developing economy clusters this research method has been used, for example, by Giuliani and Bell (2005), in an analysis that identified different types of firms within a Chilean wine cluster. Network analysis also allows the position of different actors in the cluster, including intermediaries, to be mapped within the network. Similarly, the number of links that organisations have with other actors and the centrality of their position can be measured. The opportunity to do this type of analysis makes network analysis particularly useful for the study of intermediary organizations.

A survey was designed to gather the information needed to carry out the quantitative analysis and the network analysis (See Appendix 1). A range of potential sources of knowledge were identified using the roster method, where a distinction was made between technological and commercial knowledge. Using a Likert scale respondents were asked to value the importance of knowledge received from each organization, and also the frequency with which it was received. The survey also gathered information on the range of competences that the firms had, identifying whether they were producers, packers or exporters. It also identified whether the individual firms produced fresh, dried, frozen or tinned mangos, or a combination of

these options. For exporting firms it identified to what areas of the world, Asia, North America or Europe, their mangos were exported and information was also obtained on the certification which the firms had. A pilot was carried out in July 2008 with a representative of one the cluster's largest firms which proved important in helping to provide clarity to the use of language, and how the meaning of questions would be interpreted by respondents. In the light of feedback from the pilot, the length of the survey was also reduced.

Two congresses, one held by Promango in August 2008, and one held by APEM in November 2008, were identified as suitable occasions on which to complete the survey with firm representatives in attendance, and permission was obtained from the organizations concerned to attend the congresses and complete this work. Most member organisations were included in the survey, including the larger members. In addition, a separate survey of the two producer associations that have previously been mentioned (APEM and Promango) and with six other intermediary organizations that work with the cluster.

Once the survey had been completed the data was used to compile tables of quantitative data on the various intermediary organisations studied. These tables allowed a comparison to be made of the number of firms that identified links with a particular intermediary organisation. It also allowed an analysis to be made of the relative importance a firm placed on the knowledge that they received from a particular intermediary organisation. This allowed useful comparative analysis to be made.

In addition the data collected in the survey was inputted into an Excel spreadsheet and analysed using Pajek SNA software (de Nooy, Mrvar and Batagelj, 2005). The network maps that have been produced provide an effective visual representation of the relationships that were discovered. They help to answer the research questions that have been posed in this study in a number of different ways.

Firstly, analysis of the network maps allows a picture to emerge of what type of networks exist within the mango industry, in particular whether they are densely or loosely connected. This can have important implications for how knowledge flows within the network. A picture will also emerge of how intermediaries help to structure the network. This is an important question in relation to research question 2 which drew attention to the fact that clusters in developing economies are often fragmented. Whether this is actually the case, or whether intermediary organisations

provide some form of cohesion, will be able to be examined through use of the network maps.

Secondly, the network maps will allow an examination of the position that individual intermediary organisations occupy within the networks. Consideration will be given to whether intermediary organisations occupy a central or marginal position within the network by using the measure of in-degree centrality (de Nooy, Mrvar and Batagelj, 2005). It would be expected that there will be variations in the position occupied by different intermediary organisations, and this will therefore allow some interesting points of comparison to be made between them.

Thirdly, analysis of the network maps will allow a picture to emerge of the firms and organisations that intermediaries interact with, and the communities that are formed to exchange knowledge. This will be useful for considering research question 2, which is concerned with the formation of communities within the cluster.

Finally, the network maps will be used to examine the types of knowledge that different intermediary organisations provide. As has previously been mentioned the surveys drew a distinction between commercial and technological knowledge. This will allow maps to be drawn which show the position of a particular intermediary organisation in a network for each of these types of knowledge. It will allow a judgement to be made as to whether the knowledge provided by a particular intermediary organisation falls heavily into the category of one type of knowledge, or whether they are seen as valuable providers of both types of knowledge. This will also allow an analysis to be made of knowledge networks according to types of knowledge, allowing the identification of which intermediary organisations are of most significance for both types of knowledge.

Secondary Data

The fourth research method used was the collection and analysis of a range of secondary data. A number of university and specialist libraries were visited in Lima, Peru's capital, in addition to a specialist agricultural library in Piura, the city at the centre of the mango growing cluster. Examination of historical publications on the development of the industry, present industry publications, statistical reports, trade journals and market research reports allowed the collection of both qualitative and quantitative data to be made.

The data collected contributed to an understanding of the context within which the Piuran mango cluster works, which is explained in Chapter 4 of this study. It allowed a picture to be built up of the historical development of the cluster, the current position of the mango industry within the international market, changes taking place within the international market and some of the important ‘knowledge challenges’ the industry faces that are identified in Section 4.3.4 of Chapter 4. In addition, the secondary research allowed a picture to be built up of the context within which knowledge and innovation work takes place within the Peruvian economy, an issue that is also addressed in Chapter 4.

3.3.3 Challenges / Limitations Presented by the Case Study Method

Some of the challenges/limitations of the methodology adopted will now be reflected upon, a process that can help to ensure that the results obtained are interpreted and presented in the most effective and valid way possible.

Firstly, some general issues in the completion of the case study will be considered, in particular ones related to access and resources. The mango cluster in Piura is geographically dispersed and this makes access problematic. This is a common problem in the study of agricultural clusters, and access to small and medium sized firms is often particularly problematic. The mango cluster is also a challenging cluster to study in that there are a large number of firms, as less integration has taken place in this industry than other similar industries in Peru, for example the asparagus industry. There is also a relatively rapid rate of firm turnover within the cluster. For these reasons priorities needed to be identified in the way in which the research was conducted. This is a challenge faced by all studies, however, and the prior planning of the study helped to minimize these problems, and also allowed time to gain the trust of those involved in the industry.

Secondly, the study faced the problem of integrating a number of different data collection methods into a single case study. This problem is made more prescient by the argument, put forward by Yin, that in comparison with other research methods the literature outlining appropriate procedures for case studies is relatively limited (2003). He sites this as a reason for some of the criticisms of the case study methodology in the past, and argues that the case study must be treated as

a comprehensive design strategy where constant reflection is made at each stage of its completion (ibid.).

A third possible limitation of this study is the problems associated with operationalising the concept of an intermediary. In his review of the innovation intermediary literature, Howells (2006) acknowledges the difficulties of this question. One of the problems faced is that much of the literature on intermediary organizations has been produced within the context of developed economies, while this study will be concentrating on a developing economy context. A further issue is that intermediaries are often involved in multiple roles, only one of which is as an intermediary. Therefore, care will need to be taken during the study to isolate when an individual or an organization is acting as intermediary and when it is performing other roles.

A final factor to consider associated with the case study methodology is the issue of generalisability, that is, whether the conclusions from a single case can be applied more widely. There is no simple answer to this question, but detailed attempts have been made to look at the complicated relationship between the case study methodology and theory (eg Eisenhardt, 1989; Eisenhardt and Graebner, 2007). The use of multiple cases, for example the collection of cluster case study brought together in works edited by Pietrobelli and Rabelloti (2004; 2006), is relevant in this context as consideration of a wider set of data allows more general theoretical points to be made more convincingly. While the resources available for this study will not allow multiple case studies to be carried out, it will nonetheless be possible to compare the results obtained to results from other studies.

Conclusion

This chapter has presented the propositions and research questions that will be addressed in this study. It has outlined the case study methodology that will be used, and considered some of the challenges that will be faced in employing this methodology. The following chapter will explain the context within which the study will be carried out, a mango cluster in Piura, North Peru. It will consider how the cluster interacts with the international market, and will identify some of the knowledge challenges that are faced as it attempts to do this.

Chapter 4 Developing Natural Resources: The Peruvian Mango Industry and Its Wider Context

This chapter will provide an introduction to the Peruvian mango industry, the setting in which the empirical work for this study will be done. The chapter is divided into three parts; the first part outlines how the role of natural resources in wider economic development has been reassessed, the second part examines the context within which knowledge work takes place within the Peruvian agricultural sector, while the final part provides a more specific examination of the Peruvian mango industry.

Section 4.1 Developing Natural Resources: An Opportunity for Latin America

This section will focus on how views on resource rich economies as a path to economic growth and development have changed, reflecting a longstanding debate that has taken place within the development literature. After consideration of the theoretical ideas that lie behind this debate, it will then be examined within the context of Latin America. Some specific country and industry examples from this region will be presented, in the area of agriculture in particular, and the potential they offer for a new way of engaging with the world economy will be discussed.

Section 4.1.1 Reassessing Natural Resources: A New Route to Development

For many years the potential for economic development through agriculture was seen as limited. Such a viewpoint became part of economic theory through the Prebisch - Singer thesis, which argued that the terms of trade would inevitably decline for primary commodities. Some of the assumptions of this argument when applied to the agricultural sector were an undifferentiated commodity most commonly sold on international spot markets. Producers and exporters were, therefore, in the position of having to accept great price instability and fluctuations. In addition, for many agricultural products, the markets were dominated by large multinational companies, the role played by United Fruits in the banana industry being an example. Such a system took away incentives to producers to differentiate their product and a lack of investment, and interest in new technology, were typical.

Over the last 15-20 years a reassessment of these views has taken place, prompted in large part by the effects of both globalisation and technological developments. A reconsideration of the potential that is offered through a new approach to natural resources, and industries that have traditionally been seen as low-tech, has been made (Iizuka, 2006). The Global Value Chains literature has, in addition, illustrated how opportunities, as well as dangers, now exist for producers of natural resources as a result of globalisation (Humphrey and Memedovic, 2006).

Iizuka (2006) challenges the conventional perception that manufacturing or 'high tech' sectors are the sole facilitators of technical progress, and that food and raw material sector, traditionally classified as 'low tech', do not provide any significant opportunities in this area. She critically appraises some of the assumptions of the Prebisch-Singer thesis which stated that, because of declining terms of trade for primary commodities, their development did not represent a viable strategy and instead countries should emphasise investing in manufacturing industry. Natural resource sectors can, argues Iizuka, improve labour productivity by increasing the value-added of the product and they can also develop forward linkages to spread the gains from trade. Low tech industries can also, she argues, provide learning opportunities, and can help to expand technical progress in both scope and diversity. An example she presents from the food sector is how, in a globalized economy with differentiated markets, it has become increasingly possible to distinguish commodities from 'fine produce', through the stakeholders themselves establishing sets of standards and institutions designed to deal with these issues.

Iizuka presents a case study of the Chilean salmon industry and outlines the way in which it has progressed, achieving a significantly increased share of the world's market over the last two decades. As part of this development she notes that there has been a concentration within the industry and, in addition, an increase in the number of firms that are engaged in businesses related to salmon culture, allowing the creation of increased forward linkages. Previously many firms had preferred to be self-reliant in their supply of outputs but this culture has changed as, to obtain globally competitive standards, firms have found that they need to be more interdependent and in doing so have reaped the benefits associated with clustering.

In their consideration of Global Value Chains Humphrey and Memedovic also provide a promising interpretation of agriculture as a route to development (2006). They note how this viewpoint has become widely accepted; in a 2002 report,

for example, the Department for International Development in the United Kingdom, for example, has argued that ‘Historical evidence suggests that agricultural growth and increases in agricultural productivity may be a prerequisite to broader-based sustained economic growth and development’ (DFID, 2002: 9 cited in Humphrey and Memedovic, 2006).

The 1980s and 1990s, argue Humphrey and Memedovic, saw a shift away from traditional agricultural products, coffee, cocoa, tea, sugar, spices and nuts, for example, products that had become associated with price instability and a long-term decline in prices. A shift occurred instead towards horticultural products, fruit, vegetables and flowers and fish for example, the share of which in developing countries food exports rose from 15 to 22 per cent during this period (Humphrey and Memedovic, 2006). These products also experienced both favourable price and quantity trends during this period. Another feature of horticulture is that it is relatively more labour intensive than the production of staple crops, and is attractive to small farmers because there are few economies of scale in the production process.

Humphrey and Memedovic (2006) use the concept of Global Value Chains to explain how agriculture has changed, arguing that “The global agrifood business is increasingly dominated by value chain relationships in which lead firms exercise vertical coordination” (2006:7). The sale of goods on spot markets has, to an extent, declined and instead a number of complex contractual arrangements have arisen. As quality issues, and meeting internationally recognised standards, are an increasing focus, the need for knowledge and learning is recognised, especially considering the fact that GVCs are fluid and competitive environments. The ways in which knowledge is exchanged, it’s increasingly codification for example, can affect how GVCs are governed and how the governance patterns can change.

Three challenges face countries exporting agricultural products (ibid.). The first of these is the increasing importance of standards, as both the range of products covered by mandatory standards and the stringency of standards has increased. There has also been a shift from product standards, largely enforced through border tests, to controls on the way in which products are grown, harvested, processed and transported. The second challenge is an increasingly amount of concentration in response to increasing demand from global buyers, for example for large-volume supply, speed and reliability of delivery, customisation of products through processing and packaging and guarantees about product safety. The third challenge

concerns the opportunities offered by product differentiation. This has been seen as a way out of the declining value of many commodities through adding value to them. The aim here is to establish the identity and distinctiveness of the product at its point of origin and seek to maintain this as it moves along the value chain. Examples of strategies used to do this are acquiring certification for the products, organic or fair-trade for example, or through developing closer links with traders, processors or retailers.

Dolan, Humphrey and Harris-Pascal (1999) provide a practical example of how the changes described have affected the development of the agricultural commodity chains in the African horticultural sector, focusing in particular on Kenya and Zimbabwe. The emergence of the large supermarket chains in the United Kingdom has been an example of concentration in retailing, they argue, and during the 1990s these supermarkets began to use their provision of fresh fruits and vegetables as a way of competing with each other. Key decision makers from this sector, in the types of relationships that have been established with producers, have had significant effects on how the industry is structured in producer countries. Great challenges have been posed for small producers, some of which have not been able to meet the new requirements and therefore cannot enter the chains. The more successful producers, however, have the opportunity to access better remunerated and more stable destinations for their products.

Similar changes can be identified in Latin American agricultural production, in part stimulated by changes in the region's retail sector. According to Reardon and Berdegue the 1990s was characterized by a shift from many small retailers to a few supermarket chains as 'in one globalising decade, Latin American retailing made the changes which took the US retail sector 50 years' (2002, p371). In a similar fashion to western supermarkets, supermarkets within Latin America began to purchase less from wholesale markets, as they were unable to obtain the quality and consistency of supply they desired. As an alternative they established relationships directly with producers, or began to trade directly with new kinds of, more regulated, wholesale markets.

Agro exporter firms emerged, for example, that were able to deal in high volumes and ensure adequate safety and quality standards. New types of contracts, and new, more rigorous, systems of auditing emerged in order to facilitate the development of these relationships. Firms were obliged to make new investments in

production technology and equipment, such as cooling sheds, trucks and packing equipment. New investment in management and coordination, in order to ensure quality, consistency, timing, volume and price competitiveness was also needed. One effect of such changes was a move to consolidation in the sector, as it was generally only medium and large growers that were most able to meet the increasing demands of the supermarkets (Reardon and Berdegue, 2002).

Before the specific case of Latin America is considered, a further dimension of agricultural GVCs needs to be considered, the possible changes to consumer behaviour that might be stimulated through concerns about the environmental effects of transporting agricultural produce. There has been an increasing questioning, loosely termed 'localism', about the justification for such journeys, mainly within European countries but also, to a lesser extent, within North America. In predicting how important such issues will become in determining future demand, this can most effectively be assessed on a product by product basis, and so the case of mangos will be concentrated upon.

At present a campaign for 'localism' has not affected the demand for mangos to any significant sense but, in assessing whether this will change in the future, a number of points can be made. The most important of these is the mode of transport that is used to transport the fruit. In the case of mangos this is overwhelmingly by ship, and the environmental implications of this are at present seen as of less significance than those where air travel is involved. This is potentially, therefore, a more significant issue for the Peruvian asparagus industry, where a much greater proportion of the product is transported by air.

A further factor is also relevant in the mango case, the fact that the climatic conditions do not exist to produce the fruit in the majority of destination countries. Again, a contrast can be made with the asparagus industry where it would be possible to grow a far higher percentage of the fresh asparagus that are consumed in Britain, for example, locally. While both of these factors negate any imminent threat to the mango market, therefore, as mentioned it is difficult to predict how this issue will develop in the future. Important questions remain as to what further shifts in public opinion there will be, how much these shifts will affect consumer behaviour and the timescale within which such changes might become significant.

Section 4.1.2 Latin America: Applying the New Model

The significance of the model that has just been outlined will now be assessed by locating it within the context of Latin American economic development. Economic development in Latin America has been characterized by periods of rapid growth, usually linked to commodity booms, but also by periods of great economic and political instability. While there is some evidence that from the mid 2000s onwards a greater degree of macro-economic stability has been achieved (ECLAC, 2008), whether this will survive ‘shocks’ such as the 2008 worldwide recession is debated.

A long-standing debate has existed as to how Latin American countries can achieve long-term stability and growth (ECLAC, 2008). It is argued, for example, that it will always be difficult for Latin America, with its traditionally higher wage rates, to compete with Asia’s labour-based manufacturing sector. Asia economies have also already established dominance in many different manufacturing sectors, enjoying the advantages of clustering and having secured regular markets, for example. As an alternative one approach has been to focus on exploiting the regions natural resources in a more thorough going way making use of the potential offered by technological developments. This would have possible spillover effects for other sections of the economy, helping to create greater diversification and therefore less reliance on commodity prices.

For this model to be successful, however, weaknesses in the innovation systems currently existing in Latin America need to be acknowledged. Most of the region’s economies have failed, for example, to develop dynamic, innovatory sectors along the lines of countries in East Asia (Gereffi and Wyman, 1990). Furthermore, when the National Systems of Innovation approach (eg Lundvall, 1992; Nelson, 1993) has been applied to the region they have generally been considered to be weak (Melo, 2001; Alcorta and Perez, 1998; Cassiolato et al, 2003). Problems identified include a lack of political commitment, lack of economic resources devoted to innovation initiatives and a lack of effective linkages.

Changes are taking place in this direction, however. According to Katz, over the last 20 years a combination of neo-liberalism policies and the process of globalization have brought about major structural change in Latin American economies (2006). This has had profound effects on their production structure, their international competitiveness and patterns of development of their domestic

technological capabilities. In the case of large firms new forms of capital intensive computer-based production organization technologies, replacing older labour intensive ones, have been introduced. They have also reduced their degree of vertical integration and now rely more heavily on the foreign outsourcing of technology and intermediate parts and components. SMEs have adapted less well than larger firms and most have slipped behind in terms of technological and organizational upgrading. Thousands of SMEs ceased business altogether during the adjustment process, and those that have survived have fallen behind large firms in terms of productivity growth and innovation.

Katz argues that one of the results of the reforms is that in each country in the region a small, modern sector of economic activity has emerged. In the richest countries, this can be estimated to account for some 40% of GDP while in the poorest it is in the region of 10%. Examples of this new and modern sector include natural resource processing industries, high productivity service industries such as the banking sector, tourism, energy and telecoms and a few technologically intensive manufacturing industries, which often rely on the use of imported parts and components as well as on foreign-designed production organization routines.

The potential of natural resources as a route to development is also recognised in an extensive study of Latin American economic prospects and options produced by ECLAC (2008). The study explores the importance of innovation to the future development of the region. In a section on the agro-industrial sector, for example, its importance as a source of competitiveness and technological learning is recognised. 'Many countries competitive advantages depend heavily on natural resources' the study outlines, and continues by arguing that 'it therefore makes sense to use these to promote learning and production diversification, as has been done in other natural-resource-rich countries that have achieved high levels of per-capita income' (ECLAC, 2008; p186).

As an example it is noted how the particularity of climate and soils promotes endogenous innovation and how the region harbours vast experience in first advances in plant and animal genetics. The agrifood complex can also create linkages with other sectors, it is argued. Nonetheless, however, it is also recognised that that agro-industrial sector is not homogenous, and different sectors will have different capacities to innovate and to transfer externalities to other sectors.

Investment in natural resources is seen, therefore, as a possible route out of the commodity boom/bust cycle and two examples of countries that have put this approach into practice are Brazil and Chile. Considering the Brazilian case first, in 2004, for example, agriculture and related industries were responsible for 40% of Brazil's exports and for 100% of the \$34 billion trade surplus (The Economist, 2005). It is a country that has many regions with great natural advantages, but these advantages have been maximised through investment in technology and through professional management. Brazil has, for example, in EMBRAPA, one of the most respected agricultural research institutes in the world. Through the financial resources that have been devoted to scientists, so that they have been able to study in American and European universities, Brazil has been able to develop their own technologies, ones that are suitable to local conditions.

According to Sr. José Roberto Mendonca de Barros, the head of the economic consultancy MB Associados, Brazil has been successful in creating the world's 'first competitive tropical agriculture' (cited in The Economist, 2005). He argues that 'knowledge applied to nature' can be the foundation of Brazil's development as it has been for Nordic countries, for example a major strand of the Finnish company Nokia's work was once wood pulp (ibid.). Most significantly, in terms of the arguments that were discussed earlier in this chapter, agriculture has been seen as an area worthy of long-term development, and not just as a stop-gap until greater industrial development eventually replaces it.

Another country that had achieved considerable success in applying resources to its natural resources sector is Chile. This has been true for many sectors, mining being a particularly prominent example, and there are many examples of Chilean agricultural products that have achieved considerable export success. Many studies have, for example, documented the considerable success of the Chilean wine industry (eg Hojman, 2005; Giuliani and Bell, 2005) and the salmon (Iizuka, 2006) and trout industries.

One of the results of this has been an increase in the number of support services that exist for firms. In her study of the salmon industry, for example, Iizuka outlines how the number of supplier firms increased from 75 in 1993 to 461 in 2003 (ibid.). As well as the benefits for the salmon industry this learning process has also allowed the 10th region of Chile in the south of the country to diversify, into production of shellfish and alga for example, and the knowledge which competitive

suppliers have helped in this process. Another significant factor has been the development of a successful public / private relationship in terms of the encouragement of innovation. Iizuka notes how in the salmon industry common institutions have been established for learning and negotiations and this has helped to enhance the collective capabilities within the industry and helped it to maintain international competitiveness (ibid.). In addition, on a national level, Chile has a well-respected research body, Innova Chile, which works very closely with the private sector in encouraging innovation and takes a proactive role in a number of sectors, agro industry being one of those (ECLAC, 2008).

In conclusion, it is clear that a new route of developing natural resources as a way to succeed in a globalised economy is being discussed by leading policy makers. This relies on investments in upgrading technology to improve quality, reliability of supply and product differentiation. Examples from specific countries such as Brazil and Chile, who have applied technology successfully in this process and have obtained higher value added, have been identified. With this in mind, the position of the agricultural sector in Peru will now be assessed. A specific examination of the country's mango industry, which provides the focus for this study, will then be made.

Section 4.2: Knowledge and Innovation: The Challenge for Peruvian Agriculture

Section 4.2.1 The Peruvian Economy: Adapting to an Export-Led Model

Peru is a country with a population of 26 million, one third of which is concentrated in the capital Lima. It has three distinct geographical areas, coast, mountains and jungle, which provide a great variety of climates and natural habitats. Politically it has, since the 1990s, been relatively stable with regular elections producing democratic handovers and a series of mostly centrist governments.

While there have been many ups and downs in Peru's economic history (Sheahan, 2001), the economy has in recent years experienced a period of sustained growth. Peru has had average annual GDP growth of 5% between 1998 and 2008 (World Bank Internet 1, 2010) and, while it is too early to determine how it has been affected by the worldwide recession that began in 2008, the early signs suggest that the economy has been resilient. The structure of the economy was, in 2008, made up

of agriculture (7.2%), industry (36.2%) and services (56.6%) (ibid.). Peru's business structure is also characterized by a concentration of SMEs, 98% of enterprises in Peru, for example, have less than 10 workers (Agency Interview 15, 2008).

The economic model followed by Peru over the last twenty years has focused on the promotion of exports. According to World Bank figures its average annual growth in the export of goods and services was 8.4% between 1998 and 2008 (World Bank Internet 1, 2010). Major exporting industries include mining, fishing, textiles and agro-industry, all of which are predominantly based in the coastal region (Alvarez Rodroich, 2004).

A number of international and local factors have combined to facilitate the successful adoption of this export-led model. One important factor is the new opportunities offered by globalisation. In the Peruvian case, for example, there has been a growth in the opportunities existing for exporting natural resources for which the country has a competitive advantage. In the agricultural sector, for example, there has been the effect of the reorientation of supermarkets that took place from the early 1990s onwards (Humphrey and Memedovic, 2006). Supermarkets have sought, as a result of these changes, to widen their offer of high quality fresh fruit and vegetables, as a means to differentiate themselves from their competitors, and this had offered many new opportunities to producer countries.

Another factor is changes in the political and economic climate within which Peruvian firms operate. Influential political and economic figures with Peru have, for example, been able to observe the successful transformation of other Latin American economies that have followed an export path successfully, Chile and Brazil being prominent examples. The existence of a relatively stable democratic system, with centrist governments, for the last decade has also meant that there is now a more pro-business atmosphere, and an interest in the working together of the public and private sectors. This has allowed businesses to consider more long-term planning, this being important in the agricultural sector, for example, where crops often need to be planted well in advance of them producing a saleable crop.

As these opportunities have arisen, a number of improvements have also been made in Peru's infrastructure. Some examples of this include improved airport and port facilities in the capital Lima, and widespread improvements in the travel infrastructure within Peru. Peru has a difficult terrain but significant improvements

have been made in its road network and, in addition, to transport systems within its major cities.

Section 4.2.2 Knowledge, Learning and Innovation in the Peruvian economy

Parallel to the strategy of encouraging exports has been an increasing recognition of the importance of knowledge and innovation for success in the world economy. There is an increasing political and economic commitment to the concept, and also recognition amongst the country's academic community of the concepts importance. This has been partly stimulated through awareness of the success of neighbouring countries, for example Chile, in this area but has also grown as Peru's links with countries in Europe, Asia and North America have grown.

The Peruvian National System of Innovation is weak in comparison with many other countries within Latin America. Institutions encouraging innovation in Peru do exist, but they are not well developed. There is also a significant problem as the links between them are very weak (Agency Interview 1, 2006). One of the problems in developing effective systems of innovation has been a lack of financial support. Political commitment to innovations strategies has been improving, but this is only a fairly recent phenomenon. While in the past such initiatives have been starved of the necessary funding, in 2006 Peru received a significant grant (\$36 million) from the Inter-American Development Bank, 60% of which will be dedicated to innovation and enterprises and a further 35% to increasing capacity in science (ibid.).

Two organizations that are in the forefront of promoting innovation in Peru are the National Council for Science, Technology and Innovation and the National Council for Competitiveness. The former is concerned with looking into how science and technology can be applied to a number of different areas within the Peruvian economy, biotechnology being seen as one area that has particular potential because of Peru's diversity of natural resources. Working with ceramics is also an option, as Peru has long ceramic tradition and has the ability to produce ceramics which are very thin but also very strong. The possibility of mixing wools, for example from the alpaca and vicuna, to create new, good quality, wools is also a promising area, as is the possibility of developing the market for woods which at present are not well known, for example from the jungle region of the country.

In 2008 the National Council for Science, Technology and Innovation celebrated its 40th anniversary and organised, in collaboration with more than twenty other organisations, a major international conference, examining how science, technology and innovation could be applied to bring about sustainable development to Peru. The conference brought together interested parties from government, universities, research institutes and firms. Innovation was one of the major themes of the conference and the importance of strengthening the mechanisms through which knowledge is shared and transferred was recognised. Other themes that were considered were production and competitiveness, leadership in science and technology and social development.

Another initiative that has a focus on innovation is the national plan that has been put forward by the National Council for Competitiveness. This identifies that the culture of innovation must be improved, so that it becomes more known for those firms that are involved in innovation products and the links that this has to their profitability. Another point that is raised is how to improve the demand for innovation, and a role is identified here for a variety of funding initiatives. It is also necessary, however, to increase the number of avenues that exist for the supply of innovation and technological services. All these challenges are linked, however, for example if the culture around innovation does not improve then demand for innovation services will not increase. The plan for competitiveness also recognizes the importance of developing the country's infrastructure (Agency Interview 1, 2006).

Further recognition at a political level of the importance of innovation has been the emergence of a network of organizations, known as CITEs, which specifically aim to encourage innovation amongst SMEs. Established under the auspices of the Ministry of Production, these are designed to be centres for technology transfer, which will help to provide incremental innovation for small enterprises (*ibid.*). There are three public CITEs and 9 private ones. They aim to work with all types of technology, for example they recognize that in some cases technology which is not on the frontier is still of great use to the businesses which use it. In some areas CITEs are involved in trying to encourage the development of regional systems of innovation. An example is Iquitos where the CITE is attempting to encourage links between the tropical fruits business, the medical plants business, the Chamber of Commerce and the IPPN (*ibid.*).

Section 4.2.3 Peruvian Agriculture: Context and Potential

Peru has a very diverse agricultural sector. Four main sectors can be identified, the first of these being very large exporting businesses, mainly concentrated in the coastal region and producing non-traditional products (Alvarez Rodroich, 2004). The second sector, by far the largest in terms of hectares farmed, is much smaller producers who produce traditional products such as rice, cotton, corn and potatoes. A third sector, concentrated mainly in the mountains, produces products distinct to that region such as quinoa and kiwicha. A final sector is agriculturalists who grow purely at subsistence levels, often with very small plots of land and who grow primarily for their own consumption (ibid.).

Peru's geography, in particular its division into three distinct regions of coast, mountain and jungle, greatly shapes its agricultural production. There are differences in the types of products that are grown, the volumes produced and the potential access of these products to national or international markets. Such access is often determined by infrastructural constraints, and for this reason it has been the agricultural products produced in the coastal region that have proved to have the most export potential.

Different phases of development can be identified in an examination of Peruvian agriculture over the last forty years. Firstly, the period of collectivization, which began in 1969, increased the role of the state and brought about collective ownership of the land. It signalled the beginning of a period when many business people, and also technical experts, left the sector, which had particularly significant effects on agriculture in the coastal region. Following dissatisfaction with this model, however, from the early 1980s onwards land ownership began to be returned to individual and family plots.

A major development, which had its origins in the early 1990s, has been a move towards increasing agricultural exports, particularly in the coastal region. This approach has been continued and strengthened during the 2000s, and is closely aligned with a shift in Peruvian agriculture away from traditional products such as coffee, sugar and cotton. Non-traditional exports, fruits and vegetables for example, have experienced considerable growth over the last 20 years. Peru's geographical diversity, with a number of micro climates existing in different parts of the country, presents a great opportunity for the production of a wide variety of such products.

Innovation in the agricultural sector is encouraged by a government body called INIA, which is a part of the Ministry of Agriculture. This body's remit is to work with small agricultural producers, and it works across a wide variety of products and in the diverse geographical regions that Peru possesses. Other innovation initiatives come via the initiatives of, mostly large firms, there being many examples from the asparagus exporting sector, for example, of this being a source of knowledge and learning.

The fast-growing, and most dynamic, illustration of the growth of non-traditional exports, is the asparagus sector. The sector has experienced high levels of growth over the last decade and Peru has become the world's leading exporter of fresh asparagus. Part of this success has been the industry's success in applying new technology sources and it is hoped that lessons from the industry will be applied to other sections within the Peruvian economy.

The success of asparagus, amongst other products, has prompted a wider recognition in Peruvian society of the potential offered through agricultural development. An editorial in *El Comercio* (2008), Peru's main quality newspaper, recognised the importance of the agricultural sector for the economy as a whole. The editorial noted how Peru has a number of advantages in terms of productivity and competitiveness. It has, for example, climate and soil conditions which allow certain products, asparagus for example, to be produced throughout the year. A strength for Peruvian producers is also that they can enter northern destination markets in counter season, when there is potentially a much greater demand for their product.

An accompanying article in *El Comercio* also noted the investment that has been made in the industry by businessmen that have recognised the importance of a high quality product for international success (León Torres, 2008). It identified products such as table grapes, avocados, mango and citric fruits as being ones that have shown considerable potential and ones that need to be fully exploited. Quinoa and bananas are also identified with the potential to exploit the opportunities that exist in international markets for organic products. Finally, the article draws attention to the fact that the number of potential markets available for Peruvian products is increasing. The possibilities presented by the Chinese market offer Peru a favourable market window, for example, as Chinese consumers have already expressed interest in the good flavour and size of Peruvian table grapes. Overall, it is concluded that Peru has encountered in agro-exportation a niche where it has enormous comparative

and competitive advantages, the exploitation of which will push forward the countries wider development (ibid.).

A more specific focus will now be made on the mango industry, the subject of this study. It is a product that, despite a number of difficulties faced, has achieved a very significant growth in export levels over the last twenty years.

Section 4.3 The Peruvian Mango Industry: Context and Opportunities

Section 4.3.1 The International Mango Market

Mango is native to Asia and its origin had been traced to the region of north eastern India and Myanmar (Janick and Paull (eds), 2008). Its cultivation spread initially throughout Asia and then later to Africa. It was introduced to South America following the colonisation of the continent by European powers from the 17th century onwards. Mango is most commonly eaten fresh, and can be consumed at both an immature and a fully ripe stage. It is a rich source of vitamins and of anti-cancer antioxidants, and has also been put to a variety of medicinal uses (ibid.).

Mango trees vary greatly in size, but can grow to a height of 45 metres. They generally have a broad canopy and the process of flowering and fruitation takes, from seed, between six and ten years (Janick and Paull (eds), 2008). One of the complications in producing mangos commercially is the relatively long waiting period before a tree becomes productive. Typically a tree will reach its optimal level of yearly production, in which it would be able to produce between 140 and 240 kg, between its tenth and twelfth year. Assuming that it is adequately cared for, this level of output can then be maintained for the following twenty years, after which a significant decline in levels of production begin to take place (Minaya, 1999).

A large number of different mango varieties exist and one method of categorising them is through colour, that is, reds, greens and yellows (Valeriani Vela, 2003). Red varieties tend to be fairly large, examples in this category including some of the most popular export varieties produced in Latin America such as Kent, Haden and Tommy Atkins. An example of a green mango is Amelie, which had its origins in West Africa and has low fibre content. Many examples of yellow mangos come from Asia, for example the Manila Super from the Philippines and Nam Doc Mai from Thailand (ibid.).

While many mango varieties exist only a very few are traded internationally, and in general a preference exists for red mangos over the other colours. According to Minaya this is down to lack of knowledge from consumers, and is in many cases reinforced by marketing messages (1999). A further feature is the different tastes in terms of mango sizes. The US consumer is happy to consume both smaller and larger size mangos, while in Europe there is a definite preference for larger size fruit. The emerging Asian markets also share the European preference for larger size. The most important mango importing countries are presented in Table 4.1.

Table 4.1: Mango Importing Countries

Country	Imports 2006 (\$US millions)	% of Total
United States	276.12	29
Holland	114.45	12
United Kingdom	82.60	9
France	75.73	8
Germany	51.80	5
Canada	44.54	5
Japan	43.91	5
Hong Kong	40.47	4
China	29.92	3
Belgium	28.99	3
Other countries	153.27	16

Source: COMTRADE (Promperu Internet 1, 2010)

Mangos make up 50% of all tropical fruits produced worldwide (Jedele et al, 2003). Most mangos are consumed internally, and consumption of the fruit is highest in Latin America and South Asia. External demand for mangos is currently increasing, however, as consumers in developed economies become more aware of its attractions as a fruit and more knowledgeable of how they should be stored and eaten. Growing markets exist in the USA and Europe, for example, and increasingly in Asia too. Both worldwide production, and the quantities of fresh mangos traded, have been increasing over the last 10-15 years, therefore.

The figures in Table 4.1 tend to overestimate the importance of Holland. The reason for this is the position of Rotterdam as Europe's most important harbour, and therefore a recipient of a high percentage of the mangos imported to Europe as they

are transported predominantly by ship. Almost two-thirds, however, of the mangos imported by Holland are then re-exported to other European countries.

In 2005 more than 70 countries were exporters of mangos (Agro Económica, 2008). Latin America is the most important mango exporting region. The majority of imports to the USA come from exports from the countries from this region, Mexico occupying the position of the largest exporter in this case (Jedele et al, 2003). South American countries also export a lot to the European Union, Brazil being the largest exporter in this case. Asia is the second most important mango exporting region of the world after South American, with important exporting countries being Thailand, India, Pakistan and the Philippines (Jedele et al, 2003). Overall, therefore, the vast majority of mango production takes place in developing or emerging economies. While developed economies only have a very limited amount of mango production there are, however, two important exceptions in Israel and Australia (Jedele et al, 2003). The most important mango exporting countries are presented in Table 4.2.

Table 4.2: Mango Exporting Countries

Country	Exports 2006 (\$US millions)	% of Total
Mexico	99.35	17
Brazil	87.52	15
Holland	75.60	13
Peru	59.33	10
Pakistan	32.58	6
France	30.12	5
Ecuador	23.10	4
Belgium	20.90	4
Thailand	17.86	3
United States	16.64	3
Other countries	117.64	20

Source: COMTRADE (Promperu Internet 1, 2010)

When analysis is made of the worldwide production of mangos for export an important distinction can be made between countries from the north and those from the south. This can be illustrated through consideration of Table 4.3.

Table 4.3: Mango Producing Countries: Months of Seasons

	Jan	Feb	Mar	Apr	May	June	July	Aug	Sept	Oct	Nov	Dec
Mexico												
Costa Rica												
Guatemala												
Pakistan												
India												
Israel												
Philippines												
S. Africa												
Brazil												
Peru												
Ecuador												

Shaded Area: Months when mangos produced for export
(Own elaboration: Adapted from Minaya (1999))

As the above graph illustrates, the seasons for countries in the Southern Hemisphere, which last between August and March, are complemented by those for northern hemisphere countries that occur between April and September (Valeriani Vela, 2003). This helps to illustrate the difference in supply possibilities due to region, as the countries in the south, Brazil, Ecuador, Peru and South Africa have a double advantage. Firstly, in terms of competition from other producers, they are producing at a time when those in the north are unable to produce. Secondly, in terms of market opportunities, there are able to produce their fruit at a time when fruit in the north is relatively scarce due to it being the winter season (Minaya, 1999). The implications of this for the Peruvian mango export industry, the main focus of this study, will now be considered in more detail.

Section 4.3.2 The Peruvian Mango Industry

Mangos flourish especially in areas that have a high levels of light and heat, and where temperature fluctuations have a maximum range of an average of 10% C. Peru, with its dry, tropical, climate with very little rainfall, is therefore considered to have the ideal conditions for growing mangos (Minaya, 1999) According to Proinversión, for example, the average production per hectare (19 tonnes per hectare)

is higher than the average for other producing countries in the world (7.2 tonnes) (cited in Agro Económica, 2008).

Peru has high levels of domestic mango consumption and is also a major mango exporter, although different varieties are produced for each market. There are four mango varieties that have traditionally been exported by Peru:- Kent, Haden, Tommy Atkins and Edwards. These varieties were bought from Florida in the 1950s (Minaya, 1999). While initially they were cultivated in the coastal region around Lima, they were later found to especially flourish further north in the department of Piura.

The most important export variety is Kent. Kent mangos are large and plump, full of juice and meat with little fibre or string, and are flavoursome and sweet. Haden mangos are smaller than Kents, with a smooth skin and oval shape, and their flesh has a firmer texture. Tommy Atkins, while being of a similar shape and size to Haden, is distinguished by its red, hard skin. It has one of the longest periods of conservation of all the varieties, for this reason being a commonly exported fruit throughout the world. On the downside it does not have a comparable taste or aroma to some of its competitors. (Valeriani Vela, 2003). In addition to the varieties mentioned, in recent years interest has also grown in a further variety, Kiett. This variety has some similarities with Kent, being slightly larger and having moderately sweet, juicy yellow flesh. Interest in this variety is linked to the success of the Kent variety, especially its attraction for the European market that has more of an interest in larger fruits.

Mango production for export in Peru is between the months of November and March. Peru competes therefore with a small number of countries that also produce during this time period, that is Brazil, Ecuador and South Africa. These countries have the advantage, therefore, of producing when the majority of mangos producing countries, those from the northern hemisphere, are out of season. A further advantage is that the destination countries do not have their native fruit products available at that time so that there is potentially more interest in alternatives, even if they are relatively unfamiliar such as mangos.

The majority of mango production in Peru is concentrated in the north of the country. Three departments are of particular importance, those of Piura (8,330 Ha), Lambayeque (1,295 Ha) and Ancash (245 Ha) (inform@ccion, cited in Cabrera and Larrea, 2005). Approximately two-thirds of total mango production is concentrated

in Piura, therefore, and if just those mangos considered as destined for exports are considered then the figure rises to over 80% (Valeriani Vela, 2003).

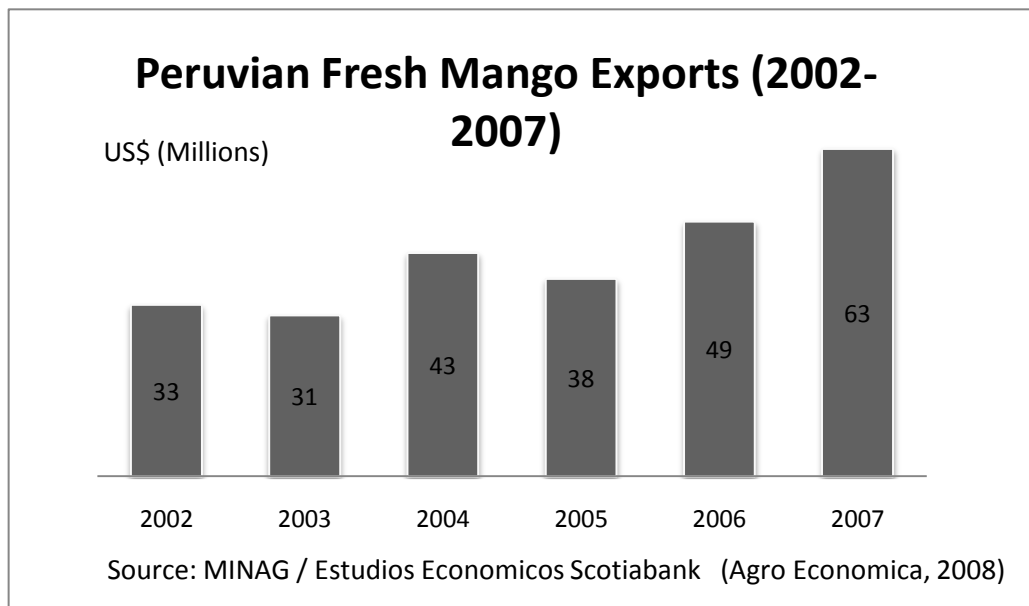
Piura is a large department that has a long coast, a large plain area and mountains in the interior. It also has its own port, Paita. It is divided into eight provinces and has a dry, subtropical, climate that is perfect for mango production (El Popular, 2004). The latter is concentrated in three main valleys within the department. The most important of these is the San Lorenzo valley, of which the nearest urban area is Tambogrande. Two other valleys, Alto Piura, of which the corresponding urban area is Chulucanas, and Chira, which has seen a large expansion in production for exportation over the last decade, are also of significance (Valeriani Vela, 2003). Other areas of Piura also produce, but with much lower volumes.

Ginocchio (1993) traces how the Piura region has had success in the production of a number of different fruits, examples including limes and bananas. It was the later that showed the potential of this sector for a successful exporting profile, however, and paved the way for interest in such a strategy from mango producers. During the 1980s there was a significant increase in mango exports, but from a very low base point. The turning point, however, was in the early 1990s when the first hot water treatment plant was installed in Piura. This allowed mangos to be exported to the USA for the first time and helped to confirm the region as the most important mango producing department in the country (ibid.).

In the light of this change the growth in the mango sector was considerable during the 1990s. This upward trend has continued throughout the 2000s and Figure 4.1 gives the total number of exports for the years between 2002 and 2007.

Figure 4.1 illustrates an important point about the growth of mango exports, while there exists a consistent upward trend there is also significant variation from year to year. The graph illustrates a fall in production for the years 2003 and 2005, for example. The most important reason for this is changes in climatic conditions, as changes in temperature, or unusual patterns of rainfall, can affect the yield greatly.

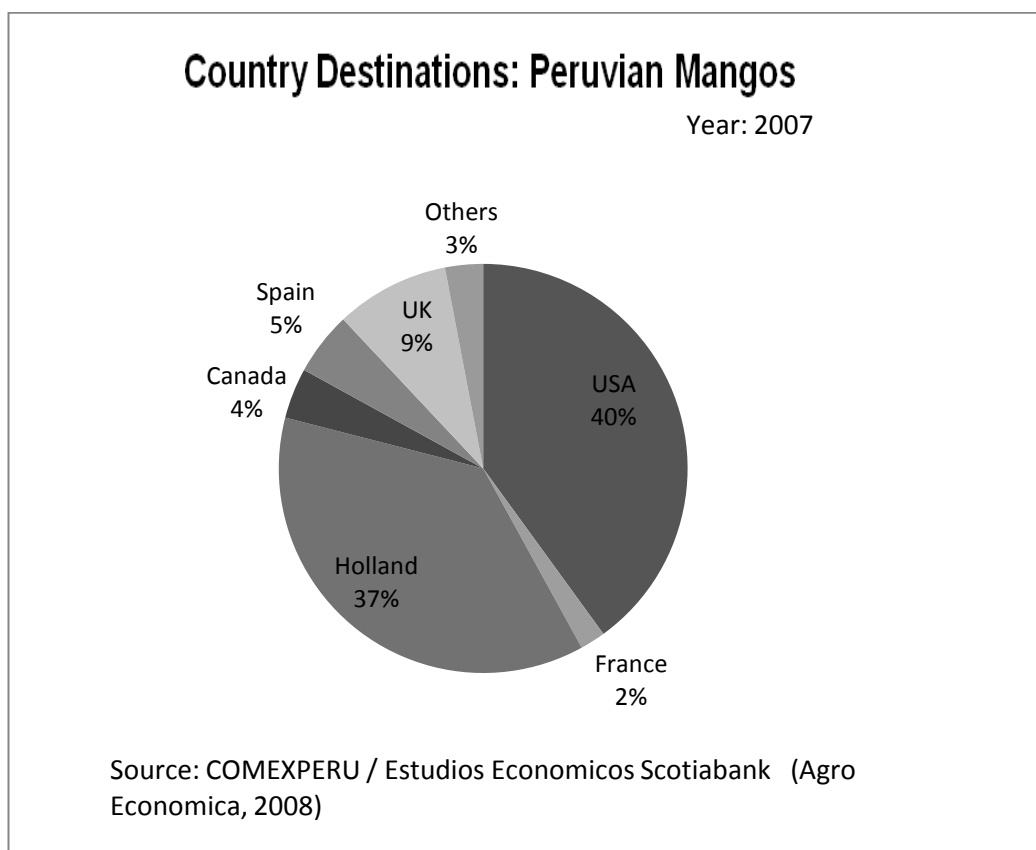
Figure 4.1: Peruvian Fresh Mango Exports



The amount of mangoes exported can also affect the price received for the product very directly. According to a representative from APEM, the US market can import between 170 and 200 containers per year in order to give an approximate price of \$4. If however, the quantity exported is in excess of this then “prices start to change very quickly” and a situation can rapidly be reached where many people in the industry are selling their fruit at an unprofitable price (Association Interview 1, 2008). As the majority of the fruit sold in the USA is sold under conditions of consignment, this presents a significant challenge for mango producers and exporters.

A distinction, therefore, needs to be made between short term rises in the quantity exported, during a favourable season, and more long term, sustainable, growth in the market. A significant section of exporters are attempting to develop a product with a high quality profile, which will be rewarded with a higher and more stable price. One of the strategies they have used is to try to expand in other markets apart from the United States, Europe and, more recently, Asia being examples. Figure 4.2 compares the percentage imported by the most important destination countries.

Figure 4.2: Country Destinations: Peruvian Mangos



The most important destination markets for mangoes are the USA and Europe, although the relevant importance of each destination has changed. According to an APEM representative five years ago the US market accounted for 70% of mango exports, while the European market accounted for the remaining 30%. This proportion has changed, however, and the US market now imports in the region of 40%, while the European market now accounts for in the region of 55% of Peruvian mango exports. This year it is projected that the European market will account for 55%, the US market for 43% and others for 2% (Association Interview 2, 2008). The European market differs as a higher percentage of the exports to this region are sold at pre-arranged prices. In return for a more secure price, European buyers tend to demand a higher level of certification.

One of the features of the mango sector in Peru is that it is relatively fragmented. Table 4.4 shows the major mango exporting firms and their percentage share of the market.

Table 4.4: Principal Peruvian Exporting Firms

Name of Firm	% variation 07-08	% of market 2008
Sunshine Exports SAC	-1	14
Camposol SA	25	6
FLP Del Peru Sociedad Anonima CER	-2	4
Nor Agro Peru SAC	-4	4
Solis Caceres SAC	-9	4
LS Andina SA	11	3
Peruvian Quality Fruits	27	3
Agricola Mochica SAC	-35	3
Sun Land Fruits Sociedad Anonima	12	3
Other firms	-	48

Source: SUNAT (Promperu Internet 1, 2010)

Table 4.4 shows a lack of large firms and in general there are between 20 and 30 firms that are usually involved in the industry. A further complication in the mango sector, however, is that there are a large number of firms that enter the sector temporarily, when favourable climatic conditions have ensured that a large volume of fruit has been produced. There are very few barriers to entry for these firms, they can employ the services of packing firms fairly straightforwardly, for example, and these firms are often already exporters of other fruit. Often, they will just export mangoes for that year, especially if the following season brings a much poorer harvest. According to statistics provided by APEM in the 2006/2007 season these were 57 Peruvian mango exporting companies. By the following season, however, this had risen to 77. Of these, only 44 had exported during the previous season, leaving 33 firms that were new to the market (Association Interview 1, 2008).

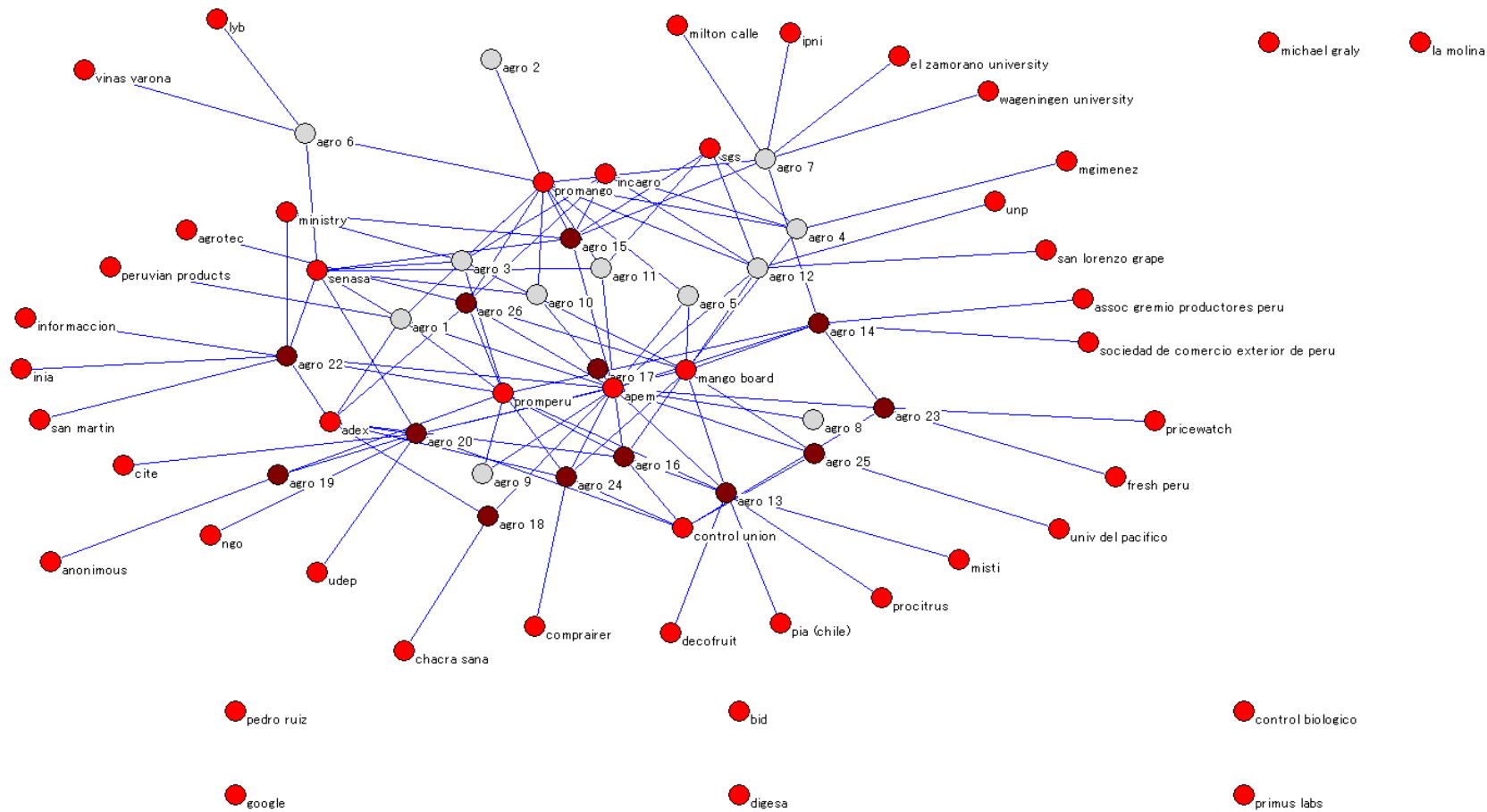
What makes such fluctuation, and fragmentation, possible in the industry is that more than 50% of the volume comes from small plots of land owned by small producers. This means that in a year when there is a good harvest it is relatively straightforward for new exporters to buy fruit from these producers, employ a plant to pack them and then ship them. Such an operation is more straightforward with the European, rather than the US, market as the former does not require the hot water treatment required by the US. Not only does the treatment constitute an extra cost, but it can also be a logistical challenge as only a limited number (eight) plants can supply this treatment.

With a structure such as this, the mango industry in Peru is very different from the avocado or asparagus sectors. Both of the later industries are dominated by large firms who own the land and grow the product, treat and pack the product and export themselves. Such fluctuations in output are, therefore, far less common. The entry of new firms to the mango industry is problematic because the sector can benefit greatly if there is cooperation amongst suppliers. In years where there is a lot of fruit, however, this is much more difficult to obtain. As the price starts to fall in the destination markets all exporters are adversely affected. There are also consequences for consumers in terms of the quality of the fruit sold, for example, the possibility of more fruit arriving on the shelves already ripe.

There are some signs, however, of consolidation taking place within the industry and this is happening in a number of different ways. Some exporters, for example, are buying land in order to produce their own product, while other exporters are taking the initiative to gather together groups of producers to assist them to become GAP certified. As there are now much greater demands in terms of, for example, the pesticides used, or the residue levels allowed, these issues are much easier to handle in larger sized farms. The increasing emphasis on quality from buying markets also makes cooperation at the various stages of the value chain increasingly important. There is a history of mistrust between producers and exporters, with late or non-payment being one area of contention, but there is evidence that, at least in some sections of the industry, more stable relationships between producers and exporters have begun to emerge.

Figure 4.3

Mango Network: Commercial Knowledge. Full network. Relative position of Promango firms (grey) and Apem firms (brown). Intermediaries and Service organisations (red)



Section 4.3.3 Evidence from Network Analysis

As was outlined in the methodology chapter data has been collected which has enabled network maps for the mango industry to be drawn. The maps have been drawn based on surveys in which firms identified organisations that were sources of either commercial or technological knowledge for them. The firms were also asked to identify the value of the knowledge that they received from each organisation.

The two network maps illustrate the whole of the mango network. Figure 4.3 shows the network for commercial knowledge and Figure 4.4 the network for technological knowledge. The maps show, for both commercial and technological knowledge, a high level of linkage amongst the various mango actors represented in the cluster.

The maps also show that lead mango firms are not at the centre of the networks. Instead, the network has a bi polar structure, based around intermediary organisations. These two focal points have been illustrated by the drawing of circles on Figure 4.4, the map for technological knowledge. There is a one clustering of firms around a focal point of the producing and exporting association APEM. There is another focal point of firms around the producers association Promango and the phytosanitary organisation Senasa. There are also some firms that lie between the two main focal points.

These maps highlight, therefore, the central position of APEM and Promango for the generation and diffusion of knowledge in the mango cluster. Clearly these organisations play a critical role in the cluster and therefore need to form a central part of the study. To facilitate this analysis network maps will show specifically the networks of firms that are members of APEM (in Chapter 5) and members of Promango (in Chapter 6), in relation to both commercial and technological knowledge.

It is also important, however, that the relative position of other intermediary organisations within the network is also considered, especially Senasa, Promperu and Incagro that occupy important positions in either commercial and/or technological knowledge transfers in the network. In order to do this the whole network has been simplified so that only the most important intermediaries are included. The resulting

maps will therefore be included in Chapter 7 (which considers the role of Senasa and Promperu) and Chapter 8 (which considers the role of Incagro).

Section 4.3.4 Knowledge Challenges and the Peruvian Mango Industry

In the previous section an analysis was made of the structure of the Piuran mango cluster, and some of the changes that are currently taking place in the industry were identified. A more specific focus will now be made on what knowledge is needed in order for the industry to maintain its international competitiveness. As a result of the examination of a large number of secondary sources, and of interviews conducted with producers, packers, exporters and other industry observers in Peru and Europe, four categories of 'knowledge challenges' faced by the industry will be identified.

The knowledge challenges identified relate to production, processing, storing and transporting, certification and the development of new and existing markets. Some of these challenges primarily involve the development of technological capabilities, while for some the development of organizational capabilities is of most importance. It is also common for a combination of both types of capabilities to be required. The challenges also differ in that some can be dealt with as part of an ongoing process, while some require a greater element of long-term planning.

The first knowledge challenge identified is that of producing mangos, in particular a range of issues concerned with their harvesting and handling (Thomson, 2003). While Piura's dry climate provides a natural advantages for the growing of the product, variations in the climate from year to year can provide many challenges. There is the question of how different varieties of plants, and different ages of plants, react to changes in climatic conditions. Linked to these factors is the different varieties of soil types that exist in the different valleys within the Piura department, and in addition the application of appropriate fertilizers, for which cost must inevitably be one of the factors that is taken into consideration. A further challenge is the control of the large number of diseases that can potentially attack the plant. A particularly important example is the fruit fly and the government agency Senasa, which is a part of the Ministry of Agriculture, plays a lead role in phytosanitary efforts.

Irrigation is also a relevant issue for producers of mangos. One of the important innovations in the growing of mangos had been the introduction of drip

irrigation, a technique that minimizes the use of water by allowing it to drip slowly to the root of the plant. This is achieved through the use of a system of valves and pipes. To be introduced successfully drip irrigation requires very careful study of the soil type, the land topography, the climatic conditions, the extent and timing of rainfall and the particular needs of the crop concerned. The most advanced system of irrigation used at an international level is a computerised system that was developed in Israel. This allows exact control of the amount of water that is applied to the plant roots.

At present the issue of irrigation is not one that generates a huge amount of attention within the industry. Many medium and large producers have invested in drip irrigation but for the large number of small producers it is considered too much of a financial outlay. It is an issue that could, however, gain more prominence in the future, especially as the demand for water increases as Peru continues to industrialize. There is also an increasingly perception in government and other circles, partly stimulated by environmental concerns, that the current price of water is too cheap and provides no incentives against waste.

A second knowledge challenge is that of processing, storing and transporting the fruit effectively. Once a mango has been harvested it is important in maintaining freshness that its size and quality are assessed, and that it is packed for transport as quickly as possible. In addition, for certain markets, certain treatments also need to be carried out. The hot water treatment, for example, is a post-harvest procedure which is primarily designed to minimize the possible damage to the fruit caused by fruit flies. It involves submerging the mangos in hot water for a specified time and is required for the US, Chinese, Mexican and New Zealand markets, but is not required for export to Europe. The main technological developments in this area in recent years have been the development of more sophisticated, computerised systems to measure the temperature of the water. As Peruvian companies also have the aspiration to begin to export to the Japanese market this presents a further challenge as a more rigorous version of the treatment is required for the Japanese market. Finally, in some countries alternatives to the hot water treatment are being researched and these need to be monitored by Peruvian processors to see if they have potential to be introduced within the Peruvian context.

The other main technology of relevance to processors and packers is the machinery used for the weighing and sizing of the mangos (known as a ‘calibrador’

in Spanish). In addition to weighing and sizing, some more sophisticated machinery can also sort the mangos according to colour. The technology used for the cooling and storage of the fruit before it is despatched to the port is also important, and the temperature in the storage rooms used needs to be carefully monitored. Such a concern with temperature needs to be maintained when the fruit is then transported to its destination port, and it is obvious benefit if the port has good facilities and positioned as close as possible to the location at which the fruit is grown.

A third knowledge challenge, one that relates to both the stages of producing and processing that have just been discussed, is that of obtaining the international certification that is necessary in order to export successfully. The requirements for certification have expanded greatly in recent years. It is a particularly important issue for producers wishing to export their product to the European market, where there is, in comparison with the USA, more of a tendency to compete on quality rather than price. The relevant certification for this market is GAP, whose name embodies the concept of 'good agricultural practices'. Its primary aim is to ensure food safety, but there are also provisions within the standard concerning conditions for workers and environmental issues. The standard was established in 1997 through an initiative by a group of European retailers and works through the establishment of a series of control points, some of which must be fully complied with, some of which must be substantially met and some of which are considered desirable but have no formal compliance requirements.

Complying with the standard presents a number of challenges for producers. Firstly, it requires the establishment on their part of well-organized and transparent management procedures. Secondly, it often involves investment in the infrastructure of the farm, for example in the provision of an eating area and adequate toileting facilities for workers, and in the infrastructure required for the successful storage of the product in question. Thirdly, it involves a monitoring, and compliance with, changes in the certification standards, an example being the fact that it is common for changes in the status of control points to take place, and for requirements that were at one time considered desirable to become obligatory.

A fourth knowledge challenge that can be identified is developing existing and new markets, showing the ability to monitor, understand and adapt to the demands of the markets to which Peruvian mangos are sold. The worldwide export of mangoes has experienced a high level of growth in recent years, as a result of

forces associated with globalisation. Technological improvements, allowing mangos to be transported greater distances successfully, have also contributed to this growth.

Exporters need to develop the capabilities to monitor and adapt to changes in existing markets, for example the USA, but also they need to take a proactive role in identifying potential new markets, for example China and Japan. In addition, new opportunities are arising in niche markets, for example, the 'fair trade' and the organic markets. Finally, there are markets that require the industrialisation of mangos, that is the markets for mango juice, for frozen mangos and for dried mangos and operating in these markets present a number of technological, as well as organisational, challenges.

Part of the challenge of responding to market demands is identifying the varieties of mangos that are likely to experience a growth in demand from buyer countries. While it is impossible to predict with total accuracy how trends in consumer demand will develop, monitoring potential shifts can be of great benefit. On the supply side, this also involves a process of investigating whether new varieties, or existing varieties that are currently produced successfully in other parts of the world, have the potential to be adapted successfully to Peruvian conditions.

The establishment of the varieties that are currently exported most from Peru, Kent and Haden, provides an interesting case study. These varieties were first brought to Peru through collaboration between Peruvian agriculturalists and a research centre in Florida (Ruiz, 2003) and the initial intention was for them to be grown in the Lima area. After a number of problematic years, however, it was decided to attempt to grow them in Piura, in the north of the country, and the results there have been extremely successful. While success was eventually achieved, therefore, the process took time and relied to a certain extent on good fortune. In today's increasingly competitive global economy, however, with new countries from around the world keen to begin to export mangos, what is needed is a more systematic and proactive approach to the issue of variety development.

In conclusion, four knowledge challenges, production, processing, certification and developing markets, have been identified. Considering these as a whole, an important factor in the mango industry is that the premier price for the product is for high quality fresh fruit. While a certain amount of technology is necessary to achieve this, it is at a relatively basic level, and has also not changed

greatly over the last ten to fifteen years (Firm Interview 8, 2008). While Peru is not at the world frontier of technology, therefore, represented by mango production in Israel for example, most exporters believe that the technology they lack would present only marginal benefits in comparison to the cost that it entails. A range of organizational capabilities, including the ability to diversify into new ranges and to coordinate in order to expand into new markets, are therefore of equal importance for success in the industry.

Whether this will change in the future will depend on the long term development of the industry. Mango is considered a non-traditional export in Peru, or an exotic fruit in the destination countries. Worry exists amongst some producers that the worldwide supply of mangoes will continue to grow and it will change from being an 'exotic' to a 'commodity' in a similar way to the present day banana market (Firm Interview 3, 2008). Another scenario, however, is that Southern producers, who have the double advantage that there are not many of them and they export at the time of the year when only a limited amount of fruit is available in the north, will continue to be able to charge premier prices for their products.

For them to assume that a market that has so far allowed them to make relatively easy profits, will continue to permit this without a more systematic process of long-term planning and research being undertaken, would appear to be a dangerous strategy.

For this reason it is the view of many in the industry that an approach that stresses the importance of knowledge, learning and innovation is a more sustainable long-term one. Some of the organisations that can potentially contribute to such a learning process, organisations that are defined in this study as intermediary organisations, will now be identified prior to them being considered in more detail in subsequent chapters.

Section 4.3.5 **Intermediary Organisations in the Mango Industry: An Introduction**

A number of different intermediary organisations have been selected to be looked at in this study. These have been identified with reference to the knowledge challenges that were identified in the last section. Table 4.5 provides a summary of the organisations that will be examined.

Table 4.5: Intermediary Organisations: Summary

Name of Organisation	Type of Organisation	Brief description of role	Role analysed in:
APEM	Trade Association	Works with producers, processors and exporters.	Chapter 5
Promango	Trade Association	Works with medium sized producers.	Chapter 6
Promperu	Promotional Body	Promotes Peruvian exports.	Chapter 7
Senasa	Phytosanitary Body	Monitors food safety.	Chapter 7
Inia	Research Body	Encourages agricultural research	Chapter 8
Incagro	Research Body	Encourages agricultural research	Chapter 8
Cites	Research Body	Encourages SME research	Chapter 8

The criteria used to select these organisations will now be explained, and a brief description of each organisation that will be looked at will be made. One of the criteria considered is the prominence and profile that the organisation have in the industry. Two trade associations come to the fore in this respect in particular. The first of these is APEM, the producers and exporters association, and the second is Promango, the association of medium sized producers.

These organisations provide a crucial meeting point for different producers and exporters within the industry. Both APEM and Promango organise regular conferences and congresses, for example, which are well attended not just by their member firms but by representatives from all sections of the industry. Evidence for the importance of these organisations is also available from the network maps (Figures 4.3 and 4.4) presented in Section 4.3.3. These maps illustrate the central position occupied by both APEM and Promango in the networks and show that they have the potential to provide a means through which difficult actors within the industry can share knowledge and work together.

The importance of both organisations can also be identified through the role they play in the launching of initiatives that are of importance within the industry. Promango has planned a particular role in the knowledge challenges of improving production, and in that of facilitating producers to obtain certification. APEM has

played an important role in the knowledge challenges of improving post-harvest techniques, and its work has been particularly significant in confronting the challenge of identifying and developing new markets. The work of both these organisations will, therefore, be considered in detail. This will be done in Chapter 5, in the case of APEM, and Chapter 6, in the case of Promango. In latter chapters, particularly Chapter 9, their roles will also be compared and contrasted.

Another important criterion to be considered is those organisations that play an important role in bringing knowledge to the industry, and ensuring that this knowledge is distributed to those in the industry that require it. Acquiring a diverse range of knowledge is important for exporting successfully, for example, and therefore there is a need for organisations that are able to establish relationships and coordinate successfully with international bodies. In addition such bodies must also develop expertise in diffusing knowledge amongst a range of actors. Two government bodies play a particular important role in this respect, Senasa and Promperu. Senasa has played an important role in providing the knowledge necessary for international certification to be obtained. Promperu has played an important role in accessing and developing new markets. The work of both these organisations will be outlined, and compared and contrasted, in Chapter 7.

A further criteria used has been looking at organisations that have a specific focus on encouraging innovation. Bearing in mind this criterion three organisations come to the fore, INIA, Incagro and CITEs. The work of these organisations is relevant for all the knowledge challenges identified in the last section, although producing is the area of most relevance. All three organisations concentrate on encouraging innovation initiatives amongst SMEs. The work of these organisations will be considered in detail, and compared and contrasted, in Chapter 8.

In addition to the above organisations, other intermediaries are also recognised as being potentially important, although they have not been examined in detail in this study. One example is the use made by firms of consultants. This area has not been considered in detail in this study, firstly because the role of consultants was only identified as important by a relatively small number of firms. Access issues were also a relevant factor, as some firms viewed details of the consultants that they use as commercially sensitive. In addition, the consultants were often located overseas, and therefore it would have been difficult to make adequate contact with them to allow them to have been studied effectively.

Other intermediary organisations that are also potentially significant include certification bodies, for example those that provide certification for both producers and processors, and NGOs that work mainly with associations of small producers. Another example is promotional bodies, such as the National Mango Board in the USA that is responsible for promoting knowledge and consumption of the fruit in that country, and for establishing improved relationships with suppliers of the fruit. Time and access constraints have meant that the role of these bodies can only be considered relatively briefly in this study. In the case of NGOs, for example, it is recognised that their role is potentially of importance but, as the main focus of this study has been on large and medium sized producers, they will not be studied in great detail here. They would, however, provide a useful route of analysis for future studies.

The study will proceed, therefore, through consideration of the first intermediary organisation that has been identified, the producers and exporters association APEM.

Chapter 5 : Trade Associations as Intermediaries: The Case of APEM

This chapter will examine the case of APEM, a producer and exporting organization that is responsible for two-thirds of Peruvian mango exports. It will begin by providing some introductory details to the organization. It will then outline the different sources of learning that can be identified for APEM members, including learning from global buyers, learning from informal international networks and learning that takes place via membership of APEM. The chapter will continue with three sections that examine the role played by APEM, looking at APEM as a knowledge diffuser, as a commercial coordinator and as a technological coordinator. It will conclude with an assessment of the different roles that the organization carries out.

5.1 Apem Members and Their Sources of Learning

APEM, the 'Peruvian Association of Producers and Exporters of Mangos', was formed in 1998. It was based in Lima for the first six months of its existence before moving to Piura, where it has its office in the Piuran Chamber of Commerce. APEM was formed with the assistance of the government agency Prompex, now known as Promperu, which is a part of the Ministry of External Trade. It was part of a series of initiatives carried out by this body designed to help the formation of associations within different agricultural industries, with the aim of providing a common point of contact for outside agencies and increasing collaboration in the sectors involved.

Membership of APEM has gradually increased throughout the years and by the end of 2008 there were more than twenty members. Its membership encompasses the majority of large exporting and packing firms, and represents two-thirds of the mangos exported annually from Peru. The majority of the firms are Peruvian owned, although there are a significant number (five at the end of 2008) that are foreign-owned or have foreign investment, mostly by interests from the USA.

The mango industry is very fragmented in comparison with other similar industries that have been successful exporters in Peru, for example the avocado and asparagus industries. One of the features of this fragmentation is that there is a great deal of firm heterogeneity. This is reflected in the activities in which firms are engaged, some firms are exporters, some firms are packers and some firms are

producers, and many firms are a combination of these activities. There is also heterogeneity in firm size and in the average number of years that firms have been involved in the industry. The mango industry is a very fluid one, with a large number of firms only exporting in years when the yield of fruit has been particularly strong. The members of APEM tend, in contrast, to be more long-term players in the industry.

The heterogeneity of firms within the cluster is reflected in the way in which the firms find knowledge and information, for example on commercial and technological matters. This, in turn, is reflected in the types of innovative projects with which they become involved. As a result of interviews with firms in the cluster (Firm Interviews 2-4 and 6-10, 2008), three main routes to knowledge and learning were identified, firstly, through contact with global buyers, secondly, through a network of more informal international links and, finally, through their membership of APEM. These three routes to learning will now be examined in more detail.

5.1.1 APEM Members: Relationships with Global buyers

Some firms illustrated a very close relationship with global buyers and this was an important influence on the way in which they work. One major exporter to Europe, for example, noted that “Throughout the year we are in constant contact with our buyers, they come to visit us and we go to visit them as well. We also attend fairs where we make contact with our buyers, for example this year we have attended fairs in both Germany and the United States” (Firm Interview 2, 2008). The relationship with buyers was considered as important by a number of firms in the acquisition of new technology. One exporting firm, in describing how they designed their new plant, outlined how “This information was brought to us by the English, because they had seen it in South Africa, and it was for this reason that we decided to buy this machinery for our plant. People from the English firm...came here and taught us how to put the machinery into practice” (Firm Interview 2, 2008). Another firm outlined how “This year, for example, the buyer has asked for a new cut for the frozen mangoes. They sent us the machine to do this, which they bought in the USA, and we are paying for it bit by bit” (Firm Interview 4, 2008). Another major firm also illustrated the important role that buyers play, outlining how they “are the ones who

send us information on the technology that they want us to use” (Firm Interview 2, 2008).

Work on Global Value Chains (GVCs) can provide an understanding of how such relationships have developed, illustrating how worldwide value chains have become more integrated. Humphrey and Memedovic (2006) have looked specifically at changes in the global agro-food business and argue that, as value chains have become more integrated, the effective flow of knowledge along them has become increasingly important. Growers, packagers/exporters, transport companies and importers need to communicate more than ever before. The codification of knowledge has formed an important part of these changes. Supermarkets increasingly specify how products should be grown and harvested, providing detailed, written procedures addressing factors such as the use of fertilizers and pesticides, for example. Similar written procedures are produced for the storage and transporting of produce. As part of this process the inspection and auditing of growers and exporters has become both more regular and more comprehensive.

In conclusion, many firms in the mango cluster pointed to the importance of their relationship with buyers as a source of knowledge and learning. More particularly, closer relationships with buyers, and demands for a higher quality product, were found to correspond more to the European market rather than the US one. One exporter noted how, while quality is a major concern in the European market, price remains of premier importance in the USA, and that the extra demands for quality in the European market lead to the necessity of a closer relationship with buyers (Firm Interview 4, 2008).

5.1.2 APEM Members: Participation in Networks of Practice

As well as the relationship that has been identified with buyers in the last section, more informal international links were also identified. A large number of exporters made reference to contacts that they made through the years that they had been involved in the industry. These were maintained and expanded through attendance at industry conferences, significant ones being held regularly in Germany and the USA for example. Many exporters and packers stressed the importance of learning from other people, as one put it “Our staff have 25 years experience working with fruit and 7 years working with mangos, we have seen plants in other parts of the world, we

have seen the mistakes that other people have made, with this experience our work team has found a way of working that has provided excellent results” (Firm Interview 2, 2008).

The international links that were established often led to a more formal relationships, for example one exporter explained that “We had a consultant that came from Holland to advise us on the treatment of water in order to avoid contamination, he spent two to three weeks working in the firm and provided some important help” (Firm Interview 6, 2008). Sometimes these relationships can become more long-term, for example another exporter/producer explained that ‘have a friend in Israel who is an expert in fertilization, who comes to the firm four times a year and this has helped us make a big improvement in our production’ (Firm Interview 3, 2008).

The concept of ‘networks of practice’ (Brown and Duguid, 2001) can be used to understand these relationships. The links identified in ‘networks of practice’ extend far beyond the boundaries of an organisation and play an important role in spreading knowledge among practitioners. Although they do not fundamentally create “new” practices within the network, as might occur within a functioning community of practice, they provide a route through which a much wider range of knowledge can be accessed.

Nevertheless, the development of common practices still underpins these networks. Practitioners that have common practices are able to share knowledge through conferences, workshops, newsletters and web contact, for example. Managers are members of networks of practice with other managers, for example. They have extensive shared practice leading to extensive shared know-how which, despite the fact they are competitors, allows extensive circulation of managerial knowledge. In the case of mango exporters/packers, these networks of practice provide a route for obtaining information on technological changes, on market changes and on developments in other producing countries.

5.1.3 Learning via membership of APEM

The final route to learning that can be identified is learning via membership of APEM. Through their membership of APEM firms have undertaken a process of perspective making (Boland and Tenkasi, 1995) and have developed a shared

viewpoint of how they see the industry developing. Because of its independence from the interests of a particular firm, the organisation has been able to unite a previously fragmented cluster, in a way that a lead firm would have been unable to do. The result of this process has been the production, in an industry that constantly fluctuates due to varying market yields, of a business strategy for long-term, sustainable, growth (Association Interview 1, 2008). Central to this aim has been a focus on quality, and the organization has helped facilitate the establishment of international links, for example with the National Mango Board in the USA, which allow member firms to receive and share knowledge on international quality standards.

APEM members, therefore, tend to be firms with a long term commitment to the industry, and their aim is to seek out long-term markets that will provide the maximum possible value-added for their product. There are a lot of factors that link the exporters and packers together, and this encourages cooperation. They face similar challenges, for example dealing with language issues and cultural differences amongst the buyers of their product. They also face similar constraints, for example, problems with the infrastructure needed for success in international markets. They also tend to travel to the same conferences and international meetings, both within Peru and to international industry conferences held in Germany and the United States. As well as such meetings, regular informal contact takes place between them through the telephone and emails. One of the factors that helps encourage such cooperation is that this has been a rapidly growing industry, and there is only a limited amount of competition amongst the exporters for clients. One exporter, for example, noted how “We compete for personnel, for services, for shipping services, for logistical demands, and for the producers who are going to give us their mangos, but not for the client because there are many of these” (Firm Interview 4, 2008).

Through an emphasis on quality, therefore, APEM members share a common vision of how the industry should develop. There is also a common realization that poor quality fruit from a small number of suppliers can affect the international image of Peruvian mangos as a whole, and this provides an important incentive for the sharing of knowledge. To achieve this, however, a process of legitimization is important, and APEM is able to provide this through the contact point it is able to provide to the industry for global buyers, and because of the relationships it has established with international organizations such as the National Mango Board.

Providing legitimacy in this way was identified as a part of the coordinating role in the taxonomy of intermediaries roles presented in Chapter 3. The work of APEM has been intrinsic, therefore, to the reputation for quality that Peruvian mangos have developed internationally, a reputation that was confirmed via an interview with a UK importing firm (Firm interview 1, 2007).

The following sections will look at some of the results of the cooperation between Apem members that has been identified. They will draw attention to the diffusion of knowledge amongst its members that APEM facilitates, and the coordination role that APEM has played in both commercial and technological projects.

Section 5.3.3 **APEM and its Members: Firm Survey Evidence and Social Network Analysis**

A survey of large and medium sized firms completed for this study (Firm Survey, 2008) gathered data on firm size and competences and also asked firms to identify the sources of technological and commercial knowledge that were important for their work (see Appendix 1). In addition, representatives from intermediary organisations were also asked to complete a survey on their work (Association interview 2, 2008). The data gained from these surveys will now be discussed. Firstly, data on both the size and features of APEM firms will be considered. Secondly, the sources of knowledge for APEM as an organisation will be examined. Thirdly, the sources identified as important by firms that are members of APEM will be examined. Finally, Social Network Analysis will, using Pajek SNA software, be employed to examine what can be learnt from the networks within which APEM member firms participate.

Table 5.1 APEM Member Firms: Firm Size and Competences

	Exporting Firms (as % of membership)	Packing Firms (as % of membership)	Producing Firms (as % of membership)	Average land if produce (hectares)	Average Employee Numbers	Firms with HACCP certification (as % of membership)	Firms with GlobalGap certification (as % of membership)
APEM Firms	93%	71%	65%	125	142	71%	65%

(Source: Firm Survey, 2008)

Table 5.1 illustrates that firms that are members of APEM tend to be large firms, both in terms of their numbers of employees and, if they are producers, the area of land that they farm. The table also illustrates variety in the activities of the members of APEM, the majority of firms are exporters and a high percentage of firms are also involved in packing. For those APEM members that produce mangos, the size of the land farmed is 2½ times that farmed by Promango members (see Table 6.1).

Table 5.2 APEM: Sources of Knowledge

Knowledge Source	Technological Knowledge Received (Importance 1-5)	Commercial knowledge received (Importance 1-5)
ADEX	5	5
Promperu	5	2
National Mango Board (USA)	4	2
Ministry of Agriculture	3	3
IMG	0	2
Senasa	2	4

(Source: Association Interview 2, 2008)

Table 5.2 illustrates the sources of knowledge for APEM itself as an organisation and was completed following an interview with a member of the organisation. It reveals links with two important organisations in Peru that encourage exports, ADEX and Promperu. It also reveals important links with the National Mango Board (USA),

which provides APEM with knowledge about exporting to the USA which it then diffuses amongst its members.

Table 5.3 APEM Member Firms: Sources of Technological Knowledge

Name of Intermediary Organisation	No. of firms identifying organisation as source of technological knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
APEM	13	2.7
Senasa	12	3.3
Certification Firms	12	3
Promperu	8	2.3
National Mango Board	8	2.1
Adex	7	2.9
INIA	5	2.2
Promango	5	2.4
Consultants	4	3.3
Incagro	3	2.7

(Source: Firm Survey, 2008)

Table 5.3 shows the sources of technological knowledge for firms that are members of APEM. The table shows that APEM firms have important links with organisations whose purpose is to encourage exports, including APEM itself, ADEX, Promperu and the National Mango Board. A further interesting issue from the table is the relatively high position occupied by certification firms, indicating that they are an important source of learning. Also of interest is the data in the table about the position of consultants. While these are used by a relatively small number of firms (four), the firms involved rate the knowledge that they receive from this source as important. The use of consultants indicates some firms have a higher level of resources, and also some international links as qualitative data collected for this study indicated consultants being bought from other countries (Firm interview 3, 2008).

Table 5.4 shows the sources of commercial knowledge for firms that are members of APEM. The table shows important links with organisations that provide knowledge necessary of exporting, including APEM itself, Promperu and the

National Mango Board. Similarly to the situation with technological knowledge, there is a relatively high position occupied by certification firms, indicating that they are an important source of learning. Consultants also again feature in this table, but their importance in providing commercial knowledge is ranked lower than that for providing technological knowledge.

Table 5.4 APEM Member Firms: Sources of Commercial Knowledge

Name of Intermediary Organisation	No. of firms identifying organisation as source of technological knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
APEM	13	3.3
Senasa	12	1.9
Certification Firms	12	2
Promperu	8	3.6
National Mango Board	8	3.5
Adex	7	2.7
Consultants	5	1.8
Promango	5	2
INIA	4	1.2
Incagro	3	2

(Source: Firm Survey, 2008)

Figures 5.1 and 5.2 show the network for firms that are members of APEM, Figure 5.1 showing the network for commercial knowledge and Figure 5.2 showing the network for technical knowledge. The arrows included on the maps indicate the direction in which the knowledge is flowing. The size of the nodes for the firms relates to the total value of the knowledge that they receive from the various intermediary organisations that are a part of the network. The size of the nodes for the intermediaries relates to the value of knowledge that they provide to the firms with which they are linked.

Figure 5.1

Network for APEM members, commercial knowledge. Yellow: APEM members. Blue: Promango members. Red: Intermediaries + Service Providers Size of nodes is proportional to knowledge transferred (valued in degree, in plus out).

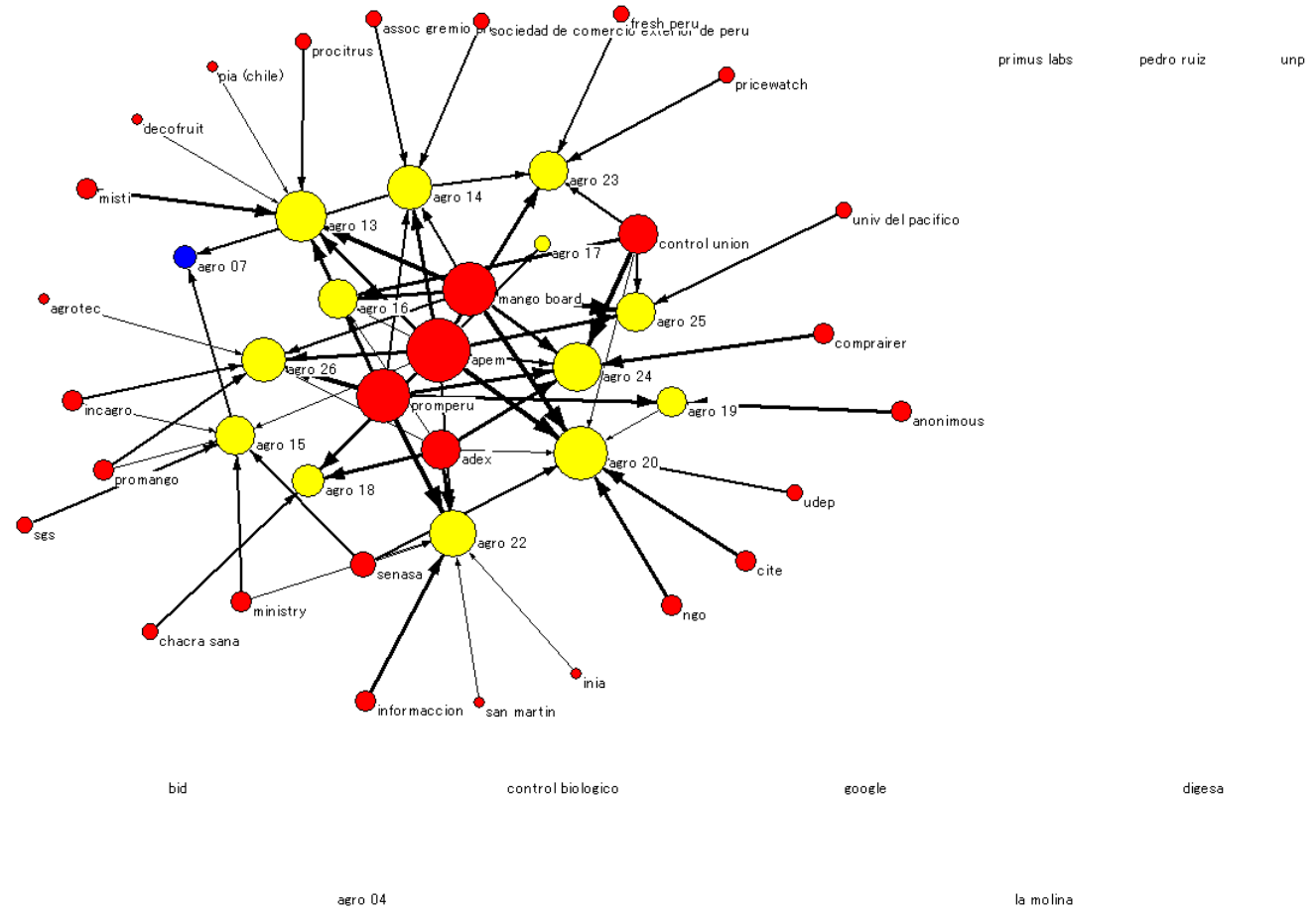


Figure 5.2

Network for APEM members, technological knowledge. Yellow: APEM members. Blue: Promango members. Red: Intermediaries + Service Providers Size of nodes is proportional to knowledge transferred (valued in degree, in plus out).

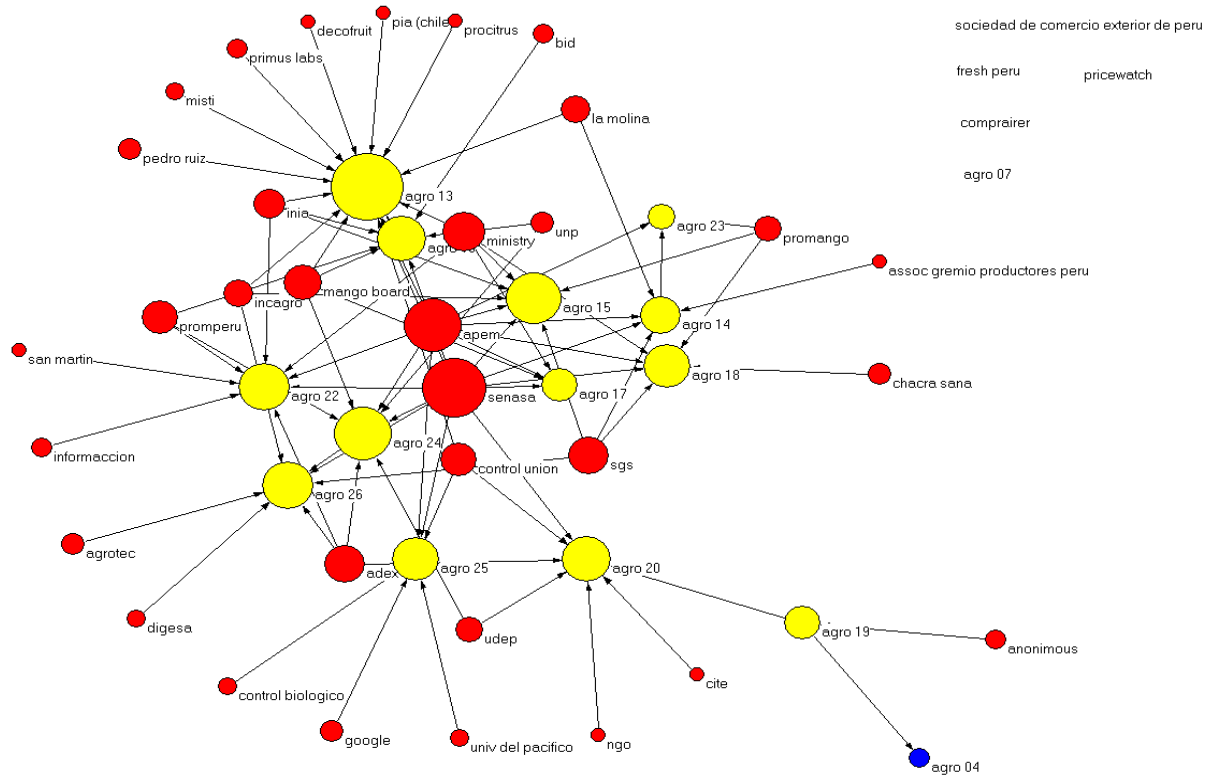


Figure 5.1 shows the network for commercial knowledge and illustrates the central position occupied by APEM in this area. It is evident from the map that APEM has linkages with a large number of firms and that these contacts are valued by the firms concerned. Figure 5.2 shows the network for technical knowledge for APEM members. The structure of this network contains some significant differences from that of the network for commercial knowledge as for this map the most important position in the network is occupied by Senasa, the phytosanitary organisation. APEM's position in this network is less significant than in the commercial network map, but it is still important.

From consideration of both maps, and comparison with similar maps that are included in Chapter 6 for Promango firms, it can be noted that APEM firms have linkages with a more diverse range of organisations than Promango firms. This would suggest that they are accessing a more diverse range of knowledge, this being consistent with the fact that many of the firms in APEM combine a number of different functions, often including a combination of producing, processing and exporting. The diversity of their contacts might also suggest that their dependency on their industry association is less for APEM firms than it is for Promango. It can also be observed from comparison of both sets of maps that some knowledge flows from APEM firms to Promango firms, and that only a very limited amount of knowledge flows from Promango firms to APEM firms.

5.3 APEM and the Diffusion of Knowledge

5.3.1 Diffusing Knowledge: The International Congress of Mangos

There are a number of ways in which APEM diffuses knowledge to its members. On a regular basis, it provides information to its members through a bimonthly newsletter, through its website and through email contact. APEM also organizes an International Congress of Mangos which takes place each year in Piura, the city at the centre of the most important mango growing region (Industry Event 1 and 3, 2008). The event in November 2008 was the seventh year in which the Congress has been held, and it has established itself as the meeting place for the Peruvian mango industry. In 2008 it was attended by in excess of 350 people, representing all parts of the industry including large exporting and packing firms, medium sized producers and representatives of associations of small producers. Its importance was confirmed

by the attendance of the Government Minister for External Trade, who stressed particular government support for the industries desire to export to Asia (Industry Event 3, 2008).

Spread over two days, presentations at the congress appeal to different interests within the industry. A focus of the 2008 congress, for example, were the features and demands of the Chinese and Japanese markets which have become of increasing interest for Peruvian exporters. Other presentations appeal more to producers, focusing on issues such as certification demands, fertilizers and pesticides. Speakers are invited from businesses providing support services, from research institutes, from university departments and from government departments. International visitors from a range of different countries and sectors also regularly attend the congress (ibid.).

In addition to the presentations, many informal meetings take place throughout the two days of the congress. Representatives from the large firms are involved in a constant stream of meetings, sitting around the pool in the hotel where the event is held, for example, with contacts from other Peruvian firms and contacts from the importing countries. According to conversations held with the conference attendees, many important decisions on the approach to be taken to the upcoming season are made during these two days.

Finally, such a large gathering of industry actors presents an opportunity for accessing knowledge, as identified in the taxonomy presented in Chapter 3. In terms of networking it provides firms that, due to limited resources don't have the opportunity to travel, the chance to mix with international representatives and with organizations that are normally based in Lima. It is also consistent with the findings of other studies (Gomes, 2006) that much knowledge sharing takes place informally, and contacts and links built during the congress are likely to prove of enduring use to firms as the season progresses.

5.3.2 Accessing and Diffusing International Market Knowledge

APEM also plays an important role in accessing knowledge through its membership of international bodies, and in diffusing this knowledge amongst its members. An example is the work that APEM does with the National Mango Board (NMB) from the USA. The mission of the NMB, which was formed by the US government, is 'to increase the consumption of mangos in the US by uniting the industry and

strengthening the mango market' (NMB Internet 1, 2010). The NMB works to try and increase public awareness of mangos through media campaigns, for example, by persuading prominent chefs to promote recipes containing mangos. While twenty years ago consumption of mangos in the US was mainly confined to its ethnic minority communities, more widespread knowledge of the fruit has increased and has led to an increase in overall consumption. Through their website, and demonstration events, they try to provide information to consumers on selecting and using mangos, for example the characteristics of the different varieties available and how to check for ripeness. They also work with retailers on how to market the fruit effectively, and on storage and freshness issues.

As part of their mission statement the organization acknowledges how the majority of mangos consumed in the USA originate from Latin America and the Caribbean and working successfully with producer countries is therefore seen as an important element in the successful growth of the industry. The Peruvian representative of the National Mango Board, an APEM member, travels to the meetings of the Board and relays the information from these meetings on to APEM's members. It is of interest to producer countries, for example, to know how their product is being promoted in their destination markets. Members of the NMB also visit and speak regularly at the International Congress on Mangoes that APEM organizes. One major exporter to the US market outlined how "The benefits of being in APEM are principally information...information on how to conduct ourselves with the USA, how to coordinate with APHIS (the USA phytosanitary organization) and the rules for exporting to the USA" (Firm interview 2, 2008).

Another aspect of membership of the NMB is that allows more regular contact to be made with other producing countries. APEM's strategy is for the long term development of markets and this requires some level of cooperation amongst producers. The reason for this is that, with planning, exporters can ensure a higher return for their product. If however, the market becomes flooded then, as previously mentioned, prices start to fall very rapidly and the situation can be reached where returns are extremely low. For cooperation to be effective a detailed knowledge of the quantity of mangos in the market at any given time is needed. For this reason one of the tasks performed by APEM is to carry out a continued monitoring of the total production of mangos each year. The information that is collected is distributed to the members of APEM on a regular basis, or can be purchased on a commercial basis

by non-members. One exporter pointed to the value of this information, stating that “APEM assists us with a lot of statistical information, so we can understand how other packers are thinking, so we can know each other better and create collaborative relations between us” (Firm interview 2, 2008).

This information is also shared by APEM with other Southern producer countries with which they cooperate, namely Ecuador, Brazil and South Africa. For example in 2007 a ‘Declaration of Commitment’ was signed by four countries, Brazil, Ecuador, South Africa and Peru (Freshplaza Internet 1, 2007). The signatories committed themselves to provide prompt and accurate information about the quantity of exports that they were making, with the aim of each country being in a position to make better decisions on production and exports. This agreement was signed at the Sixth International Mango Conference held in Piura in August 2007 and it served to illustrate the importance of this event as a means through which the various countries can meet with each other and share information (ibid.).

All of the countries involved acknowledged the difficulties involved in collecting accurate information, especially since the various trade organizations from the different countries do not represent 100% of the exporters from their countries. They pledged to use information from packaging plants, and from the customs in their respective countries, in order to provide as accurate information as possible. Its value was pointed to by one exporter, who described how “With APEM we can have relations with other organizations in other parts of the world, it is with Ecuador, Brazil and South Africa that we have the closest relations. These southern countries are working together and sharing knowledge...so it is worthwhile participating” (Firm interview 2, 2008).

In conclusion, in this case APEM is involved in a long term knowledge role, one which provides producers with information that helps them to plan production, time their shipments to maximize their return from the product and make more long-term decisions on the future of their business. In carrying out this accessing role Apem is showing its ability for perspective taking (Boland and Tenkasi, 1995), being able to understand and respond appropriately to the worldview and perspectives of other bodies. The knowledge that is gained is useful in that it allows a level of coordination to take place amongst Southern producing countries. Coordination also takes place with the NMB who, for example, can adjust the decisions they make on

the timing of the marketing of the product they make in the US to coincide with peaks and troughs in production levels from the Southern exporting countries.

5.3.3 Diffusing Knowledge Amongst Small Producers

APEM has also been involved in efforts to diffuse knowledge amongst small producers. The relationship between exporters and small producers has historically been a difficult one within the industry, characterized by what is called in Spanish 'informalidad'. A lot of mistrust has existed and is expressed in disputes about payment for fruit, the quality of the product supplied and other areas. In addition, there exists a suspicion amongst some small producers that the larger firms wish to take them over.

An example of a business working closely with producers is an initiative began by Sunshine Export S.A. in 2005. In September 2007 the firm published a document entitled 'Metodologías de Capacitación Para Pequeños Productores' in which the strategies that the company has developed for assisting the capability building of the producers were outlined. They worked together with 250 producers, who were grouped into 22 associations, in order to assist them in obtaining certification for the production of organic mangoes. The producers are concentrated in the valleys of San Lorenzo and Alto Piura and certification has been granted by the 'Control Unión Perú' company. In addition to playing this role, Sunshine Exports has also agreed to purchase the entire organic crop produced, providing an incentive for the producers to make the necessary changes. In practice small producers have had differing experiences of the project, however. Some have benefited greatly while others have complained about inconsistencies in the way the scheme has been implemented, and believe that it has merely served to reproduce the existing tensions in the industry.

A second route to certification, however, has been identified in which the role of intermediary organisations is important. An example is a project initiated by APEM to facilitate small producers within the mango cluster to develop their capabilities and become certificated. In 2007 APEM began, in collaboration with the Inter-American Development Bank, a project aimed at facilitating the certification of producers in the Piura region (Association Interview 2, 2008). The project is aimed at small and medium firms who produce for export, especially those who currently, or have ambitions, to export to the European market. The project was initiated in

recognition of the fact that importers, particularly European ones, are becoming increasingly demanding as regards the conditions in which mangoes are grown, needing certification documents from producers to guarantee that the standards required have been followed. The project has three stages, firstly, a ‘capacitation’ stage in which the participants are able to recognise the important constituents of good practice. Secondly, there is an implementation stage that allows producers to take the necessary steps to achieve certification, and assess whether these have been achieved. The final stage is the certification stage itself in which producers will obtain the EUREP-GAP certification demanded by many European importers. The project has involved approximately 180 producers, it began in August 2007 and its planned duration was for 18 months.

A number of examples of the way in which APEM is involved in the diffusion of knowledge have been looked at therefore. A further assessment of this role, and a consideration of the limits to the diffusion role, will be made in Section 5.5.

5.4 APEM and Commercial Coordination

Developing skills in being able to identify and take advantage of commercial opportunities is seen by many in the industry as the key to success, and tends to be talked out by producers and exporters as more crucial than any changes in technology. The development of markets is one of the key areas in which commercial advantage can be gained. Firstly, it is important that existing markets, most importantly the North American and European ones, are maintained and developed. New markets are also important, however, and in his address to the 2008 International Congress of Mangos Mr Daniel Bustamente, the incoming President of APEM, drew attention to the fact that the opening up of new markets had been an important focus of APEM’s business strategy (Industry Event 3, 2008). The most recent example has been the effort that APEM has placed in gaining an entry to the Chinese market. Over the last five years many cultural, political and logistical barriers have been overcome as Peru has begun to export mangos to China, and APEM has played a significant role in this process.

5.4.1 Developing the Chinese Market

For a number of reasons China is seen as a promising market for Peruvian mangos. The Chinese are high consumers of fruit in general, and mangos in particular, although the varieties of mangos that are consumed are different from those that are traditionally grown in South America. The consumption of fruit is believed in China to bring harmony and closeness to family. For this reason it is a very common gift, and this leads to a demand for quality, and particularly for products that can be seen as selective or exclusive. The main period of gift giving is the Chinese New Year, recognized as the largest annual worldwide migration, but gifts also perform an important part of other festivals throughout the year.

In recent years the Chinese economy, as well as achieving exceptionally high levels of economic growth, has become increasingly market-orientated and open to foreign trade. As part of this process the rise of a large, increasingly affluent, urban middle class forms a potentially large market for quality agricultural products. Developing its agricultural production has not, however, been viewed as a priority by Chinese government, who has not seen it as having as high a value added as manufacturing industry and services, on which the Chinese growth strategy has concentrated. In the past a lot of Chinese agricultural imports arrived in the country via Hong Kong, thus avoiding customs duties and phytosanitary regulations. In 2005, however, the Chinese authorities put in place new regulations that reinforced phytosanitary regulations for imported fresh fruit. This made it more difficult for Hong Kong, challenging its position as a low cost route to the Chinese market.

These developments have, therefore, presented opportunities for countries with the ability to export agricultural products to China. While China does produce its own mangos, and could also import from neighbouring countries, the Southern producers of Brazil, Peru, Ecuador and South Africa enjoy the same counter-seasonal advantage as when they export to the North American and European markets. Peru has some significant advantages over its Southern competitors. In the case of Brazil and South Africa, the considerably longer journey time from both of these countries is a major problem. In addition, the varieties that are mainly produced in these countries are not seen as appealing to the Chinese market. Finally, neither Brazil nor South Africa has a phytosanitary agreement signed with China. Ecuador, the other major Southern competitor to Peru, has a similar advantage in that its journey time is

shorter. Like Brazil and South Africa, however, it cannot export to China as it does not have a phytosanitary agreement signed with the country.

5.4.2 Preparing an Export Strategy

In order to take advantage of this opportunity, however, a commitment to export had to be developed amongst Peruvian firms. The concept of perspective making, the process through which a community of knowing develops and strengthens its own knowledge domain and practices (Boland and Tenkasi, 1995), can be used to understand the role that APEM has played in the development of this commitment. It has played a role in establishing interest in the Chinese market, helping to forge the development of a common approach and helping the idea of exporting to China to spread throughout the cluster (Association Interview 1, 2008). It has also gained acceptance for the lead role that it, as a producers and exporters association, is playing in the process.

APEM has also played a role in diffusing information about the Chinese market, both through the annual congress it organizes and through other outlets. At the 2006 congress, for example, there was a presentation about the opportunities and challenges in exporting to the Chinese market (Industry Event 1, 2006). At the 2008 congress exporting to the Asian market, not just China but Japan also, became a major focus of the conference (Industry Event 3, 2008). This was reflected in the publicity material that was produced for the congress and speakers invited to the conference who were experts on both the Chinese and Japanese markets. This focus was also reinforced by the visit to the congress of the Minister for External Trade, who stressed in her speech the importance to the national government of increasing exports to Asia, an example being a visit to China that had taken place earlier in 2008 by the Peruvian President, Dr Alan Garcia.

A number of major challenges have been faced in beginning to export will now be examined, and the role that APEM has played in overcoming these challenges will be highlighted.

The first of these challenges was achieving a phytosanitary agreement with the Chinese authorities. In early 2005 an agreement was signed that allowed Peruvian table grapes to be exported to China. Later, in December 2005, an agreement was signed that laid out the rules and technical procedures that Peru needed to follow in order to export mango to China. Senasa, the Peruvian phytosanitary organization

which is an agency of the Ministry of Agriculture, has played a lead role in this achievement, with assistance from other organizations such as APEM. The early signing of phytosanitary agreement has been a big advantage for Peru. In particular, the early interest it has shown in following the legal route to exporting will help the country develop a reputation for quality amongst retailers and consumers.

The second major challenge that can be identified is establishing initial contacts with Chinese businesses and APEM has played an important role in the various stages that were needed to achieve this. Developing trust has been an important part of this process. One exporter stated how “to open this market you need to go step by step, because initially the Chinese don’t trust us, and we don’t trust them, and without a condition of trust things don’t go well” (Firm Interview 3, 2008).

A representative from APEM made an exploratory visit to China in 2005 and contact was made with the commercial office of the Peruvian consulate in Shanghai. Through this contact it was arranged for a group of Chinese businessmen to visit Peru in October 2006 in order to get to know the products available and their place of production, and to meet, amongst others, mango exporters. The Chinese businessmen were met by representatives from APEM who arranged for inspection visits to processing and exporting firms, and arranged for meetings to take place with representatives from the large firms in the cluster that had expressed an interest in exporting to China (Association Interview 2, 2008).

5.4.3 Understanding Market Demands

At this stage of the process it is relevant to consider the process of perspective taking. The large firms intending to export, working through APEM, had to take a perspective on what variety of mango would appeal to Chinese consumers, including consideration of issues such as the size of the fruit, its taste and its colour. They also had to consider issues such as when they would pay a good price for the product, how it should be packaged and presented effectively, and what retail outfits could be used to most effectively sell the product. They did this through consultations with the buyers, through the assistance of a representative of the commercial office of the Peruvian consulate in Shanghai and by using their experience gained from approaching other markets in the past, for example the US and European markets. They were also able to use some of the technological knowledge gained from other

exporting experiences, for example the hot water treatment needed for the Chinese market is the same as that which is needed for the US market.

An important part of perspective taking was deciding on the variety of mango that would be exported to China. In making this decision there was a need to be aware of and understand the culture and tastes of Chinese consumers. A decision had to be taken on whether Kent, the variety that is primarily grown in Peru, would be suitable for the Chinese market. This was a difficult decision because it is a variety that has never been consumed in China before. Kent has a number of characteristics, however, that make it potentially appealing. Both its red colour, and its large size, are important assets and it was thought that its texture, taste and aroma would also appeal to Chinese consumers. Two further advantages are that Kent is resilient to the hot water treatment that is needed for the Chinese market, and that it lasts well on long journeys.

After discussions between representatives from both the Chinese and Peruvian side it was decided that Kent provided the most viable prospect. Decisions were also made at this stage of the size of fruit that would be sent, how the fruit would be presented and packed and what conservation measures would need to be taken in order to ensure that the fruit arrived in a good condition. A look was also taken at ways to promote the fruit, including, for example, attendance at relevant trade fairs.

A process of perspective taking also had to be taken by Peruvian exporters in deciding on the timing of their exports to China. Peru is in the fortunate position that its period of production coincides with the Chinese New Year. As previously mentioned the red colouring of Peruvian mangoes provides an important competitive advantage during this period, a website designed for western businessman, for example, refers to ‘the association of the colour red with protectiveness, prosperity and luck during the fifteen days of the Chinese New Year’ (Renmenbi Internet 1, 2008).

Organizing the arrival of their mangos to China by this time has, however, presented a number of logistical challenges for Peruvian exporters. As the Peruvian mango season begins in November time needs to be carefully managed. Mangos exported to China need to undergo a hot water treatment, which slows down the process, and the length of the journey to China is also problematic. This problem has been dealt with at a cluster level. APEM has worked closely with producers, packers

and exporters to ensure that the supply of mangos is coordinated for the appropriate time. It has also worked closely with shipping companies in order to cut down the journey time necessary for the fruit to the minimum possible.

As this was a process with an uncertain outcome, and considering the feature of the cluster in not having large firms able to take big risks, the members of APEM decided that in the initial years APEM itself would be the exporter. As the market develops the plan is that the mangos then begin to be exported in the names of individual firms. In addition to its coordinating role, therefore, APEM has also played an important brokering role as the process of exporting to China has developed. It has been responsible for the drawing up of initial contracts with the Chinese buyers and the legal complexities that those have inevitably involved.

5.4.4 Conclusion: APEM as a Coordinating Organisation

In conclusion, the development of the Chinese market has progressed rapidly and APEM has played an important role in this process. In the first year of exports, 2006/07, only two firms were certified to export and only two containers were sent to China but by the following year this had increased to five firms certified and ten containers exported. It is hoped that, if the market grows as expected, eventually more than 5% of total Peruvian mango exports will be destined for the Chinese market.

APEM has played a central role as a coordinating body and as a means through which perspective making and perspective taking have taken place. Some of the particular challenges that have been faced in approaching the Chinese market include understanding a different business culture, overcoming language and culture difficulties and building trust. It has been an important organisation because it has been able to bridge the gap between the different communities involved, translating the interests of one community to another.

APEM has used a variety of skills and capabilities in carrying out this role. For example its past experience in dealing with other international markets, initially the USA and later the European market, and adapting to the particular demands of those markets has been important. The confidence that exists in the quality of Peruvian fruit, and the professionalism with which the various stages of the supply chain are managed, has also been important and this is something which APEM has been working on for many years. In addition their ability to negotiate successfully

with various service providers, for example the shipping firms, has also been important. Finally, the role of APEM has ensured that the various stages needed to be taken have been able to be carried out in 'riskable steps'. This is something that is recognized as important in emerging clusters (Schmitz and Nadvi, 1999), particularly in cases such as the mango cluster where there is a lack of strong lead firms.

5.5 APEM and Technological Coordination

5.5.1 Possible areas of technological innovation

There are a number of possible areas where research and development work within the mango sector could prove to be beneficial, and where technological innovation might take place. One of these is research into new varieties of mangos that could potentially be grown in the Peruvian climatic and soil conditions. Another area is research into alternatives to the hot water treatment that is currently required by the USA. For example in Mexico research is being done on the irradiation treatment method. Research would also be of benefit looking at new developments in agro chemicals, and pesticides, that could be used in Peruvian conditions. Research would also be of use into methods to help to deal with the unpredictable climatic conditions that exist in Peru, an example being the heavy rains that invariably fall during the season. One large producer mentioned that he was aware that in Brazil research is taking place into new methods that are being developed to limit the negative effects of the rain, but that no similar initiatives were taking place in Peru.

5.5.2 Technological innovation: The Hot Water Treatment Project

One example of technological innovation that has taken place in Peru relates to the hot water treatment required for export to a large number of countries. This requires that the mango is heated at a constant temperature for a set amount of time. Traditionally the sector had used machinery from Mexico in order to give treatment to the mangos but this was providing a lot of problems. The most difficult issue was maintaining the machine as each time there were problems the companies had to wait for staff to fly from Mexico in order to provide assistance.

In the mid 2000s a Professor from the University of Piura was approached by one of the major mango packers, who had become aware of some of the projects they had been involved in previously. The Professor is part of a team of three from the

University, all of which have considerable international experience, having completed international projects in the Dominican Republic, Italy and Argentina as well as at a national level. The team worked for two months designing a system which registered the heat of the water at one minute intervals (Academic Interview 4, 2008). They then contracted a company with whom they had worked on many previous projects to build the system. There are two technicians who are available to deal with any problems that arise with the system, the they can be at the relevant plant in a matter of hours rather than the days that it takes those who use the Mexican system to get service. Of the eight businesses that have the capacity to apply the hot water treatment, four now use the system developed in Piura while four continue to use the Mexican system. There has also been interest in the system from businesses from Ecuador (ibid.).

It has taken, however, a long time for businesses in Piura to develop trust in the team's capabilities. According to one of the team's members they had been exporting successfully and supplying other regions of Peru for several years before local businesses began to consider using their expertise. The University team is at present investigating the possibility of a new project with a large packing firm, in this case seeking to develop a more efficient sizing and weighing machine. Funding will be sought from a fund created by the government agency CONCYTEC, which aims to promote innovation through encouraging links between academic institutions and businesses (ibid.). In conclusion, while this project was not initiated by APEM, it saw important cooperation take place between different members of APEM and some important links being drawn between firms in the cluster and a local university.

5.5.3 Technological Innovation: The Standards Committee

Another example of technological innovation is the work on the quality and standardisation of mango production that has been done as a result of the Standards Committee. The standards committee has its roots in the work of Indecopi, the Peruvian national authority for Technical Norms. The organization is responsible for the formation of Technical Norms across a range of industries, and also attempts to ensure that they are promoted and diffused. Technical norms already exist for a number of agricultural products in Peru, including asparagus, table grapes and avocados. These technical norms define certain characteristics of the fruit or vegetable, for example its size and its internal and external characteristics.

The setting up of the Standards Committee was initiated by Promperu (previously known as Prompex), which is part of the Ministry for External Trade, and it has been in operation for more than five years. It is a body that meets on a regular basis, usually every three months, and draws together people from different parts of the industry (Agency Interview 13, 2008). One of the members of the committee is a member of the local university, a significant fact as links between mango producers and exporters and universities have been relatively rare in the mango industry (Association Interview 2, 2008).

The Standards Committee has been responsible for putting together two documents, the first of which is the Technical Norms document where the parameters in which the Peruvian mango needs to be produced are defined (INDECOPI, 2002). A second document that has been produced is a guide explaining how these technical norms should be interpreted. This contains a lot of photographic material which provides more understandable guidance to the growers and processors of the fruit. At the moment the committee is working on a proposal to try to bring about a new set of guidelines, and a new document, that specifically focuses on the maturity of the fruit.

The work of the Standards Committee is an example of a coordinating role being carried out by APEM, as people from different parts of the industry are being drawn together. The documents on which the committee works act as a boundary object (Brown and Duguid, 1998) which allows participants from parts of the industry whom might have different interests, to meet and find areas of agreement. In addition to the documents that are worked on the meetings provide an opportunity to discuss wider developments within the industry, and knowledge is exchanged that can be of both commercial and technological value to the participants present.

Section 5.6 Interpreting the Results: APEM as an Intermediary Organisation

The role played by APEM will now be assessed, making specific reference to the research questions that were posed in Section 3.1.2. Reference will also be made to how APEM fulfills the roles identified in the taxonomy in Chapter 3, in particular to how it plays the coordination role in a distinctive way.

The second research question considers how intermediaries play a role in the formation of cluster communities. When APEM was formed at the end of the 1990s the exporting of Peruvian mangos had already been in a period of growth but APEM

played a critical role in accelerating this process and in building the strength of the cluster. It has done this through encouraging an increase in horizontal cooperation between firms. Evidence has been presented of how the members of APEM have a lot of characteristics and concerns that unite them, and the formation of APEM has allowed these shared interests to become more apparent.

One of the ways in which APEM achieved this is through performing the diffusion role outlined in the taxonomy of intermediaries roles presented in Chapter 3. It has done this through the organization of talks, training course, internet and email communication and through the annual mango congress it organizes each year which is the meeting point for the industry. A further example of it diffusing knowledge is the week to week information it provides to firms on the export levels of its competitor countries in South America. In order to obtain this information these countries share information, and through the sharing of information they aim to reduce the negative price consequences which a flooded market in the USA would have.

The second research question also considered the extent to which intermediaries play a role in the development of common understandings, common practices and common learning perspectives in emerging clusters. In the case of common understandings the focus on quality, and the development of long-term markets, can be pointed to, and the role that APEM has played in perspective making can be identified. Once again, the diffusion role played by APEM is important as the learning that has taken place through APEM has helped an appreciation emerge in the industry of how international standards can be achieved. Firms increasingly recognize the importance of good practices, for example a representative from a large exporter stated that ‘There are no big shifts in technology actually; it is more about being able to show best practices’ (Firm Interview 8, 2008).

Achieving a level of production consistency, through the adoption of common practices, is important for international recognition, and the success of Peruvian exporters in this area was confirmed through an interview with a leading importer in the UK (Firm Interview 1, 2008). Common practices have been encouraged through the move towards international certification that has been followed in recent years. An initiative followed by APEM to work with small producers in this area has been outlined in this chapter, and provides an example of knowledge diffusion. The development of the standards committee, discussed in

section 5.4.3, is also an example of APEM carrying out the diffusion role. This committee has helped the establishment of a common understanding of the characteristics of a good quality mango, and has helped to spread the common practices that are needed in order to achieve this.

The third research question considers the extent to which intermediaries play a role in the emergence, and coordination, of common strategies amongst cluster actors. APEM carries out the coordination role identified in the taxonomy in Chapter 3, in doing so providing a mechanism through which firms in the cluster can successfully work together. This role has proved to be particularly significant in the commercial enterprises that it has been involved in, particularly the development of new markets which has been a central part of the strategy followed by APEM in recent years. In carrying out this work APEM has helped its member firms to become more integrated into the value chains in which they participate.

The development of the Chinese market is an example where APEM has demonstrated its mediation, research and networking skills. Its work has illustrated the importance for successful coordinating of the ability to build networks, and to develop a degree of trust amongst those participating in particular projects. Important in carrying out this role is the process of perspective making, the preparatory work that needs to be done for them to be convinced by, and therefore commit to, a new strategy. In the case of exporting to China, for example, APEM played an important role in convincing exporters of its feasibility.

While APEM has demonstrated its contribution to the development of organisational capabilities, less success has been achieved in the development of a common perspective on research and development and technological innovation. Initiatives in this area, while significant, have tended to arise at an individual firm level and have suffered from a lack of resources and poor communication. This is an issue a representative of APEM indicated his awareness of, and noted how in other agricultural sectors he was aware of such bodies operating successfully (Association interview 10, 2008). The need for a body that can provide more leadership in this area, be it APEM or an alternative organization, has been pointed to by several exporters and could also become more crucial in the future, as more competitors in mango production emerge in different parts of the world.

In considering the above evidence on research questions two and three, some points of qualification need also to be made. In particular a number of limits to

knowledge flow within the cluster community can be identified. Firstly, not all large firms are members of APEM and the organization would like to expand its membership. Reasons given for non-membership include concerns about the cost of membership, and also a perception amongst some firms that the organization supports the interests of a very small number of large members. Non-membership can also be explained, in some cases, by firms exporting mangos on an opportunistic basis, and not having a long-term commitment to the development of the industry.

Secondly, the relationship between APEM and medium sized firms is a problematic one. There are a number of ways in which the split of large and medium firms into two distinct organizations, APEM and Promango, damages knowledge flows within the cluster. It makes the coordination of joint research projects problematic, for example the lack of structured initiatives in developing new varieties is an example. The split also means that there is no single point of reference for contact with other bodies. Finally, the relationship between large firms and small producers is also one which can provoke tension within the cluster. This is something that APEM has tried to address in some work on certification it has done with small producers. Nonetheless, these initiatives have also been a cause of some problems and a lot of distrust between large firms and small producers still remains.

Returning to consideration of the first research question, this considers the extent to which intermediary organisations play a role in accessing knowledge from both intra and extra cluster knowledge sources. APEM has been particularly important in the process of gathering information about the different markets to which Peru exports. Relationships must be developed with different organizations, for example the National Mango Board in the USA, from the market being accessed and APEM involvement is important because it allows personal contacts to be maintained. Foreign travel, for example, is very expensive for Peruvians and therefore individual firms operating independently would be unlikely to attend so many events. Another important example of accessing is that fact that different markets demand different characteristics for the fruit, including issues such as its size, presentation and sweetness. APEM has the contacts to access and compile information on the latest market trends, in addition to accessing information on related aspects such as distribution networks and developments in transport technologies.

5.7 Conclusion: Intermediaries in Developing Economy Clusters: Lessons from APEM

This section will consider the wider implications of the material that has been presented on APEM, and reference will be made to the study's propositions as presented in Chapter 3.

5.7.1 The Importance of Intermediaries in Developing Economy Clusters

The first proposition made in this study was that intermediary organisations provide an important route to knowledge and learning for developing economy clusters, a factor that has been underestimated by previous studies. The interviews that were conducted with large and medium firms, and APEM representatives, have revealed a cluster structure that is diverse and shows a lack of strong lead firms. The larger firms that do exist within the cluster are still relatively small by international standards and, in addition, there have been several examples of financial instability amongst them within the last five years.

In such circumstances the role of APEM as an intermediary organization has been found to be of crucial importance. The proposition that they provide a route to learning has been demonstrated through the evidence of them helping to create cluster communities through which knowledge flows (summarised in sections 5.5.1 and 5.5.2), how they have initiated knowledge creating strategies (summarised in section 5.5.3). APEM has also been important in helping cluster firms to develop and become more integrated into international value chains, and the way in which they have been able to access knowledge from outside the cluster (summarised in section 5.5.4) has been crucial to this process.

5.7.2 Roles played by Intermediaries: Reviewing the Taxonomy

The second proposition of this study is that a number of distinct knowledge and learning roles can be identified as being carried out by intermediary organisations in developing economy clusters. In terms of the accessing role, APEM has been able to

develop a wider range of links than lead firms would be able to. Examples of this are links it has been able to build with organisations from abroad, for example the National Mango Board from the USA. It had also been able to build successful links with representatives from different government departments, the visit of the Minister for the Department of External Trade to the International Congress of Mangos organised by APEM in 2008 being evidence of this. In carrying out this accessing role APEM has developed specialist skills that individual firms don't possess, an example being the skills to present a case effectively and to negotiate successfully. They also, because of regular foreign travel by their representatives, can develop their language skills (particularly in English) and their understanding of different cultures. The latter point is particularly relevant as Asian markets are becoming increasingly important, and often require a certain level of cultural understanding for successful negotiations to take place.

The spread by APEM of common practices could also not be performed in the same way by lead firms. Lead firms often consider circulating knowledge as against their interests, and therefore could not be relied upon to do. Because of its links within the industry APEM also has the ability to diffuse information quickly. It would therefore be in a position to react quickly, for example, if there was a health scare involving Peruvian mangos or about Peruvian agricultural products generally.

The coordination role also provides an example of the unique contribution that intermediary organizations can make. This role can be carried out far more effectively by a body that is recognized in the industry as being independent. Such strategies often consist of collaboration between large firms and in several instances APEM has drawn them together. Also of relevance, however, is the fact that APEM has the ability to make links with all parts of the industry, including both small and medium sized producers, many of whom attend the annual mango congress organised by APEM, the meeting point for the industry as a whole.

Despite the significance of the coordination role that has been identified here, it is not a role that is identified in the taxonomies of intermediaries that have been produced in the context of developed economies (eg Howells, 2006; Hargadon, 1998). The lack of stable lead firms, who have achieved a degree of financial stability, is a possible explanation for why it is of particular significance in developing economy clusters. In addition, the fact that developing economy clusters

tend to operate in an uncertain, and challenging, knowledge environment might also help to provide an explanation.

5.7.3 Intermediaries Roles: Change and Development

Finally, one of the factors that the evidence in this chapter had drawn attention to is that, as a cluster develops, there are changes in the roles played by intermediary organizations. There is the possibility that lead firms will have the increasing desire, and capabilities, to want to do more things themselves. There is also the possibility that as the intermediary organization develops its own capabilities, it might also adapt, and possibly expand, the roles that it plays.

In the case of APEM dynamism can be identified in the roles of accessing, diffusing and coordinating. In terms of accessing it was found that once the larger firms become established they were found to develop their own capabilities and to develop their own 'networks of practice' (Brown and Duguid, 2001), which meant that they were increasingly likely to access international sources of knowledge independently. Accessing by APEM still remained important in the development of new markets, however. In addition, while the role of diffusion remains important, there is also evidence that this role has been slightly diminished as large firms have developed their own capabilities in information gathering. While the increase in the capabilities of large firms might be argued to ultimately lead to the diminishing of the role of the intermediary, the case of APEM illustrates that this is not necessarily the case. APEM has shown its ability to establish a common purpose within the cluster, one that encourages at least some level of collaboration. A further point is that the activities of APEM give legitimacy to Peruvian mangos as an export product, and this role has remained important despite the growth in the size of some firms within the cluster.

Conclusion

The evidence presented in this chapter has therefore allowed two points to emerge. Firstly, the importance of intermediary organizations as a route to learning in developing economy clusters has been demonstrated through the encouragement that APEM has given to horizontal cooperation within the cluster, and to the vertical integration of cluster firms into international value chains. Secondly, APEM has been

identified as playing the roles of accessing, diffusing and coordinating as identified in the taxonomy of intermediary roles. These points will be discussed in more detail in Chapter 9, when evidence from a wider range of intermediary organizations will be synthesized and analysed.

Chapter 6: Producer Associations as Intermediaries: The Case of Promango

As was outlined in Chapter 4 one of the characteristics of the Piuran mango cluster is the divisions that exist between large, medium and small firms. Promango, as the foremost organisation amongst medium-sized producers, therefore occupies an important position. It had been significant in encouraging the formation, amongst firms that were previously fragmented and isolated, of a community amongst this group. This has allowed them to improve their bargaining position with larger firms and, in addition, has enabled a number of learning projects to be successfully undertaken. The distinctive way in which Promango has carried out this role will be explored in this chapter which will use concepts from the practice-based perspective of knowledge to help illustrate the organisations activities.

6.1 Promango: History and Context

Promango (Asociación Peruana de Productores del Mango) was formed in April 2002 as a non profit-making professional association. Prior to this a number of firms had been cooperating informally, but the bad harvest experienced by producers in the 2001/2002 season provided the spur to establish this on a more formal basis. There were initially fourteen members who, in the light of commercial pressures, believed that together they could strengthen their market position and increase the price received for their product by negotiating together with exporting firms.

Assistance in the formation of the association was received from Prompex, part of the Ministry of External Trade, who provided legal advice on the process of forming an association, and practical advice gained from their experience in helping establish other agricultural associations. The majority of the members of Promango, numbering 28 at the end of 2008, are medium-sized producers of mangos and together they produce one third of the volume exported from Peru each year (Association Interview 3, 2008). In its day to day operation the organisation has few financial resources, relying primarily on the time donated by its members and on a relatively modest monthly membership charge to support the upkeep of its office.

6.2 Promango and its Members: Firm Survey Evidence and Evidence from Social Network Analysis

A survey of large and medium sized firms completed for this study (Firm Survey, 2008) gathered data on firm size and competences and also asked firms to identify the sources of technological and commercial knowledge that were important for their work (see Appendix 1). In addition, representatives from intermediary organisations were also asked to complete a survey on their work (Association interview 3, 2008). The data gained from these surveys will now be discussed. Firstly, data on both the size and features of Promango firms will be considered. Secondly, the sources of knowledge for Promango as an organisation will be examined. Thirdly, the sources of information identified as important by firms that are members of Promango will be examined, this being done for both technological and commercial knowledge. Finally, Social Network Analysis will, using Pajek SNA software, be employed to examine what can be learnt from the networks within which Promango firms participate.

Table 6.1 Promango Member Firms: Firm Size and Competences

	Exporting Firms (as % of membership)	Packing Firms (as % of membership)	Producing Firms (as % of membership)	Average land if produce (hectares)	Average Employee Numbers	Firms with HACCP certification (as % of membership)	Firms with GlobalGap certification (as % of membership)
Promango Firms	17%	17%	100%	56	28	17%	100%

(Source: Firm Survey, 2008)

Evidence from Table 6.1, which shows the characteristics of firms that are members of Promango, indicates that these firms are predominantly producing firms. Each of the members surveyed has GlobalGap certification which, as is outlined elsewhere in this chapter, is in the majority of cases the result of a project organised by Promango. The average size of Promango firms, in terms of employees, is a fifth of that of APEM member firms.

Table 6.2 Promango: Sources of Knowledge

Knowledge Source	Technological Knowledge Received (Importance 1-5)	Commercial knowledge received (Importance 1-5)
EMBRAPA (Brazil)	5	1
GlobalGap	5	1
Pivano (Ecuador)	5	3
Senasa	4	0
INIA	3	0
CITE	2	0
UDEP (University)	2	0
UNP (University)	2	0
Promperu	0	2
National Mango Board (USA)	0	2

(Source: Association Interview 3, 2008)

Table 6.2 shows the sources of knowledge for Promango itself as an organisation and was based on data gathered via an interview with a representative for the organisation (Association Interview 3, 2008). The table illustrates that for commercial knowledge the organisation accesses knowledge from neighbouring countries, specifically Brazil and Ecuador. It also has a close relationship with the phytosanitary organisation Senasa. A further significant factor from the table is the relationship it has with two universities in Piura.

Table 6.3 Promango Member Firms: Sources of Technological Knowledge

Name of Intermediary Organisation	No. of firms identifying organisation as source of technological knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
Promango	12	3.6
Senasa	11	2.5
APEM	9	2.6
Incagro	7	2.5
Adex	6	1.4
Promperu	6	2.2
INIA	5	1
National Mango Board (USA)	5	3.4
SGS (Certification Firm)	5	3.3

(Source: Firm Survey, 2008)

Table 6.3 shows the sources of technological knowledge for firms that are members of Promango. The table reveals that Promango is identified as the most important source of knowledge by these firms, both in terms of the number of firms identifying the organisation and the rating of importance they give to the knowledge received. Senasa is also identified as a source of knowledge by all except one of the Promango firms surveyed. Comparison of Tables 6.2 and 6.3 shows how there are certain sources of knowledge, two foreign organisations and two universities, accessed directly by Promango itself but not by the firms that are members of the organisation. This indicates that Promango plays an important intermediary role in this situation, accessing knowledge from these organisations. As the knowledge received is technologically complex, Promango plays a role in translating it into a form that can be absorbed by its members and, through its congresses and other events, it also diffuses this knowledge as widely as possible. This relationship is confirmed by the qualitative data that is discussed in this chapter.

Table 6.4 Promango Member Firms: Sources of Commercial Knowledge

Name of Intermediary Organisation	No. of firms identifying organisation as source of commercial knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
Promango	10	2
APEM	9	3.3
Senasa	8	1.9
Promperu	6	3.6
Consultants	5	1.8
Adex	5	2.7
National Mango Board (USA)	5	3.5
INIA	4	1.2
Incagro	4	2

(Source: Firm Survey, 2008)

Table 6.4 confirms the position of Promango, Senasa and APEM in terms of their identification by Promango member firms as important sources of commercial knowledge although the rating in importance of commercial knowledge is less in terms of both Promango and Senasa. Two other significant features emerge from the

table. Firstly, consultants are identified as a source of commercial knowledge, while they weren't identified for technological knowledge. Secondly, in terms of the importance of the knowledge received, Promperu and the National Mango Board feature highly.

The survey data collected (Firm survey, 2008) has also been used to compile network maps (Figures 6.1 and 6.2). Figure 6.1 shows the network for commercial knowledge and Figure 6.2 shows the network for technical knowledge. The arrows included on the maps indicate the direction in which the knowledge is flowing. The size of the nodes for the firms relates to the total value of the knowledge that they receive from the various intermediary organisations that are a part of the network. The size of the nodes of the intermediaries relates to the value of knowledge that they provide to the firms with which they are linked.

Figure 6.1 shows the network for commercial knowledge and illustrates the central position occupied by Promango in this area. It is evident from the size of the Promango node that the organisation has linkages with a large number of firms and that these contacts are valued by the firms concerned. In terms of technological knowledge (Figure 6.2) Promango's position in this network is less important than is in the commercial network map, but it is still significant.

From consideration of both maps, and comparison with similar maps that are included in Chapter 5 for APEM firms, it can be noted that Promango firms have linkages with a less diverse range of organisations than APEM firms. The linkages that Promango firms have can also be identified as tending to be concentrated around public services organisations. This lower, and more restricted, level of linkages suggests that the dependency for Promango firms on their industry association is more than it is for firms that are members of APEM.

The size of the APEM node in both the technological and commercial knowledge networks also illustrates that it is an important source of knowledge for a number of Promango firms. Two individual APEM firms also figure in the network of technological knowledge as providers of knowledge to Promango firms. There is evidence therefore of both APEM itself, and some of its member firms, being a part of the Promango network. As the maps for the APEM networks that were produced in Chapter 5 illustrated, there is no corresponding evidence of Promango itself, or any of its member firms, having a similar presence in the APEM network. This evidence from the network analysis suggests, therefore, that an element of unequal

power exists between APEM and Promango firms. This is a point that the qualitative evidence collected for this study, on firm's relative history, size, range of functions and level of resources, substantiates.

Figure 6.1 Network for Promango members - Commercial knowledge. Yellow: Promango firms. Blue: APEM firms. Red: Intermediaries +Service Providers. size of nodes is proportional to knowledge transferred (valued in degree, in plus out).

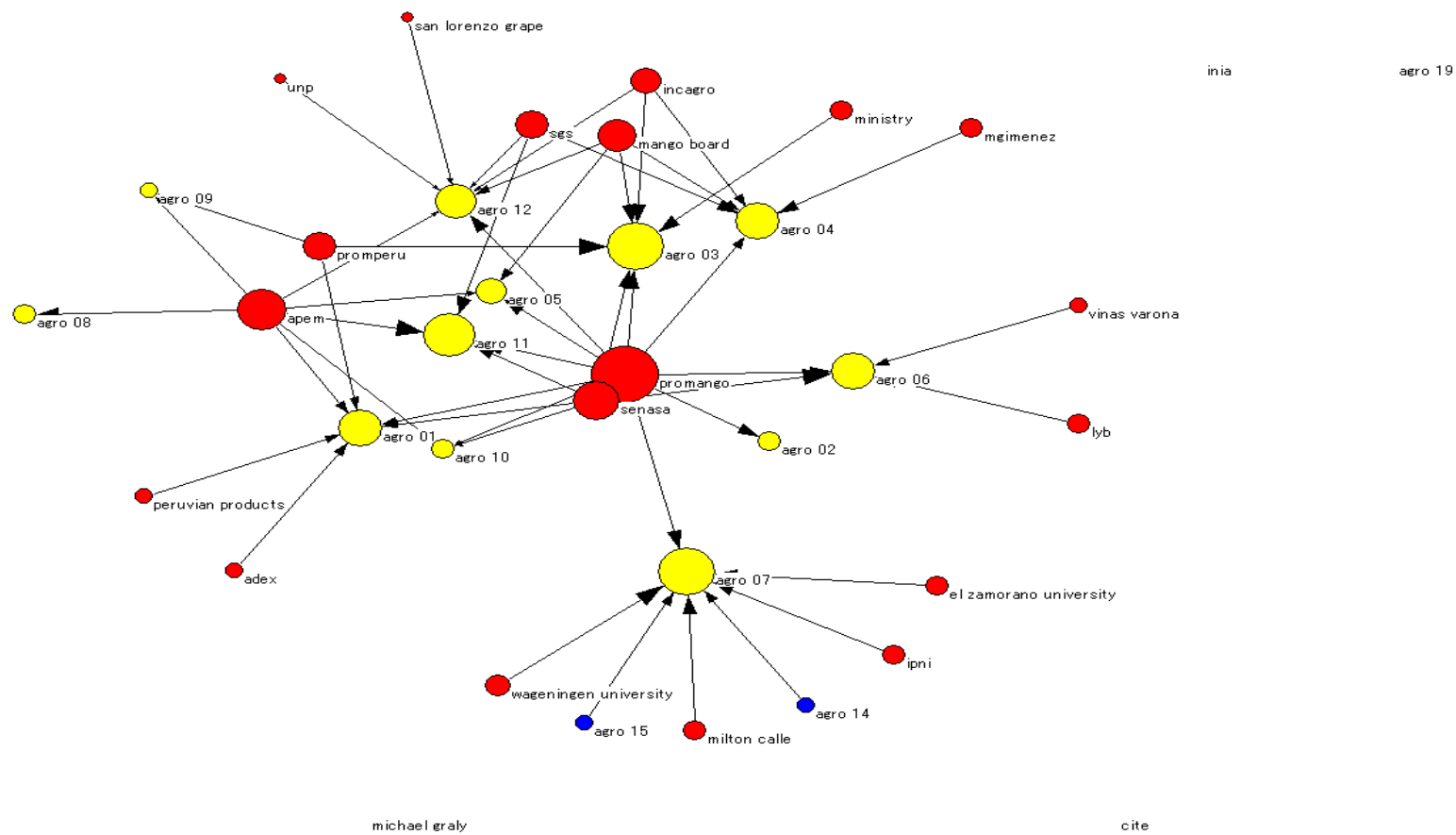
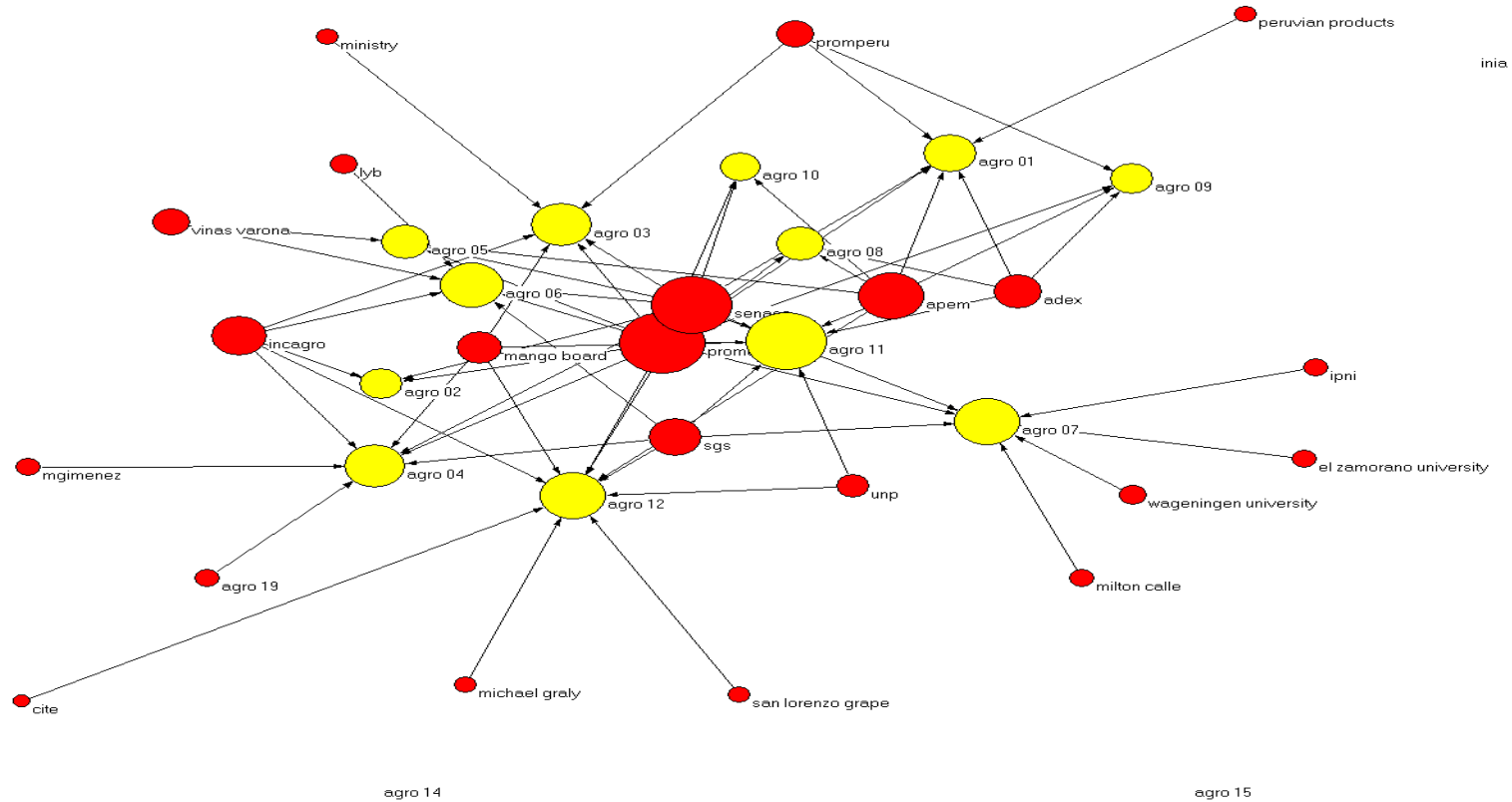


Figure 6.2

Network for Promango Members - Technical Knowledge. Yellow: Promango firms. Red: Intermediaries + Service Providers
Size of nodes is proportional to knowledge transferred (valued in degree, in plus out).



6.3 Diffusion and Knowledge Sharing amongst Promango Members

One of the aims of Promango is to build cooperation in a sector that has had a history of a lack of trust between producers. According to a representative from the organization 'the situation before was that all of the producers felt that they had the secret for producing good mangos, and they didn't wish to share it with anyone... as Promango, however, we started to share all types of information, group together what each firm was doing, and in this way we created links between the organizations members' (Association Interview 3, 2008).

The concept of communities of practice (Brown and Duguid, 1991; 2001), which was discussed in Chapter 2 and refers to informal groups of people who have some work related activity in common, can be used to understand how the relationship between Promango members has developed. Communities of practice can be identified that spread across organizational barriers, for example in industries where the firm size is relatively small and there is a large amount of information sharing amongst its members. One of the factors in the successful operation of a community of practice is the sense of a shared identity and one of the features of Promango is the relative homogeneity of member firms. While there are differences in firm size and resources almost all Promango members are medium-sized producers. At the end of 2008 only one of Promango members was also an exporter, so the majority of members all have the same task of selling their product to exporters.

The members of Promango producers have, as is common within a community of practice, developed a common view of their own organisation and of outsiders. They have developed a range of stories, for example, that are often told in a humorous way, about some of the tricks and bad experiences they have experienced at the hands of buyers of their product. One firm in particular, which many members of the organisation have had conflicts with, is often referred to and appears to be used symbolically to encapsulate the range of problems and frustrations that producer firms feel they have experienced at the hands of buyers (Association Interview 3, 2008).

As mango producers Promango members also face similar challenges as they attempt each year to successfully grow their product. In Chapter 4 a number of 'knowledge challenges' were identified as existing within the mango industry and

those related to the production of mangos are the ones of most relevance to the members of Promango. Promango members have identified the sharing of information as an important route to meeting these challenges and there are many examples of how, as the work of Promango has developed, the sharing of information and trust amongst its members has grown.

Observation of the Promango Mango Forum organized in August 2008, for example, provided evidence of this approach in practice (Industry Event 2, 2008). The two day event was attended by approximately 100 delegates, the majority affiliated to firms who were members of Promango, in addition to a large number of guests. One of the greatest challenges faced by producers is dealing with Piura's erratic climatic conditions. A lot of discussion during the conference centred on the very difficult growing conditions existing that year and illustrated how for agriculturalists discussion of the weather is far more than a social convention. As the Forum progressed different points of view emerged as to how the maximum or minimum temperatures during a single day can affect mango growth.

Debate also took place on the significance for plant growth of the difference between the hottest temperatures and lowest temperatures during the growing season as a whole. Another area of discussion was the particular characteristics of the soil in the Piura region. The dry conditions in the Piura area are particularly suited to the growing of the mango varieties that Peru exports. They can, however, present their own difficulties and a visitor to the Forum from the United States prompted amusement in the audience when he congratulated those producers present on successfully producing their crop on what appeared to him to be one large beach! (Industry Event 2, 2008).

The complexity of growing successfully under these conditions was illustrated, therefore, and different presenters focused on issues such as the variety and age of plants, dealing with different soil types, irrigation methods, and types and applications of fertilizers. A speaker at the conference pointed to the importance of situated knowledge, stating that 'each piece of land is like a book and the grower must be able to read their own plants and soil' (Industry Event 2, 2008). The same speaker also argued against too deterministic a view of the effect of challenging weather conditions, noting how they do affect some producers very adversely, but how those who have built up the experience and expertise in dealing with difficult conditions are usually able to overcome such adversity.

Perhaps because of the immediacy of the issue, the threat to production the climatic conditions were presenting, the presentations prompted lively debates amongst the Forum's delegates. While a great deal of codified information is available on growing mangos, from numerous internet sites for example, and books are available that focus specifically on growing mangos in Peruvian conditions (eg Ruiz, 2003; Rimache Artica, 2007), what the discussion illustrated was the importance of the sharing of tacit knowledge, picked up over years of experience of the differing climatic conditions each season presents in this part of Peru. In a different setting, but in a similar way, Orr (1990) has identified the need for photocopy repairers, despite the extensive codified manuals they carry with them, to find opportunities to meet with each other and share information. For Promango's members, therefore, the knowledge needed to successfully meet the season's climatic challenges was both highly situated and deeply embedded in the practices of the producers at the Forum.

Many speakers at the conference outlined research that their firm had been involved in, and details and illustrations were provided in accompanying slides that were available to all participants electronically. There were also specific invitations given by a number of firms for those interested to visit the firm's land and learn more thoroughly about the research that was being done. A representative from one firm, one of those who made such an offer, mentioned the fact that he appreciated that his firm had been seen in the past as quite distinct and isolated from others within the organisation, but that there had recently been a change of management in the firm and that there was now a practice emerging of participating more closely with other firms (Industry Event 2, 2008). On a more general level, a representative from Promango confirmed that 'each member of Promango can visit the land of the other members without any type of restriction' (Association Interview 11, 2008).

These invitations, and the formal and informal sharing of knowledge during the two day event, illustrated the sense of community and shared purpose amongst the firms present. This is of particular significance because, as was outlined in Chapter 2, trust is an asset that has been shown to be lacking in many studies of developing economy clusters (Schmitz and Nadvi, 1999). They illustrate how the formation of Promango, and the way in which it had chosen to work, has provided an avenue through which knowledge is diffused amongst the organisation's members.

6.4 Common Learning Strategies: Strengthening the Production Chain

Since its formation in 2002 Promango has played an important role in the development of common learning perspectives amongst its members, and in the design of strategies to enable the desired learning to be successfully completed. The website of the organization, for example, lists characteristics of Promango members as being ready to adapt to changes, to be innovators and to be in a state of constant capacity building (Promango Internet 1, 2009). This intention was put into practice through a project, organised in collaboration with Incagro, which was entitled ‘Strengthening the Mango Production Chain’ and which took place between January 2004 and June 2006. Incagro is a government agency that is part of the Ministry of Agriculture and has the aim of encouraging innovation in agriculture and provides financial support for projects presented by medium and small sized producers. The work of the agency will be discussed in more detail in Chapter 8.

The initial impetus for the project was the extremely low prices that mangos had obtained during the 2001/2002 season, which had meant that everybody in the industry had suffered. The experience of this bad harvest resulted in a process of ‘perspective making’ (Boland and Tenkasi, 1995) amongst medium-sized mango producers. They began to develop a set of ideas of the steps that they needed to take if they were going to be successful in improving their market position. As has been previously outlined the immediate result of this perspective making was the formation of Promango in 2002. The project which began in January 2004 was extremely important, however, because it signified the organisation securing the resources, and the contacts, to begin to make significant progress on the changes its members wished to implement.

The aim of the project was to involve all of the components of the production chain, improving the coordination between them so that the problem of overproduction could be avoided. The benefits to Promango members that the project brought can be seen in the areas of developing business skills, improving their production skills and achieving certification for their products. It also helped to strengthen Promango as an organisation.

As has been previously mentioned Promango was initially formed with a strong commercial focus, its members wishing, by working together, to strengthen their bargaining position with the large exporting firms. In attempting to improve this

situation Promango diffused knowledge amongst its members which helped them to negotiate for better remunerated and more stable deals. Members exchanged information on the contracts that needed to be drawn up, as such contracts with buyers are invariably complex affairs. They involve, for example, detailed information on the expected size of the fruit and its colour, both being criteria that determines acceptable fruit for export. Contracts also outline complex formulas which are used to determine the price to be paid for fruit in relation to price on the international market. A formula also exists to determine the price paid for fruit that is not considered suitable for export.

By sharing information on the technical nature of these contracts, Promango members now feel that they are able they are now able to negotiate with the larger firms from a position of strength. Benefits exist not just in the terms outlined in the contracts, but also in the measures that can now be more successfully taken to ensure that the contracts are respected in an industry where trust has been a problematic issue for many years.

A second benefit of the project was the improvement of Promango members' production skills. A particular problem was that the bulk of production tended to be concentrated around January, and this limited the price gained for the product and made it susceptible to unfavourable climatic conditions. In dealing with this problem Promango was able to access international expertise, building relationships with worldwide research centres such as Embrapa, Brazil's foremost agricultural research institute (Association Interview 4, 2008). A representative from this organization visited Piura and passed on valuable technological expertise, introducing changes which meant that the production could be more flexible, and bought forward or taken back to increase the potential value of the fruit. Instead of the previous January concentration, therefore, production is now spread much more evenly between November and March. The relationship with the Brazil research centre has proved to be of enduring significance, and will be discussed further when the development of the table grape market by Promango members is considered.

In addition to the lengthening of the production period, other technological changes introduced as a result of the project were to result in increasing the output per hectare of land. Promango developed contacts with a research centre in Israel, significant because it is one of the world's leading mango producers and at the cutting edge of technology. A representative from this organisation was able to

provide important advice on irrigation, one of the ‘knowledge challenges’ identified in the Chapter 4 (ibid.).

Another benefit of the project was that it provided a mechanism through which all Promango’s members could achieve EurepGAP certification (now called GlobalGap). The standard aims to ensure that good agricultural practices are being implemented, and as a result of its adoption Promango members developed the common practices required in the application of pesticides and fertilizers, the measures needed to ensure that fruit is stored correctly, and other issues related to food safety. In some case, work was also needed in developing the infrastructure of the farms. The certification process also encouraged Promango members to ensure that their businesses were well-organised, and that the management procedures followed were both clear and transparent.

Certification has had not just intrinsic but also extrinsic benefits. It has helped the Promango members’ produce to be recognised for its quality product and therefore command higher prices. This is particularly important for firms wishing to export to the growing European market, which generally demands certification. The common practices required for certification have also provided a meeting point for Promango members, and encouraged a shared understanding of what good practice is and a shared desire to achieve it.

Finally, the project has enabled Promango to develop its relationships with other organisations. In addition to the international research centres mentioned Promango also built contacts with public institutions, for example the regional government, local municipalities and the Ministry of Agriculture. As part of the project, for example, it worked in collaboration with the ‘Casa de Agricultor’ in the municipality of Tambogrande, which allowed it to collaborate with small producers. Promango was also able to strengthen its relationship with private institutions, for example with the CITEagrindustrial Piura, and with private firms in the cluster. In the latter case one firm collaborated with Promango in the certification process, for example.

In conclusion, the project bought a number of benefits to Promango as an institution. It developed its ability to negotiate in the market on behalf of its members, it helped its members achieve significant advances in their production capabilities, it helped to ensure that through certification these capabilities were

recognised and it increased its links with a variety of national and international, and private and public, organisations.

Finally, and most importantly, the project helped to increase the feeling of shared identity and shared purpose amongst the organisations members. The fact that Promango had been successful in accessing the resources to allow the project to take place, and had successfully directed the project, were important in establishing a central role in the future learning of its members. As a result of this success Promango members developed further perspectives of how they could develop in the future. The necessity to diversify from an over-concentration of production on the Kent variety is widely accepted (Firm Interview 12, 2008). Routes to achieve diversification are identified through the search for new varieties, through consideration of entering the dried mango market and through consideration of alternative crops that could be produced alongside mangos, table grapes being the foremost example. These diversification strategies will be considered in the following section.

6.5 Common Learning Strategies: Diversification Projects

6.5.1 Diversification: Dried Mangos

Since the formation of Promango its members have been aware of the issue of overproduction and, because of the increase in cultivated areas, this has become a worsening problem. One response to this problem on a cluster level has been the search for new markets, and Chapter 5 has highlighted how large exporting firms have pursued this strategy through Apem. Promango has also produced its own response to the problem, ‘because we have discovered that we cannot find a market for all the fresh mangoes we can supply’ states a representative of the organisation, ‘we have to diversify in order to increase the demand for our mangos’ (Association Interview 3, 2008).

One example of diversification has been an interest in the industrialization of mangos. At present more than 80% of the mango market is for fresh mangos. The main options for industrialization are frozen mangos, at present representing approximately 10% of the total mango market, and dried mangos and mango juice, which both have significantly smaller market segments. Due partly to the fact that

several large firms, mostly APEM members, are already active in the frozen market and that the mango juice market is dominated by one, relatively large, firm, members of Promango have identified the dried mangoes as the most viable option. Both an international and national market is envisaged for the product and a number of potential clients have been identified in several European countries and the USA. A national market is also possible for the product, with sales amongst the Lima middle-classes being a potential target.

Several challenges are faced, however, on the road to industrialization. The first of these is that the mango season in Peru is relatively short which makes it difficult to consider a big investment in machinery for something that can be used for a relatively short amount of time. A second problem is the variability of the crop produced from year to year. In some years there is a huge problem of overproduction, and a large amount of crop would be available for industrialization. In other years, when production of mangos is limited, the price for fresh mangos remains relatively high and industrialization is not an economic prospect.

Developing appropriate technological capabilities is essential and members of Promango have taken steps to learn about what technological is available at what price, and how it can be adapted to their particular needs. They have benefited in this process from the lead role that a large firm, a Promango member, has played. This firm has, because of profitable interests in other sectors, resources that it has been able to devote to the project. It played an important role in an investigatory trip that Promango members took to a German university, where dehydrating machines in use there were investigated and an effort has been made to investigate how this technology can be attempted to the needs of Promango members. One of these machines was bought to Peru and tested, but it was felt that the volume produced was not enough. Efforts have since been made to find a way to produce a greater volume, therefore, and in doing this Promango has developed links with machine producers in Lima, the Peruvian capital. In addition, and linked to this issue, debates have taken place as to where the machines purchased will be located, and consideration has been given to the option of purchasing a much larger machine, and locating it centrally, rather than smaller machines being bought and located on individual members plots of land. This would ensure that members could cooperate in both the production process and maintenance of the machine.

Since the mid 2000s, therefore, several members of Promango have been involved in the project to develop dried mangos as a viable product. Proofs of the product have been produced and, through their diffusion at the various events that Promango holds, these have been shown to other members of Promango and interest in the product has grown. A consortium of various Promango members, the ‘Consorcio Agroexportador del Peru SA’, has been working in particular in trying to identify potential markets (Firm interview 11, 2008). According to a representative from Promango it is hoped that production can begin soon, ‘we hope that in the 2008/09 season’, he states, ‘if everything goes well, we will be able to begin with an association of five members in order to produce dried mangos’ (Association Interview 3, 2008). This is an example of horizontal cooperation (Morris and Barnes, 2006) and shows that once a culture of cooperation is established it can grow and expand into areas that none of the participants would have thought possible in the early days.

6.5.2 Diversification: The Production of Table Grapes

From approximately 2005 onwards members of Promango, who has spare land they originally planned to plant with mangos, began to experiment with new crops. Several crops were tried, dates and avocados for example, but in each case there were problems; some crops grew very small in Piuran conditions, some required extensive technical support, and some were discounted because export to the European Union was found to be problematic.

Through its links with the Petrolina area in Brazil, the production of red table grapes was identified as the most promising alternative. Petrolina, a similar area to Piura climatically, had grown the Red Globe grape variety in this area successfully for several years but, when it began to be affected by local bacteria, decided to switch to another variety. This presented an opportunity for the producers in Piura, who saw the potential of growing the Red Globe variety in their own department (Association Interview 3, 2008)

Cultivation of the crop, however, presented both technological and financial challenges. To meet the technological challenges Promango made use of its contacts in Brazil. According to a Promango representative ‘we bought technical experts from Brazil various times, the production of many fruits is very advanced there and the

producers there have support from a government institution called Embrapa which is very advanced' (Association Interview 4, 2008). Embrapa is the Brazilian equivalent of the Peruvian organisation INIA, which will be studied in Chapter Eight, and is a body funded by the Brazilian government that is responsible for agricultural innovation.

The visitors from Brazil helped with a number of technological issues, one of the most important being to ensure that the window of production is as wide as possible. The benefits of the advice they were able to give in the production of mangos has already been studied in Section 6.3, and a similar success has been achieved in the production of grapes. Moreover, one of the big attractions of the crop is that in Piura it can be harvested in the months of September, October and the first part of November, therefore just as its production is beginning to wane the harvesting of mangos is starting.

Considering the finance needed to begin the production of grapes, Promango re-established the previously productive relationship that it had had with Incagro. The success of a previous project in collaboration with Incagro has already been examined in Section 6.3, and in 2007 Promango began a two year project in collaboration with the organisation (Agency Interview 5, 2008). The link with Incagro has provided the finance to bring in the expertise from Brazil, in addition to initiatives for the diffusion of the new knowledge gained.

For the producers to begin the large scale production of grapes a number of infra-structure changes were necessary and this required an additional sources of finance. Finding this initially proved difficult because table grapes were not a product that had a proven record in the Piuran region. Promango, therefore, tried to promote the product through the cultivation of a demonstration area, showing its suitability to the local conditions, and through disseminating information about the products potential profitability at trade fairs and congresses. In doing this it showed its ability to diffuse knowledge amongst its members, and the use of a demonstration area showed the importance of 'learning by doing' as an effective way of sharing knowledge.

Eventually a suitable arrangement was established with COFIDE (Corporación Financiera de Desarrollo SA), a government organisation that provides finance to SMEs. In 2007 COFIDE signed a cooperation agreement with the Chamber of Commerce in Piura and established a regional office, for the North of

Peru, in its office (Agency Interview 16, 2008). This is the same building in which the Promango office is located and, as amongst COFIDE's aims are the encouragement of new business enterprises, particular for small businesses, and also the provision of training and capability building for both internal and external markets, Promango was successful in obtaining finance for its grape project.

With the finance in place by 2008 the table grape project reached the stage of implementation and large-scale planting took place, involving approximately three-quarters of the firms who are members of Promango. Promango has also stepped up its efforts to diffuse knowledge about the new crop's potential and in October 2008 it organized a two day Symposium specifically devoted to the cultivation of table grapes. This was the first event specifically focused on the production of grapes, and aimed to bring together the main producing firms, technical and market specialists, and others related to the industry. In putting on this event Promango was able to draw on the networks and expertise it had developed through its record of work in the mango industry. One of the motives for the event, for example, something learned from the experience with mangos, was recognising the importance of integrating the production chain as much as was possible. In addition, much of the knowledge accumulated in the production of mangos, on climate, soil, fertilizers and pesticides for example, was also able to be transferred and adapted to this new setting and the Brazilian contacts Promango has were able to play the enabling role and help this transfer of knowledge to take place effectively.

6.5.3 Promango's Role in Diversification Projects

Two different attempts by Promango members to diversify have been examined, therefore, and a number of common themes can be identified in both of the strategies followed. Firstly, in both cases the projects followed have been collaborative ventures, drawing together the resources, expertise and enthusiasm of a number of the organisation's members. In addition, in the case of the dried mango project, an extra benefit has accrued due to the fact that several Promango members have benefited from the resources one firm in particular has been able to devote to the Project. The result has been that, in keeping with the concept of 'riskable steps' outlined in Chapter 2, firms that in themselves would not be able to donate significant resources to innovation, have together been able to develop their skills

and capabilities. Both projects have also served to confirm the centrality of Promango in the learning strategies of its members. The organisation has shown, through its ability to raise finance, for example, that it can provide a focus through which joint learning initiatives can be planned and successfully implemented.

Secondly, both projects have provided examples of Promango carrying out some of the roles mentioned in the taxonomy of intermediaries roles presented in Chapter 3. It has played the accessing role, for example, not just through its ability to access finance from organisations such as Incagro and COFIDE, but also through its ability to access a range of technological knowledge from its links with Brazil. It has also played the role of enabling knowledge to be translated from one context to another. The knowledge that has grown up over years of mango production has, for example, been adapted for the production of table grapes, being that both products are being produced in fields side by side to each other and therefore there are commonalities in issues such as irrigation, pesticides and fertilizers, local knowledge of soil and climate and the way in which both products need to be carefully packed and stored for export. The role of translation has also been played in the links established with Brazil, as the knowledge gained has had to be adapted, and made relevant and understandable, to Peruvian conditions.

Promango played a diffusion and coordinating role through its involvement in both diversification projects. Several examples have been mentioned in previous sections of the way in which Promango diffuses knowledge amongst its members, and its organisation of the Symposium on the production of table grapes in October 2008 illustrates how this role continues to be important. Its involvement in the dried mango project, however, also illustrates it assuming a coordinating role, bringing together some of the larger firms in the organisation around a common aim.

Section 6.6 Analysing The Results

An assessment will now be made of the role played by Promango within the Piuran mango cluster, making specific reference to the four research questions that were outlined in Chapter 3. The wider implications of Promango's role, considering what it reveals about intermediary organisations in general, will then be considered in Section 6.7.

The second research question asked whether intermediary organisations play a role in the formation of cluster communities through which common understandings, practices and learning perspectives emerge. Evidence of Promango having played such a role has been presented in this chapter, and horizontal cooperation has increased substantially between medium-sized firms since its formation. Prior to its formation these growers were isolated and fragmented, and this had important implications for both their weak market power and the limited learning opportunities that presented themselves.

As a result of the principles established in the setting up of the organisation, Promango has facilitated the development of a community of practice amongst its members. Its members are relatively homogeneous, in comparison with APEM, for example, the largest trade association in the cluster, and this has allowed a sense of shared identity and shared purpose to develop. An important question is whether this shared identity will be able to be maintained as the organisation grows. Membership has almost doubled since the organisation was formed in 2002 and, while the increased numbers give added strength, they also have the potential to cause conflicts and bring about a situation where decision making within the organisation becomes potentially more problematic and less inclusive.

The increased flow of knowledge that Promango has stimulated has brought about the establishment of common practices and common learning perspectives amongst its members, an issue also raised by the second research question. An example of this is the certification process that all of Promango's members undertook as part of the 'Strengthening the Production Chain' project. This project stimulated a common understanding of the processes and procedures necessary in order to grow mangos safely and successfully, and also helped the organisations' members focus on other improvements that they could possibly make.

The third research question asked what role do intermediary organisations play in the emergence, and coordination, of common strategies amongst actors within developing economy clusters and, in the case of Promango, the common learning perspectives discussed in the previous paragraph have led to common strategies. The organisations members have, for example, taken part in a number of successful joint projects, the strengthening of the production chain, for example, and the diversification into dried mangos and grapes. These projects have facilitated considerable development of the organizational capabilities within the cluster, in

addition to development of technological capabilities achieved in several cases through the accessing of international sources of expertise, and through the sharing of localized knowledge amongst the members of the cluster.

The first research question considered to what extent intermediary organizations play a role in accessing knowledge from intra and extra cluster sources. In this case Promango has been identified as an organisation that had been able to access knowledge from international sources and translate this knowledge to make it applicable to Piuran producers, a significant achievement for an organisation of its size and resources.

One of the areas that illustrate the usefulness of the accessing of knowledge is the role that Promango plays in the fighting of diseases. The organisation has developed links with specialists from around the world in fighting diseases, and is able to access the expertise its needs at the first sign of such problems arising. A representative from Promango, discussing the role of these specialists, described how ‘Sometimes they come from Brazil, there are some plagues that are controllable with a specialist from Lima, and some that we can control with our own local knowledge and with help from the specialists that we have here in Piura’ (Association interview 3, 2008). Accessing external sources of knowledge has also been important in the diversification projects Promango members have been involved with. Promango has facilitated the establishment of successful links with support bodies, for example Incagro and COFIDE, and both have provided financing at important times for its members.

While a number of achievements in the work of Promango can be identified, therefore, consideration must also be given to where its influence has been more limited, and to the context within which it is working. Firstly, the organization faces limited resources, as medium-sized producers its members typically have much smaller turnovers than the large exporting firms and this means that funds for long-term research projects are necessarily limited. An example is the issue of investigating new varieties, one of the ‘knowledge challenges’ identified in Chapter 4. While there are members of Promango who are interested in the potential of new varieties, the organisation as a whole has not had the resources to ensure that these are investigated in a systematic way.

A second, very important, issue for the context within which Promango works is its relationship with APEM. The split of large and medium firms into two

distinct associations, APEM and Promango, has many downsides. It makes the coordination of joint research projects problematic, for example. As mentioned, the lack of structured initiatives in developing new varieties, an area that would provide potential benefits to exporters, packers and producers alike, is an example of this point. The split also means that there is no single point of reference for contact with other bodies. Interest was expressed during the Promango Forum of 2008 in the idea of Promango working more closely with APEM but, for this to become a reality, there are several barriers that need to be overcome (Industry Event 2, 2008). In addition, if a merger was ever to be contemplated in the future this would have implications for how the new institution worked and made decisions.

Overall, as Promango has a relatively homogenous membership, tensions within the organisation have been relatively limited. There are some circumstances, however, in which these might increase. One of these is the effect that bad harvests can have on producing firms. A second issue is that, as is outlined in this chapter, some Promango firms are interested in exporting directly, and this might possibly lead to a divergence of interests within the organisations in the future.

Section 6.7 Conclusion: Promango as an Intermediary Organisation

The first proposition made in this study is that intermediary organisations provide an important route to knowledge and learning for developing economy clusters. This chapter has shown how Promango has increased the horizontal cooperation amongst its members, establishing a shared identity and shared purpose. Through the certification process it helped to establish the quality of its member's product and Promango has also built relationships with many different kinds of organisations, with international research centres, for example, and with public and private institutions within Peru. Most significantly, however, Promango has established a central role in the learning of its members, a role that has been carried forward in recent initiatives to defeat the problem of overproduction through diversification.

The second proposition made in this study is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. This chapter has highlighted the way in which Promango has primarily acted as a diffuser amongst its relatively homogeneous members, helping to ensure that the range of knowledge needed to produce mangos

of an international standard is distributed widely. In addition Promango has also begun to take on the role of a coordinator, and the success of its project to strengthen the mango production chain is an illustration of how it has adapted successfully to this role.

There are a number of factors which mean that Promango can carry out these roles in a way that lead firms could not. A factor that is of particular relevance for Promango firms is the fact that member firms, being medium sized producers, are geographically relatively isolated and therefore without an effective association they would have few natural points of contact. In addition member firms tend to have limited resources, the inherent instability in the production of mangos due to its reliance on climate means that they cannot devote significant resources to more long-term development projects with confidence.

In addition, by acting together as members of Promango firms have more power to negotiate with the exporting firms that buy their product, but a certain amount of trust has needed to be established in order for them to reach that position. A final reason why Promango performs a role that lead firms would find it difficult to do is that it has developed an expertise in gathering information that member firms, based as they are in the countryside, would find it difficult to tap into. Information on future market trends, the international interest in new varieties, for example, provides an illustration of this point. Firms need specialised and specific knowledge to make judgements in these circumstances and the existence of an organisation like Promango means that it is more likely that they will be able to obtain this.

In conclusion, Promango has been identified as an organisation that has established a community of practice amongst its members, who share the situated and embedded knowledge needed to grow mangos in the Piuran soil and climate conditions. These members have adopted a number of common practices which has allowed them to achieve the quality levels needed for their product to be suitable for the international market. In addition Promango, showing its ability to initiate a process of perspective making, has coordinated a number of joint projects amongst its members, and this has led to a successful process of diversification.

Chapter 7: Government Agencies as Intermediaries: Senasa and Promperu

This chapter will examine two government agencies, Senasa and Promperu, that have been fundamental to the rise of Peruvian agricultural exports over the last 15-20 years. The chapter will reveal how they have played an important role in the areas of food safety (Senasa) and quality (Promperu) and have helped to spread the common understandings and common practices that were mentioned in Research Question 2 of this study. The work of both organisations has, however, stretched wider than this and has seen them performing a number of the intermediary roles identified in the taxonomy presented in Chapter 3. Both organisations, for example, regularly access knowledge from international sources and both organisations, through different mechanisms, diffuse this knowledge widely. In addition, on occasions, both organisations have been involved in specific innovation initiatives, and have played the enabling role outlined in the taxonomy. The following chapter will outline, analyse and compare the roles played by both organisations.

Part One: Senasa: Achieving Food Safety

Senasa (The National Agrarian Health Service) is a decentralised office of the Ministry of Agriculture and has existed in its present form since 1992, working in a period, therefore, when Peruvian agricultural exports have grown rapidly. For the mango industry, as with other fruits, the main focus of Senasa's work has been control of the fruit fly. According to a representative from the organisation 'To fight a disease like the fruit fly is like a war, if you don't have all the elements in place then you lose' (Agency Interview 3, 2008). To be successful in this struggle Senasa has embarked on a continuous process of education and diffusion of knowledge to fruit producers, exporters and the general public. In doing this it has tried to spread the common understandings and common practices that are necessary to control the fruit fly and, therefore, its role is particularly relevant in relation to Research Question 2 posed in this study.

7.1 Senasa: History and Objectives

Since Senasa was formed in the early 1990s there has been a growth in both consumer and government awareness of food safety issues. The magazine 'Exportar' for example, in a special issue on Senasa, noted how complying with international standards has become an essential component of competitiveness, now being just as important as the factors traditionally identified such as productivity, positioning, market identification and logistical evaluation (Exportar, 2008). In accordance with this the importance of the work carried out by Senasa has been increasingly recognised by the Ministry of Agriculture. The organisation has new headquarters in the affluent 'La Molina' district of the Peruvian capital Lima, adjacent to INIA, the country's main agricultural research body (see Chapter 8), and opposite Peru's main agricultural university. These headquarters were partly financed by money obtained from the Inter-American Development Bank and, in addition to its office space, Senasa also has its own research laboratories (Agency Interview 3, 2008).

Senasa performs a number of roles that help establish a suitable food safety strategy. Most importantly, it is responsible for the control of existing diseases and for preventing new ones developing. Considering specifically the cases of fruits such as mangos, the main challenge facing Senasa is the control of the fruit fly. It has also, however, played an important role in attempts to develop new markets for Peruvian exports, for example it was involved in technological developments necessary for entering the Japanese market and Peruvian negotiations for a free trade agreement with the United States. In addition, it has an aim of raising public awareness on phytosanitary issues, and in doing so improving the general quality of life for Peruvian citizens.

In its day to day roles Senasa can be identified as having to play a difficult dual role. On the one hand, it is attempting to ensure that producers, processors and exporters follow phytosanitary regulations rigorously, and, on the other hand, seeking to provide more positive support to the same group of people. There have been occasions, therefore, where, because of the role it has to play in the implementation of phytosanitary standards, Senasa has been viewed by some firms as an obstructing organisation, a feeling exacerbated by the general reality in Peruvian society that trust of the government and government institutions is low. Politically, the context of Senasa's work can also be problematic. Agricultural policy is a difficult area that exposes a lot of tensions in Peruvian society, and there is a

constant debate about the suitability of the export model, and whether its benefits are being seen by all sections of society. A further challenge is its limited economic resources which has implications in many areas. According, for example, to a Senasa representative, ‘Training is lacking here, it is a very different situation to countries like the USA or Japan. Even Chile has big advantages compared to Peru’ (Agency Interview 3, 2008).

7.2 Working with Exporters, Processors and Producers: Senasa and its Networks

A survey was completed for this study in which both large and medium sized firms were asked to identify the sources of technological and commercial knowledge that were important to them (Firm survey, 2008). Consideration of the data from both sets of firms allows an assessment to be made of the importance of the role played by Senasa.

Table 7.1: Sources of Technological Knowledge for Firms (All Firms)

Name of Intermediary Organisation	No. of firms identifying organisation as source of technological knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
Senasa	23	3.4
APEM	22	2.8
Promango	17	3.4
Certification Firms	17	3.2
Promperu	14	2.1
ADEX	13	2.8
National Mango Board	13	2.4
Incagro	10	2.9
INIA	10	1.9
Consultant	6	3
CITES	4	2

(Source: Firm Survey, 2008)

Table 7.1 shows the sources of technological knowledge identified by firms. The table shows that the organisation was identified by 23 of the 26 firms that participated in the survey, the highest number of any of the intermediary organisations included in the survey. These firms also ranked the knowledge received from Senasa with the highest level of importance of any of the intermediary organisations surveyed.

Table 7.2: Sources of Commercial Knowledge for Firms (All Firms)

Name of Intermediary Organisation	No. of firms identifying organisation as source of technological knowledge	Firm ranking of importance of knowledge received (average calculated from scale: 1 = little importance, 5 = very important)
APEM	22	3
Senasa	20	2.6
Promango	15	3.1
Certification Firms	15	2.3
Promperu	14	3
National Mango Board	13	3.5
ADEX	12	2.2
Consultants	10	1.7
INIA	9	1.1
Incagro	7	2.3
CITES	4	1

(Source: Firm Survey, 2008)

Table 7.2 shows the sources of commercial knowledge identified by firms. Senasa is ranked second in this table, APEM being the only intermediary organisation that is ranked higher.

Consideration of both tables shows the importance of Senasa as an organisation, therefore, and this is further confirmed through the network analysis that has been completed for this study. In carrying out its various roles Senasa needs to work effectively with processing and exporting companies, and also with mango

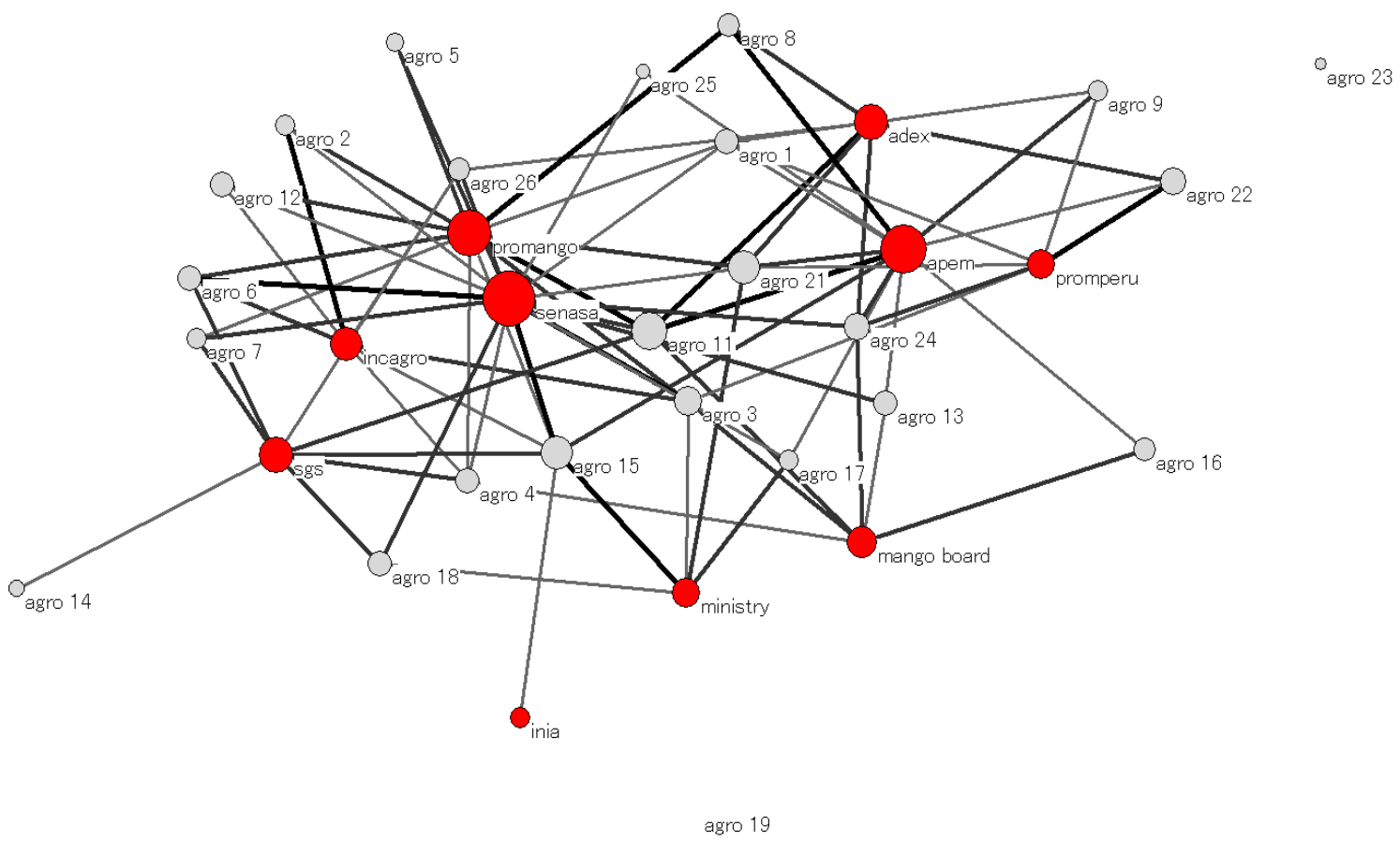
producers (Agency Interview 10, 2008), and the network maps illustrate the extent to which the organisation is able to achieve this.

Figure 7.1 provides a map of the network that identifies the important sources of technical knowledge. The size of the nodes is proportional to the amount of information given or received. The map shows Senasa occupies a position in the centre of the network. It is the most important source of technical knowledge amongst all of the intermediaries identified in the survey. Senasa is also illustrated as receiving and giving information to both APEM and Promango members, although its relative importance is greater in relation to Promango members.

Figure 7.2 identifies the important sources of commercial knowledge and, as with Figure 7.1, the size of the nodes is proportional to the amount of information given or received. In this case Senasa's position in the network, while still of importance, is much less central. In addition, its relationship in this area appears to be predominantly with Promango members, and only to a very limited extent with APEM members.

The network maps, therefore, indicate that Senasa is primarily a very important source of technological knowledge for practitioners, its position within the network allowing it to diffuse knowledge widely. They highlight the degree of technological reliance firms have on government intermediary services for the export of agricultural products to develop markets. As such, organisations such as Senasa form part of the basic knowledge infrastructure emerging export clusters require to penetrate world markets.

Figure 7.1: Mango Producer and Exporters Firms: Sources of Technological Knowledge (Threshold>3)
 Legend: Grey for firms, red for intermediaries. Size of nodes is proportional to the amount of information given or received. Only the largest intermediaries have been considered, in order to simplify the diagrams.



7.3 Control of the Fruit Fly

The fruit fly, Senasa's biggest challenge, disseminates in the form of larvae in contaminated fruit and vegetables (Agency Interview 10, 2008). The fruit fly disease is a worldwide problem, and affects over 200 vegetables and fruits that can act as hosts. In addition to being a problem for producers hoping to export, it is also responsible for the destruction of significant quantities of fruit originally destined for the home market.

7.3.1 Certification and Treatments

One of Senasa's most important roles is the establishment of clearly understood standards and procedures. A potential exporter needs to ensure that they complete the requirements established by the national organisation of phytosanitary protection in the destination country. These regulations potentially include quarantine regulations, post-harvest treatments, or other conditions of entry, and, in many cases, also involve obtaining a phytosanitary certificate. This system of international phytosanitary regulation is carried out through a body called the International Plant Protection Convention (IPPC). This is an international treaty relating to plant health and was initially adopted by the Food and Agricultural Organisation of the United Nations (FAO) in 1951. As of July 2009, 173 governments adhered to the treaty. It plays an important role in international trade, seeking to ensure that its member's exports, through the use of phytosanitary certification, are not a means by which pests are introduced to the trading partners (FAO Internet 1, 2009).

According to a representative from the organisation 'Senasa is the Peruvian representative on the IPPC and as members we are involved in a continuous back and forth between member countries' (Agency Interview 3, 2008). Membership of the IPPC allows, therefore, for an exchange of information with the countries that Peru imports goods from, as well as those to which it imports. Senasa has a department of internal quarantine, for movements inside the country, a department of external quarantine, for goods that are exported, and a department of importing quarantine for goods that enter the country.

As part of its duties Senasa is responsible for the issuing of phytosanitary certificates, a document which guarantees that fruit or vegetables are free of

prejudicial diseases and have been inspected according to the appropriate procedures. The certificate is issued in accordance with the phytosanitary regulations established by the appropriate body in the importing country. For mangos a phytosanitary document is required for, amongst other countries, export to the US, Argentina, Chile, Mexico, New Zealand and China. The increase in the quantity of Peruvian vegetables and fruit being exported has led to an increase in demand for such certification. According to Senasa, the issuing of such certificates protects the reputation of Peruvian products internationally, and also is important for business negotiations (Senasa Internet 1, 2009).

One of the post-harvest requirements required for export to some of the international markets for mangos is the Hot Water Treatment and Senasa is involved in this as part of its work with processors and exporters (Agency Interview 10, 2008). The Hot Water Treatment involves submerging the mangos in hot water for a specified time, usually between 75 to 90 minutes, depending on the size of the mangos. It is required for the US, Chinese, Mexican and New Zealand markets, but is not required for export to Europe. In addition to dealing with the fruit fly, it also serves to eliminate other infections (ibid.). The treatment was first introduced in Peru in 1988 and since that time the US phytosanitary body APHIS has been responsible for its regulation. The development of the treatment in Peru was the result of a programme that took place in Brazil and led to capability building in the surrounding region. It meant that in 1990 mangos with the hot water treatment could be exported to the United States for the first time (Agency Interview 3, 2008).

One of the aims of Senasa is to work towards the reduction of phytosanitary regulations for the goods which Peru exports (Senasa Internet 1, 2009), thereby reducing the costs to businesses of complying with such requirements. The costs incurred by APHIS, the US phytosanitary body, are met by the exporting companies, for example. According to a Senasa representative an employee of APHIS costs in the region of \$15,000 per month, while that of a Senasa worker would incur costs of approximately \$700 per month (Agency Interview 3, 2008). Senasa has therefore been attempting to seek agreement from APHIS to take over part of the role from them.

It has been able to intermediate between the wishes of APHIS for a robust and professional phytosanitary system, and those of the exporters for a reduction in costs. From the mid-2000s onwards less inspectors have had to be sent from the

United States, and they have been replaced by Senasa ones. While APHIS still supervises the work the result is less costs for exporters, and Senasa hope that the transfer of activities will continue and be extended. The ability to inspire confidence in the process of inspection has also had knock-on effects in the relationship established with buyers apart from the United States. According to a Senasa representative, for example, ‘inspectors from China only come at the beginning of the season to inspect the systems in place. They then return to China and allow Senasa to carry out its day-to-day operation’ (Agency Interview 3, 2008). Much fewer costs are, therefore, incurred by exporters.

In addition to working with processors and exporters, Senasa also plays an important role working with producers in the control of the fruit fly, supervising the presence of the fruit fly disease in many of the largest valleys in Peru. Appropriate measures and procedures need to be established, and implemented, for the production and movement of any fruit or vegetables potentially susceptible to the fruit fly. Senasa also has to ensure that the importance of such measures is recognised by producers, and a system of inspections, tests and surveys exists to ensure that this is the case.

In conclusion, therefore, in its work concerned with the fruit fly Senasa plays the diffusion role presented in the taxonomy of intermediaries’ roles in Chapter 3. One of the challenges is that the nature of the threat from the fruit fly, and responses to it, are constantly changing and therefore the latest information available needs to be accessed, translated and diffused. In addition, information about other diseases must also be accessed and diffused, as must information about any new measures that Senasa are introducing. Finally, information about developments in the phytosanitary regulations of importing countries is also sometimes of relevance to producers.

Evidence from the network maps, outlined in Section 7.2.2, indicates how Senasa has a very central position in the network amongst medium-sized producers, and is therefore able to play this role effectively. Senasa also diffuses information through representatives of the organisation attending and speaking at conferences organised by producers. For example, at the 2008 Mango Forum organised by Promango one of the presentations given to attendees was on management of the fruit fly (Industry Event 2, 2008).

7.3.2 Research Projects

There are many learning processes necessary to fulfil the government's aim of increasing agricultural exports. The Senasa website identifies two objectives, the protection of actual international markets through a system of phytosanitary certification, and the attempt to reduce the number and extent of phytosanitary regulations, which have already been discussed (Senasa Internet 2, 2009). A further aim, the opening up of new international markets, is also identified however. While this aim is less precise, it implies a more proactive role being played by the organisation and was confirmed by a representative from the organization who stated that 'Peruvian exporters are looking for alternative markets, and one of the functions of Senasa is to collaborate for exporter organization to help them gain access to new markets' (Agency Interview 3, 2008).

The representative recognised how the United States has always been a traditional market for fruit and vegetable exporters, and will continue to be important, but pointed to the potential that Asian markets promise. Peru, for example, is a member of APEC, an organisation that links American and Asian countries. Moreover, it hosted the meeting of the organisation in 2008, and the visit of heads of states from a large number of countries presented many opportunities for links to be made and networks created (Agency Interview 3, 2008). Most focus has, however, been placed on the Japanese and Chinese markets, understandably given both the size of their respective economies and, in the case of China, the unprecedented rates of growth that have been achieved there in the last decade.

An example of Senasa playing this third, more proactive role, in practice is a project is involved in which has the aim of facilitating the export of mangos to Japan. The project began when contact was made with the Japanese Ministry of Agriculture, through contacts from the Peruvian diplomatic staff in Tokyo, towards the end of 1995 and the beginning of 1996 (Agency Interview 3, 2008). A long-term plan was put in place, the main challenge being that there is a difference in the hot water treatment demanded by that Japanese phytosanitary organizations in comparison to that that is required by other countries, for example the USA. While the USA requires the temperature of the water to be measured during the treatment, Japan requires the temperature in the middle of the fruit to be measured.

Three main bodies were involved in the project, Senasa, APEM (the producers and exporters association) and the National University of Piura. Senasa played the main coordinating role, making use of a number of contacts which members of its organisation possess. It also provided the finance needed for the purchase of the tank and other equipment necessary for the research. Another source of finance came, however, from exporting firms themselves and this was significant because, according to a representative from Senasa ‘There is an expectation in Peru that businesses don’t take part in research, they expect the government to do it’ (Agency Interview 3, 2008). This project differed, however, in the fact that significant financial support was provided by APEM, the producers and exporters association. APEM funded, for example, the salaries of the three researchers who were employed to work on the project. In addition it participated in some of the logistical issues that needed to be addressed, for example the supply of the mangos that were needed for the experimentation to take place.

A further major logistical problem was providing a site where the machinery could be stored and the experimentation could be carried out. This was solved through a relationship that was established with the University of Piura. A member of Senasa, who has studied at this university, used his contacts to establish an arrangement with the relevant department there. In addition to providing the site where the machinery could be stationed, the University also provided some technical support to the project.

In carrying out the research on the project the researchers were able to draw on experiences from other countries, and also on experiences that researchers had had in designing treatments for other fruits. In terms of the technology used, sensors were brought in from Germany and made a significant contribution to the quality of the treatment designed. Tests were also conducted amongst consumers to determine whether any significant differences in tastes could be observed as a result of the treatment. Twenty people were given the fruit at periods of two, five and ten days after the treatment to determine if any changes could be identified, and the results were used to fine-tune the process. According to a representative from Senasa, some of the knowledge gained could also prove useful in other settings, for example for the application of treatments to larger mangos for the US market, as there is evidence that there is an increasing interest in larger fruit amongst US consumers (Agency Interview 3, 2008).

Progress on the project was relatively slow, partly because of the complexity of the task posed by the Japanese regulations and the thoroughness with which they monitor any potential solutions. A further factor, however, is that there is an element of lack of trust between Senasa and some exporter firms, an issue that was previously discussed in Section 7.1. The final report on the project was, however, sent in early 2008 to the Japanese authorities. In January 2009 representatives from the Japanese phytosanitary authorities visited Peru in order inspect the working of the system in practice. In September 2009 Senasa announced that a formal agreement for exports to begin would be made by the Japanese authorities in November or December 2009, meaning that the 2009/2010 season could see mangos being exported from Peru to Japan for the first time (Living in Peru Internet 1, 2009).

In conclusion, therefore, the initiative provides an example of successful cooperation between government agencies, universities and firms represented through their trade organization. This is something that has been quite rare in the Peruvian context, and something that those who are interested in innovation within the country would like to greatly encourage. There is also the possibility that the knowledge gained can be transferred to other contexts.

Senasa can be identified as an intermediary organisation that successfully played an enabling role, helping access and adapt the knowledge required and to make it usable in the context of the Peruvian mango industry. It was able to do this through bringing different organisations together and making use of the network of contacts it possesses.

7.3.3 Eradication Efforts

The ultimate aim in attempts to control the fruit fly is complete eradication of the disease. This is something that has been achieved in Chile, Peru's southern neighbour. It was therefore no coincidence that the southern valley of Tacna was selected in the 1970s as the most appropriate place to begin a Peruvian effort to eradicate the disease. Not only was Tacna's closeness to Chile an advantage, but also its relative isolation from other valleys in Peru.

While initial progress in this project was slow when Senasa was created in 1992 a new initiative was launched in order to try and eradicate the disease. Funding was sought, and eventually obtained, from the Inter-American Development Bank in

order to carry out the programme (Agency Interview 10, 2008). The work began in 2000 in the southern departments of Moquegua and Tacna and the fruit fly has now successfully been eradicated from both areas. This effort has taken place in close collaboration with Chile, and strict measures have been put in place to ensure that produce that is bought into the region is not contaminated. According to the magazine *Exportar* the investment destined for the eradication of the fruit fly in the period 2006-2009 has reached \$30 million, a similar amount to that which was invested in the seven years between 1997 and 2000. The successes in the southern region have, moreover, allowed an increase in the quantity and range of products exported from the area, including products such as paprika, oregano, olives, watermelons and avocados (*Exportar*, 2008).

Success in eradication has also been gained in other parts of Peru, for example some valleys close to the capital Lima are also now free of the disease. In the north of the country, however, eradicating the disease poses a much more comprehensive challenge. One of the reasons for this is that, while in the south the variety of fruit fly is a Mediterranean one, in the north there are a wider variety of fruit flies which exist and are threatening, some of which are of South America origin (Agency Interview 3, 2008). The tropical nature of the climate also makes control more difficult, as does the fact that it is more problematic to try and isolate a distinct agricultural zone and monitor it vigorously, especially as there is not the advantage of having a fruit fly free neighbour in the north as there is with Chile in the South.

One important element of such an effort is the research work that Senasa carries out at its laboratories. It is necessary to study the different types of fruit fly, to examine their different ways of life, their responses to different treatments, and the potential effects of these treatments on the environment. In addition, part of the effort to eradicate the fruit fly is the laboratory production of sterile fruit flies, with an estimated weekly output of 300 million, which are then released into the countryside in the relevant areas (*Exportar*, 2008).

Research such as this is very expensive, however, and for this reason a programme of public education, at all levels of society, is also a vital part of any such effort. For the majority of the Peruvian population, for example, the most common method for travelling around the country is by coach. Senasa has, for example, placed prominent signs in a large number of coach stations informing passengers of

the damaging effects of the fruit fly, and what produce they should not transport from one part of the country to another. Convincing people to change their behaviour is a difficult task, however, but there are signs that a level of success is being achieved. Agricultural producers in Moquegua and Tacna, the zones where the disease has been eradicated, are taking an increasingly active role in trying to change public opinion, for example, as they increasingly see the benefits of the measures. There is also evidence of increasing political awareness of the issue. A Senasa representative, for example, told the story of when the previous Peruvian President was presented with a gift of fresh vegetables while visiting Venezuela, he apologised profusely for not being able to take the gift back to his country as it would get him into trouble with Senasa! (Agency Interview 3, 2008).

In its work on eradication, therefore, the importance of the diffusion role, identified in the taxonomy of intermediary roles outlined in Chapter 3, being played by Senasa can again be identified and emphasised.

In conclusion, the significant increase in the last decade in the level of Peru's agricultural exports is, as Senasa is involved at several stages of the export process, evidence of the success of the organisation. As part of its work Senasa has established links with a wide range of organisations, showing the ability to build networks. Its role in diffusing the knowledge it accesses has been crucial, and, in an era when consciousness of food safety has risen exponentially, has been fundamental in allowing Peru to gain an international recognition as a reliable supplier. A detailed analysis of the roles that it has played will be conducted in Sections 7.9 and 7.10.

Part Two: Promperu: Facilitating Exports

Promperu, the 'Comisión de Promoción del Perú', is part of the Peruvian Ministry of External Trade and its significance for this study is the role it has in promoting exports. Since the mid-1990s onwards its work in supporting the export model of economic growth outlined in Chapter 4, supported by an increasingly outward looking government, has been crucial. Non-traditional export products, such as mangos, have grown particularly fast. In carrying out this role Promperu has built significant international contacts, accessing information and then diffusing it to producers in the export industries it supports. In the mango industry it has played a particularly significant role in the formation of the two main associations, APEM and Promango, whose significance has already been examined in Chapters 5 and 6 of this study.

7.4 Promperu: History and Objectives

Promperu has two main functions, the promotion of exports and the promotion of tourism. In promoting exports the organisation works mainly with small and medium sized businesses. Sometimes large firms also need assistance, especially if they are new to exporting, but for experienced large exporters assistance would come from more specialised services, rather than Promperu. Promperu has operated under this name since 2007, its immediate descendent being the 'Commission Para la Promocion de Exportaciones' (Prompex) which was created in 1996. Prior to this there had been several institutional changes in the bodies promoting exports in Peru, two separate bodies had existed at different times during the 1980s but when these ceased operations there was a vacuum in this area until the formation of Prompex in 1996.

From 1996 onwards Prompex quickly established itself as a dynamic organisation, particularly concentrating on encouraging non-traditional exports. The work it undertook was initially in accordance with the 'Plan Estrategico Nacional Exportador' (PENX), that aimed to provide tools for the development of exports, the opening up of international markets and actions to support business management. The aim for Peru was to have a supply of international exports that was competitive,

diversified and had a high level of value added. The plan aimed to develop a relationship of cooperation between the public and the private sector and this has always been an important part of Promperu's work; its directorate, for example, is made up of a mix of public and private sector organisations.

According to a representative from the organisation, Promperu can be defined as a Business Development Organisation (BDO). It aims to work with exporting businesses and with associations of producers (Agency interview 12, 2008). In doing this it helps firms to access and use commercial intelligence, and to define strategies for penetration and concentration. A big focus for the organisation has been the encouragement of a culture of quality, to be achieved through the spread of good practices and quality assurance systems. The priorities for Promperu have been non-traditional exports, including non-traditional agriculture and agro industry, along with other areas such as textiles, 'artesanía', and services. Such areas are identified as offering great potential for the generation of employment opportunities, an issue that is vital for the Peruvian economy. A further aim was the decentralization of the supply of exports, and with a special emphasis on supplying support to SMEs as it was recognised that this is a very important sector within the Peruvian economy.

The following sections will consider a number of aspects of Promperu's work, including the role it has played in the formation of producer associations, its role in developing markets for Peruvian goods and the important role it plays in quality management.

7.5 Working with Exporters: Promperu and its Networks

A survey was completed for this study in which both large and medium sized firms were asked to identify the sources of technological and commercial knowledge that were important to them (Firm survey, 2008). Consideration of the data from both sets of firms allows an assessment to be made of the importance of the role played by Promperu.

Table 7.1 (see Section 7.2) shows the sources of technological knowledge identified by firms, while Table 7.2 (see Section 7.2) shows the sources of commercial knowledge. In both cases Promperu is recognised as a source of knowledge by 14 of the 26 firms that participated in the survey.

Consideration of the data from Chapters 5 and 6 allows a comparison to be made of the importance of the organisation for both large and medium sized firms. This reveals that Promperu is primarily recognised as important by large firms that are exporters, which rank the knowledge received highly, particularly in the case of commercial knowledge. A contrast can be drawn in this case with Senasa, the reach of which is wider and spreads across both large and medium sized firms.

Comparison of the technological and commercial network maps also illustrate that it is in the commercial knowledge area that Promperu's influence is of most relevance. For this reason Figure 7.2 (see Section 7.2) is the most relevant one to consider here. The size of its node in the map indicates that Promango is one of the most important intermediary organisations in the network.

The types of firms that were indicated through the map as receiving information from Promperu are predominantly large firms, which are mostly, although not exclusively, members of APEM. This is consistent with the fact that Promperu is an organisation seeking to encourage foreign trade and exports, and the fact that the large exporting firms in the mango cluster tend to be members of APEM.

7.6 The Formation of Producer Associations

Promperu, and its predecessor Prompex, have worked extensively in the agricultural sector, in particular with non-traditional agricultural exports such as asparagus, lemons and mangos. One of the most significant contributions they have made is the encouragement they have given to the formation of producer associations. The aim of this work has been to create a single point of contact for the industry, a mechanism to lower costs through economies of scale and a route to encourage cooperation and joint learning.

Following its formation in 1996 Prompex rapidly identified a number of challenges that needed to be overcome if the agricultural sector was to meet its export potential. According to a representative from the organisation 'if you are seeking to export then you are working with huge companies, they are asking for volume and they are asking for quality...if you are not well organised then you do not have any chance at all of entering international markets' (Agency Interview 12,

2008). The need for good organisation has become even more important as Peru has entered a number of free trade agreements, an example being the one with the United States that came into force in 2009.

Before Prompex started this work there were some industries that already had relatively small associations, but they invariably did not coordinate together and the government needed one body that could act as a representative of all the exporters, so that producers could ‘have one voice, not a lot of different voices’ (Agency Interview 12, 2008). Prompex gave support to the formation of an asparagus producers group, a citrus group, a mango group and a grape group, amongst others, the first group to form being the asparagus group. Asparagus has grown to become Peru’s leading agricultural export despite the fact that the beginning of the export industry was problematic. A large initial investment, and a plot of land between 20-30 hectares, is needed in order to be competitive and the formation of the association helped overcome some of these initial barriers.

An interesting question is why forming associations was initiated by Promperu as, according to a representative ‘theoretically, the responsibility of this organisation should have been from the agricultural ministry, but they aren’t working in that way, so we realised that if we do not support them we will not be able to bring about a growth of export’ (Agency Interview 12, 2008). In contrast the Ministry of Agriculture strategy has been to focus mainly on small producers, an approach which is often interpreted as being for reasons of political expediency. There also exists a perception of inefficiency and organisational inertia within this ministry from those observing it from outside (ibid.).

The approach taken by Promperu was to provide financial support initially, and then gradually withdraw this as the association got stronger. They secured funding for the monthly salary to be paid for a manager for APEM, the mangos association, for example, but this was withdrawn by a certain percentage each year as it became clear, in a relatively short space of time, that the industry was becoming profitable. According to a representative “first of all we had to demonstrate to them that they can work positively with a manager, once that had been done it was ‘now you pay for it’” (Agency Interview 12, 2008).

In designing their strategy Prompex sought some advice from other Business Development Organisations, for example they worked with people that could offer advice on the administration tasks, about financing and logistics issues and about

how to organise phytosanitary rules. They also adapted the methods that they used according to the industry sector with which they were working. Mango, for example, was a sector that had people coming into the industry with a lot of business experience, from the banking sector for example, and they were therefore very proactive in pushing the exporting process forward. Other sectors, which did not have this advantage, needed more guidance and input from Prompex. In addition, as the number of successfully operating producer associations increased, there were also increasing opportunities for knowledge to be shared between them.

One complication that has arisen in the mango industry, however, and is an issue that has been examined in this study, is the fact that two associations, APEM and Promango, have formed. Although Promperu has encouraged them to work together, not least because of the financial savings that could be made through their combined buying power, it has not been able to do this. According to a Promperu representative this has been mainly because of different personalities as ‘they do not have a different strategy, and they do not have a different way of proceeding’ (Agency Interview 12, 2008). There are some initiatives to encourage more cooperation, and these would be supported by Promperu.

In conclusion, the initiative taken by Promperu in forming the producer associations has been vital for the industry. As has been examined in Chapters 5 and 6, APEM and Promango have been a route through which a great deal of learning in the mango industry has taken place. In response to Research Question 3 posed in this study the formation of both associations has allowed the formation of cluster communities through which knowledge has begun to flow.

7.7 Developing New Markets

Another major focus for Promperu is developing new markets and expanding existing markets. Amongst the services provided are arranging for producers and exporters to visit trade shows, the provision of various forms of commercial intelligence and the encouragement of the links and knowledge needed for entering new countries, such as China, or niche markets such as that for organic products.

Promperu encourages the participation by industries in trade shows around the world. In the fruit sector, for example, shows take place in France, Russia and Germany, a prominent example being the Fruit Logistics show held in the later

country. In some cases Promperu is able to offer financial support for participation in these shows, which is usually decided through the use of a scale that assesses the ability of the association or firm to pay. Promperu has worked with both APEM and Promango to encourage trade show participation and, in addition, has worked with smaller associations interested in the organic market where more specialised trade shows have been relevant.

Promperu also have a series of commercial attaches with whom they work, many of whom are diplomats. They encourage these people to visit Promperu so that a clearer understanding can be gained of the role that they can play in providing assistance to exporters. A visit was made to the Promperu office in early 2008, for example, by a young diplomat who was about to work in the United Kingdom. A number of different roles, such as finding out and contacting the most important buyers, arranging visits by producers and exporters, including meetings with buyers, and working together with the Ministry of Foreign Affairs of the host country, were discussed during this meeting (Agency Interview 12, 2008). Such roles are increasingly being played by Peruvian representatives abroad and they proved to be crucial, for example, in the recent entry of the mango industry to the Chinese market. Promperu, in partnership with the phytosanitary organisation Senasa, worked successfully with the Chinese authorities to overcome bureaucratic barriers and therefore shorten the process of gaining access to the market.

Promperu is also able to provide commercial intelligence through the statistical material that it produces. It is able to do analysis on potential markets for Peruvian products, for example on the most important buyers and on how particular supply chains operate. Promperu can also provide assistance with specific requests made by exporters or potential exporters, and its website also produces regular monthly reports and international analysis per product. This work has made a contribution to the work of both Promango and APEM, in particular to the latter organisation as it has sought to establish itself in the European market (which has different demands and dynamics to the US market) and has also recently sought information on new markets in Asia.

Promperu also has a programme that helps firms and associations draw up business plans. The statistical information mentioned above is obviously of relevance in this context, in addition to other areas of advice that can be given such as on standards and on phytosanitary regulations. Logistics is also an area where

Promperu's expertise can be of assistance. In the work that it has done with handicraft and textile producers, for example, it has helped secure substantial savings through locating a cheaper way of mailing these products to their export destinations.

The entering of the market for organic mangos has also been encouraged by Promperu and is part of a wider strategy of encouraging organic production and export. From the beginning of the 2000s onwards the export potential of organic markets began to be realised, with interest initially being in grains from the Andes region, and in coffee and cacao. In terms of non-traditional exports the potential market for organic bananas was an early area of interest.

Since Promperu began working in this area the growth in organic exports has been rapid, exceeding 50% annually for some products while mango growth achieved a 40% increase one year (Agency Interview 14, 2008). There is recognition, however, that such growth levels are unlikely to be maintained; it is unclear, for example, as to how the worldwide recession will affect the demand for organic goods as it is considered by some consumers to be a luxury product.

One of the ways in which Promperu attempts to assist organic producers is through giving information on the certification process. This market is of particular interest to small producers because, as they often don't use fertilizers due to financial constraints, they don't need to substantially change the way in which they produce the crop in order to obtain organic certification. While Promperu doesn't finance the certification process (this remains the responsibility of the firm or association) it is able to give information on the requirements for organic certification and put small producers in contact with the two certification companies that provide such certification for mangos, Control Union and Biolatina.

Promperu can also provide producers with market information. It provides information about trade fairs that are relevant for organic products, for example, and is sometimes able to provide financial support to allow producers to attend these. One of the aims of Promperu is to search for new markets, and a focus on Asia markets for organic products has been made. Russia, for example, is one country that is seen as having potential. Another activity that Promperu takes part in is the organisation of visits by importers, through which suppliers can build contacts.

Promperu has worked with a number of associations of small producers that have an interest in exporting organic mangos. Two examples are Apromalpi (Association interviews 5 and 6, 2008), which is based in the Chulacanes region of

Piura, and Agrovida (Association interview 7, 2008), which is based between Sullana and Tambogrande. The first of these organisations has a longer history and is larger in terms of membership and has been extremely dynamic in entering new markets and developing its own skills and infrastructure. Agrovida is an organisation with similar aims that has also achieved organic certification. In addition Promperu has also worked with a large exporting firm, Sunshine Exports, the most significant player in the organic mango market in terms of volume.

7.8 Quality Management

One of the keys to international competitiveness and exporting successfully is quality management. According to a representative from Promperu there are three main areas in which the organisation is involved in quality management work, work to do with certification, work to do with national standards and work to do with the monitoring and implementation of changes to regulations around the world, particularly, of course, in destination markets (Agency Interview 13, 2008). Each of these areas will now be considered, and the common approach that has emerged will be recognised. The work of the organisation in this area is particularly relevant to Research Question 2 in this study, as it encourages the development of common understandings and common practices as a means to achieve the level of quality needed.

7.8.1 Certification

The first quality management area of work to which Promperu contributes is certification. All export sectors have witnessed an increase in the demand for certificated suppliers over the last decade and, in addition, the demands of the various certification bodies have become more and more stringent. Mostly these certification programmes are designed, implemented and monitored by international bodies, an example being GlobalGap. In addition there exist certification regimes that are elaborated by individual firms, the most important example in the mango industry being Tesco and its certification programme called Tesco Nature's Choice (TNC).

Promperu helps producers or manufacturers meet the standards required by the certification bodies, for example by providing training on quality issues and tuition in the specific requirements of different certification processes. In some cases, although this is rarer and is usually only in the case where industry firms are relatively short of resources, they can also provide financial support for the certification process.

7.8.2 Standards Committee

A second important quality management role that is carried out by Promperu is the elaboration of national standards for a number of different industries. INDECOPI, the national institute for standardisation in Peru, is responsible for delegating the elaboration of standards to appropriate bodies. Promperu is one of the bodies to which this role is delegated, specialising in products that are important for Peru's export offer. Promperu is in charge of the secretariat of the national committees for 15 products and as a part of this role it arranges committee meetings, usually on a monthly basis, coordinates with committee members on upcoming issues of importance, does background research work when necessary and also administers a budget for the presentation of the standard.

In the mango industry, Promperu has worked closely with APEM, the producers and exporters association. APEM, in addition to having its own representative on the committee, can, because of its central position amongst exporters, help to ensure that successful liaison with the other members of the committee takes place. Members of the committee include, for example, a number of representatives from firms, in particular large firms, a representative from the University of Piura, and representatives from the phytosanitary organisation Senasa and from Promperu.

An important early task that the standards committee carried out was the production in 2002 of a standards document which lays out the guidelines for the industry on what constitutes a good quality product (INDECOPI, 2002). The standards committee met on a regular basis during the period February to October 2001 in order to discuss the contents of the document. Once the standard had been proposed it was then put through a process of public consultation by INDECOPI for 60 days, before being approved for publication. The standards committee set up a

number of guidelines related to factors such as the size of the fruit, hygiene issues such as the presence of any contaminants, and factors concerning the appearance and presentation of the product, for example the presence of any marks. The standards relate to fresh mangos only, not applying to those that are destined for industrialization. Within the document criteria are also laid out for different categories of mangos.

In 2006 a further document was published which includes guidelines and illustrative materials designed to make it easier to interpret and follow the recommendations from the original 2002 edition. Promperu helped meet the financial costs of producing the guide, and its financing helped the inclusion of pictures in this guide. According to a representative from Promperu in putting together this guide ideas were taken from the work of the OECD in Europe, which is responsible for a lot of standards work for fresh products. ‘We based our guide on the way that they present their guide’, stated the representative, ‘they add a lot of pictures and so looking at this kind of document we knew that it would be better and easier to understand if we included pictures’ (Agency Interview 13, 2008).

Promperu also provides support in helping to ensure that the guide is distributed effectively to the relevant parties. One of the ways in which they do this is liaising with the relevant associations and, in the case of mangos, they have worked with APEM and Promango in order to gain assistance with this task. They also arrange specific events in order to both publicise the document and distribute it to producers. According to a representative of the organisation, for example, ‘we give this standard for free for the producer; we invite them to a meeting so that they can receive information about what is in the standard, how it should be understood and we allow them to discuss it and then we give them the standard document hoping that they will use it’ (Agency Interview 13, 2008). According to the representative 2000 of the mango standard documents have been distributed, 1000 of the original standard and 1000 of the 2006 guide.

The standards document needs to be reviewed on a five year cycle or order to determine if any updates are necessary. Promperu plays an important role in this, accessing and interpreting information from the international bodies responsible, in particular the Codex Alimentarius Commission. The latter was created in 1963 by the Food and Agricultural Organisation (FAO) of the United Nations and the World Health Organisation. It develops, under its Food Standards Programme, international

food standards, guidelines, and codes of practice with the aim of promoting consumer health.

In addition to updating the existing guide, the standards committee also has a plan for a new guide which will set a standard for the maturity of a mango, provisionally entitled 'Determination of maturity in fresh mangos'. This project was initiated at the demand of the producers as there are sometimes problems with the season and with the weather which means measures in order to accelerate maturity need to be applied. This has to be done in the right time frame and if it is not done correctly then there is the possibility that the mangos will fail to get to maturity. The standards committee is also considering how the market for processed mangos might be increased, as this is also a part of its role. One of the areas that is being considered in this respect is developing standards for mango nectar, a form of thick, undiluted fruit juice, that is seen to have significant export potential (Agency Interview 13, 2008).

In conclusion the standards committee, and the guidelines it produces, operate as a boundary object through which a wider discussion of quality issues and other developments in the industry can be made. It is the body which allows the widest cross section of representatives from different parts of the industry to meet together and share their expertise. According to a representative from APEM, for example, this is the only occasion in his experience when expertise from university academics is inputted into the industry (Association Interview 2, 2008). The success of the committee can be judged through the initiatives it is taken to refine existing standards, ensure that they are widely distributed, and through the initiatives they are taking in developing new standards.

In its work with this committee Promperu can be seen to be playing the roles of accessing and diffusing. In terms of diffusing its method is one of involving producers as much as is possible. According to a representative from Promperu 'I think the producers of mango follow the standard closely because they participate in the process of elaboration. The elaboration process involves producers, exporters, research institutions, laboratory staff, certification bodies and national bodies such as the phytosanitary authority the standard needs to be approved by consensus and this is done through the participation of all the stakeholders' (Agency Interview 13, 2008).

7.8.3 Monitoring International Regulations

A third quality management role carried out by Promperu is the monitoring of changes in export regulations and the passing on of this information to exporters. As international consumer interest has grown in the issue of food safety, and suppliers have been faced with increasingly regulated business environments, the need for this role to be effectively performed has become paramount. For fresh products, such as mangos, it is even more of an imperative. In carrying out this role in the mango industry Promperu works closely with Senasa, the phytosanitary body responsible for fresh products and meat.

An example of an area where regulations need to be monitored is that of the 'Maximum Limits of Residues' (MLRs). MLRs are the maximum concentration of residue from pesticides that are permitted to occur in food after the use of pesticides. They are designed to ensure that residue levels do not pose unacceptable risks for consumers, and form an important part of trading regulations for fresh products. There is a wide variation between countries on the level of pesticides which are allowed and, because of this variation, a difficult monitoring challenge is presented for exporters. According to a representative from Promperu, for example, 'This kind of information is really hard for an exporter, if England has a different MLR than the Netherlands, for example, and if a mistake is made then the container will not enter the market' (Agency Interview 13, 2008).

Promperu recognise that it is not easy for firms to access information on these areas that are often quite technical. Accessing the information is a challenge not just because of the differing MLRs in operation, but also because the national authorities from differing countries invariably only produce the information in English, and it is sometimes in pdf format and sometimes in Excel which also sometimes presents a challenge.

For this reason Promperu compiles information from a range of international sources and presents it in a form that it is easy for firms to access. In 2006, for example, they began a service on their website where they list the MLRs for some of the most important exported product. It is usual for between 10-12 products to be listed (resources prevent a more comprehensive list being maintained) and the MLRs for 10 different markets are presented. The information on the website is updated every six months, and is easily exported into Excel, which means that the exporter

can get hold of the information required unproblematically. Feedback from the site has been very positive, and the organisation has also heard that it is used by producers in other countries.

In conclusion, in carrying out this work the role of accessing international sources of knowledge played by Promperu is very important. Promperu has developed a level of expertise which allows it to understand which changes in regulations are of significance, and the mechanisms that are needed for their implementation. It has also developed a range of methods and skills in diffusing this information to producers, by communicating them to the standards committee, by using its contacts with associations, through its own web page and, on occasions when the changes have a wider significance, through initiating coverage in the press. This role is of particularly important for fresh fruit products such as mangos as the risks, and therefore the regulations, are constantly changing.

7.9 Analysis of Results: Senasa and Promperu

The roles played by Senasa and Promperu as intermediary organisations will now be analysed with direct reference to the research questions posed in Chapter 3 being made. Research question two, which asked what role intermediary organisations play in the formation, amongst previously fragmented actors, of cluster communities through which common understandings, practices and learning perspectives emerge, will be considered first and both organisations considered in this chapter have made contributions in this area.

Promperu played an extremely important role in this respect with the work it did from the mid-1990s onwards encouraging the formation of producer associations. It has done this work in a number of different industries, mangos included, and it has been a major contribution to the rapid increase in the volume and value of Peruvian agricultural exports since this time. In carrying out this role Promperu sought advice from other Business Development Organisations, and also had to adopt a flexible approach depending on the capabilities already in evidence in the sector it was working with. This work has not been without its complications, the formation of two associations, APEM and Promango, in the mango industry being an example. Nonetheless, as Chapters 5 and 6 of this study have shown, both organisations have been crucial as initiators and coordinators of a great deal of learning in the cluster.

The work that Promperu has done with the standards committee has also specifically addressed the issue of common understandings and common practices. Promperu organised the committee in a way that encouraged a collaborative approach, with inputs and contributions from a wide cross section of the industry, reflecting the view that knowledge flows best within communities as identified by the practice-based perspective of knowledge. The design of the publications that have come out of the committee's work have tried to translate these common understandings into common practices and considerable effort, such as the issuing of the illustrated 2006 guide, has been made to try to achieve this.

The role Senasa plays in diffusing the knowledge that it acquires from international bodies such as the IPPC is also of importance for this research question. Common practices in the area of phytosanitary regulations are of vital importance as a way to ensure that fruit quality is consistent throughout the cluster, and prevent Peru's international reputation being damaged by a few poor quality suppliers. Senasa often plays this diffusion role through the links it has with producer associations, and the evidence from the network maps considered in Section 7.2 illustrates the networks it has helped create and plays a central role in. Over the last ten years consistent progress has been made and, according to a Senasa representative 'We have been able to achieve a certain level of confidence with the US...this is important not just in relation to the US market itself but this confidence is also a good signal to other countries of the level we have reached' (Agency Interview 3, 2008). Evidence of this effect in practice was the rapid way in which Senasa was able to work with its counterpart in China and obtain agreement for mangos to be exported there from Peru.

As part of this diffusion role Senasa also ensures plays the role of translating, that is making the knowledge understandable to the different audiences to whom it is relevant. There are differences, for example, in the regulations that are relevant to processors, and those that are relevant to producers, and Senasa needs to ensure that each group receives the knowledge that it requires in a form that is understandable.

In carrying out the above roles both Senasa and Promperu have fulfilled the challenge identified by research question one, that of accessing intra and extra cluster knowledge sources. Senasa carries out an accessing role in day to day operations with international bodies, for example with the IPPC, and in the exchange of information it engages in with equivalent bodies in other countries. In carrying out

this role Senasa has shown the ability for perspective taking, the ability to understand the priorities and needs of international bodies and importing countries and has also shown the ability to build networks. The way it has gained the trust of APHIS, the US phytosanitary body, is evidence of this. Promperu also has fulfilled this role through a number of different routes. It closely monitors changes in international regulations, the work that it does on MLRs described in this chapter being an example. It also accesses market information from a variety of different international sources, for example information on a product's main buyers, market developments, and developments in costs, for example different transport options.

Finally, research question four asked 'What role do intermediary organisations play in either providing new knowledge inputs for cluster actors, or adapting existing knowledge to make it understandable and usable?'. The work that Senasa has done in regards to the project for exporting to the Japanese market is an example of the enabling role, as identified in the taxonomy of intermediaries' roles, being carried out. In this project Senasa took a wider role than its normal remit and was able to initiate significant innovation within the cluster, brought about through encouraging cooperation between itself, the producers association APEM and the National University in Piura. The project reached fruition in 2010 when Peruvian mangos were exported to Japan for the first time, and the market has the potential to be a very lucrative one because of the premium prices that mangos attract in that country.

7.10 Conclusion: Senasa and Promperu as Intermediary Organisations

The work of both Senasa and Promperu will now be considered in relation to the studies two main propositions outlined in Chapter 3. The first proposition is that intermediary organisations provide an important route to knowledge and learning for developing economy clusters, a factor that has been underestimated in previous studies. Senasa's role has been shown to be important in this chapter through its day to day imparting of knowledge to producers, for example in the areas of control of the fruit fly and in that of hot water treatments. It has also had an involvement in special projects that have had a distinct knowledge creation role, the clearest example being research on treatments needed for successful export to Japan. It has also played a role in liaising with other international organisations, most importantly with

phytosanitary bodies from other countries. Such a role is important because phytosanitary regulations are an extremely sensitive area; errors in such matters can produce widespread public concern in destination countries and can rapidly and adversely affect public perception of exporting countries goods.

The work of Promperu is also important in relation to the first proposition. Firstly, it has made a significant contribution to mango industry organisation, particularly by encouraging the setting up of producers associations. This work has been vital in building the cluster and increasing the extent of horizontal cooperation that takes place. Secondly, Promperu has contributed to the development of new markets, and to the full exploitation of existing markets. In this way it has helped mango firms become more vertically integrated in the GVCs within which they participate.

Finally, Promperu has contributed greatly to the attempt to improve the quality of exports, which has also been essential for firms to become integrated into international value chains. It has done this, firstly, through work on certification. In some industries, mango being an example, it has also been involved in the coordination of standards committees. The standards committee for the mango industry, and the documents which it has produced, have been identified here as a boundary object around which a wider discussion on quality has been able to take place. It has helped to establish debates around quality as being important, and has provided a forum within which such issues can be discussed.

The second proposition is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. These roles were presented in the taxonomy outlined in Chapter 3 and both organisations can be identified as filling a number of these roles. For Senasa the most important role is that of diffusion, this being because a successful phytosanitary procedure is vital for the continued success of the cluster and one mistake can cause a huge amount of damage. For Promperu the diffusion role is also crucial, and its work on the standards committee helps ensure that the common understandings and common practices needed for a quality product are established. Another important role is the accessing of information and both organisations have developed considerable skills in accessing information from international bodies. In some areas there has also been an enabling role, an example here being the work that had been

done by Senasa in relation to the project in order to allow mangos to be exported to Japan.

In fulfilling the roles outlined both Senasa and Promperu have shown that they are a part of an important contribution made by government bodies to the re-orientation of the Peruvian economy towards exporting. Both organisations have also, however, had to experience tensions and resistance to their work as they have developed. In the case of Senasa these tensions often arise because of the regulatory role that it plays with firms that sometimes criticise the organisation for being too strident in their application of phytosanitary rules. For Promperu a tension has been that some firms have criticised the initiatives that it has launched, and the way in which it has decided to utilise its funds.

Both organisations have also had to convince the governments of the day that their work is valid, is achieving results and therefore merits adequate funding. An additional tension for both organisations has been that of convincing firms that they need to be prepared to invest their own money in efforts to improve their product and production processes. There has been a tendency for firms to assume that such work is the responsibility of government. Both Senasa and Promperu have tried to challenge this assumption, offering support at vital stages but trying to ensure that this provision of support does not become institutionalised.

In considering the roles outlined, it is of relevance what it is about these organisations that allows them to carry out this role in a way that lead firms would not be able to do. Both organisations, for example, have an interest in diffusing the knowledge they access as widely as possible, which would not likely to be the case with lead firms. They have also developed considerable skills in achieving this successfully. The network maps, for example, show both Senasa and Promperu communicating regularly with firms and with producer associations. Some examples of this include Promperu and the distribution of the standards document, and the current and comprehensive website that it maintains. In the case of Senasa the links that it has established with medium sized producers, though the work it does with Promango, are of particular relevance.

Another important aspect to the success of these organisations is their ability to be seen as neutral and develop relationships of trust with the firms with which they work. This was a contributing factor to the work that Senasa did in collaboration with large firms in the development of the treatment system for the Japanese market. A

further point is that these organisations also have the authority to deal with international bodies. They have established this through their track record of dealing responsibly and efficiently with issues as they arise, and also by dint of the specialist knowledge that they have accumulated through many years of working in the field and through their experiences with products across the agricultural spectrum.

Part of what gives these organisations such authority is the development they have made of specialist knowledge. Lead firms would not be able to do this effectively and would find it more difficult to establish international legitimacy, lacking as they do the neutrality, the specific knowledge required and the incentive to share their knowledge throughout the cluster. In conclusion, as intermediary organisations their role is critical, and it is not one that lead firms would be able to carry out in such an effective way.

Chapter 8: Encouraging Agricultural Innovation: Incagro, INIA and the CITEs

This chapter will consider three institutions that are specifically concerned with innovation, Incagro, INIA and the CITEs. All three of these organisations provide research and development assistance to members of the mango cluster, this support being in the most part concentrated on small producers and providing evidence of them fulfilling the enabling role as identified in the taxonomy of intermediary roles.

The work of these organisations will be considered in relation to the export orientated and knowledge centred model of economic development that was outlined in Chapter 4. One of the focuses of this new model has been an increased emphasis on cooperation between the public and private sector and differences can be identified in how the different organisations have adapted to this challenge. The CITEs, for example, have developed a distinctive entrepreneurial led approach while INIA, as a more traditional government research body, has found it more difficult to adapt to the new model. This was one of the reasons for the setting up of Incagro, an off-shoot from INIA which had a particular focus on innovation. This body, which has now been reincorporated into the overall INIA structure, is the one that has been most heavily involved in the mango industry, and for this reason it will be considered first in this chapter.

8.1 Incagro: Encouraging Innovation

8.1.1 Incagro: History and Objectives

Incagro (Innovacion y Competitividad para el Agro Peruano) is a project that comes under the auspices of the Peruvian Ministry of Agriculture. Its origins stretch back to 1999 when the Peruvian government sought to achieve finance from The World Bank, in order to begin a long-term project aimed at increasing the competitiveness of the countries agriculture. By 2001 funding, and other organisational issues, were in place and the Incagro project formally began.

One of the first actions by Incagro was to organise a series of conferences in order to identify the particular challenges facing the Peruvian agricultural sector. The conferences organised in 2002 concentrated on four main themes, Markets, Products,

Technology and Resources and Organisation and Management. An important issue that was considered from the start was the significant differences in needs between the three very distinct geographical areas of Peru, that is the coast, the mountains and the jungle.

The specific objective of Incagro is the establishment of a modern system of science, technology and innovation. Its features were to be its plurality, its decentralised structure, and its demand-led nature through initiatives provided by the private sector. The technologies it aimed to develop were also intended to be both sustainable and environmentally friendly. A particular focus of Incagro's work is to promote and strengthen the provision of non-financial services, as this was identified as a particular weakness within the Peruvian economy.

The original design of the programme was that it would take place in three phases. Phase 1 would see a system of technological innovation established, while in Phase 2 this system would be expanded. During the second stage of the project some of the priorities that were identified were the strengthening of the market for innovation services and the strengthening of the strategic competences needed for research and development. An increase in the information services and the quality of the policy making process for innovation was also planned. A further aim of the second phase of the project was the institutionalisation of capabilities of the public sector in the agricultural sector.

When Incagro was set up it was envisaged that during Phase 3 the system of technological innovation that had been set up would be consolidated. It has now been decided, however, that from 2009 onwards Incagro will cease to operate as an independent institution and will be merged with INIA, so the original work planned for Phase 3 will now take place within that context.

Incagro has used the organisation of various competitions for funds as the principle method through which it had allocated resources. Firms or associations are invited to submit proposals for innovatory projects to these competitions and if successful receive the financial backing to carry out the proposal. A typical length of a project is 18 months, although this can vary. The use of the competitive funds methodology was seen to bring a number of advantages. Firstly, the involvement of the agents that would carry out the projects in their design was seen as a positive strength. Secondly, it is a method that leads to transparency and, finally, it allows for a great deal of flexibility. Two main competitive funds were set up, the Agricultural

Technology Fund (FTA) and the Fund for the Development of Strategic Services (FDSEA).

In its first seven years Incagro held 45 competitions and allocated resources for more than 580 projects. These have primarily gone to producer associations and, to a lesser extent, private firms. They have also contributed to regional training programmes aimed at increasing skills and capabilities, and some funding had been made available for postgraduate training programmes.

8.1.2 Incagro and the Mango Industry

Incagro has become involved in a number of different projects related to the mango industry. In several cases these have been projects that have been initiated and proposed by associations of small mango producers. Of most significance for this study, however, are the projects that Incagro has been involved in with Promango, the association of medium sized producers. The first of these projects was concerned with strengthening the production chain, and ran from January 2004 to June 2006. The second project was designed to allow mango growers to begin to start to cultivate grapes and begun in November 2007.

Both of these projects have been outlined in some detail in Chapter 6 and the following sections will therefore only provide a brief summary of their main points. In addition, some details will also be given of a project that Incagro has been involved in with small producers from the Hualtaco valley. Analysis will then be made of the roles played by Incagro in the various projects that have been considered.

8.1.3 The ‘Strengthening the Production Chain’ Project

As was outlined in Section 8.1 Incagro’s way of working is through the organisation of a competition in which different firms or organisations can put forward their suggestions and bid for funds. This was therefore how the ‘Strengthening the Mango Production Chain’ project, which ran from January 2004 to June 2006, originated. Promango had been formed in 2002 as a result of low prices that mangos had obtained during the 2001/2002 season. According to a representative from Promango ‘We had gone through very difficult time and we had started to think that, if things were to continue in that way, we would have to stop producing mangos. For this

reason we launched a project with Incagro with the aim of finding a way in which we could compete better in the market' (Promango Source 1).

As a result of the challenging market conditions they faced, producers developed a set of ideas of the steps that they needed to take to improve their market position and, through their membership of Promango, they were able to put a successful funding application into Incagro. The aim of the project was to involve all of the components of the production chain, improving the coordination between them so that the problem of overproduction could be avoided.

The main achievements of this project were that Promango members were able to improve their production skills in several ways, including being able to lengthen the production window for their product. All Promango members were also able to gain Eurogap certification for the mangos they produce and, in addition, became more skilled in drawing up contracts with the buyers of their product. Finally, the project helped Promango develop a wider range of contacts with other organisations, and helped to unite its own members and provide new impetus to their plans for the future.

All of these benefits have been examined in detail in Chapter 6 and do not need to be re-iterated here. The specific contribution of Incagro, however, will be discussed in Section 8.3.

8.1.4 The Table Grape Project

One of the consequences of the 'Strengthening the Production Chain' project was it helped Promango to focus on further areas in which they could strengthen their business position. In particular, they began to consider diversification into other products. Many Promango members had spare land that they had originally planned to plant with mangos but, by the early to mid 2000s, they increasingly realised there would not be sufficient extra demand and therefore they began to consider alternative crops. After a number of different crops had been tested, it was felt that the production of table grapes provided the most promising avenue.

Both technological and financial challenges were faced in pursuing this strategy, however, and the project that Promango began to undertake in collaboration with Incagro in 2007 aimed to meet these challenges. Because of the funding available as a part of this project Promango has been able to access technical

expertise from Brazil and, through this, has been able to gain valuable advice on adapting to the specific growing conditions that exist in Piura.

Promango has also been able to take advantage of some of the skills that it has developed during its previous activities, improved knowledge of effective irrigation techniques and general preparation of the soils available in Piura being cases in point. The knowledge of the challenging climatic conditions that exist in Piura, that Promango producers have assimilated over years of growing mangos, has also been applicable in an adapted form to the production of grapes. In addition, as a part of the production chain project, Promango established links with a number of other organisations on both a national and international level, and several of these have been renewed in a beneficial way as a part of the grape project.

8.1.5 Other Mango Projects

Incagro has been involved in a number of projects working with associations of small producers. An example is a project with the ‘Asociación de Productores de Mango de la zona de Hualtaco’. This is a relatively recently formed organisation which is based in the valley of San Lorenzo, Tambogrande, Piura. It has fewer than 60 members who in total farm in the region of 110 hectares, with an average plot size of 1.90 hectares.

The association has the desire to strengthen itself as an organisation, and to develop the skills to be able to negotiate on a more equal footing with the buyers of the product. It therefore initiated a project with Incagro in which it put forward various proposals through which the competitive capabilities of the association’s members could be enhanced. The project entailed working in cooperation with both an NGO and a private service providing firm. IGCH (Instituto de Gestión de Cuencas Hidrográficas) is an NGO that supports the groups with which it works with credits for machinery, assistance with irrigation projects and other measures that are concerned with environmental sustainability. Sanvill SRL is a private firm that works with businesses that are looking to make technological improvements. It works on a national level and with a variety of different agricultural crops.

In terms of production a number of different measures were taken in order to improve the production skills of the organisations members, the aim being to reduce the significant percentage of the harvest that, prior to the project, had to be either completely discarded or sold at a much reduced price. Training days were organised

for small groups of producers on different techniques used for producing mangos, as well as more individual advice being available on issues such as fertilisation, irrigation and managing the flowering process. As part of this process a demonstration plot of land was set up, in which the new technology introduced as part of the project was introduced to the members. The NGO IGCH participated in this part of the project, and supplied training to the association's members in the application of 'Good Agricultural Practices'. The intention was that, at a later stage, an application for Eurogap certification could be considered.

The project also involved trying to improve the managerial and business skills of the members of the association at two different levels of the organisation. For ordinary members of the organisation training courses were organised in order for them to learn more about the context of the international market and the demands made when preparing a product for sale to that market. In addition, a more specialised set of training directed at the leaders of the organisation was organised, looking specifically at techniques that could be used for marketing the product at an international and national level. As a part of this process detailed planning was done in which the expected revenues that could be expected were anticipated, and both optimistic and pessimistic projections were made on the ways in which the market could possibly develop.

One of the aims of the project was that a much higher percentage of output of the association's members would be suitable for the export market, principally to the USA and to Europe. It facilitated the contact of the association's leaders with representatives from the government organisation Promperu (see Chapter 7) with the aim of participation in international trade fairs where the product could be promoted. A further aim of the project was that the organisation would be able to consider the potential of niche markets, for example the fair trade and organic market.

8.1.6 Incagro and the Mango Industry: Assessing its Role

In total Incagro has been involved in four projects relating specifically to the mango industry, and a further project with Promango members relating to table grape production. Four main areas in which its work has been significant will now be identified and discussed, these being providing funding, providing assistance with business planning, encouraging a focus on innovation and ensuring that collaboration and cooperation takes place between different organisations.

Firstly, the role that Incagro provides in providing financial support is seen as crucial by the organisations with which it works. It can be seen as a means to encourage firms and organisations to be more ambitious, and also to be willing to consider putting their own funds towards a project. A key part of Incagro's effectiveness, therefore, is the efficacy of the decisions it takes on which entrants to its funding competitions it decides to select and, in carrying out this work, it is able to bring its experience in recognising a well-thought through business plan.

Describing the production chain project, for example, a Promango representative stated that 'Incagro was the organisation that provided the funding for the project' (Promango Source 1) and described some of the benefits that having increased funding available brought. One example was that funding provided provides organisation with a way of extending their pool of knowledge, this being particularly important in a situation where resources are very restricted for this type of work. Another representative from Promango, for example, described how the financial support from Incagro had helped to bring experts from Israel and Brazil to participate in the production chain project (Promango Source 2).

Secondly, the work of Incagro is significant because it provides a framework within which planning can take place. Initially, for example, it is able to offer, through general training sessions or individual assistance, advice to potential applicants about the process of putting together a successful bid. This can help ensure that applicants are being realistic in what they are asking for, and how they might see their businesses develop. Such advice can be extremely useful for firms or organisations that have not have experience of going through such a process and can, for example, help them to develop technical and commercial skills in the process of bidding that then prove to be of use in other circumstances.

Incagro also provides a structure which ensures that regular check-ups on the progress of projects are made. As part of the planning process a number of 'critical steps' are identified and these are reviewed at set intervals. Some flexibility is also built in to the way in which the projects develop. According to a representative from Promango 'The Project was due to last two years but because we wanted a continuation, which would allow us to give further instruction in techniques of growing mango, we extended the Project a further six months with Incagro's approval' (Association interview 3, 2008).

Thirdly, the focus of Incagro on innovation ensures this issue remains in the forefront of participants minds. One of the problems in the Peruvian economy, which was previously identified in Chapter 6, is that firms in the country are traditionally reluctant to allocate any of their own funds to research or development work. They assume, for example, that such work should be paid for by the government, or by other relevant bodies. Incagro's project with Promango, in which the organisations members made significant investments themselves, is an example of this attitude being challenged and beginning to change.

Such a focus on innovation can have a number of positive consequences. One of these is that it can encourage those that have participated on one project to consider initiating new projects, an example being the move by Promango members to the grape project following their successful participation in the production chain project. A further positive consequence is Incagro can transfer knowledge learned in one project to new projects.

A final significance of the way in which Incagro works is its encouraging of different organisations to work together. During its projects with Incagro, for example, Promango established improved relationships with government bodies, for example it signed an agreement of cooperation with the local office of the Ministry of Agriculture. It also worked in cooperation with the 'Casa de Agricultura' during the 'Strengthening the Production Chain' project, allowing the knowledge which it gained to be distributed to smaller producers. During its project the association in Hualtaco, San Lorenzo worked in collaboration with an NGO and a private firm, in addition to the government organisation Promperu.

This aim of encouraging cooperation ties in with the desire of Incagro to create an agricultural system of innovation, as was mentioned in Section 8.1. One of the aspirations is that positive relationships that emerge as part of working together during a particular project will develop into becoming more long-term relationships, and that such relationships will be beneficial to all parties concerned.

8.2 INIA and Agricultural Innovation

8.2.1 INIA: History and Objectives

The 'Instituto Nacional de Investigación Agraria' (INIA) is a research centre that is responsible for the research and diffusion of new technologies in the agricultural

sector. The organisation comes under the auspices of the Ministry of Agriculture and its national headquarters is in the La Molina district of Lima, adjacent to the country's largest Agricultural University and Senasa, the national phytosanitary organisation which was discussed in Chapter 6. The large site the headquarters occupies contains both administrative offices and research laboratories.

Agricultural research in Peru had its origins at the beginning of the 20th Century, beginning as a private sector initiative through groups of producers jointly financing research projects. In the 1930s the state began to become involved in agricultural research for the first time and two research centres, one in the capital and one in the jungle, were set up. Various organisations existed during the post-war period but in 1992 the 'Instituto Nacional de Investigación Agraria' was created, and became responsible for agricultural research. In the decade that followed the involvement of the state in research became reduced due to privatisation programmes and a reduction in funding introduced by the Fujimori government. Following the Fujimori era much of the work of INIA has returned to the public sector (Agency Interview 8, 2008). Another development has been that, from the early 2000s onwards, the organisation Incagro has also been in operation, and has also played a role in encouraging innovation and research as has been discussed in earlier sections of this chapter.

Concerning its activities close to the mango growing regions, INIA's main northern base is the 'Estación Experimental Vista Florida', which is situated in Chiclayo in the department of Lambayeque. In the department of Piura there is a much smaller research station 'Estación Experimental El Chira', which is situated close to Sullana, and the later also has an annex in Hualtaco. A representative from the INIA office in Piura identified 'adaptive research' as being the speciality of the organisation, that is research that can help to increase the production capabilities of local producers (Agency Interview 6, 2008). To be successful this involves both the generation of new technologies and the successful transfer of existing technologies.

INIA also offers a number of services, for example, the analysis and diagnosis of specific problems that may be of concern to agriculturists, general research studies and a series of training programmes. It also aims to offer small agriculturists practical assistance through the provision of affordably priced and good quality products, for example seeds and young plants. Finally, at a national level,

INIA is also interested in the maintenance, administration and development of Peru's genetic resources, in relation to both the countries vegetable and animal species.

In the following sections an examination will be made of the work that INIA does in the areas of, firstly, research and secondly, training and the diffusion of its work. The material that is covered will be related to the mango industry and, finally, an assessment will be made as to the contribution that INIA has made to the development of the industry.

8.2.2 INIA's Research and Development Work

The research work done by INIA covers an extremely wide range of products, emanating from Peru's three distinct regions, the coast, the mountains and the jungle. According to representatives from INIA throughout the 1990s the majority of INIA's research work took place in the mountain and jungle regions, and work in the coastal region came to a halt (Agency Interview 8, 2008). By 2001/02, with the re-availability of at least a basic level of public sector finance, research work began to re-emerge in the coastal region. INIA began to work again in areas such as Chiclayo, from where the 'Estacion Experimental Vista Florida' provides leadership for the whole of the organisation in the northern region, including the main mango growing region of Piura.

The main representation of INIA in the department of Piura is the 'Estación Experimental de El Chira' which is based in Mallares, a short journey from the town of Sullana. Having opened in July 2003, it works on a variety of different products including traditional staple such as rice, corn and cotton, as well as some of the fruits that have been increasingly exported over the last fifteen years. Examples from the latter category include organic bananas and mangos and there has recently also been an increasing interest in table grapes. Of most relevant to the mango industry is a research programme called 'Fruits for exporting' (INIA Internet Source 1, 2009). A brief explanation of the philosophy behind the programme will firstly be made, and then some specific examples of research that has been done in the mango industry will be outlined.

The rationale for the project is that there are four main areas where technological challenges are being faced. The first of these is a lack of knowledge that exists of the gene banks that are of interest for the international commercialisation of fruits. The second of these is a lack of knowledge of the

managing of agricultural technology that would ensure the optimum output and quality of fruit. Inefficiencies in present practice in terms of the management of pruning, the use of mineral nutrition, successful irrigation and effective harvesting procedures are identified as being of relevance here. The third challenge identified is the management of plagues in an integrated and planned way. The fourth challenge is a lack of effective techniques for the successful management of post-harvest operations, including the establishment of effective quarantine techniques for the fruit that will be exported and, in addition, of effective alternative uses for the fruit that is not of sufficient quality to be exported.

In the light of these challenges the general objective of the programme is to ‘develop, incorporate and validate technology that will bring about an increase in productivity , and an increase in quality, and ensure levels of production which will make the development of the exporting of fruits by the country profitable and sustainable’ (INIA Internet Source 1, 2009). More specific objectives are the development of a wider offer of varieties and the development of different cross breeding techniques that would be suitable to use in different conditions. Also of relevance is the development of technologies that can improve the quality of fruit and the length of the season when this fruit can be supplied.

Other relevant objectives are the validation of quarantine procedures and of post-harvest techniques and the generation and diffusion of scientific and technical knowledge. A final objective is to establish and strengthen the strategic alliances the organisation has with both national and international and public and private institutions, with the aim of developing and diffusing technology relevant to the species of fruit considered of relevance in the programme. An example of this is that, in the executive summary of the project, there is a recognition of the roles played by a number of universities in the research process, including the ‘Universidad Nacional Agraria La Molina’, the ‘Universidad Nacional Pedro Ruiz Gallo’ in Lambayeque and the ‘Universidad Nacional’ in Piura.

Mangos are one of the crops that form a part of the ‘Fruit for Export’ programme. INIA has estimated that they development of more effective ways of providing nutrition to the plants and of more efficient pruning techniques could increase the output of the fruit by 15%. In the light of this a plan of action was developed from the mid-2000s onwards which included a number of different initiatives aiming to improve mango production techniques.

One of these projects was to examine what affects the initiation of the flowering process for the mango plant, and what factors determine its intensity. In relation to this question, tests were carried out to look at the effects of different approaches to pruning. Tests were carried out for this project in the field, in demonstration plots of land in two different locations, one being the district of Motupe, in the department of Lambayeque, the other being Tambogrande, in the department of Piura. Another research project on a similar theme also took place in both Motupe and Tambogrande. This test looked at the effect of different applications on the flowering process of the mango plant, with a particular focus being taken on the effect of the use of Etheplon on this process.

A further project has concentrated in particular on the mango variety Kent and has looked at what are the consequences of the use of different cross breeding techniques. The tests have shown clear differences in the effect of the use of different methods, for example in the extent to which the mango trees develop and, in addition, the extent to which cracking of the stems of the trees might take place. The test is, therefore, important in decisions that need to be made in the future about the best techniques to be used.

8.2.3 INIA's Training and Diffusion Programmes

In a bid to make its work more accessible, from the mid 2000s onwards INIA has expanded its work in the area of training, with a section of its operations now known as 'Transferencia and Capacitacion' ('Transferring and Training'). Training programmes have not been a traditional part of INIA's work, which as previously mentioned has focused on research, but according to two representatives from the section, it is now seen as an important area (Agency Interview 7, 2008). The training work that INIA does can be divided into three main areas, the maintenance of demonstration plots, the organisation of training courses and the organisation of dedicated 'countryside days'.

Firstly, INIA runs 'parcelas demostrativas', that is demonstration plots. These are areas that are maintained in the countryside and serve as places where new and potentially useful techniques and technologies can be demonstrated to potential users. Two representatives from INIA described such a demonstration plot that the organisation runs in the Tambogrande area of the department of Piura, in collaboration with a successful producer who has a plot of approximately 80

hectares. One hectare of this land is devoted to the demonstration work and this allows for training and guidance to be given, on an issue such as pruning for example, in a real life situation. INIA also runs a further demonstration plot in the nursery it has at Hualtaco (Agency Interview 7, 2008). In 2007 INIA also began to work with an organisation called the 'Casa de Agricultores' on plans to set up a demonstration plot in the Yuscay region. The idea of this location is that it is very high ground and therefore presents different challenges to growers, as the climatic conditions are likely to be very different, with larger differences between the highest and lowest temperatures being recorded being expected (ibid.).

Secondly, INIA organises a series of training courses. Such courses will often take place in the countryside itself, making use of demonstration plots that have just been mentioned, and in this case they are able to have a more practical focus. Often, however, they will take place in urban centres that are easily accessible to producers from the surrounding countryside, and they provide an opportunity for specialists from INIA to share their expertise and present particular insights from their own work that are of relevance to producers. An example is a course that was organised in August 2007 and which took place in the auditorium of the Tambogrande municipality. The course was aimed primarily at producers of mango in the Piuran region but attendance by university students was also welcomed. The course was organised by the 'Unidad de Transferencia de Tecnología', based at INIA regional headquarters in Chiclayo, and examined the ways in which the basic resources needed for the successful production of mangos could be successfully utilised. New technologies that could help achieve a more integrated mode of production were introduced to producers by a series of speakers (INIA Internet Source 2, 2008).

In the previous year a course was organised by INIA on the theme of drip irrigation, on the premise that improving the system of irrigation is one of the most important challenges for the modernisation of the national agriculture. A major aim of the course was offering training in a system of irrigation that was affordable, and therefore accessible, to small producers. This course was organised by the 'Estación Experimental Vista Florida', from Chiclayo, and introduced a technology that had been developed at a national level by INIA. The system is designed to operate without the need for conventional energy, instead functioning through the difference in pressures that could be generated between the source of the water and the ground where it was to be used (INIA Internet Source 3, 2008).

The final activity that is organised by INIA as part of its training and transferring initiatives are 'Dias de campo', that is countryside days. These days are held approximately once a year and involve the use of a number of methods to highlight the organisation's work. As a part of the activities organised, for example, demonstrations are given of new fertilizers, irrigation techniques, pruning options and harvesting techniques, and details are provided on the benefits that each method can provide and their relative prices. Often a producer that is proving to be an innovator and leader in their industry is invited to talk and demonstrate their experiences, and the involvement of such figures encourages a large attendance from other participants in the industry. Organisation of these events takes place with the participation of the local municipality, the local regional office of the Ministry of Agriculture and relevant associations of producers. Through the networks that these partners are involved in it is usually possible to obtain media coverage for the event, and this helps to encourage good attendance levels.

In addition to the three methods of training that have been mentioned INIA also uses its own publications, and opportunities that are available in both the local and national media, as a way of diffusing its work. The organisation has, for example, produced its own videos on different systems of producing crops as a means of diffusing its work, and it is increasingly using its website for such a purpose. In addition, it is also a regular contributor to programmes on local radio stations, and also contributes to the television programmes on agriculture that are broadcast very early in the morning by some television stations within the country. An example of one of its own publications is a leaflet entitled 'Variedades de Mango', that has been produced by the 'Estación Experimental de Vista Florida' from Chiclayo (Variedades de Mango, 2008). The leaflet gives an explanation of the difficulties in growing the main varieties of mangos that are grown for export in Peru, and some advice points for each variety.

The leaflet also introduces producers to a service provided by INIA. After noting that many producers have the problem that they have to start with young plants of inferior quality, because they come from nurseries that have not been certified, it informs producers that plants of high genetic quality can be purchased from the nursery run by INIA. The plants are sold at 'El Vivero Fruticola Hualtaco', which is situated 48 km from Sullana in the region of Piura and four varieties of mango are available to purchase, these being Kent, Haden, Edwards and Keitt (Ibid.).

8.2.4 INIA and the Mango Industry: Assessing its Role

The material in the previous two sections has identified an organisation that is undertaking an active role in the training area. It is involved in a number of training initiatives with small producers including demonstration plots of land, a range of training programmes and the organisation of ‘countryside days’. In this aspect of its work it can be seen to fulfilling the role of ‘diffusing’, as was identified in the taxonomy of intermediaries roles outlined in Chapter 3.

The primary purpose of INIA is, however, as a research body and Section 8.3.2 has outlined some of the research projects that INIA has been involved in relation to the mango industry. While the projects mentioned there have their worth, however, there is a widespread feeling within the industry of the need for a research organisation that can serve the needs of all parts of the industry, and not just the needs of small producers. As part of this study interviews have been conducted with a large number of firms of differing sizes, and with other organisations involved in the industry, and the lack of impact of INIA’s work has become apparent.

If the medium sized producers association Promango is considered, for example, when it has undertaken projects involving the need for new knowledge it has worked closely with EMBRAPA, a state-owned organisation that fulfils the same role as INIA in Brazil. While members of Promango appreciate the intention of INIA, stating that, according to a representative from the organisation, ‘The method which they use is a scientific one and that is valuable’ (Association Interview 3, 2008) they point out that ‘the problem with this organisation is that it works very slowly’ (ibid.). An attempt was made by Promango, for example, to involve INIA when they were seeking ways in which they could bring forward and take back the dates of their harvest. According to a representative from the organisation, however, ‘there were several requirements that we put to INIA but they took two years to reply to them, and by that time we no longer required the information so the reply for any request comes very slowly’ (ibid.).

A similar situation also exists with the other main producer organisation, APEM. In interviews that were conducted with its representatives the organisation was never mentioned as a source of useful knowledge. In addition, during the three industry congresses that were attended for this study, two organised by APEM and one by Promango, the work of INIA was barely mentioned. There were no speeches

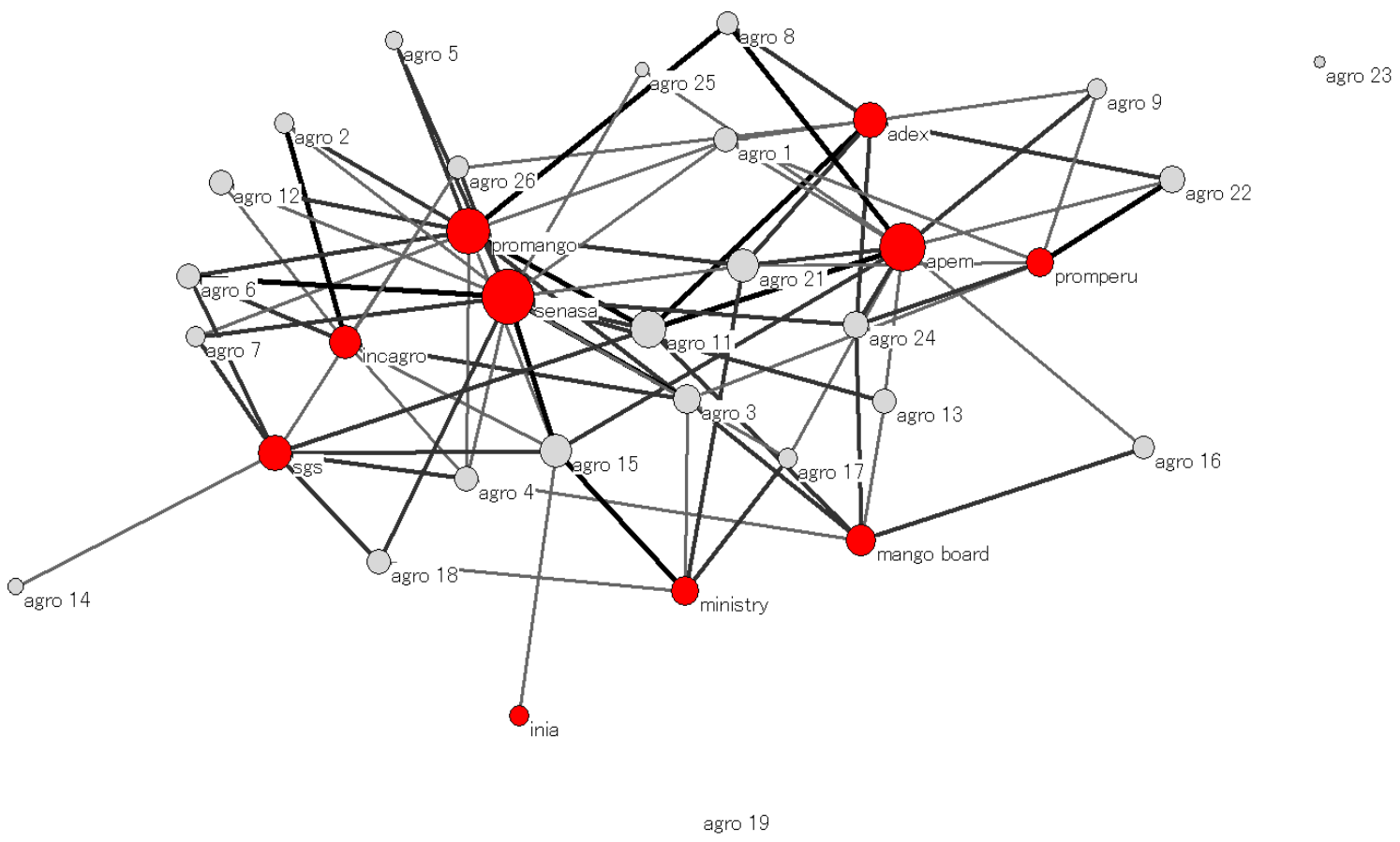
or presentations by INIA representatives, for example, and some work being done by INIA was only mentioned marginally during one of the presentations at the Promango congress.

One of the explanations for this situation is that INIA is an organisation that works primarily with small producers. Two points can be made in relation to this, however. Firstly, INIA has a significant amount of resources in terms of its research facilities, both in the capital Lima and in its various research centres around the country. Its research interests cover a very wide area of interest and it also has as a resource the knowledge and experience of its staff members. Whether it is efficient for these resources to only be available to small producers is a question asked by people in many different agricultural sectors, as there is a feeling that the resources should be used to encourage innovations that benefit the whole of the industry.

Secondly, if the results from the mango industry in particular are considered, the need for a research body that can produce relevant and research is recognised widely in the industry. A body is needed to coordinate efforts in technological coordination in the same way that successful commercial coordination has been identified as taking place, mainly via producer associations, in previous chapters of this study. Such a body would aim to play the enabling and coordinating roles that have been outlined in the taxonomy of intermediary roles presented in Chapter 3. How these roles could be performed, whether via the creation of a new body or the development of an existing body, is an important policy challenge for the Peruvian polity.

In conclusion, when the roles fulfilled by INIA are considered in relation to the taxonomy of intermediaries roles outlined in Chapter 3 it can be concluded that through its training programme it plays an important diffusing role, spreading knowledge of good production techniques amongst small producers. There is also a need, however, in the industry as a whole, for the enabling and coordinating roles to be fulfilled more effectively.

Figure 8.1: Mango Producer and Exporters Firms: Sources of Technological Knowledge (Threshold>3)
 Legend: Grey for firms, red for intermediaries. Size of nodes is proportional to the amount of information given or received. Only the largest intermediaries have been considered, in order to simplify the diagrams.



8.3 Incagro and INIA: Evidence from Social Network Analysis

Analysis of network maps for commercial and technological knowledge indicate that the type of knowledge that INIA and Incagro provide to firms falls into the technological category, neither organisation occupying a significant position in the commercial knowledge network. Figure 8.1, which illustrates sources of technological knowledge, is therefore relevant for consideration.

The map shows significant differences in the participation and position in the network of the two organisations. The map shows that Incagro has links with a number of different firms. These firms are mostly medium sized producer firms which are primarily, although not exclusively, members of Promangro. The size of its node means that Incagro is shown to be one of the most important intermediary organisations identified in terms of technological knowledge.

INIA's position in the network is different and its linkages show a different pattern from Incagro. Only one of the firms interviewed indicated INIA as a source of technological knowledge. An explanation for this is that INIA's linkages are with small producing firms, and therefore are part of a different network from the one represented in the maps. During the survey work that was done in preparation for the network analysis it was only possible, for logistical reasons, to contact a relatively small number of small firms. The network maps that have been drawn, therefore, are only the ones that include large and medium sized firms. From the limited data that it was possible to collect from small firms, however, it would seem that INIA would be likely to occupy a significant position in such a network.

8.4 The work of the CITEs

8.4.1 CITEs: History and Objectives

'Centros de Innovación Tecnológica' (CITEs) are a network of organisations that aim to support small and medium businesses (SMEs) with the acquisition and successful use of new technology. CITEs exist in different parts of Peru and specialize in products that are produced in the local region. The network of CITEs is coordinated centrally through PRODUCE, the Peruvian Ministry of Production.

CITEs had their origins at the end of the 1990s when there was a recognition at a political and economic level, of the need for more support for SMEs. SMEs

constitute a significant part of the business structure in Peru, and provide an important source of employment. It was realised that, as the Peruvian economy moved towards a more export orientated model, providing a mechanism through which SMEs could acquire the knowledge and technology to compete internationally was an important challenge. Problems identified include SMEs lack of specialised technological knowledge, and their lack of access to qualified human resources.

The first CITE, CITEccal, was created in 1998 and two more, CITEmadera and CITEvid, were created in 2000. Their design was influenced by examples and advice from Spain, where the model of a network of organisations working with SMEs in a number of production chains had been successfully implemented. In the year 2001 an investigation by the World Bank, looking for ways to promote a rise in Peruvian exports, recognised the CITEs network as a key instrument for technology transfer. As a result CITEs gained increased political, business and public support, and began to figure prominently as interest in innovation began to increase throughout the economy as a whole. The success of the early CITEs, and the interest in the model of development they represented, providing a platform from which the number of CITEs in operation could be expanded (Agency Interview 1, 2008).

The network of CITEs comes under the auspices of the Ministry of Production. The first CITEs that were instituted were all public bodies, but their management was of a private nature, with entrepreneurs being heavily involved in their directorships. There are presently differences in the way in which the individual CITEs are constituted in that some are public and some are private. The majority of CITEs in existence by the late 2000s were, however, private bodies; for example in 2008 there were three public CITEs and nine private ones (Agency Interview 15, 2008).

In all cases the aim of CITEs is to build a network of interested parties, encouraging alliances between the business community, the state and universities. They are designed to be centres for technology transfer, which help to provide incremental innovation for small enterprises. They are facilitators of research and development work in the production chains in which they operate, using the tools of pilot projects, specialised training to improve the quality of human resources, access to laboratory tests and analysis and, for some products, work on computer-assisted design.

The sections that follow will consider, firstly, the work that CITE Piura has done in relation to the mango industry. A consideration will then be given to the work of another CITE (CITEvid) that is based in Ica and works with the grape industry. It is included here as a model for what an intermediary organisation can achieve within an agricultural sector, and it is also of relevance because its pioneering work has been diffused throughout the nationwide network of CITEs and been applied in many different settings.

8.4.2 CITE Piura and the mango industry

The idea for CITEagroindustrial Piura (CITE Piura) came when an association of interested parties formed in 2003, and it became formally established as a CITE in 2004 (Agency Interview 2, 2008). A number of organisations have at various junctures formed a part of CITE Piura - in 2008, for example, these included The University of Piura, the Chamber of Commerce, the producers association Promango, the NGO Cedepas, and other organisations mainly involved in the coffee and algarrobina industries (Agency Interview 9, 2008).

CITE Piura is a private organisation but there is support and participation from the Ministry of Production who provide, amongst other things, financial support to enable the employment of staff. The organisation also raises its own funds through a network of collaborators. Its offices, for example, are provided by the University of Piura with which it has had a longstanding relationship. The advantage for the CITE of being private are, according to a representative from the organisation, that it has more flexibility, the disadvantage compared to the privately funded CITEs is, according to the same source, the less stable source of funding available (Agency Interview 9, 2008).

The objectives of CITE Piura are to provide support to the different businesses involved in agricultural production chains, therefore contributing to an efficient and competitive local agricultural sector. It does this through providing specialised laboratory services, providing or facilitating training opportunities, working on products' technical norms, working on food processing processes and advising on plant technology. The organisation is also part of the wider network of CITEs that exist in different parts of the country and tries to exchange information, and learn new ideas, through its contact with these organisations. It also maintains

links with Spain. Since its formation CITE Piura has worked with a number of products, prominent examples being bananas, mangos and algarobbina (Agency Interview 9, 2008).

The work with the mango industry can be divided into a number of different areas. One of the roles played by CITE Piura is involvement in the setting of the standards for a quality product. In order to achieve this it is necessary to study the characteristics and provide a definition of what should be considered a product of good quality. In many cases this already exists in other countries and needs to be transferred and adapted to the particular local conditions. CITE Piura has been involved in this process for both the mango and algarobbina industries, playing a part in the committee that meets in relation to this for the mango industry, the work of which was discussed in detail in Chapter 7.

One of the projects that CITE Piura is currently involved in is an attempt to establish a Pilot Plant in the University of Piura's Department of Chemistry where the organisation is based. This would allow new technologies to be tested, and also serve as an invaluable resource as a location for training programmes. It could be used, for example, as a place where concentrations of fruit juice could be made, for example, or as a means to experiment in the different techniques that could be used for the drying of fruit for commercial purposes.

CITE Piura is also involved in providing, or assisting in the organisation of, a large number of training programmes. This training can be provided or arranged in the areas of production, processing or administration. CITE keeps contact with a large number of trainers, from both the local area and from Lima, the country's capital. The organisation has, for example, provided training for a producers association in the Chulucanes area of Piura that is involved in producing dried mangos, although at this stage these are not destined for the export market. Another area where training is often required is that of certification, which is very important for many agricultural products.

Another example of a project that CITE Piura has been involved in with the mango industry has been work that it has done with the small producers association Agravida (Association Interview 7, 2008). This is an association of small producers that has been very active in recent years, and in 2008, for example, it consisted of 31 members that were producing a total of 75 hectares of organically produced mangos. In 2007 the head of Agravida made contact with CITE Piura. Since then joint work

has taken place on the design of the plant, while Agravida has also gone through a process of searching for funds that would allow the construction of the plant to take place.

CITE Piura has also had contact with another association of small producers called Apromalpi (Association Interviews 5 and 6, 2008). They worked together with that organisation in 2007 in organising a training course that looked at good practices that can be applied when mangos are being processed. Apromalpi obtained funding for the course through an NGO with which they were working, and contacted CITE Piura in order to ask for suitable trainers that would be able to deliver the training. Members of CITE Piura have also visited the Apromalpi plant, during which they were able to provide some technical advice.

Another area in which CITE Piura works is in promoting the formalisation of businesses. Within the Peruvian economy there is a culture of informality but, through proper registration, businesses can gain a number of advantages, and in many case save money. This is an area that the organisation has worked in particular with producers of bananas, but the experience they have gained in this area can be passed on to producers in other sectors.

Since it was first set up CITE Piura has also had connections with Promango, the association of medium sized producers that was studied in Chapter 6. They have cooperated on several occasions, for example, in sharing the expertise of visitors to the project. When speakers have visited the fairs and congresses organised by Promango, for example, they have sometimes also spoken at events organised by CITE Piura as a part of the same trip. There has also been involvement with the Consorcio Agroexportador del Perú, an organisation that is an offshoot from Promango and which is concerned with looking for new ways in which the product can be commercialised. For several years that have been involved in a project with the aim of seeking a market for dried mangos.

8.4.3 CITEvid: Supporting the Grape Industry

The ‘Centro de Innovación Tecnológica Vitivinícola’ (CITEvid) is an organisation that specialises in grape production. It was created in October 2000 and has its headquarters in Ica, a large grape growing region to the south of Lima. As a part of the research for this study an opportunity arose to participate in a day of activities

organised by CITEvid on 7/6/08. This consisted in a series of talks held at CITEvid's headquarters, in addition to the opening of a new vineyard which took place during the first part of the day (Industry Event 4, 2008).

A presentation by a leading local businessman reviewed the projects that CITEvid had been involved in between its formation in 2000 and 2007. During the first year of its activities major work took place on the construction of the site. The ground had to be cleaned in preparation, and then suitable irrigation put in place, prior to the construction of a 'Bodega' (winery) that could be used as a demonstration site and for training purposes. During this process cooperation came from a large number of international bodies, primarily from Spain but also from France, Uruguay and Argentina. From Spain particular help came from an organisation called the 'Agencia Española de Cooperación Internacional' (AECI) that provided advice but also help with the financing of the site. An organisational model used by the 'Institutos Tecnológicos' in Spain was followed by CITEvid in the way it decided to organise its activities (Agency Interview 15, 2008).

A major aim during the early days of the centre was to build a relationship of confidence between the organisation and local producers and, in order to achieve this, demonstration plots of land were installed in the principle producing zones. It was designed to illustrate to producers the benefits that technological innovation could bring, for example how costs could be reduced, output could be increased and, at the same time, a higher quality product produced.

CITEvid has given a great deal of assistance to producers in both the areas of production of Pisco, the Peruvian national drink, and also to producers of wine and of table grapes. Both Pisco and table grapes have proved to be extremely successful products in the export market. Between 2002 and 2007, for example, the production of Pisco trebled and by 2007 the volume of exports had arrived at the same level as Chile. During the presentation the key to this success was identified as being the higher quality of Peruvian Pisco, which in addition had meant that it was able to command a higher price in the international market (Industry Event 4, 2008).

A great deal of emphasis was placed during the presentation on quality being the key to success in the international market. The organisation has been able to set up an impressive range of facilities and services that can assist producers achieve the necessary quality standards. In addition to the demonstration 'Bodega' (winery) on its grounds it also has a 'Laboratorio Enológico' (winemaking laboratory). This

provided assistance to 183 producers in the seven year period that was being discussed. In addition, in June 2006, a 'laboratorio vitícola' (grape laboratory) was set up and in the first two years of its existence provided support to more than one hundred SMEs. Evidence of the growth of the table grape sector is provided by the fact that the number of businesses that were formally registered has risen dramatically from 16 in the year 2000 to 350 in 2007.

The work of CITEvid is, therefore, crucial as a means by which producers can obtain the knowledge and the technology they need in order to achieve the quality that is needed to compete internationally. The link between achieving a quality product, and producers working together, the concept of 'Asociatividad' as it is known in Peru, was also stressed during the presentation (Industry Event 4, 2008). 'Asociatividad' is an emerging model in Peru, and is based on the idea of producers working together in order to initiate joint projects, share ideas and share costs. During the day's activities an opportunity arose to speak informally with a group of small producers from a neighbouring region who had been invited to the event by an NGO they were working with. As they received advice from CITEvid staff, and other attendees, throughout the day the issue of working together was continually stressed as the only route through which the learning that was necessary could take place.

On the same day in which these presentations were made, the official opening of a new vineyard, located at Santa Fe de Lanchas, Pisco, also took place. The vineyard had been started by six producers working together and consisted of 47 hectares dedicated to the production of table grapes. The area where the vineyard was located was extremely dry, desert like, terrain and, as was mentioned during the opening one presentations, it would not have been seen as a suitable place for agriculture fifteen years previously (ibid.).

A great deal of technical expertise had been needed to set up successful methods of irrigation and fertilization for the plants. The particular characteristics of the soil, which has a very high salt content, and of the water that is available, had to be understood. The producers had also been involved in the production of paprika, and had learnt valuable lessons from this experience that they could transfer to the production of grapes. As regards fertilisation a method for the construction of the vines that is used in Spain was adopted, as it made it easier for the application of fertilizers. Their first harvest had been in January and February 2008. Their plan was

to export their crops directly although they accepted that significant percentages of the production would be lost during the first years of production.

One of the issues that arose during the opening of the vineyard was the importance of the model of 'asociatividad' for success in the agricultural sector. The group of producers opening the vineyard had, for example, worked together as the 'Asociación de Productores de Santa Fe de Lanchas' (ibid.).

A benefit of the project was the success it has had in creating employment, and in some cases workers have been recruited from other, more economically impoverished, areas of Peru. This was in part a reflection of the success of the agricultural sector in the department of Ica as a whole. In addition to the Pisco and table grape industries, for example, the department is also the main centres for asparagus production, Peru's fastest growing and most successful agricultural export.

8.4.4 Conclusion: The Role of CITEs as Intermediary Organisations

In conclusion, two examples of the organisations that make up the network of CITEs, CITE Piura and CITEvid, have been examined in this section. They have been successful in raising awareness amongst SMEs of the potential offered by technological change, and have been able to facilitate, through a number of measures, steps that organisations can take in order to acquire such technology. This work is in keeping with the enabling role that was identified in the taxonomy of intermediaries roles outlined in Chapter 3. One of the ways they have performed this role is through the provision of new knowledge inputs themselves, for example through the research laboratories that CITEvid possess. This role has also been performed through advice on adapting new technologies, for example the work the CITE Piura has done advising small associations on the purchase of processing equipment.

One of the keys to the institutional design of the CITEs is that they have been able to combine a sense of purpose and dynamism coming from the centre, but retain an important level of flexibility at the local level (Agency Interview 15, 2008). An example of this flexibility is that some of the CITEs are constituted as public bodies and some as private bodies. Building communities through which knowledge can be shared has also been an important part of the way that CITEs have operated, and this approach is in keeping with the insights offered by the practice-based perspective of

knowledge. The CITEs have also been successful at accessing knowledge, becoming established as a part of both national and international knowledge networks, and in this aspect of their work they have played the mediating role identified in the taxonomy of intermediaries' role outlined in Chapter 3.

A positive result of the CITEs work is that they can help encourage investment and expertise into the industries they are supporting. In informal conversations with business people at the CITEvid event, for example, one mentioned how the organisation provided a route for learning everything that was needed to enter the grape industry (Industry Event 4, 2008). Such support is seen as crucial in what is recognised as a new generation of agriculturists emerging in Peru that have a wider range of experiences than was previously the case. They are able to bring to the industries they enter skills they have gathered, which can be of a technical or business nature, in other contexts and they are also often in the position of having capital available that can be used to make significant investments in the industries concerned.

8.5 Incagro, INIA and CITEs: Analysing The Results

The work of the three organisations that have been considered in this chapter will now be assessed through consideration of the research questions that were posed in Chapter Three of this study. Research question four asked what role intermediary organizations play in either providing new knowledge inputs for cluster actors, or adapting existing knowledge to make it understandable and usable. The evidence that has been presented in this chapter has shown that the organisations involved in this role have mostly been ones that have worked with small producers.

An example is the work of Incagro, which has enabled the producers association Promango to gain access to some important new knowledge inputs. During its project aimed at strengthening the mango production chain Promango received new knowledge inputs from the contacts that it established with research institutes in Brazil. While this was obviously a very positive experience, it also raises a wider question for innovation in Peru as to why such knowledge inputs were not available locally or nationally within the country.

The work of the CITEs in the grape sector is a further example of an organisation that both provides new knowledge inputs, and in addition pays attention

to the question of adopting existing knowledge to new contexts and opportunities. At the regional CITE site, in Ica, there are research laboratories where original research is done, for example, and this is diffused very directly to local producers as the level of contact that the CITE has established with this constituency is impressive.

One of the findings of this study, however, is that there has been less success in the mango cluster in helping large firms find the new knowledge inputs necessary in order to develop and introduce new technology. This is an issue that is discussed in more detail in Section 8.6.3 of this chapter.

The second research question asked what role do intermediary organisations play in the formation, amongst previously fragmented actors, of cluster communities through which common understandings, practices and learning perspectives emerge. This is relevant for the experiences of Incagro and Inia, both of which work with associations of small and medium producers. An example is the campaign that Incagro worked on in collaboration with Promango which had a specific focus on certification and was a conscious attempt to establish the common practices and high standards that are needed in order to produce fruit of sufficient quality for the export market. The project, therefore, specifically addressed the knowledge challenge of certification that was identified in Chapter Four. The campaigns which Incagro provides funding for, which invariably involve working with either associations of either medium sized or small producers, also are relevant here as they help to encourage common learning perspectives amongst the participants.

Finally, the first research question asked what role do intermediary organizations play in accessing knowledge from both intra and extra-cluster sources. The network of CITEs has been involved in national and international networks, gaining knowledge of new technologies, funding opportunities and possible collaborators in the process. The support given by Incagro to Promango is a further example, allowing them to access international sources of knowledge, in particular the contacts that they have established with research institutes in Brazil. In carrying out these activities both organisations can be seen to be playing the accessing role that was identified in the taxonomy of intermediaries roles presented in Chapter Three.

8.6 Conclusion: Intermediary Organisations as Enablers

8.6.1 Assessing The Importance of Intermediary Organisations

The first proposition made in this study is that intermediary organisations provide an important route to knowledge and learning for developing economy clusters. The material that has been presented in this chapter, and was analysed in Section 8.5, has shown how these organisations have provided new knowledge inputs to members of the cluster, and have also adapted existing knowledge to make it accessible and usable to cluster actors. They have done this in differing ways, and to different extent, and a number of points can be made about the types of learning that they have stimulated.

Firstly, the work that they have done has been mainly concentrated on initiatives with small producers and has been associated with introducing new techniques and practices. This highlights the opportunities presented by the opening of world markets, and how intermediary organisations play an important role in helping the necessary learning to take place. Secondly, the work has been carried out with a very low level of funding and its success has often depended on making use to the full extent of the human resources that are available. Thirdly, the organisations that have been examined in this chapter have tended to be multi-functional, they have not relied on a very narrow research role but have also been involved in adaptive work, passing on knowledge to those that can use it, either through direct involvement, training sessions or a variety of other routes.

Insights offered by the practice-based perspective of knowledge help to provide an understanding of how this learning has been encouraged and taken place. This perspective stresses how learning is context based and takes place within communities. The way in which all of the organisations examined in this chapter have adopted the concept of ‘asociatividad’ underlines the importance of knowledge being shared. An example is the group of table grape producers that were able to open a vineyard in what would have previously been considered very unfavourable conditions in Pisco. This group received important help from CITEvid, the intermediary organisation, but was also able to learn from their ability to share information and, crucially, adapt knowledge from other sectors and work areas in which they had had experience.

The initiative of Incagro with Promango, encouraging the members of the organisation to work more closely together, is another example of the importance of communities in helping knowledge to be shared. Incagro has done similar work with other associations of small producers and it is a part of its funding criteria to encourage an increase in cooperation and links both within and between organisations. A similar principle is applied by INIA who, during the ‘countryside days’ they organise, encourage producers to learn directly from colleagues who have a track record in innovation and, therefore, have a lot of knowledge that they are able to share.

In the case of the CITEs the concept of communities of practice is also useful in understanding how the organisations have been so successful despite the enormous challenges that they have faced. In this case staff members of the different CITEs that have been set up in different parts of the country have successfully worked as a community of practice, being involved in a regular exchange of knowledge. This has taken place via email and other electronic communication, and via regular contact with the organisation’s central office in Lima from which dynamic leadership has been provided. A regular newsletter, for example, is produced by this office which has helped to circulate knowledge and become the most extensive regular review of innovation in Peru. In addition, occasional inter-site visits take place between staff members from different CITEs, particularly to those CITEs, such as CITEvid, that have been particularly successful and can therefore help provide examples of good practice to other members of the network. The result of all these activities is that a shared understanding of the most effective methods and techniques that can be used to encourage innovation amongst SMEs has been built up amongst CITEs staff members and volunteers.

8.6.2 The Roles played by Intermediary Organisations

As well as establishing the importance of intermediary organisations in knowledge and learning, a further proposition made in this study is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. In accordance with the taxonomy of intermediaries roles that was outlined in Chapter 3, the role of enabling emerges as the most significant one being carried out by the organisations considered in this chapter. Two

aspects of this enabling role are of most importance. The first is the provision of new knowledge inputs and the second is the accessing and translating of knowledge to make it usable in another context. Many examples of these roles being carried out have been outlined throughout this chapter, and they were summarized in Section 8.5.

For a number of reasons intermediary organisations are able to play an enabling role in a way that firms are unable to. The first reason is that they are able to develop a level of technical expertise themselves. INIA's research laboratories and highly skilled staff provide a level of expertise that cannot be replicated by firms. In a similar way some of the members of the network of CITEs have been able to install research laboratories, such as those that have been constructed by CITEvid.

A second reason is that these organisations have been able to develop contacts with wider technological networks, an example being the close relationship that CITE Piura has been able to establish with the University of Piura. Incagro is also an organisation that has developed a high level of contacts, both with providers of technology and with firms. In addition, in several cases these organisations have been able to develop international contacts and are able to use these to gather information on developments in international technology. The wide international links which the networks of CITEs have is an example of this.

A third reason that intermediaries can play this role, while firms would find it difficult, is that the firms these organisations are dealing with are primarily small ones, and have limited financial resources and are often quite isolated. For this reason they have often considered technological change as outside of their capabilities but yet the discussion has highlighted that, through the provision of only a very basic level of funding, their ambitions about what change is possible are often raised.

Intermediaries therefore provide a knowledge infrastructure and firms can benefit greatly from the links to a variety of knowledge sources that intermediary organisations provide. Incagro, for example, has been involved in setting up an extensive electronic resource which aims to offer comprehensive information on organisations working within the agricultural sector. CITE Piura also uses its extensive range of contacts to set up collaborations in the area of technological advice, funding opportunities and the organisation of training.

8.6.3 Intermediary Organisations: Some Institutional and Policy Issues

Despite these roles that and their importance in the learning process, this chapter has also revealed some weaknesses in the institutional framework within which research and development takes place. A perception exists in the industry that the research assistance available could be more effective, and that the effective commercial coordination identified in previous chapters does not exist to the same extent with technological coordination.

One aspect of this debate is the fact that INIA, the main agricultural research body, concentrates its research primarily on the needs of small producers. One consequence of this is that its research is not seen as relevant by the exporting sector of the industry, and in addition they are seen as being slow to respond to requests. There is also a feeling that the research done is not distributed as effectively by small firms as it would be by larger ones who have more resources to devote to this activity. In addition, it means that a body that also might feasible coordinate the research efforts of a number of large firms, and encourage cooperation between them, does not see this as a part of their role.

A major question is whether there is a body that can emerge that can provide some sort of technological coordination amongst large firms. The institutional framework within which government support takes place is obviously an important policy area for the Peruvian state. In 2009, for example, a reorganisation took place and from that date onwards the work of Incagro has been subsumed into INIA, and the intention is that the organisation will have more of a focus on practical innovation. This intention has been reflected in a name change for the organisation, which from 2009 onwards is now known as the 'Instituto Nacional de Innovacion Agraria'.

Related to this question of policy and institutional frameworks are questions such as economic resources and political philosophy. Funding is a major challenge and questions exist as to how the very limited public funds are divided, but also of which organisations are able to prove effective in tapping into international sources of funding. For this to be done successfully an element of momentum is needed, with a sense of organisations cooperating and working together towards a creditable vision of progress. Political instability often makes achieving such momentum difficult, there being the possibility of a government being elected with a completely

different economic philosophy, and that can place the whole principle of any government support for research and innovation into question.

Conclusion

In conclusion the three organisations examined in this chapter have been identified as playing an enabling role, providing new knowledge inputs to cluster actors. The support they have given has mostly been concentrated on small, and sometimes medium-sized, producers. This support has been provided either through using their own infra-structure, or through the expertise the organisations have developed in adapting knowledge accessed from other sources, and making it usable to cluster actors.

Chapter 9: Understanding Intermediary Organisations: A New Framework

This chapter will begin by evaluating, in the light of the empirical evidence presented in Chapters 4-8, the two propositions made in this study. Proposition 1 will be assessed through an outline of the distinctive contribution intermediary organisations have made to increasing horizontal cooperation, increasing vertical integration and through facilitating knowledge inputs. Proposition 2 will be assessed through an evaluation of the roles of accessing, diffusing, coordinating and enabling carried out by intermediary organisations, as outlined in the taxonomy of roles presented in Chapter 3.

The chapter will continue by outlining the main conclusions of the study, identifying how the present understanding of the roles played by intermediary organisations needs, in the context of a developing economy cluster, to be revised and extended. The generalisability of the study's findings will then be assessed, prior to a consideration of some of the strengths and limitations of the study. The chapter will conclude by making some suggestions for future research, and identifying policy implications that emerge from the study's conclusions.

Section 9.1 Assessing Proposition 1

The first proposition made in this study is that intermediary organisations provide an important route to knowledge and learning for developing economy clusters, a factor that has been underestimated in previous studies. The literature review in Chapter 2 argues that a strong link exists between joint action and learning (eg Bessant et al, 2003; Morris and Barnes, 2006) and suggests that intermediary organisations play a role in reinforcing this link. However, the precise nature of what organisations might fulfil this remit, or the potential roles that they might play, has not been examined in any detailed or systematic way (Morris and Barnes, 2006). Instead the literature on intermediary organisations has tended to concentrate on their linking roles, and has failed to recognise that in some contexts their roles stretch wider and are more fundamental to firm and cluster development.

This study, in attempting to fill this gap, finds that intermediary organisations play an important role in the encouragement of horizontal cooperation. They also encourage, although to a lesser extent, increased vertical coordination, demonstrated

when more links are made with global buyers and other actors operating within Global Value Chains. In addition they provide and facilitate new knowledge inputs to firms, although the picture that emerges here is a complex one and is affected by the institutional setting in which they operate.

Each of the above points will now be considered in detail, and use of the practice-based perspective of knowledge will illustrate why intermediary organisations are able to carry out these roles successfully. During this analysis it will also be acknowledged how the role of intermediary organisations is a complex one, and how they can sometimes serve vested and entrenched interests and can even serve to reinforce, possibly extend, tensions and conflicts that exist within the cluster.

Section 9.1.1 Encouraging Horizontal Cooperation

As was argued in Chapters 2 and 4, developing economy clusters face major challenges in the knowledge economy, including low levels of trust and limited knowledge sharing amongst firms. There is also commonly a lack of large, well-resourced, firms that can play a lead role in learning and, as was identified in Chapter 2, in natural resource based clusters only limited opportunities for learning from global buyers exist. Each of these factors, as was identified in Chapter 4, has been found to be relevant to the mango cluster examined in this study.

Increasing horizontal cooperation is one of the ways in which such clusters can overcome these challenges. The practice-based perspective provides an explanation of how intermediary organisations are able to increase horizontal cooperation, and assist in the formation of communities through which knowledge can flow. This study suggests that intermediaries are effective at establishing a common identity amongst cluster actors, encouraging the adoption of common practices and, finally, fostering a shared purpose amongst cluster members.

Establishing the legitimacy of their organisation is, however, a precursor for intermediaries initiating such joint action. In the mango industry, for example, when the trade association APEM was first set up few firms had interest or confidence in it, or were willing to consider contributing to it financially. APEM's role has evolved over time, however, and through learning from its own experiences, and observation of other organisations carrying out this role, it has developed the skills needed for its

own practice. Through a similar process Promango, the trade association representing medium sized producers, has also established its legitimacy.

With such legitimacy established, intermediary organisations have the ability to establish and emphasise a common identity, and APEM and Promango have been particularly important in carrying out this role. While there are different ways in which trade associations can operate (Perez-Aleman, 2000), those that are most successful show the ability to understand the needs of their members, reflect on what is common amongst these needs and then translate them into a concrete strategy. In doing this they develop and use the skills of negotiation and mediation, and attempt, as far as is possible, to establish a neutral position amongst member firms as a part of the process of building trust.

Chapter 5 showed how APEM has been successful in bringing together a diverse group of firms, some of whom are producers, some processors, some exporters and some a mixture of these roles. While this means that there are different interests within the organisation, APEM has helped to create some unity amongst this group of firms. The members of APEM have developed a common identity which focuses on quality and the development of markets for long term growth, distinguishing them from short-term, low quality suppliers. Chapter 6 showed how, because of a much greater degree of firm homogeneity, establishing a common identity has been a more straightforward process for Promango. The role of the association has still been crucial, however, as it has prompted firms to shift from a very individualist outlook to one where they ‘started to share all types of information, group together what each firm was doing, and in this way create links between the organisations members’ (Association Interview 3, 2008).

The practice-based perspective stresses the importance of common identity for knowledge sharing. Knowledge flows best when actors have similar assumptions about aims, understand each other’s assumptions implicitly and tend to share the same language and culture. When common identity is established high levels of mistrust, an issue identified in many studies of developing economy clusters (Morris and Barnes, 2006), are reduced. For example, in the mango cluster, the formation of associations has helped to alleviate the fragmented structure, and history of conflicting interests and disputes, that was identified in Chapter 4. The associations have led to a greater number of links being formed amongst cluster members, and have also increased the opportunities for informal contact where tacit knowledge is

regularly exchanged. Nonetheless, evidence from the Piuran mango cluster also underlines how challenging the task of establishing a common identity and community formation is. The existence of two different associations, APEM and Promango, points to a continuing division within the industry, one that has deep historical routes in disputes between exporting firms and medium sized producers.

In addition to establishing a common identity, intermediary organisations also play a role in establishing common practices within a cluster. Common practices are necessary to achieve the quality levels necessary to compete in a globalised economy and, for agricultural products, they are particularly important as poor quality produce from one producer can affect the international reputation of the whole industry. To successfully carry out this role intermediary organisations first need to establish their authority, as this enables them to convince and educate firms of the central importance of quality issues. They can do this by demonstrating a particular set of knowledge, and a past record of success. An example of this is the issue of certification, as firms have to be convinced that this is important, valid and worthy of financial investment.

In particular, this study has underlined how developing new and effective practices for cluster firms represents a specialised division of labour that intermediaries have been particularly adept at undertaking. As their role evolves intermediaries have developed specialist skills in generating, embedding and diffusing practices. They develop expertise in the formal diffusion of knowledge, through the organisation of congresses, conferences and training sessions and through the use of the various forms of electronic and traditional communication. Equally important, however, are the opportunities that they help to create for the informal exchange of often highly situated knowledge, a factor whose importance has been recognised in studies of other fruit-producing clusters (Gomes, 2006). Through these informal exchanges important, invariably tacit, knowledge is shared.

There are many examples in the mango industry of intermediary organisations encouraging common practices. Chapters 5 and 8 showed how APEM and Promperu have worked in partnership on the standards committee, ensuring that there is a common understanding of what criteria are used to judge the quality of a mango, and what practices can help to achieve these criteria. The standards document produced has served as a boundary object (Brown and Duguid, 1998),

allowing a discussion on quality issues to take place with contributions from many different interests within the industry.

Chapter 7 outlined how Senasa plays a role in encouraging common practices in phytosanitary issues, working alongside firms to investigate the range of procedures necessary to ensure food safety. Chapters 6 and 8 showed how a partnership between Promango and Incagro helped implement a project that achieved certification for all of Promango's members, ensuring that their produce is produced to consistently high standards. The informal sharing of practice, through congresses and inter-member farm visits, has particularly encouraged the sharing of practice in Promango's case. The tacit and situated nature of much of the knowledge that is transferred, on climate, soil conditions, pesticides and fertilizers for example, can be noted. Despite the increasing amount of codified information available on mango production, therefore, tacit knowledge continues to form an essential part of the learning process and the establishment of practice commonality.

A final part of their role in increasing horizontal cooperation is the ability intermediary organisations have to foster shared purpose. As has been mentioned trade associations are examples of intermediaries that have a unique ability to incorporate different aims and needs of firms and they are able to forge a common view on how a grouping of firms can move forward. Essential to this process of perspective-making (Boland and Tenkasi, 1995) is the ability intermediaries have to identify new opportunities. The links that they establish through their daily practice ensure that they can spot opportunities early, and they can use the experiences they have accumulated to assess their feasibility.

An example of this from the mango cluster, presented in Chapter 5, is the way in which APEM has encouraged a shared purpose in approaching new market opportunities in Asia. Chapter 6 also showed how Promango has fostered a shared purpose in diversification attempts, for example the exploration by its members of the production of dried mangos, and the investigation of the feasibility of table grape production which has proved to be an extremely fruitful avenue.

Consideration of the network maps that were presented in Chapters 4 and 5 confirms the importance of intermediary organisations in increasing horizontal cooperation. When the map for the whole network presented in Chapter 4 is considered, it reveals how the network has a bi-polar structure, based around

intermediary organisations that substantially increase the number of horizontal links within the cluster. Within the map one clustering of firms around a focal point of APEM can be identified, as can another focal point jointly around Promango and the phytosanitary organisation Senasa.

The importance of both APEM and Promango is reinforced when Figures 9.1 and 9.2 are considered. These maps show how the links between firms come via their respective memberships of the two organisations. In the first map the lack of linkages independent of the organisations is shown, while in the second the linking role that the two organisations play becomes evident.

Section 9.1.2 Encouraging Vertical Coordination

The role of intermediary organisations in encouraging vertical coordination, while less central than that in horizontal cooperation, is also significant. Vertical coordination is important in a globalised economy because, to maintain competitiveness, firms must develop sources of learning that enable them to react quickly to market changes.

In the mango cluster example, this area is of most relevance for larger firms, who are either already integrated into Global Value Chains or have the desire to become so. Through interviews with some of the larger firms in the cluster (Firm Interviews 1-13, 2008) the heterogeneity of firms experience in respect to vertical coordination was apparent. Some firms had a strong relationship with particular global buyers and therefore provided evidence of a vertically integrated supply chain. For the majority of firms however, while they may aspire to a more stable relationship with buyers, there is an uncertain relationship and no substantial evidence of learning taking place via this source. Survey evidence also suggests that those firms that do learn from global buyers only share the knowledge that they obtain with other firms in the cluster to a very limited extent (Firm Survey, 2008). There is little evidence of firms acting as ‘technological gatekeepers’ (Giuliani and Bell, 2005), that is accessing extra-cluster knowledge and diffusing it amongst other firms in the cluster.

Given the limited levels of cooperation and the lack of a knowledge sharing culture, the role of intermediary organisations in encouraging vertical coordination is crucial. There are a number of reasons why they are able to carry out this role

successfully. Firstly, they develop the negotiating, cultural and language skills in order to be able to bridge gaps (Burt, 2005; Brown and Duguid, 1998). They develop the ability to understand the worldview and priorities of others, and to transfer the gains from this skill in perspective-taking (Boland and Tenkasi, 1995) over to firms.

Chapter 7, for example, outlined how the government agency Promperu has undertaken a number of activities that have bridged the gap between producers and buyers. In the early days of mango exports it took the initiative, in common with its approach in several other agricultural sectors, of encouraging the setting up of producer associations to act as a contact point for buyers. It also assists producers to contact buyers by, for example, arranging trips by potential exporters to destination markets and trips by potential importers to Peru. It also develops contacts in Peruvian embassies and consulates around the world that can help to provide potential introductions.

In addition, Promperu sponsors firms to participate in international trade fairs and also organises its own promotional events in destination countries as a means of interesting potential buyers. An example of where Promperu has performed this role very effectively, and has used several of the strategies mentioned, is the assistance it has given to Peruvian exporters in establishing relationships with Chinese buyers. In order to successfully carry out this role Promperu has built up a comprehensive knowledge base and the organisation also attempts, as far as is possible, to make this commercial intelligence easily accessible by firms. It provides information, for example, on trends in international markets, country specific information and, where relevant, information on regulations that must be followed for the export of certain products.

Secondly, intermediary organisations are important because they can encourage joint action which assists the development of an coordinated value chain. In the mango cluster, for example, Chapter 5 outlined how APEM has done this through securing adequate shipping at a competitive cost for its members, and also devoting its resources to the logistics of shipping to China. Another example is the work that APEM has done in the development of a hot water treatment for the Japanese market. As well as helping to put in place new value chains, Apem has also sought to develop the relationships that exist with existing buyers, for example the work it has done in helping firms to understand the logistics of the European market and the keys to success in this market. The significance of APEM carrying out this

role is that the benefits of this activity are shared amongst the members of the cluster which would not have been the case had this initiative been led by a private firm. While there have been only a few firms that have pioneered exporting to China, the work done by APEM can be seen as preparing the way for other firms to follow.

Thirdly, intermediary organisations are important in encouraging vertical coordination because of the role that they can play in establishing the international legitimacy of an industry's product and processes. Often they have a set of specialised knowledge which is important in allowing them to be able to play this role successfully. The role played by Senasa, as presented in Chapter 7, is an example as it has developed an expertise in phytosanitary regulations which is increasingly recognised internationally. This allowed the mango cluster to obtain rapid consent for its phytosanitary control system when it was seeking to gain agreement from the Chinese authorities to begin to export to that country. The work done by Promperu, already mentioned in this section, is also of relevance here and has been crucial in establishing an international reputation for Peruvian products.

In conclusion, intermediary organisations have played an important role in increasing vertical coordination within the mango sector, from the industries early exporting days in the 1990s when it was trying to establish relationships with North American buyers, to the last decade when its insertion into US and European value chains has become more firmly established. An example of this success is that, within the last five years, the industry has demonstrated considerable organisational skills in negotiating entry into Asian value chains rapidly and successfully.

Section 9.1.3 Providing/Facilitating Knowledge Inputs

A third way in which the role of intermediary intermediaries can be identified as important is in providing new knowledge inputs. This role can involve both original research and development work and the translating of existing knowledge so that it can be used by cluster actors. An increasing amount of codified knowledge is, for example, easily accessible but one of the dimensions of this role is that intermediaries have developed the know-how to enable practitioners to understand and adapt this knowledge and make it usable in a local context.

Providing new knowledge inputs is particularly important in developing economy clusters where barriers to learning commonly exist. Chapter 4, for example,

revealed how the mango cluster has a fragmented structure with a large number of very small firms, conflicts between medium-sized and large firms, and only a small number of vertically-integrated firms. The lack of stable large lead firms, with the resources to devote to long-term research, confirms the evidence from many developing economy clusters that limited technological creation facilities are a barrier to learning (Bessant et al, 2003). According to an interviewee with many years experience in the sector, for example, the limited research work that has been done by mango firms is overwhelmingly reactive (Agency Interview 5, 2008).

In such circumstances the contributions of intermediary organisations are important in a number of ways. Firstly, intermediary organisations are, in some cases, able to provide the specialised knowledge, research infrastructure and personnel that are able to provide new knowledge inputs. In the mango cluster, for example, Chapter 8 outlined how Inia has the specific task of encouraging innovation in the agricultural sector and has a national and local research infra-structure through which it does this. It was also outlined in Chapter 5 and 7 how universities have been involved in some innovation initiatives, and have bought the technological expertise which they have to two important projects within the industry.

Secondly, intermediary organisations are able to establish links which means that firms can gain access to a wider range of knowledge than would be possible otherwise. Thus Chapter 7 outlined how the links that both Promperu and Senasa have with international bodies allow them to access and translate complex knowledge and make it accessible to mango cluster actors. Chapter 8 also outlined how CITEs have developed a particular expertise in establishing international links which have benefited a number of different agricultural sectors, including those of mangos and table grapes. A final way in which intermediary organisations can help provide new knowledge inputs is through the financial resources they can provide for innovation initiatives. In the mango cluster, as was outlined in Chapter 7, Incagro is an example of an organisation that has done this and its financial support has bought great benefits to, for example, Promango members and allowed them to access new knowledge inputs from both Brazil and Israel.

Overall, while there is evidence of some success in this area, the mango cluster presents a complex set of evidence regarding the role of intermediaries in providing new knowledge inputs. Evidence exists, in particular, of the need for more knowledge inputs in some areas, technological innovation being the clearest

example. There is also some evidence that the intermediary organisations that exist (INIA, for example, with its focus on small producers) are not serving the needs of the industry as a whole adequately in this area.

Section 9.1.4 Assessing Proposition 1: Conclusion

A range of empirical evidence from Chapters 4-8 has therefore been summarised and assessed in this chapter. This evidence will now be directly related to the propositions made in Chapter 3 of this study. In doing this reference will also be made to the context in which intermediary organisations work, and to some of the complications of their role.

The central finding of this section is that intermediary organisations play an important role in learning in developing economy clusters, providing confirmation of Proposition 1. Through a synthesis of the empirical evidence presented in Chapters 4-8, therefore, it has been shown how intermediary organisations contribute to an increase in horizontal cooperation, an increase in vertical coordination and the provision of new knowledge inputs.

This role played by intermediary organisations has been found to be important in the context of a cluster that lacked large and well-resourced firms. Evidence presented in Chapter 5 showed that some learning did take place via lead firms in the cluster. There was also evidence presented in that chapter that some cases lead firms had established relationships with global buyers, in which the buyers contribute to firm learning through providing both guidance and practical support. In general, however, the opportunities for learning via lead firms in the cluster were found to be limited.

In such circumstances the contribution of a diverse range of bodies, characterised in this study as intermediary organisations, has been found to be particularly important. A variety of organisations have been found to fulfil the roles of intermediary organisations. In this study a detailed examination has been made of business associations, government bodies and research bodies that are specifically concerned with encouraging innovation. As was outlined in Chapter 4, however, there are also other organisations that might successfully fulfil this role, example being NGOs and certification bodies.

Effective intermediary organisations have been found to exist in both the private and the public sectors and there has also been an increase observed in effective cooperation between these two sectors. One of the reasons for this is that a number of government organisations have evolved that have played a crucial role in transforming the Peruvian economy towards a more export-focused direction. Contrary to a view commonly held of government organisations as being inefficient, bureaucratic and prone to inertia, these bodies have proved to be important catalysts for change. This focus of support being provided to exporters has come as part of a wider initiative by central government, as it was identified how firms needed assistance with often quite basic business functions that form a part of exporting. It has been particularly significant for SMEs as it has been realised that globalisation has created unprecedented exporting opportunities for this group of business but, to take advantage of these, investment and development of the necessary capabilities was necessary.

The work of Promperu, defined by a representative as a Business Development Organisation, is an example of a successfully functioning organisation. Senasa is another organisation that has developed a track record of success, also proving to have talented and committed personnel at both a national and a local level. Chapter 7 highlighted, for example, how its international reputation helped the rapid passing of phytosanitary export regulations to allow it to export to China, for example, and also outlined how it had been involved in a project involving significant innovation (Hot water treatment) for export to the Japanese market. The network of CITEs, examined in Chapter 8, is also a good example of an institution that has had significant success. Working specifically with SMEs, and operating with restricted resources, they have encouraged exports from parts of Peru where traditionally have not taken place and have also built up an impressive array of international links.

Finally, while the assessment made here has stressed the importance of the role played by intermediary organisations, there are also some aspects of their operation which have been problematic. One example is that their role in encouraging horizontal cooperation has, alongside examples of increased trust, also in some cases reinforced existing tensions. More specifically, the tensions that have historically existed between producers and exporters continue to exist despite the existence of the two business associations, APEM and Promango. These two

organisations have in some ways institutionalised, and maybe even increased, the divisions that already existed. The organisations, although their offices are located very close to each other within the same building, very rarely have contact with each other and therefore opportunities to cooperate in pursuit of joint interest are lost.

Another criticism made of intermediary organisations is that they can become bureaucratic, ineffective and unable to respond and adapt to change. This is a weakness that is of particular importance in a period where major changes have taken place in the orientation of the Peruvian economy as it has become more export orientated. As was outlined earlier in this section this has not been the case for the majority of intermediary organisations that have been examined in this study, which have generally played important roles in such changes. As was examined in Chapter 8, however, an example of this point is the debates that have taken place within government and business circles about the role of INIA, which is seen as ineffective and irresponsible to the challenges a focus on exports poses. The creation of Incagro was, in this sense, partly a recognition that INIA was unable to respond to the demands for innovation that are placed on exporting organisations.

A further criticism sometimes made of intermediary organisations, and in particular business associations, is that they can become dominated by the most powerful interests within their organisation. Some evidence for this drawback has been found in this study in views expressed by a small number of exporters concerning the association APEM. These feelings are not widespread, however, and in general sentiment to both APEM and Promango was positive. Both organisations were, for example, widely identified in the surveys conducted for this study as important sources of knowledge. One factor that has helped maintain such relative consensus, however, is that for the last 15 years the industry has been able to achieve consistent growth. If the industry faces more challenging business conditions in the future it is possible that more deep-rooted tensions within such organisations might arise.

While the complexity of the roles played by intermediary organisations is acknowledged, therefore, the overall conclusion of this section is that intermediary organisations provide an important route to learning for developing economy clusters. In carrying out this analysis, however, the study has also been able to identify four distinct knowledge and learning roles carried out by intermediary organisations in developing economy clusters. These will now be examined in more

detail and an examination will also be made of what skills intermediary organisations need in order to be able to carry out these roles.

Section 9.2 Assessing Proposition 2

The second proposition made in this study is that a number of distinct knowledge and learning roles are carried out by intermediary organisations in developing economy clusters. In reviewing this proposition the taxonomy of intermediaries' roles presented in Chapter 3 will be discussed in the light of the empirical evidence presented in Chapters 4 to 8. To assist with this task Table 9.1 considers each of the roles individually. For each role a consideration is also given to the extent to which the cluster has been successful or unsuccessful in encouraging this aspect.

The table also identifies different intermediaries that have successfully carried out this role. In the discussion that follows organisations that have performed a role within the mango cluster in a significant or distinctive way will also be identified, and the way in which the practice-based perspective of knowledge provides a tool for understanding these roles will be outlined. Consideration will also be given to what skills organisations develop in carrying out these roles.

Table 9.1: The Peruvian Mango Cluster: Intermediary Roles and Cluster Learning

	Accessing	Diffusing	Coordinating	Enabling
Cluster Strengths	Lead firms (independently and via APEM) accessing international market information Government agencies accessing knowledge from international bodies	Close links, and sharing of knowledge, established between medium-sized firms Some knowledge sharing amongst large firms	Projects established between large firms eg successful development of new markets Common learning amongst medium sized firms.	New knowledge inputs obtained from Brazil for medium-sized producers Innovation support, and knowledge inputs, available for small firms
Cluster Weaknesses	Limited accessing of technological knowledge Accessing problems for many small producers	Division of producers and exporters into two associations, ie APEM and Promango Difficulties in diffusing knowledge to small producers	Division of producers and exporters into two associations, ie APEM and Promango Problematic links between large firms and small producers.	Lack of technological enabling body for large and medium sized firms. Limited links with National System of Innovation and translating of knowledge from other industries
Prominent Intermediary Organisations	Promperu and trading information / commercial intelligence Senasa and phytosanitary information Apem and links with international markets	Promango members sharing knowledge on production techniques Senasa and phytosanitary regulations Apem diffusing competitor countries production levels	APEM coordinates approach to Chinese market APEM and Promperu organise standards committee Promango coordinated project on certification for members	Incagro providing support for innovation projects. Promango projects (using international sources of knowledge) and other projects amongst small producers CITEs providing technological advice to small producer associations
Other Intermediary Organisations	Individual firms and technological projects NGOs accessing knowledge of niche markets eg organic and fair trade for small producers	Small associations (eg Apromalpi) working on quality issue NGOs and small associations	APEM and production monitoring Incagro facilitating projects with medium + small producers Cites and grape producers	Senasa and the hot water treatment project for Japan
Policy Suggestions	Closer links to national system of innovation Development of closer links with other industries.	Continue encouragement for the formation of associations amongst small producers Encouragement of large firm /small producer links + common learning	Funding / coordination of joint projects	Public sector support for a technological enabling body for large firms via either:- i) Establishing new body ii) Expanding trade associations role

Accessing

Chapter 3 proposed that intermediary organisations undertake the role of accessing intra-cluster and extra-cluster knowledge sources. As has previously been outlined this role involves the scanning of a wide range of national and international knowledge sources. One of the findings of this study is that the cluster has been more successful in developing organisational capabilities rather than technological capabilities and this has been evident in the way the cluster has been successful in accessing a wide range of commercially useful knowledge from international sources.

The accessing role played by Senasa and Promperu, as identified in Chapter 7, is particularly important. Senasa played a key role in accessing knowledge of changes in international phytosanitary regulations, while Promperu played a similar role accessing changes in trading regulations at both a national and international level. These two intermediary organisations are in a position to carry out this role because they have a certain amount of specialised knowledge, and also because they develop an authority when dealing with international bodies as a consequence of their links with the State which smaller private organisations would not be able to achieve. Crucial to this process has been the ability of both organisations to understand other community interests and appreciate their assumptions and world-view, a process underlined by the ‘perspective-taking’ concept (Boland and Tenkasi, 1995).

Accessing is also part of the role played by other intermediary organisations in this study. APEM, for example, must access knowledge in order to carry out its coordinating role which will be discussed below, and Promango must also access the knowledge that is of relevance to producers. The CITEs, discussed in Chapter 8, are an example of an organisation that has shown particularly accessing capabilities. Despite their limited funds they have developed an impressive network through which knowledge is accessed from a wide range of international sources, and also circulates freely within the network within Peru.

The success of the cluster in accessing technological knowledge has been much more limited, however, and this is important because the establishment of external linkages has been identified as one of the keys to developing technological capabilities (Bell and Albu, 1999). A reason for this is the lack of firms in the cluster with sufficient resources and long-term stability to devote to the task. In addition,

there is also a lack of a body that has been able to group firms together for technological projects, and access the knowledge needed on their behalf (this point is discussed in more detail in Chapter 10). It is also significant that accessing has most successfully been done by public sector bodies which suggests that in developing economy clusters, where the resources and knowledge management skills of firms are limited, public sector support plays a crucial role.

Diffusing

The second role carried out by intermediary organisations is that of diffusion. In order to export successfully a wide range of knowledge, on quality, certification, technologies and market opportunities, is needed and this can be a difficult challenge for firms with limited resources. Intermediary organizations therefore play an important role in this respect, through firstly accessing this knowledge, as has previously been discussed, and then ensuring that it is diffused to relevant parties within the cluster. While these tasks are linked, however, they require different skills and in the case of diffusion the ability to present knowledge in a simplified and accessible form is of most importance.

As identified in Chapter 7, Senasa and Promango have been particularly important in carrying out the diffusion role. Both organizations appeared in the network maps as having significant links with medium sized producer firms. The diffusion work which Senasa engages in is of the phytosanitary regulations that are of relevance to the industry, more specifically the control of fruit diseases such as the fruit fly. Senasa diffuses knowledge in this area through having a physical presence in producers farms and in processing and treatment centres, through participation in industry conferences and through their publicity material which tries to educate both agriculturalists and the general public about the harmful effects of the fruit fly.

The diffusion role played by the producers association Promango is also significant and is highlighted because it has fostered a sense of community, and a commonality of purpose, amongst its members. The importance of the establishment of common understandings and common practices can be observed and is fostered through an open access policy, meaning that any member of the organisation is allowed to visit the farm of another member and observe and discuss the way in which things are done. The impetus towards knowledge sharing was also identified

during the Promango Mango Forum where the exchange of a lot of detailed, situated knowledge took place (Industry Event 2, 2008).

Some of the skills that both Senasa and Promango have demonstrated in carrying out this role include the ability to build networks, the ability to present information in an effective way and, in the case of Promango, the ability to demonstrate the track record of the organisation and therefore persuade members of the worth of the organisation. Some differences have been identified in the literature, for example, of how diffusion takes place within different networks (Provan and Human, 1999) and the evidence shows that, in Promango's case, the organisation encourages a broad encouragement of discussion amongst their members, cross-member communication and sharing of knowledge.

Coordinating

The third role played by intermediary organizations is that of coordination. In the mango cluster the producers and exporters association APEM plays a major coordinating role. APEM has led coordination efforts to find new markets for the product, in particular the expansion into the Chinese market. As a part of this initiative APEM has worked with a group of firms that see the potential of this opportunity, ensuring that an achievable set of common objectives are established. The approach taken by APEM has also provided a mechanism to ensure that the financial risks that would be faced by individual firms in the early days of the venture would be minimized.

The coordination role has also been played by the government agency Promperu which has provided a great deal of assistance to firms wishing to export. It helps firms to become integrated into international value chains through the information that it provides and through the practical assistance it provides in setting up contacts and links. It has also played an important role in the setting up of producers and exporters associations in several agricultural sectors and these bodies have been vital in allowing producers to approach international markets jointly and, in this way, achieve greater penetration.

Another example of the coordination role carried out by both APEM and Promperu is the organisation of the standards committee. This role is particularly important for establishing the legitimacy of new industry practices and procedures. The standards guide produced, and the wider work of the committee, have served to

act as a boundary object (Brown and Duguid, 1998) and have provided a meeting point around which different interests within the industry have been able to congregate. They have also provided a means whereby participation in the industry has been encouraged, for example representatives from universities in Piura contribute to the committee, and so inputs from both a scientific and food safety perspective are combined with more traditional business concerns. Boundary objects also allow a community to understand better the way in which other communities think, and the standards committee has enabled key representatives from the cluster to understand more fully what is expected from global buyers and from international regulatory authorities. The committee has, overall, emphasised the importance of common practices becoming established as a route to quality throughout the cluster.

Intermediaries can play a lead role in coordinating in a way that is difficult for lead firms for a number of reasons. Firstly, they are able to build trust. Establishing trust within the mango cluster has been a challenge, because of the fragility of the industry and high firm instability, but the work of APEM has been important and it is perceived, at least to a certain extent, as being independent of particular firm interests. It has also been successful because it has been able to demonstrate to firms over a period of time a record of success, and this has made interest in the projects that it has pursued more sustained. The international contacts that it has built up, and its understanding of the cultural and language aspects of doing business internationally, have also been of importance.

Enabling

Finally the role of enabling, which has the two main dimensions of providing new knowledge inputs and translating existing knowledge to make it usable in another context, will be discussed. While this role, more than diffusion and coordination for example, fits in with the innovation intermediaries literature as it has been advanced in developed economies, there are also some distinctive features, and challenges, that have particular resonance for developing economies.

Three organisations have been identified in this study that specifically have responsibilities that fall into the enabling category, these being INIA, Incagro and the CITEs. Reference has been made in Chapter 8, for example, to how CITE Agroindustrial Piura has provided knowledge inputs for a number of associations of small producers in the Department of Piura, providing technical assistance to

organisations such as Apromalpi and Agrovida as both organisations have sought to develop their own facilities and capabilities to process the fruit themselves. The CITEs also have an impressive track record in translating existing knowledge and making it usable to new users. It has an extensive range of contacts, in Europe for example, where support was gained from Spain in setting up the network of organisations and designing the way in which they work.

Senasa, as was identified in Chapter 7, has also played an enabling role, in the project to establish a hot treatment procedure for export to the Japanese market. It was able to provide a lot of technical expertise, in addition to making contacts with qualified researchers at the National University of Piura. The role of enabling was also carried out by the University of Piura, a project that was outlined in Chapter Five. A team of researchers at the University worked with a group of large firms in the cluster and a new mechanism for administering the hot water treatment for mangos was developed.

Intermediary organisations have, therefore, been able to carry out the enabling role not only through the technical expertise they themselves develop, but also through their ability to develop contacts with wider technological networks. While examples of this role being played successfully have been identified here, however, some weaknesses in the framework of intermediary organisations that exist within the mango cluster can also be identified. In particular, the fact that the enabling organisations in the cluster work primarily with small firms, and associations of small firms, means that there has been a deficit in this area for large technological projects.

To conclude the consideration of Proposition 2, therefore, four roles carried out by intermediary organisations have been considered. Heterogeneity has been found in the types of organizations that act as intermediaries, as previous surveys of intermediary organisations have also demonstrated (Howells, 2006). In the mango cluster, for example, different types of organizations fulfil the various roles outlined in the taxonomy with different parts of the cluster and a division of labour between intermediary organisations can be identified. Dynamism can also be identified in the roles outlined in the taxonomy and, as a cluster develops, these are affected by changes within the cluster's firm structure and also by changes in the capabilities of intermediary organizations. Both of the main trade associations studied in the mango

cluster have, for example, expanded their roles over the last decade from ones initially focused on diffusion to ones including an important role in coordination.

9.3 Conceptualising Intermediary Organisations: Summary of Findings

Following the consideration of this study's two main propositions that has been made in this chapter, this section will outline and summarise the study's main findings. It will, by drawing attention to a number of roles carried out by intermediary organisations, outline how the way in which such organisations have previously been conceptualised needs to be revised and extended.

In most previous formulations of intermediary organisations what takes precedence is the brokering role (Burt, 2005; Stewart and Hyssalo, 2008), also variously described as linking (Hargadon, 1998) or bridging (Bessant and Rush, 1995; Sapsed et al, 2007). These studies emphasise how intermediary organisation bring previously unconnected actors together and how this can bring benefits in a range of areas, entrepreneurial opportunities and innovation initiatives being examples. Several studies also consider a wider range of roles, a common one being the role that intermediaries can play in the introduction of new ideas, sometimes described as accessing (Hargadon, 1998) or as scanning (Howells, 2006). Some studies stretch the roles wider to include implementation (Hargadon, 1998) and knowledge generation and combination, commercialisation and standardisation (Howells, 2006).

This study argues that the roles played by intermediary organisations need to be contextualised, and that in some circumstances they are more fundamental than those that have been previously identified. This finding emerges from a case study of a developing economy cluster where it was found that intermediary organisations have contributed to the development of both organisational and technological capabilities within the cluster, their most distinctive contribution being in the former area.

Three main ways in which intermediaries contribute to firm and cluster learning are, in particular, highlighted. The first of these is that intermediaries perform a cluster building role, providing a platform on which increased inter-firm cooperation can be built. This role is particularly important in fragmented clusters which lack strong lead firms. Through its emphasis on how knowledge flows best

within communities, the practice-based perspective explains why intermediaries, through establishing common identity, spreading common practices and fostering shared purpose, can create the conditions through which joint learning occurs. In promoting common practices intermediary organisations carry out the diffusion role identified in the taxonomy of intermediary roles. They can diffuse knowledge in a way that lead firms cannot because of the skills they develop in presenting knowledge effectively, the formal mechanisms they establish for the diffusion of knowledge and the opportunities for informal interactions between firms they create where tacit knowledge is exchanged.

In certain circumstances intermediaries also take their engagement a stage further, helping to establish and coordinate common strategies amongst groups of actors. Through the fostering of shared purpose, they carry out the coordinating role identified in the taxonomy of intermediary roles. They are able to do this in a way that lead firms cannot through their ability to establish a degree of neutrality, their success in building trust, their ability to spot opportunities and the position they establish whereby they have gathered a range of resources together.

Secondly, this study has highlighted the ways in which intermediary organisations have helped to increase vertical coordination. Becoming integrated into GVCs is vital for firms to remain competitive and through their contribution in this area intermediary organisations carry out the accessing role identified in the taxonomy of intermediary roles. They can do this because of the skills they develop in perspective-taking, the ability to understand the outlook of the international organisations with which they interact and translate those priorities to practitioners in the cluster. The coordinating role is also important in encouraging vertical coordination and can be played by intermediary organisations because of the authority they develop with member firms. In the mango cluster, for example, trade associations have been able to initiate a number of joint actions that have strengthened existing value chains, or help set up new ones as is the case with the emerging Asian markets. Government agencies have also played an important role in bridging the gaps between buyers and potential exporters.

Finally, this study has identified the way in which intermediary organisations can either provide new knowledge inputs themselves, or facilitate the adoption of outside sources of knowledge and translate it into a form that is usable to cluster actors. This role is important as developing economy clusters often lack lead firms

with the resources to devote to research and development. Moreover, such clusters are often low-trust environments where little knowledge sharing by larger firms occurs. In this sense, innovation projects by intermediary organisations are important because they can benefit the whole cluster. Furthermore, this study has outlined the distinctive role played by intermediary organisations in the innovation process through the taxonomy presented in Chapter 3. This highlights the specific role intermediaries play in accessing, translating and diffusing the new knowledge needed by the cluster. The role of accessing is particularly important in this respect because, through the skills they develop in participating in international networks, intermediaries can gain access to a wider range of knowledge than individual firms would be able to.

In conclusion, therefore, intermediary organisations have been found, through interpretation of the empirical evidence presented in Chapters 4-8, to both initiate and foster horizontal cooperation, contribute to increased vertical coordination and provide new knowledge inputs for cluster actors. These roles are particularly important in emerging clusters, where the opportunities identified for learning from lead firms, and for learning from global buyers, are more limited. The evidence from Chapters 4-8 has also revealed how a heterogeneous range of organisations carry out these intermediary roles, and there is often some overlap between them. In addition, these chapters have revealed how some dynamism exists in the roles played by intermediary organisations, and this is related to changes in firm size and in cluster structure.

9.4 Intermediary Roles: Assessing Generalisability

As outlined in Section 9.3, therefore, intermediary organisations have been found to play an important role in the promotion of learning within developing economy clusters. This section will examine the extent to which this finding, based upon the study of a mango cluster in northern Peru, is more widely generalisable. This question will be considered, firstly, in relation to other developing economy agricultural clusters, secondly, in relation to a wider range of developing economy clusters (including other natural resource and manufacturing clusters) and finally in relation to the role that intermediary organisations play in developed economies. In

doing this reference will be made to how the study has tried to incorporate comparative research into the design of its methodology.

The mango cluster studied can be identified as sharing a number of characteristics with other developing economy agricultural clusters. While there are variations between them these clusters have typically found opportunities to export because of the diversification of markets that has taken place as a result of globalisation and, in many cases, they have been able to access high end markets in North America and Europe for example. There are many examples of these clusters in Latin America, the region in which this case study was conducted (eg Pietrobelli and Rabellotti (eds), 2006). Examples also exist from other parts of the world, for example fruit and vegetable clusters in Africa (eg Dolan et al, 1999).

These clusters often have a complicated history, in many cases having produced initially for the home market with a focus on exports coming at a later stage of their development. Typically, although not invariably, these clusters also have a firm structure within which small firms dominate and in which there is a lack of strong, well-resourced, lead firms. This firm structure has often changed as a result of increased exporting, however, and in some clusters large firms have started to emerge and become established. Gomes, for example, in the three fresh fruit clusters that she studied, found differences between large firm and small firm dominated clusters (2006). In addition, as was outlined in Chapter 4, these clusters often face a challenging knowledge environment. They operate in countries where there are typically weak national and regional systems of innovation (Melo, 2001). Finally, in many agricultural and other natural resource clusters, the involvement of global buyers is often limited (Gomes, 2006), and the responsibility for learning is therefore placed on cluster actors themselves.

The identification of clusters with so many similar characteristics suggests that the conclusions on the role of intermediary organisations made in this study are more widely generalisable. Consideration of the comparative research on other agricultural clusters that was completed for this study also supports this assertion. The work on the intermediary organisation CITE in Chapter 8, for example, considered some detailed examples of the work that it had done in the table grape sector. Interviews were also done with a business association representative, and an academic expert, in the asparagus industry (Association Interview 9, 2008; Academic Interview 6, 2008).

Some common themes were recognised through this comparative work, for example a similar importance of the role of business associations in the asparagus and mango industries. This, and other secondary research material considered from two neighbouring countries, Brazil and Chile, also showed that the mango industry shares many features in common with natural resource based clusters in developing economies, for example its fragmented nature and the difficulties that industry actors experience with local infrastructure. A common theme that also emerges from Brazil, Chile and Peru is that the role that intermediary organisations have played in the successful increase in private sector/public sector cooperation. Examples are the prominent role played in Brazil by the research institute Embrapa, and the increase in state/association cooperation observed in studies of Chile (Perez-Aleman, 2000).

Considering the issue of generalisability more widely, there are some aspects of the study's findings that are of relevance to other sectors in developing economies, and also to advanced economies, although in both these cases such claims need to be made with more caution. In the first case, that of other sectors in developing economies, there are important differences in the production of more standardised manufacturing products from that of agricultural production.

Agricultural production has the feature of involving a lot of situated knowledge, for examples on issues such as climate, soil and fertilization. There is also the sense of the common good, relevant to issues such as disease prevention. The later issue, and the more wide-ranging imperative to establish a good international reputation for a country's products, mean the establishment of common practices is of particular relevance in this sector. While these factors are not present in other sectors, however, there are still ways in which the role of intermediary organisations as identified in this study are potentially relevant. Increased horizontal cooperation has been found to be important in other sectors, for example (eg Morris and Barnes, 2006) and the provision of new knowledge inputs is one that is of relevance across a wide variety of different sectors.

Finally, it is recognised that there are a number of significant differences between the context of advanced and developing economies. Due to financial constraints, for example, firms in developing economies are likely to have less access to the services of private consultants or organisations such as KIBS, for example. It is also the case that in advanced economies firms are likely to have an increased level of capabilities, being able to plan and execute innovation initiatives more effectively.

For this reason the identification in this study of the diffusion and coordinating role played by intermediary organisations is likely to be of less relevance. Nonetheless, there are some circumstances where it might still be of some significance, the case of a newly emerging economy in an advanced economy being an example.

Section 9.5 Strengths and Limitations of the Study

An assessment will now be made of some of the theoretical and methodological strengths and limitations of the study. Firstly, one of the theoretical challenges faced in this study is that the role of intermediary organizations has been examined in a number of different literatures. These literatures were examined in Chapter 2 and a strength of the study is that it was possible to make links, comparisons and cross-fertilizations between them. Such an eclectic set of literature does, however, present the potential problem of a lack of focus and inevitably not all of these literatures became a central part of the work. Adequate focus for the study was provided, however, through the identification of the practice-based perspective of knowledge as a means to answer the questions the study posed.

The practice-based perspective, in particular, proved to be an important contributory source for the taxonomy of intermediaries' roles that was developed in Chapter 3. This taxonomy proved robust when applied empirically in Chapters 5-8 and also provides a heuristic for future research. One limitation, however, was that the study was restricted to one case study. Multiple case studies would be useful in order to apply the taxonomy to different settings that would incorporate a wider range of industries and the different institutional settings that exist in different economies. A further theoretical limitation in the study was that the significance of differences in intermediary roles in developed and developing economies was not considered in detail. Some commonalities, and some particularities, exist between the two settings and more work is needed in identifying and distinguishing these.

Considering the methodological strengths of the study the combination of different research methods, a traditionally strength of case study work, was exploited in this study and allowed a nuanced picture of the subject cluster to emerge. In addition, very good access was obtained for the principle research method selected, semi-structured interviews, and more than forty in-depth interviews were completed with both local and national representatives from institutions and firms. The other

research methods used were also completed successfully. A survey was completed with 26 firms allowing network analysis to be completed, and the observation method was used at three conferences and other industry events. Some comparative research was also done with other industries in Peru, in particular the asparagus and grape sectors, and through secondary research some consideration was also given to how the conditions existing in Peru might be typical or atypical of those in other developing economy clusters.

A methodological limitation of the study is that the case study was of one industry. The reason for this was that the industry studied has a complicated mix of large, medium and small firms, and therefore an in-depth examination was needed in order to fully understand its nature. Its geographical position also meant that it was a lengthy process gaining adequate access to industry actors. An attempt was made to deal with this limitation by conducting some comparative research with other agricultural industries in Peru, in particular the asparagus and grape sectors. The work done on CITEs in Chapter 8, for example, considered some detailed examples of the work that it had done in the grape sector. Interviews were also done with a representative of a business association, and an academic expert, in the asparagus industry (Association Interview 9, 2008; Academic Interview 6, 2008).

A second methodological limitation that can be identified is that it was not possible to extend the network analysis to consider small producers. The reasons for this were the very large number of small producers in the cluster and their dispersed, often inaccessible, locations. Overall, however, it was more important to show the network for large and medium producer, as this was where the knowledge and learning of most relevance for the export market took place, so this limitation did not seriously weaken the study. In addition, if it had been practical to gather the data to produce network maps for small producers, their denseness and complexity would have been potentially problematic due to the very large number of small producers in the cluster.

Section 9.6 Research and Policy Implications

Having stated the study's main conclusions, and made an assessment of its strengths and limitations, two ways in which the analysis made in the study could be further

developed will now be presented, an agenda for future research and an identification of policy implications arising from the research.

Future Research

One area in which more research would be useful would be allowing the taxonomy of intermediary roles to be tested and developed further. It could be extended, for example, by considering other organisations that act as intermediaries, for example NGOs and certification companies as only a limited look was taken at such organisations in this study. As these organisations work mainly with small producers, this would allow more consideration of the learning processes small firms undertake and the contribution of intermediaries to these.

As was mentioned in the ‘Strengths and Limitations’, section some comparative work was done with other agricultural sectors but this was quite limited. It would be relevant, therefore, to investigate in more detail the role of intermediary organizations in other sectors, looking at what factors have led to their success or failure and how the ways in which they work differs between sectors. It would also be of value to extend the study to examine other countries that have different institutional settings. This would allow a consideration of what role intermediary organisations have played as clusters have responded to the challenges of globalisation, and what the effects of different public policies towards intermediary organisations have been.

A second area for future research would be considering how intermediary roles change as a cluster develops and grows. This study has identified some dynamism in intermediary organisations roles, a particular example being the way in which trade associations such as APEM and Promango have moved from a predominantly diffusing role to one that also includes coordination. Linked to this point is the observation that as firms grow in size, the way in which they participate and interact with trade associations begins to change. More research could allow more comparisons to be made, for example on the differences between incipient and mature clusters (Schmitz and Nadvi, 1999). This could include an examination of the particular challenges that each type of cluster faces, and the types of contributions that intermediary organizations can make towards solving these challenges.

A final area in which more research would be useful is in investigating the differences in intermediary roles in developed and developing economies. This study has concentrated on the role of intermediary organizations in developing economy clusters but there are potentially a number of overlaps between their experiences and those of clusters in developed economies. It would be productive to investigate whether the cluster building role exists in the same way in developed economies where stronger, more stable, lead firms exist. Another area needing further investigation is the role of intermediaries in encouraging vertical integration. Existing studies of developed economies (Bessant et al, 1999) have already identified how intermediary organisations in developed economies contribute to this, but more research would be useful in this area. Some of the methods that could be used to make more comparisons include using network analysis to compare the type of networks that exist, and the varying position of different types of intermediary organisations within these networks.

Policy Implications

The work that has been presented in this study can be used as a tool for policy makers to assist in the design, and assessment of, policy options. The table presented in Chapter 9 (Figure 9.1), for example, demonstrates how the taxonomy of intermediary roles can be used to assess the strengths and weaknesses of cluster learning, and assess the importance of contributions made by intermediary organisations involved in the learning process. A number of different policy implications will now be outlined, some of which are specific to the Peruvian situation and some of which have a more generic application to developing economy clusters.

The first policy implication arises from the role intermediary organisations play in increasing horizontal cooperation between cluster firms. This role is particularly important when, as is common in many developing economy clusters, there is a lack of well-resourced lead firms. The success of the government agency Promperu in setting up trade associations across a variety of agricultural sectors is one that could be implemented in other countries and the encouragement of such joint approaches, ‘asociatividad’ as it is referred to in Peru, continues to be a central part of policy at both a national and a local level.

Public policy should seek, therefore, to provide the tools for intermediary organisations to establish themselves and operate successfully, for example through the provision of training for their personnel. It should also encourage the development of networks that allow practitioners from such organisations to exchange ideas and learn from each other's practice. The way in which, as was identified in Chapter 8, this is done within the network of CITEs provides a successful example. The taxonomy of intermediary roles developed in this study can also be used by individual organisations seeking to clarify their own roles, examining, for example, their aims and objectives, and considering some of the methods that they might use, and the skills they would need to develop, in order to achieve these objectives.

A second policy implication arising from this study concerns how public support is given to innovation projects, and what the role of intermediary organisations is in this process. A particular challenge is making policy appropriate to the challenges of competing in a global economy. This study has found a concentration in public policy on the needs of small businesses, the historical reason for this being the traditional dominance within the Peruvian business structure of small firms. As the Peruvian economy has moved more and more towards an export lead model, however, public policy has failed to recognise the competitive realities of participating in a globalised economy. It has traditionally been assumed in many developing economies, where an economic structure dominated by small firms is very common, that medium and large firms are doing well already and therefore do not need public support. In a globalised economy, however, where innovation is increasingly important, such a view needs to change.

This study argues that supporting intermediary organisations is a means through which public/private partnerships can be established which have as their emphasis innovation aims. The role of public agencies as catalysts for private sector joint actions has been recognised as important for developing economy clusters (Schmitz and Nadvi, 1999) and there are several examples in the mango cluster of where public agencies have acted successfully in this way. Such partnerships provide a model, especially for small producers, for dealing with the challenges posed by globalisation. There are many examples of this in the developing economy literature, for example, one case being the recognition of the importance of state / trade association cooperation in Chilean agro-industry (Perez-Aleman, 2000). The clearest

example in the mango cluster is the way that the public body Promperu has encouraged the formation of trade associations, which then discover that they have the incentive and resources to operate successfully independently.

A third policy implication, which links closely with the issue just discussed, relates specifically to public policy support given to technological innovation. The distinction between organisational and technological capabilities made in this study has helped track the different types of learning in the cluster. Its success in developing organisational capabilities has given it a significant competitive advantage over its rivals, but it has had less success in technological innovation. More of a focus on technological innovation is, however, of vital importance considering the argument that has been made in this study that knowledge and learning are key to success in a globalised economy. It fits in with a vision for the development of Latin America economies which sees the application of technology to the region's natural resources as central to a more prosperous and stable economic future (ECLAC, 2008).

In the mango cluster an experienced observer notes how the research that is done in is primarily reactive, responding to problems rather than being designed with any long-term agenda (Agency Interview 6, 2008). An example is that there is a lack of any coordinated research programme on new varieties, despite the opportunities of adapting new varieties originating from Asian to new conditions. As the international mango market becomes increasingly competitive, being close to the forefront of technological change will become increasingly important. The study has, therefore, identified a need for an effective coordinating body for technological innovation, a factor that is also recognised by industry insiders (Association Interview 10, 2008). Long-term technological 'perspective-making' needs to take place, involving investments in research and development that might not achieve immediate results.

Conclusion

In conclusion, this study has highlighted the importance of a diverse range of bodies, categorised as intermediary organisations, to learning in developing economy clusters. The evidence collected from a case study of a mango cluster in northern Peru, combined with comparative work, has pointed to three main contributions to cluster learning. Intermediary organisations perform a cluster building role, through

their encouragement of horizontal cooperation. They also contribute to the vertical coordination of cluster firms within international value chains. Finally, intermediary organisations either provide firms with new knowledge inputs, or translate existing knowledge into a form that is usable by firms.

The identification of these three contributions has revealed how the role played by intermediary organisations needs to be reconceptualised and, in certain contexts, stretches wider than that identified in previous studies. In particular, in the context of developing economy clusters, a more substantial role in diffusion and coordination has been identified. This study also argues that, in view of the importance of intermediary organisations, more focus should be placed on them in academic research. Finally, it has been identified in the final chapter of the study how the conclusions reached raise a number of policy implications.

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Association interview 2 (2008), Sr Juan Carlos Rivera, Gerente, Apem, Piura, Date: 3/3/08

Association interview 3 (2008), Sr Franz Vega Dienstmaier, President, Promango, Piura, Date: 24/6/08

Association interview 4 (2008), Sr Cesar Chang Valdez, Promango, Piura, Date: 30/6/08

Association interview 5 (2008), Sr Pedro Miguel Checa Farfán, Presidente, Apromalpi, Chulucanas, Dept of Piura, Date: 7/7/08

Association interview 6 (2008), Sr Cesar Morocho Marchan ,Gerencia General, Apromalpi, Chulucanas, Dept of Piura, Date: 7/7/08

Association interview 7 (2008) Sr. Rómulo Teodoro Anazco Valencia, Presidente, Agrovida, Sullana, Dept of Piura, Date: 10/7/08

Association interview 8 (2008), Sr. Augusto Aponte Martínez, Director Ejecutivo, Pidcafe, Lima, Date: 8/8/08

Association interview 9 (2008), Sr Armando Grados Mogrovejo, Gerente General, Frio Aéreo, Lima, Date: 13/8/08

Association interview 10 (2008), Sr. Daniel Bustamante, President, APEM, Piura, Date: 7/11/08

Firm interview 1 (2008), Mr Geoff White, Utopia UK, Spalding, UK, Date: 5/12/07

Firm interview 2 (2008), Sr. Alberto Irazola and Sr. Omar Acuna, F.L.P. del Perú SAC, Dept of Piura, Date: 22/2/08

Firm interview 3 (2008), Sr Reynaldo Hilbck, Empafрут, Sullana, Dept of Piura, Date: 25/2/08

Firm interview 4 (2008), Sr Gelio Ocampo Chocano, Gerente General, Sunshine Exports SAC, Piura, Date: 26/2/08

Firm interview 5 (2008), Ing. Luis Angel Serra Sandoval, Gerente de Operaciones, Mar Agro SAC, Sullana, Dept of Piura, Date: 27/2/08

Firm interview 6 (2008), Sr Alfredo Del Aguila Perales, Jefe de Exportaciones, FYC Export, Sullana, Dept of Piura, Date: 27/2/08

Firm interview 7 (2008), Sra. Dora Elsa Lazaro A., Nor Agro Perú, Sullana, Dept of Piura, Date: 4/3/08

Firm interview 8 (2008), Sr Gino Fosca, Empafрут, Sullana, Dept of Piura, Date: 4/3/08

Firm interview 9 (2008), Sr Luis Tuesta Atala, Gerente General, Agrícola Mochica SAC, La Victoria, Lima, Date: 27/3/08

Firm interview 10 (2008), Sra. Esther Incháustegui M, Distribuidora, Int'l Agroindustrial Lima, Date: 4/6/08

Firm interview 11 (2008), Sr Luis A. Llanos Cabanillas, Consorcio Agropecuario del Perú SAC, Piura Date: 24/6/08

Firm interview 12 (2008), Sr Bruno Javier Fossa Villar, Agricola Santa Isabel S.R.L and Sociedad Agricola El Brujo, Date: 22/8/08

Firm interview 13 (2008), Sr Reynaldo Hilbck, Empafрут, Sullana, Dept of Piura, Date: 3/11/08

Firm Survey / Social Network Analysis

Firm Survey (2008) - Survey completed by twenty-six Exporting, Processing and Producing Firms between July and November 2008 (Please note: Firm responses were confidential and participating firms have, therefore, not been listed by name).

Network Maps (2008) Compiled from Firm Survey data in collaboration with Dr Ismael Rafols (Research Fellow, SPRU, University of Sussex) and Dr Matias Ramirez (Senior Lecturer, SPRU, University of Sussex) using Pajek Social Network Analysis software.

Industry Events

Industry Event 1 (2006), 5th International Congress of Peruvian Mangos, *Organiser:* APEM, *Venue:* Hotel Rio Verde, Piura, Peru *Date:* 17-18 Aug 2006

Industry Event 2 (2008), 4th Mango Forum *Organiser:* Promango, *Venue:* Piura, Peru *Date:* 21-22 Aug 2008

Industry Event 3 (2008), 7th International Congress of Peruvian Mangos *Organiser:* APEM *Venue:* Hotel Rio Verde, Piura, Peru *Date:* 4-5 Nov 2008

Industry Event 4 (2008), Presentation Day (including vineyard opening) *Organiser:* CITEvid *Venue:* CITEvid Headquarters, Ica, Peru *Date:* 7/6/

Appendix: Encuesta: Conocimientos Tecnológicos y Conocimientos Comerciales

Nosotros apreciaremos si usted pudiera darnos algunos detalles de su empresa antes de completar esta encuesta. **Cualquier información recolectada como parte de esta encuesta será estrictamente anónima y confidencial y no será revelada ni pasada a terceros.**

Nombre de la Empresa Numero de Empleados Correo Electrónico

¿Cuales de las siguientes actividades su empresa realiza?

Exportación de mangos Empaque de mangos Producción de mangos Si produce, cuantas hectáreas tiene

¿Su empresa exporta o produce lo siguiente?:

Mangos frescos Jugo de mango Mango deshidratado Mango en conservas

¿Cuales de las siguientes certificaciones tiene su empresa?

HACCP GlobalGap Tesco TNC Otras

<u>Organización</u>	<u>Importancia</u>	<u>Frecuencia</u>
APEM		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
PROMANGO		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
ADEX		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

Otras Empresas / Consultadores

<u>Organización</u>	<u>Importancia</u>	<u>Frecuencia</u>
OTRAS EMPRESAS DE MANGO		
Nombre:		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
Nombre:		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
EMPRESAS QUE DAN CERTIFICACIONES		
Nombre:		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
Nombre:		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5
CONSULTADORES PRIVADOS		
Nombre:		
- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

Organizaciones Gubernamentales

<u>Organización</u>	<u>Importancia</u>	<u>Frecuencia</u>
PROMPERU (ex PROMPEX)		

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

SENASA

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

MINISTERIO DE AGRICULTURA

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

INCAGRO

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

INIA

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

CITE AGROINDUSTRIAL PIURA

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

Organización

UNIVERSIDADES / INSTITUTOS

Nombre:

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

Nombre:

Importancia

Frecuencia

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

ORGANIZACIONES NO GUBERNAMENTALES (ONGs)

Nombre:

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

NATIONAL MANGO BOARD (USA)

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

ORGANIZACIONES INTERNACIONALES

Nombre:

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5

SI HAY ORGANIZACIONES IMPORTANTES QUE NO FIGURAN EN LA LISTA POR FAVOR INDICA SUS NOMBRES

Nombre:

- Reciben Conocimientos Tecnológicos	1 2 3 4 5	1 2 3 4 5
- Reciben Conocimientos Comerciales	1 2 3 4 5	1 2 3 4 5