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Intermediaries and Capability Building in an Emerging Resource based Cluster

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Abstract

This paper evaluates and analyses the role played by intermediary organisations in consolidating the position of an emerging resource-based cluster in exports markets. Through a purpose-built typology, the argument is made that organisations undertaking important intermediary functions act not only to facilitate the transfer and diffusion of knowledge, as previous literature has emphasized, but that in emerging clusters, their scope of activities, extending into leading joint actions by producers, coordinating new investment and enabling new knowledge, places intermediaries at the centre of the network of organisations. The implications of this for the governance of the cluster, including inclusion of diverse producers is discussed.

Introduction

A number of studies have pointed to the new openings that have emerged for the export of natural resources to industrialized countries and the opportunities this has created for the upgrading of producer capabilities in some hitherto underdeveloped clusters (Gomes 2006; Mccormick 1999). Yet it is also clear that this has been a highly uneven process. A major challenge for policy makers has been that in many areas, fragmented land ownership, poor communication infrastructure and historically low prices for produce have created a low platform from which to develop producer capabilities. Yet, this paper discusses the case of a relatively successful emerging cluster, where the absence of strong producer organisations has meant that what shall be termed "intermediary organisations", that include government bodies and producer associations, have assumed dominant roles in a range of functions associated to the upgrading of production and technological capabilities of local producers. The influence of intermediaries extends into areas such as leading investment initiatives, conforming key networks and planning entry into new markets. These activities have articulated joint actions amongst local actors, a key factor behind the achievement of what a section of the literature has called collective efficiency, that allow small firms to upgrade productive activities (Schmitz 1995; Gomes 2006; Schmitz and Nadvi 1999).

The focus on intermediation raises some new questions for cluster development, for while intermediary activities have been highlighted in a series of different contexts, for example helping to augment firm-level competencies (Howells 2006) and assisting artisans and entrepreneurs respond to market opportunities (Piore and Sabel 1984), intermediary organisations have usually been consigned to playing an important but subsidiary role as compared to producer organisations in cluster development. We suggest, by contrast, that intermediary organisations can actually play a far more central and critical role in the development of emerging clusters than has until now been recognized, the consequences of which are quite significant for overcoming important obstacles to cluster development and

including small producers in the upgrading process. This argument is developed in the paper by means of a taxonomy that specifies intermediary functions in the development and dissemination of knowledge in the cluster. The taxonomy draws to a significant degree on a practice-based approach to learning and knowledge transfer that usefully links upgrading of capabilities to the socialisation of new practices amongst communities of producers and intermediary roles within this (Brown and Duguid, 1991).

The literature is developed in the following way. Firstly, we discuss why intermediation may be particularly relevant in emerging clusters, with particular emphasis on the concept of collective efficiency as developed by Schmitz (1995). The paper then synthesizes a relatively dispersed set of empirical findings on intermediaries drawn largely but not exclusively from clusters in less industrialized regions through a taxonomy of intermediary functions. This is built around concepts of accessing, diffusion, coordinating and enabling. Intermediary roles are then analysed through an empirical study of the mango cluster in Piura, an emerging agricultural cluster in the north of Peru. This relies both on social network analysis drawn from a survey of local producers and semi structured interviews with local actors. We summarise by specifying in detail different mediating activities, their importance for the evolution of the cluster and underline the importance of including intermediaries in future analysis of the factors that explain the success or otherwise of emerging clusters.

Why intermediaries?

The study of intermediary roles in production processes has tended to focus on two principle areas. According to Popp (2000), neoclassical economic analysis views intermediaries essentially as actors who position themselves strategically to take advantage of monopoly rents on the information they have and control, without providing any value added themselves. However, a number of studies have challenged this view and draw attention to their positive influence in knowledge creation. Popp (Ibid.) for example emphasizes the specialist roles of intermediaries for reducing information costs associated to distance and volatility in the

clothing industry by improving supply chain transparency. Interest in intermediaries has also been prominent within innovation studies, where a discourse linking intermediary activities to competence building, knowledge transfer and diffusion of knowledge amongst communities of organisations has emerged (Bessant and Rush, 1995; Sapsed, Grantham and DeFillippi, 2007; Gherardi and Nicolini, 2002). Howells's (2006) comprehensive review of intermediaries suggests the rise in the importance of intermediary organisations also reflects a new and more diverse division of labour in the knowledge economy, where collaboration, outsourcing and a more open innovation system has led to a focus on the nodes and brokers through which knowledge transfers. Intermediary roles therefore appear most commonly as generating and mediating flows of knowledge and their significance is most apparent as bridgers, facilitating the process of knowledge transfer between organisations, or as brokers, whereby individual agents act to strengthen existing links (Burt 2005; Obstfeld 2005). We therefore define an intermediary organisation 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. From this definition it follows that a wide range of organisations, coming from public, not-for-profit and private sectors can potentially play intermediary roles. Amongst these are individual entrepreneurs, trade associations, professional bodies, consultants, research councils, knowledge intensive business services (KIBS) and non-governmental organisations (NGOs), even though for many of these organisations, intermediation will be only part, sometimes not even the most significant part of what they do.

Whether acting as bridges or undertaking other mediating services, intermediaries have on the whole been considered useful for augmenting competencies of client firms but ultimately playing a subsidiary function to producer firms, who in business or economic terms, are considered to be the principle performers. However, some detailed case studies emerging from studies of developing economy clusters suggest that intermediary type organisations can actually fulfil more important roles than has generally been accounted for in studies of more industrialized regions. For example, Giuliani et al (2005), Gomes (2006) and Schmitz and Nadvi (1999) have commented on intermediary activities in helping to develop joint actions amongst

small producers, which resonates with Schmitz's (1999) concept of collective efficiency, whereby consciously pursued collective actions can lead to local external economies. Intermediary roles have also been noted for helping to build trust between organisations by Bessant et al (2003) and for learning in value chains by Bessant et al (1990). It appears from such studies that intermediaries become more central to communities of firms where coordinating functions are important and/or where there is large gap between opportunities for upgrading and existing competencies of local actors.

However, developing a conceptual framework to understand the pivotal but distinguishing roles that flow from intermediation with other organisations is complicated by the fact that intermediary roles in networks are highly contingent upon context and subjectivity (Burt 2005), limiting the usefulness of generic frameworks. Intermediary functions in this paper are therefore analyzed within a very specific context, which is emerging agricultural clusters. First we discuss some the challenges associated to emerging clusters in developing countries and the role that intermediaries might play in this, we then discuss a conceptual framework that can be used for the subsequent analysis of intermediaries.

Learning in "emerging" developing economy clusters

Within advanced industrial economy contexts clusters are habitually discussed with reference to agglomeration economies and in particular the advantages that accrue from greater competition, knowledge spillovers and concentration of skilled labour (Marshall 1920, Malmberg and Power 2005; Porter 1990). However, within a developmental context, clustering has taken a somewhat different narrative. Dominated in some cases by subsistence production, so-called "survival clusters" (Altenburg and Meyer-Stamer) have in the past been characterised with endemic underdevelopment (Amin 1994). A pertinent question which can therefore be posed is, given the new opportunities for export-led growth, what functions can intermediaries play, as part of a new division of labour, to encourage the upgrading of producer capabilities in these emerging clusters? We address this question by looking firstly at the challenges such clusters encounter.

Altenburg and Meyer-Stamer (1999) usefully differentiated clusters in less industrialised countries as a precursor to developing policy recommendations to generate positive externalities. The category of "survival cluster" referred to a cluster made up predominantly of micro- and small-scale enterprises with poor entrepreneurial competence, a dearth of management skills, low trust and poor contract enforcement mechanisms which compromise the potential to reap the benefits of clustering. Although our use concept of emerging clusters differs from survival clusters in terms of their new found opportunities, they are clearly in a transitionary stage, with many of the structural problems inherited from the past. Thus, opportunities for penetrating export markets and adopting new productive capabilities through "learning-by-exporting" (Gereffi 1994), combine with the overwhelming dominance of small firms and micro enterprises that have few resources to invest in upgrading.

Yet, in their study of manufacturing clusters in less industrialized areas, Schmitz (1995) and Sengenberger and Pyke (1991) argue that the problem facing small producers lies less in their size, than in their isolation and in some cases exclusion from opportunities for learning by larger established enterprises. The consequence, it is argued, is that small producers are often embedded in a social environment that is delinked from the business community of the formal sector, which creates obstacles to the diffusion of knowledge from the more modern firms. A second feature of survival clusters that may prevail has been found to be a general lack of trust between producers, and hence low willingness to cooperate. Altenburg and Gomez (1995) suggest that producers in survival clusters are particularly reluctant to share any kind of information because many owners perceive their business as a survival activity to sustain them until a better opportunity arises. In such an unstable environment there is little incentive to invest in long-term commitments and a good reputation.

Thirdly and perhaps most significantly, it is possible to distinguish a set of challenges stemming from the generalised absence of lead firms with the resources and know-how to invest in technological upgrading. Where lead firms exist, some of this knowledge can then diffuse to smaller firms through the supply chain, some form of coordinated effort to disseminate knowledge or labour mobility. This question of "leadership" is therefore critical and directly impinges upon our discussion of intermediaries. On the one hand, from the global value

chain literature, much emphasis has been placed on the powerful role that buyers higher up the value chain have traditionally played in passing information to suppliers to assist in upgrading production capabilities (Gereffi 1994; Schmitz and Knorringa 2001). However, case study evidence suggests that global buyer firms are not necessarily always prepared to assume this role. In her study of the fruit sector in Brazil, Gomes (2006) suggests a change in buyer behaviour has taken place in areas where product differentiation is less prominent, with greater responsibility for upgrading increasingly falling on local actors and less on firms further up the value chain. Buyers are increasingly 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 and establishing certification standards, buyers in some cases play very little role in the upgrading processes of local clusters. The hurdles and associated risks of meeting certification kitemarks, achieving consistent quality, organizing logistics and establishing a basic scientific base for testing and measurement of basic quality standards therefore increasingly requires small-sized producers to build a local knowledge base with less reliance on global buyers and large firms (Schmitz and Nadvi 1999).

The literature around cluster dynamics has also emphasized that knowledge flows within 'cliques' of actors within a cluster, that tend to be larger firms with high absorptive capacity, can provide new knowledge inputs for smaller clustered firms (Giuliani and Bell, 2005). While many studies of successful developing clusters, such as the Chilean wine cluster (Bell and Giulianni 2007) focus on the key role played by lead firms and their networks, the reality of emerging clusters is that they often lack lead firms with the resources to assume large-scale experimentation and risks. By contrast, there is greater reliance on coordinated action by groups of organisations such as producer associations and cooperatives that pool resources around training for the adoption of new practices and for the use of new technology. The concept of collective efficiency as developed by Schmitz (1995), whereby competitive advantage and upgrading can be derived from local external economies and joint action of small producers rather than requiring the prior existence of large firms is particularly relevant.

Upgrading of emerging clusters therefore involves above all developing the ability to access and in some cases adapt the most relevant knowledge for local producers and establish a basis for joint practices. Nevertheless, while the advantages of clusters in developmental contexts, including benefits derived from joint action, external economies and low transaction costs, continue to underline the potential advantages of co-location (Schmitz, 1995), it is also clear that for such benefits to emerge, a division of labour that enhances capabilities for learning and development also needs to emerge. The following section discusses the roles intermediation can play in these emerging agricultural clusters.

Intermediary roles in clusters

Evidence of intermediary activity in building clusters appears largely anecdotal. However, some research focuses on their part in building a basis for joint action by producers. For example Piore and Sabel (1984) and Brusco (1990) argue that specialised services - business associations, producer consortia, as well as government bodies - built a basis for inter-firm collaboration in Northern Italy by facilitating access to specialized markets and skilled labour, as well as more generally encouraging joint investment schemes. Significantly intermediation is separated form more general service functions. Given the absence of strong producer organisations, within emerging clusters, specialised institutions can be expected to play an even greater role. Thus Gomes (2006) identifies growers associations as working in partnership with public sector agencies in an attempt to make research accessible to SMEs.

There is also some evidence of intermediary organisations contributing to the building of clusters. Drawing on the work of Maggi (2003), Pietrobelli and Rabellotti (2006) comment in relation to the development of the Chilean salmon industry, that public bodies and international development cooperation agencies played a critical role in helping to establish standards, improving quality and gaining access to new markets. In her analysis of the same industry, Iizuka (2006) 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.

Accounts therefore exist of how clusters have historically relied on public agencies, producer associations, NGOs and other service organisations to act as catalysts for joint action and growth. Nevertheless, these accounts have been sketchy and there is a distinct absence of a framework that explains how these organisations incorporate specific skills in areas of gatekeeping, diffusion and knowledge. Given our contention that these activities may be critical for emerging clusters, the following section discusses a taxonomy for understanding intermediary functions in clusters.

A taxonomy of intermediary functions

The above discussion underlines that intermediary roles can be crucial when seen in the light of the challenges facing emerging clusters. Below we present a taxonomy, the purpose of which is to outline the functions and skills that organisations acting as intermediaries undertake to help overcome these challenges in the context of these emerging clusters.

A characteristic of the skills intermediaries develop is that they are fundamentally relational and practical i.e. the ability to communicate and activate new practices with other organisations and with respect to a community of surrounding actors is critical. In this sense, the taxonomy draws upon two independent bodies of literature. Firstly, it synthesizes a wide range of empirical studies that describe intermediary activities in areas associated to learning, competence building and innovation. Secondly, it is useful to draw upon a literature that draws a direct link between know-how, knowledge and practice at a collective level. The so-called "practice-based" perspective (Brown and Duguid 1991, Amin and Cohendet 2004) emphasizes that knowledge is collectively practiced within communities, where the importance of developing a common identity around specific practices is recognised. Therefore know-how - the ability to use knowledge - is identified as being a situated and a social activity that is brought out in practice and is the product of experience and the kind of insights which experience brings.

A related concept that develops directly from the practice-based approach is that of communities of practice (COP). Developed originally by Lave and Wenger (1991), this refers to an informal group of people who have some work related activity in common and share similar backgrounds and skills. As new practices amongst these individuals are developed, common jargons and technical languages become embedded directly in the development of new practices. The significance for the diffusion of knowledge is that within communities of practice, the shared understandings between members means that knowledge is able to circulate more freely (Brown and Duguid, 1998).

With its emphasis on shared understanding, the practice-based approach offers a potentially fruitful lens to support our earlier discussion around how common action, or "joint practices" can be created. However, by focussing the analysis on the intermediary, we broach the role that agency can play in defining which practices are adopted as opposed to others. The taxonomy is described below and summarised in table 1 below.

Accessing

It is possible to group a set of activities associated with *accessing* knowledge. This focuses on how intermediaries expose other organizations to a wide range of new sources of knowledge and how they can help to assess the value of different alternatives or indeed prioritise search strategies. Examples of accessing knowledge can be found in a range of empirical studies. Howells (1986) refers to it as scanning and information processing and suggests it involves tasks such as information gathering, technology intelligence and identification of potential collaborative partners. Maggi (2003) highlights accessing in the development of the Chilean salmon sector, while Bessant et al (2003) point to how the Industrial Restructuring Project (IRP) played an intermediary role by accessing important sources of knowledge that helped to bring the South African furniture industry international status and esteem. Accessing is also particularly associated with brokering activities (Hargadon, 1998, Burt 2005). For Burt (2005) in particular, intermediaries can play a significant role in networks by filling gaps in the structure of information flows between actors – so-called structural holes. Intermediaries can therefore

prosper where there are opportunities for “closure”, in other words, filling voids and connecting otherwise separated communities.

Diffusion

A second group of intermediary activities can be grouped around the concept of diffusion and refers to the spread of knowledge amongst different actors within an industry. Empirically, diffusion activities have for example been identified by Bessant and Rush (1995), who discuss how consultants fulfil, either implicitly or explicitly, the function 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. Intermediaries are also important in setting up both infrastructures and relevant spaces that diffusion of knowledge require. Thus, trade associations often host websites, distribute newsletters and arrange physical and pre-arranged events, such as trade conferences, that become ritualistic spaces where new practices and strategies can be legitimized. On the other hand, the formal skills required for diffusion include the ability to communicate effectively and to build and maintain a network of organisations. Here, the centrality of the intermediary within the network, which may depend on both formal roles (for example a dominant trade association) or on access to knowledge, will be crucial.

An important aspect of this discussion concerns the influence intermediaries can wield when diffusing certain practices. For example, Giuliani (2003) defined oenologists in the Chilean wine cluster as an epistemic community who share a technical language and scientific background. Amongst themselves they developed a common understanding of a specific set of problems facing local wine producers and the solutions to these, which were passed on to producers. However, this process can be contested as argued by Provan and Human’s (1999) study of two different networks of SMEs with separate brokers within the wood-processing industry. They found that the most notable differences between these networks lay in the degree to which the brokers centralized information or encouraged dispersed communication amongst the actors. Where the broker encourages less reliance on itself this lead to a more

productive environment for learning to take place (ibid.). The agency role of the broker is clearly magnified in terms of the influence on learning outcomes.

Coordination

A third role performed by intermediary organisations is that of coordination. Coordination can involve linking different actors within the cluster, an important function where these are geographically isolated or where information flows are blocked. However, the primary tasks involve establishing a basis for cooperation and collaboration, a challenging task where, as discussed, firms are often unstable and have few resources to take on risky investments or where there is a lack of trust or cooperation between producers. Combining trust with specialised intermediary skills is evident in Bessant et al's (2003) study of the South African furniture industry, where intermediaries worked closely with internal change agents, many of whom had been unsuccessfully arguing for changes and collaboration for some time. A key factor mentioned for the success of the intermediaries was that they were seen by the parties as not favouring some firms over others, which can be a particularly important feature of traditional power dynamics within certain industries. Schmitz and Nadvi (1999) similarly note how in clusters dominated by SMEs, helping these to take initiatives in 'riskable steps' is of importance. In these circumstances, a specialised division of labour for coordination in the form of an intermediary proved to be highly valuable.

Coordination roles can also encompass the formulation and assistance for the implementation of common strategies amongst the members of a cluster. For example, Gomes (2006) comments on the important role played by the Brazilian Apple Growers Association and EPAGRI (the state's Agricultural and Research Agency) in the cluster-wide upgrading efforts of three fresh fruit producing clusters in Brazil. The intermediary role in helping small growers organize into cooperatives that enabled growers to process and market their apples collectively was highlighted. In these cases, strategizing is based on a longer-term relationship between the intermediary organisation and the parties with whom they are working.

Enabling

The fourth and most challenging intermediary role identified in the literature is that of *enabling*. For enabling roles to be carried out, intermediaries require research facilities, and infrastructure and/or human resources necessary to achieve the designed innovation, available either in-house or at least easily accessible.

There are two parts to this role, firstly providing new knowledge inputs and secondly adapting existing knowledge to make it applicable to a different context and situation. Through his empirical study, Howells (1996) makes the point that many of the intermediary tasks initially limited themselves to matchmaking and brokering (accessing). However, as these intermediaries learned and improved their competence, they moved out of these initial roles and assumed wider and more complex functions. For example, organisations involved in formal testing, accreditation or standard setting began to develop these roles independently, in part because they were able to facilitate interaction with outside knowledge much more easily and because for clients, intermediary organisations are seen as being independent and impartial by supplier and user firms alike.

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.* Brown and Duguid (1998) described translators as actors able 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 (ibid.). Translation is useful for understanding how communication can be facilitated in such cases because communities have different standards, priorities and evaluating criteria. Thus, Brown and Duguid (1998) found that in Hewlett Packard, what looked like best practice in California didn't look that way in Singapore. Similarly, in a study in the Colchagua Valley wine cluster in Chile, disagreements occurred between professional winemakers, whose main focus was on quality and entrepreneurs whose main focus was on profits. This required the development of common interests (Hojman, 2005).

Table 1: A Taxonomy of intermediary Organisation in Developing Economy Clusters:

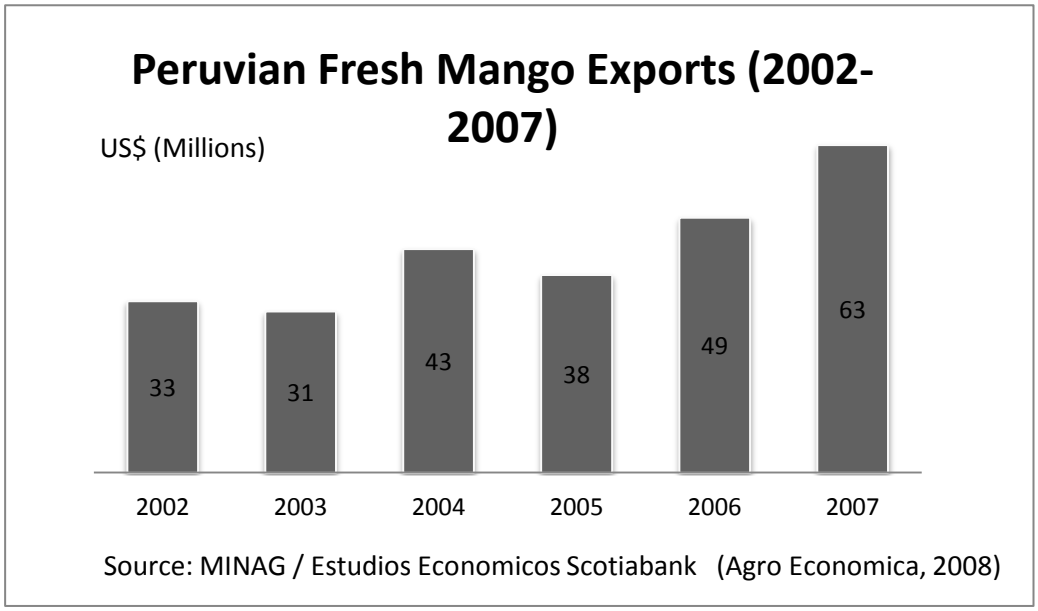
Role	Description	Similar Role in-	Skills needed	Examples
Accessing	Scanning a wide range of national and international sources Accessing knowledge on new technologies, new markets and potential trading partners	Howells (2006) Hargadon (1998) Bell and Albu (1999) Boland and Tenkasi (1995)	Ability to build networks Ability to maintain 'weak' links Understanding of markets +technolog	Firms acting as 'technological gatekeepers' in a Chilean wine cluster (Guiliani and Bell, 2005) Growers associations accessing production knowledge in Brazilian fresh fruit clusters (Gomes, 2006) International development agencies accessing market knowledge in a Chilean salmon cluster (Maggi, 2003)
Diffusing	Facilitating the spread of knowledge/ good practice amongst actors within cluster Simplifying knowledge for non-specialist audiences	Brown and Duguid (1991) Provan and Human (1999) Perez-Aleman (2000)	Building trust Development of effective networks Interpretation and communication skills	Diffusion of knowledge to small producers in Chilean agro-industrial sector (Perez-Aleman, 2000) Producer Associations diffusing good regulatory practice within a Chilean salmon cluster (Maggi, 2003) Oenologists diffusing innovation and good practice within a Chilean wine cluster (Giuliani, 2003)
Coordinating	Facilitating joint initiatives (commercial or technological) Establishing legitimacy of industry practices/ procedures	Schmitz (1995) Boland and Tenkasi (1995) Perez-Aleman (2000)	Building trust + partnerships Devising / implementing plans Knowledge of international standards etc	Coordination by Benchmarking Clubs in the South African auto cluster (Morris and Barnes, 2006) Coordination by a range of organisations in Brazilian fresh fruit clusters (Gomes, 2006) Trade associations facilitating collective learning in Chilean agro-industrial sector (Perez-Aleman, 2000)
Enabling	Providing new knowledge inputs Translating knowledge to make it usable in another context (adaptive innovation)	Howells (2006) Brown and Duguid (1991) Boland and Tenkasi (1995)	Ability/resources to conduct original research Knowledge management skills	Consultants role in technology transfer (Bessant and Rush, 1995) Research group translating knowledge in a South African furniture cluster (Bessant, Kaplinsky and Morris, 2003) Technological consultants advice on upgrading of production facilities in the Chilean wine industry (Gwynne, 2006)

Research Questions and Methodology

The central research question posed by this paper is what roles intermediary activities may have in the evolution of an emerging cluster. The significance of the concept of "emerging" is that although there are opportunities for upgrading, typically producer capabilities are at a basic level and/or there is a high level of fragmentation between actors. We suggest that in these circumstances accessing, diffusing, coordinating and enabling roles of intermediaries will be significant. However, particularly from the point of view of policy makers, greater specification is required of what particular skills intermediaries develop, how these roles are undertaken and what impact might the dominant roles of intermediaries have on the cluster, if indeed this phenomenon arises.

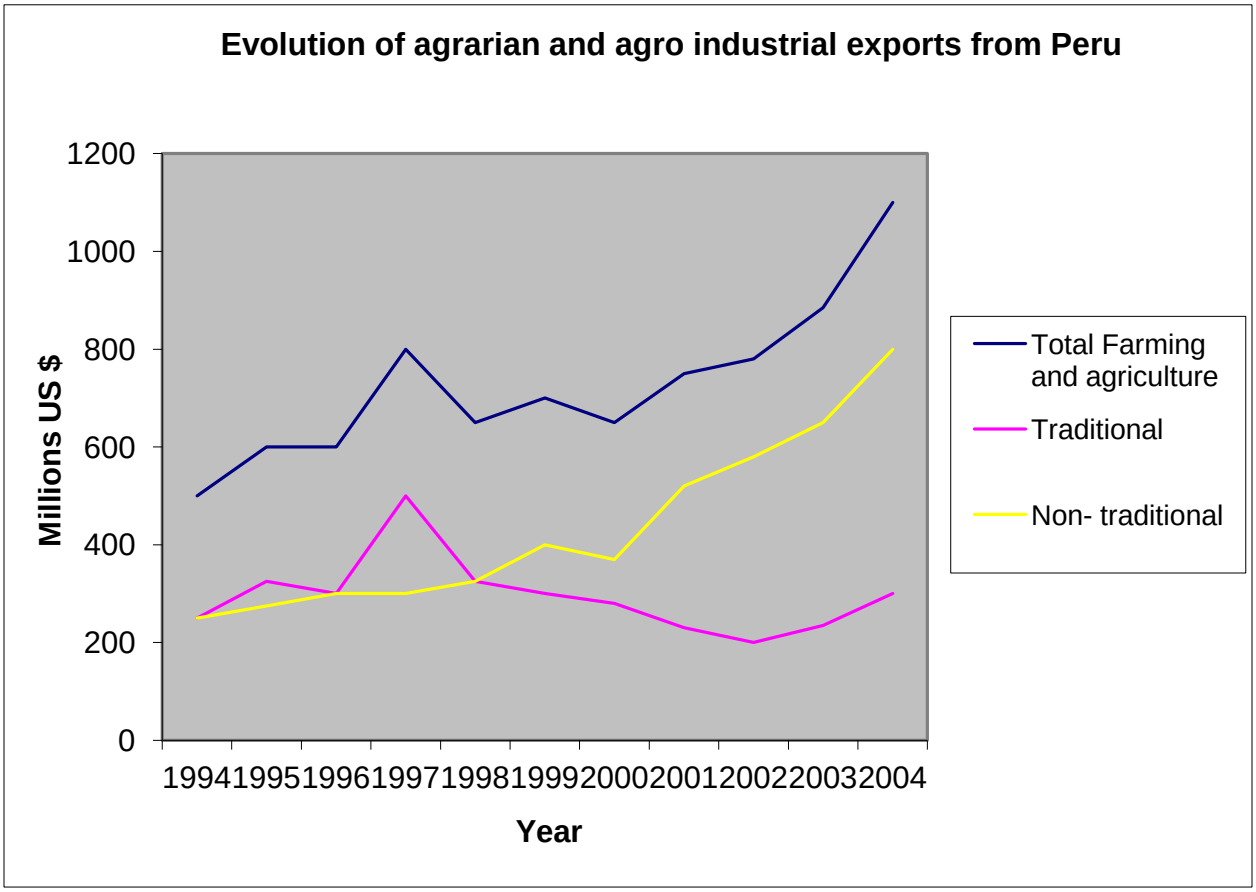
This empirical study is set in the agricultural cluster of the Piura region of northern Peru. The area has experienced rapid economic growth through the export principally of fruit products, taking advantage of its unique dry tropical weather conditions, which allow rapid growth of crops without the associated problems of excess rainfall. Export of mangos began in the 1980s but from a very low point. Production however stepped up when in the early 1990s the first hot water treatment plant was installed in Piura that allowed mangos to be exported to the USA. This helped to confirm Piura as the region with the most important mango producing department in the country, contributing to 3% of non-traditional exports for Peru in 2008 (Ginocchio 1993). This upward trend continued into the 21st century with the expansion of exports to Europe and more recently Asia (see Figure 1).

Figure 1



Significantly, figure 2 shows that mango is just one example of accelerated growth of non-traditional exports, mainly premium priced fruit and vegetables that have driven overall export growth in Peru during the 1990s and first decade of 21st century. However, as the discussion will show, the conditions for successful production continue to be extremely challenging and important structural problems, including a high degree of fragmented ownership pattern of the land, low capabilities of producers and geographical isolation of producers has had to be faced and overcome.

Figure 2



Source: APEM

Collection of data firstly involved 20 face-to-face semi-structured interviews with the directors of the two principle mango growers and exporters federations: APEM (Peruvian Association of Mango Producers and Exports) and PROMANGO. Both organisations group around 30% of mango growers in the region and account for 60% of production in the cluster. Interviews also took place with owners of medium sized and small mango firms and other representative of government agencies with offices located in Piura. The producer association congresses of APEM and PROMANGO were also attended. Secondly, a survey was carried out of 26 organisations belonging to APEM and PROMANGO. The survey additionally included APEM,

PROMANGO and 6 organisations that provide services to the mango producers and exporters in the cluster. The principle question in this survey was: “from whom did the organisation receive technical and commercial assistance and how important was this to them”? They were then provided a list of organisations (producers, services, universities, consultancies and an open section to name other organisations from whom assistance had been received) and if so to rank this from 1-5 in ascending order or importance. From this information it was possible to produce a network map using social network analysis software PAJEK, showing the ego centric relations (i.e. the ties between two organisations) based on the movement of knowledge between organisations (see figure 3 below).

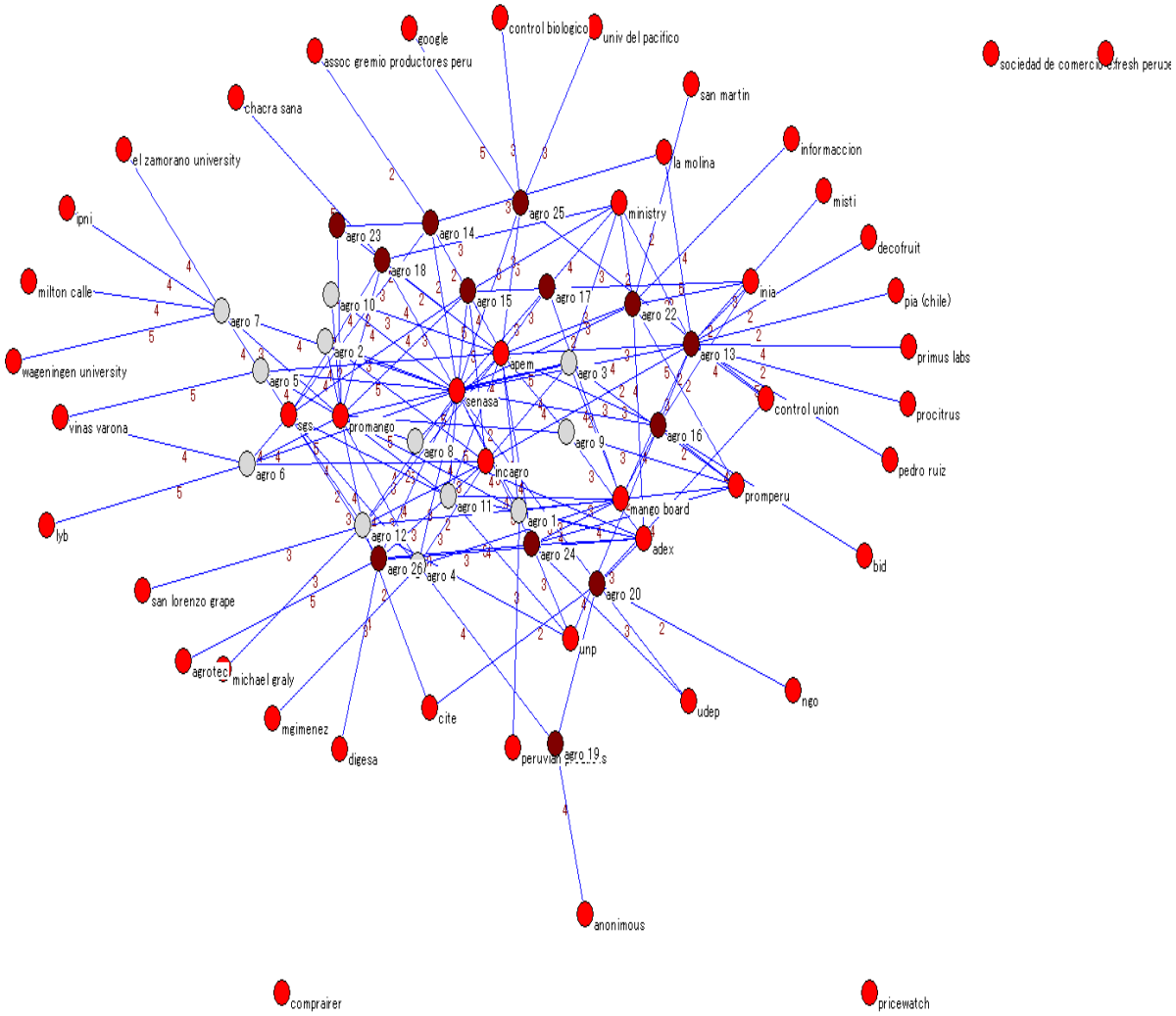
Cluster Structural Characteristics

The most obvious effect of the opening of Western markets to Piuran fruit and specifically mangos was that hitherto fragmented producers were provided with an incentive to begin working together to coordinate supply strategies both to improve the quality of produce along the supply chain and to avoid large fluctuations in price. This forced larger firms with pretensions to export and smaller organisations, principally growers, to address a history of mistrust and tensions. Larger firms traditionally claim quality of produce is poor, while smaller firms claim larger firms act as cartels to fix prices and delay payment.

There is evidence that, at least in some sections of the industry, more stable relationships between producers and exporters have begun to emerge, including *Sunshine’s* (the largest local exporter organisation) initiative to organize a training programme for SMEs for certification with government funds. However, the data drawn from the survey actually suggests that no one individual mango producer or exporter is considered by their peers as a major source of knowledge transfer or bilaterial links. This can be measured in two ways. Diagrammatically, the algorithm of the PAJEK software puts the firms with the highest number of links at the centre of the network, thus allowing a graphical representation of the most important broker firms. In figure 3, the organisations are represented by dots and labelled by name, but also by colour, where service organisations are red, producer organisations members of APEM are brown and producer organisations members of PROMANGO are grey. Producer firms are numbered to

protect their anonymity. The map also shows a range of service organisations including consultancies, universities and marketing organisations. As figure 3 shows, the organisations at the very centre of the knowledge flows in the cluster are the producer associations APEM and PROMANGO, and the government offices SENASA, INCAGRO and PROMPERU.

Figure 3



The centrality of particular organisations in the cluster can also be measured by calculating the degree centrality statistic, which is defined as the number of ties incident upon a node or the number of paths of length that emanate from a node (EVERETT and BORGATTI, 2005). It is therefore a relatively basic measure of the number of links each actor has in the network. This

is provided in table 2 below. The top three organisations are APEM, PROMANGO and SENASA. Moreover, amongst the top 25 providers of knowledge, consultancies, government services and universities were also highly ranked. Only one mango organisation was mentioned with more than one outlink. Furthermore, only ten of the 25 organisations that provide knowledge were physically based in Piura. This underlines the fragmented nature of the cluster in terms of knowledge flows between producers.

Table 2 Degree Centrality of organisations in the Mango Cluster

Weighted average out degree centrality	Organisation	Type of Organisation
8	Agro 19	Mango Producer
8	La Molina	University
9	Vinas Varona	Private consultant
11	Control Union	Certification Organisation
11	Instituto Nacional de Innovation Agraria	Government Service
16	UNP	University
23	Ministry of Agriculture	Government Service
23	PROMPERU	Government Service
26	Mango Board	Overseas Industry Association (US)

27	INCAGRO	Government Service
32	SGS	Certification Organisation
33	ADEX	Government Service
55	PROMANGO	Local Industry Association
57	APEM	Local Industry Association
77	SENASA	Government Service

Mango firms appear far less prominent as agents of knowledge transfer compared to service organisations. Only one mango producer is mentioned in the top 15 knowledge providers according to their peers. Given the importance of establishing common practices for the export of what is essentially the same product, firms do not appear to establish bi-lateral links with each other or diffuse of new practices through these links. By contrast, at the centre of the network lie 5 service organisations whose existence is to play intermediary roles for mango organisations. This suggests an extremely high reliance on these intermediary organisations both for access to external knowledge and for the transfer of knowledge in the cluster. The following section provides a brief glossary description of these intermediaries as a prelude to a discussion of their role in the evolution mango cluster.

APEM (Asociación Peruana de Exportadores de Mango)

APEM was formed in 1998 with the assistance of the government agency now known as PROMPERU as part of a series of initiatives designed to encourage the formation of associations within different agricultural industries. The aim was to act as an intermediary for producers by providing a common point of contact for outside agencies and increase collaboration of firms. One of the problems in this industry has been its highly fragmented nature. Some firms are exporters, some are packers and some are producers, and many firms combine some of these activities. The majority of APEM members are Peruvian owned, although five are foreign-owned

or have foreign investments, mostly from the USA. Table 3 below provides details of APEM members. APEM membership has gradually increased throughout the years and by 2010, its members represented two-thirds of the mangos exported annually from Peru. As intimated in the network analysis map and further discussed in the empirical section below, APEM's influence and scope of work has broadened and become critical for mango firms in Piura. Its annual congresses attract hundreds of producer and service organisations involved in all aspects of the value chain ranging from production, packaging, logistics and transport to sales and marketing in the export markets.

Table 3 APEM Member Firms: Firm Size and Competences

	Exportiing Firms (as % of membership)	Packing Firms (as % of membership)	Producing Firms (as % of membership)	Average land if producer (hectars)	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)

PROMANGO

Formed in 2002, PROMANGO is the foremost organisation amongst medium-sized and some small producers. 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 more formal ties. Table 4 below provides details of PROMANGO membership. As can seen, the share of direct exporters is much smaller. 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. By 2008 membership of PROMANGO had grown to 28 and together they produce one third of the volume exported from Peru each year. Unlike APEM that is primarily focussed on opening business links and market opportunities, PROMANGO has played a significant role in the formation of a community of practice amongst an important group of previously fragmented

and isolated producers to share day-to-day practices. This has been essential for improving the productivity of small and medium producers and helping them achieve certification standards required to sell their produce on to exporters. The establishment of PROMANGO however was also a strategic move by smaller sized producers to improve their bargaining and negotiating position viz-a-viz larger firms and exporters on issues such as price and as way of leveraging funds for training on certification. In its day-to-day operation, the organisation has few financial resources, relying primarily on the time donated by its members and a very modest monthly membership charge to support the upkeep of its - also modest - office.

Table 4 Promango Member Firms: Firm Size and Competences

	Exportiing Firms (as % of membership)	Packing Firms (as % of membership)	Producing Firms (as % of membership)	Average land if produce (hectars)	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)

SENASA

SENASA (The National Agrarian Health Service) is the official government office of the Ministry of Agriculture in charge of food health and safety. It has existed in its present form since 1992, working in a period where Peruvian agricultural exports have grown rapidly. It has two critical roles in the sector. Most importantly, it is responsible for the control of existing diseases and plagues and for preventing new ones developing. For this purpose it has its own research laboratories. Its most prominent role in Piura is in the control of the fruit fly. As a representative of SENASA commented, 'to fight a plague like the fruit fly is like a war, if you don't have all the elements in place then you lose' (Interview with Piura office SENANSA). 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[i]. SENASA has also played a critical role in providing technical assistance to open new markets for Peruvian exports

in areas such as Japan and in the negotiations for a free trade agreement with the United States.

Its second critical role has been in helping producers comply with the international standards to export. This activity, that includes establishing and monitoring routines such as quarantine regulations, post-harvest treatments such as hot water treatments and meeting other conditions of entry to obtain phytosanitary certificates, now considered just as important as the factors traditionally identified such as productivity, positioning, market identification and logistical evaluation.

PROMPERU, INCAGRO CITES and INIA

PROMPERU, the 'Comisión de Promoción del Perú', is part of the Peruvian Ministry of External Trade and its mission is to promote exports, access information and diffuse this to producers in the export industries it supports. As the principal export intermediary, PROMPERU's role has been significant in galvanising the restructuring of the industry. Its principle achievement has been to encourage the creation of a coherent organisational structure, which in the mango sector has been principally by helping to secure funding for APEM, thus creating a single point of contact for the industry. In addition, PROMPERU has assisted in ensuring representation at international fruit fairs and meetings. In addition it has participated in quality management initiatives, helping establish certification and standards committees and monitoring international regulations.

Three other intermediary type organisations play a role in encouraging the development of technical and scientific capabilities. Firstly there is INCAGRO, a government agency tasked with the aim of establishing sustainable and environmentally friendly technologies. It has allocated resources for more than 580 projects primarily to producer associations and, to a lesser extent, private firms. They have also contributed to regional training programmes aimed at increasing skills and capabilities. In the specific case of the mango sector, this includes working with PROMANGO to improving the coordination between producers to avoid

overproduction, improving production skills and lengthening the production window for their product. All PROMANGO members were also able to gain EUROGAP certification for the mangos they produce and, in addition, become more skilled in drawing up contracts with the buyers of their product. Secondly there is the work of CITES (Centros de Innovación Tecnológica), whose work is centred on supporting small and medium businesses (SMEs) with the acquisition and successful use of new technology. 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. This network has helped establishing a Pilot Plant in the University of Piura's Department of Chemistry to allow new technologies to be tested for applied analysis, such as the different techniques that could be used for the drying of fruit for commercial purposes. Finally there is INIA, whose main mission is conduct research for the benefit of small farmers. It's main projects are the development of gene banks, the management agriculture to improve productivity, including of pruning, the use of mineral nutrition and successful irrigation. Thirdly it is involved in the management and prevention of plagues and fourth, developing effective techniques for post-harvest operations, including the establishment of effective quarantine techniques for the fruit destined for export. It is also involved in projects investigating alternative uses for the fruit that is not of sufficient quality to be exported. Table 5 below summarizes the principle intermediary providers of knowledge services

Insert table 5 here

The following section elaborates in detail activities of the above intermediary organisations as part of the evolution of capabilities in the cluster.[ii]

1st phase accessing: Bridging the information gap and establishing platforms for common perspectives

As outlined, unlike other horticultural export clusters in Peru such as asparagus and avocado that are dominated by large firms, the mango cluster is largely fragmented both in terms of

concentration of production and the division of labour in the sector. In the Piuran cluster, 9 firms control around half of production, the rest comes from small plots of land owned by micro producers who generally sell their produce to the larger firms that have the technology to treat the mangos before they are exported.

Fragmentation also exists because of the high risks involved in production in the industry. According to the President of PROMANGO, there is a 25% risk of each fruit being rejected for export and a further 25% chance that once selected, the fruit will not make it to the export market due to problems en-route. This makes consolidating all the activities of production, packing, logistics and transport into one firm highly risky (interview, President PROMANGO). These factors mean that producers typically have had very short-term visions for investment and production and therefore little or no history of coordination to share and improve either best practices or negotiate jointly to achieve good prices for products or supplies.

In its early exporting phase it is possible to identify three principle intermediary activities. The first is provision of information for producers, the second establishing joint practices, the third providing the cluster a basis for incorporating knowledge from outside the cluster. Producer association activities and approaches varied considerably in this process. APEM represents primarily a “business community”, the stated aims of which are improving their ability to supply the export market. Once it was established, the primary demand from the exporter and producer firms was to “bridge the information gap”, in particular gathering and disseminating statistics to producer firms and packers on prices, the state of demand and supply and establishing a fluid line of communication across different languages with buyers from the US. APEM’s role in this early stage was therefore to provide a shared resource for understanding how the export market functions, including certification requirements and the needs of supermarkets in export markets. This helped to prioritize certain practices.

PROMANGO members on the other hand represent smaller-sized mango growers, the priorities of whom were initially to address the problem of uneven practices and yearly fluctuations in output and quality. This represented an important challenge. As a speaker at the 2008 PROMANGO conference stated, ‘each piece of land is like a book and the grower must be able

to read their own plants and soil' (2008). Many practices of producers had hitherto been hidden local skills situated in the particular socio-cultural context of each producer and his/her environment. Moreover, given the low price that traditionally can be charged in domestic markets, producer horizons have tended to be short-term and there has been little incentive to methodically improve production, invest in technologies or share good-practice.

Following the opportunities opened by new export markets, PROMANGO assumed an intermediary role for firms by establishing a community of practice. Yet, unlike APEM's business gravitas, the community of growers around PROMANGO resembles Amin and Cohedet's (2004) concept of a craft community, where there are limits to codification and innovation builds on existing practices. PROMANGO's initial work therefore concentrated on encouraging producers to communicate with each other, compare experiences and establish a common identity based on sharing good practices. Formal events have been necessary for this to happen, above all the annual PROMANGO congresses, although specific training programmes and informal gatherings with the explicit purpose of revealing what works best in different circumstances such as day-long detailed discussions around different forms of cutting the mango from the tree to avoid leakage of lactose that burns the fruit, storage techniques, comparing soil types and the effect of different forms of pesticides.

Finally, an important part of the intermediary organisations activities has been establishing contact with outside organisations. International speakers are invited to APEM and PROMANGO congresses where key agenda issues such as prospects for diversification of production to different mango types or establishing new export routes to China are discussed. PROMANGO and its meetings become the space at which other organisations and in particular SENASA, the phytosanitary organisation, disseminates its advice, norms and regulations on critical issues such as preventative measures to keep the fruit fly out of the area.

Through their initial work with producers APEM and PROMANGO have become central to the creation and diffusion of knowledge. This is exemplified in figure 3. Tables 6.1 to 7.2 specify in more detail the degree to which knowledge from outside the area and in particular overseas organisations comes into the cluster via APEM and PROMANGO rather than direct to the firms.

Table 6.1 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 6.2 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)

Two organisations provide knowledge to the cluster exclusively through APEM. However, tables 7.1. and 7.2 show that six organisations communicate exclusively with PROMANGO, including two universities. This is not entirely surprising given that PROMANGO members are smaller and may need more assistance to interpret technical knowledge. In its initial phases therefore, by establishing itself as the primary agent for accessing knowledge, PROMANGO and APEM became the focal point through which information by producers and other service organisations was concentrated and then disseminated.

Table 7.1 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)

Table 7.2 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)

Other intermediaries have also developed key skills in bridging gaps between producers and overseas buyers. PROMPERU for example, has developed a comprehensive knowledge base for producers to contact buyers by organising trips by potential exporters to destination markets. To facilitate this process, PROMPERU has built commercial intelligence in areas such as trends in international markets, country specific information and, where relevant, information on regulations that must be followed for the export of certain products.

2nd phase coordinating: Creating new practices

A second phase of activities can be identified that pass from the provision of information to the coordination of joint initiatives by intermediary organisations. These involve projects to establish joint practices between members of the adjoining communities (for example producers and exporters) or establishing a basis for knowledge transfer between quite different types of actors (ex producers and scientists). APEM's most substantial initiative was the establishment of a standards committee for the implementation of new industry norms to improve quality of produce in the Peruvian side of value chain for mango exports in collaboration with PROMPERU. The committee was conformed by different industry actors, but mainly included technical specialists such as SENASA, universities and organisations from outside the cluster. It thus served as a meeting point around which traditional business concerns and scientific and food safety specialists congregated.

The production of a set of new norms from this committee, codified in a document, was a significant step and chimes with Brown and Duguid's (1998) point that "boundary objects", or codified documentation can help to make a community's pre-suppositions apparent to itself, thereby encouraging a process of reflection and development of joint practices. APEM's role was to promote a shared understanding of what actions to undertake through negotiation to agree common steps. In this process, APEM moved into the realm of agenda setting and establishing priorities for its members. Other initiatives to establish technical guidelines of this type followed, including for the first time coordinating local scientists and laboratories to establish formal measures of acidity and sweetness levels of mangos and the development of a hot water treatment for the Japanese market, a project involving inputs from the phytosanitary organisation SENASA and a local Piuran university.

Perhaps the most important coordinating initiative funded by the Inter-American Bank and coordinated by APEM involved a set of training activities to facilitate the certification of small and medium sized producers in the Piura region. The project was initiated in recognition of the fact that diversification of exports to Europe require new and more demanding certification requirements. Intermediation in this case was essential because of the history of mistrust

between producer SMEs who sell their fruit to the larger exporter firms. Thus, the ability to develop a wider perspective from that of individual producers has been an important skill gained as a consequence of their position as intermediaries.

PROMANGO and INCAGRO also led an important coordinating activity with their members that involved knowledge transfer from outside the cluster. One of these included a joint project to bring in overseas experts from Brazil, where agricultural practices are considered more advanced, to advice on extending the agricultural season beyond the traditional 4 months. A project was also launched examining the prospect of diversification towards the production of dried mangos by importing machinery from Europe and a successful investigation into the feasibility of table grape production[iii]. PROMANGO also coordinated visits by overseas experts to provide advice on the suitability of different mango varieties. Coordination has therefore become a particularly significant activity as needs of cluster producers have become more diverse and complex. Above all, producer firms require intermediaries with specialised skills in negotiating and bridging cultural and language gaps.

3rd phase Enabling

A third phase of intermediary activity focuses on developing new knowledge for the cluster. Two types of contributions can be identified. The first is technical that enhances production capabilities inside the cluster. The activities of CITES and SENASA are relevant in this heading. Both government agencies have established local offices and their work has been praised by exporting firms for their ability to translate fairly complex norms and regulations for the needs of local producers. This includes SENASA's role in a project to establish a hot treatment procedure for export to Japan, where the treatment criteria for fruit differs to other parts of the world. CITES on the other hand has provided technical assistance to a number of small associations of producers as they have sought to develop facilities to process their own fruit themselves.

These examples contrast somewhat with that of INIA. PROMANGO representatives expressed mixed feelings towards INIA, the principle critique being that it was overly focussed on very small producers and when assistance was required, it was too slow to act. The absence of a local office in Piura may explain its poorer performance the lack of local know-how and practice in this region. Thus the key to successful technical help appears less in bringing general norms of action to producers but in adapting these to local conditions.

A second enabling contribution relies less on technical skills than on organisational knowledge of the cluster. A new strategic initiative to enter the Chinese and Japanese markets led by APEM is particular significant. For China, the characteristics of the project involved developing a feasibility plan and business model for supplying mangos for the Chinese New Year. The particular logistical challenges include an extremely short time window to supply the fruit, ensuring that at the retail end the fruit must have a red colour (the colour preferred at Chinese new year) and above all, packing the mango in ornate traditional Chinese style so that it can be given as a new year gift. APEM worked with a group of firms to establish a set of common objectives whilst minimizing the financial risks to individual firms. APEM not only initiated the project, but undertook the necessary studies of logistics adequate for the cluster and contacts in China to make the new strategy a viable enterprise. An added significance of the APEM leadership is that while only a few firms initially pioneered exporting to China, the benefits of such activity could potentially be shared amongst association members, who can use APEM contacts to establish their own clients.

Discussion and Conclusion

This paper makes two principle contributions to the understanding of intermediary roles in the development of producer capabilities in emerging resource-based clusters. Firstly, it has highlighted the centrality of intermediary services and the high reliance of producer firms on these for the activities broadly described as accessing, diffusing, coordinating and enabling. Two aspects of these activities were particularly significant. The first involves providing a basic information platform for producers for export production. Accessing and diffusing information

such as spot prices and certification requirements fulfils one part of this function. However, more sophisticated intermediary skills involving evaluation of the relative benefits of outside technologies to the local setting suggest intermediaries are more than passive bridges between practitioners. This is particularly the case where, as is common, the technical skills necessary to make some of those decisions are not readily available at a local level. In these circumstances the coordinating functions of intermediaries become crucial. Finding experts in such specialised areas as agricultural engineering or plant pathology and assisting in the process of translating such knowledge from outside the region to local needs emerges as a skill developed through close collaboration and practical involvement in the local area. Hence it has been intermediaries such as SENASA, that have local offices and are therefore embedded in the region and familiar with local practices that are mentioned as most relevant by producers. The critical importance, in developmental contexts, of organisations with the skills to integrate outside technology into local settings therefore emerges as a dominant theme. This point has been stressed by authors such as Viotti (2002), who argue that most knowledge intensive activities in Latin American contexts involve absorption, diffusion and improvement of innovations produced in more research intensive environments rather than the development of new frontier research. Our argument goes one step further by emphasizing the need for the development of a specialised division of labour associated to intermediation, brokering and gatekeeping that is able to bridge local needs with technologies developed outside. However, the interviews suggest this process involves a parallel development between the increasingly more complex and sophisticated needs of producers within the cluster and the skills and capabilities of organisation providing intermediary services. Hence, the development of an ecosystem of specialised services emerges not from the ether (or even primarily from outside the cluster), but, as the discussion on evolving practices has outlined, evolves bottom-up within a community by improving practices from within the cluster.

A second critical impact of intermediaries has been in the development of joint action between producers. This was particularly prominent in the creation of a community of practice by PROMANGO. Studies of clusters in different industrial settings with hub and spoke type structures similar to that illustrated in figure 3, for example Gray et al. (2010), suggest that

clusters reliant on a few organisations are typically able to rapidly diffuse information and generate rapid regional growth. This feature may help explain the mango cluster's rapid growth in production in its early phase.

However, arguably the most significant impact of having not-for-profit organisations playing intermediary functions located at the centre of the network map has been that information has been made available to actors in the cluster (a free good in the case of government departments, a "club good " for projects led by APEM and PROMANGO) and that projects to develop knowhow were undertaken with the involvement (and in many cases ownership) of producers and implemented through a careful process of training and education. PROMANGO's initiatives to form communities of practice preventative programmes against plagues, projects to extend the fruit growing season and experimental trials to diversify to other fruits were particular significant and made what Nadvi (1996) described as an "active" rather than passive cooperation.

Moreover the ability of intermediaries to bring together learning of producers with scientific know-how and codification of best practice was significant. The importance and difficulty of drawing producers together in this way can be revealed by contrasting Piura's experience with less successful coordination initiatives in other emerging clusters. For example, Pant et al (2008) highlight the unsuccessful efforts of mango growers in the Andhra Pradesh area of India to enter export markets, citing poor intra-sectoral linkages and difficulties in coordinating a myriad of heterogeneous and fragmented agents that have context-specific skills, including public and private stakeholders. These contrasting experiences underline the point that joint actions, external economies and agglomerations emerge not through an anonymous market but through conscious planning and building organisational capabilities as opportunities for upgrading arise. In this sense, although Schmitz (1995) and Nadvi (1992) correctly criticise the exclusive historical focus of cluster studies on the productivity of individual firms and by doing so largely ignore network benefits, it is also the case that networks and joint action require individual actors firms with specialised intermediary skills to realize the benefits of collective efficiency.

Finally, an important part of the analysis of this paper concerns industry context and governance in which organisations such as APEM, PROMANGO and other intermediaries functioned. Structural analyses (for example network maps) provide limited insights if abstracted from the social relations that emerge as a cluster evolves through different stages of growth. In the case of the Piurian mango cluster, what helped to define the benign influence of intermediaries were primarily export opportunities that created an overriding agenda to upgrade producer capabilities, a necessary step to towards inserting the sector into a global value chain. A second contextual factor was that the establishment, support for and agenda of the main intermediaries was coaxed and encouraged by regional and national policy makers and international institutions to develop inclusive agendas that incorporate different groups of producers in exporting activity. This factor have played some part in focussing intermediary efforts towards coordinating actions between different producers such as training initiatives, rather than on rent seeking or value distribution activities, which other studies such as Olson (1982), who have been highly critical of collective actions groups such as producer associations, have focussed on.

In conclusion, intermediaries can play a significant role in formerly highly underdeveloped regions in Latin America where, despite the mushrooming of newly emerging export-oriented clusters, poor inter-firm linkages, dispersed practices and weak traditions of coordination and collaboration represent important obstacles to upgrading. Accessing and coordinating activities were essential in the early stages in particular and created a basis for the first joint action of producers. As the cluster evolved, intermediaries were thrust into playing a major supporting role for producer firms and in many cases leading new investment and business initiatives. Given their importance, further analysis of the particular functions intermediary organisations play, their agendas, skills and strategies will be highly relevant for the development of the entire cluster.

Finally, although some success was clearly achieved through collaboration in the development of producer competencies, studies comparing intermediary functions in agricultural clusters at more advanced stages would be highly beneficial since some studies, for example by (Schmitz

1999) in the Brazilian shoe cluster, suggests that achieving collaboration between firms in areas such as marketing and branding are more complex and challenging.

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Intermediary Organisations: Peruvian Mango Cluster

Name and type of organisation	Description of role	Key skills
APEM Business Association	Provides members with market information necessary to monitor supply, prices and quality in conjunction with similar clusters. Establishes and maintains links with key partners outside the cluster such as American National Mango Board. Coordinated project to measure acidity of fruit between scientific and practitioners communities. Coordinate project to bring in hot water treatment technology from Mexico. Coordinated 18 month certification project with 180 SMEs and producers with Inter-American bank. Establish feasibility studies for entry to the Asian market including logistics, treatment of fruit.	Change agent: Develop new business and strategic plans, market understanding for entry to new markets and/or diversification. Broker: able to bridge language, communication and cultural gap and link cluster with outside network of mango practitioners. Establishment of boundary objects: codification of norms, routines, plans of action. Represent interests of larger producers, exporters and packers groups and establish close links smaller producers. Translate external knowledge for use in cluster
PROMANGO Business Association	Established Community of Practice amongst producers through the "Strengthening the Mango Production Chain project". Included establishing agreed formula for the payment of export and non-export of mango, attainment of EurepGAP (GlobalGap) certification, Brings together producers around congresses and other events to share practices. Coordinated project to reduce overproduction through diversification via production of table grape using a	Change agent: Articulate common agenda for new practices as a basis for action amongst producers. Broker: Negotiates with APEM, SENASA and other organisations on behalf of its members around new practices and certifications. Translate external knowledge for use in cluster especially on how to adapt external technology, seeds and practices to different climate, soil types.

	demonstration area with participation of 75% of members. Coordinated project to produce dried mango, frozen mango and mango juice. Establish network of outside organisations to gain know how on fighting plagues.	
PROMPERU Promote exports within Peruvian SMEs.	Support exports, particularly of non-traditional products such as lemons, asparagus, mango, organic and textiles. Monitor changes in export regulations such as Maximum Limits of Residues that vary by country. Access and use of commercial intelligence to define strategies for penetration of export markets. Represent exporters through their associations, including in trade fairs such as "Fruit Logistics".	Expertise in developing business plans with SMEs for buyers that require high volume produce. Cultivating international networks of buyers and brokers, diplomats.
Senasa Monitoring and ensuring compliance of food safety regulation.	Issue of phytosanitary certificates, necessary for export. Developing regulations on food safety, food safety control of plagues and diseases and other phytosanitary regulations. Leads campaign with producers against fruit fly. Coordinated technical requirements to begin exports to Japan.	Technical expertise in international standards in Phytosanitary regulations as applied to Peru and ability to gain economies of scope (i.e. applying knowledge from one setting to another in areas such as certification). Understanding of how cluster community, including small farmers can implement food safety norms. Ability to coordinate producers around new practices such as plague eradication, including public education campaigns. Production of clearly understood norms and procedures.
INIA Research and	Provides small farmers with practical assistance through the provision of affordable seeds and young plants.	Develop mechanisms for diffusion of new techniques, and routines to improve productivity. These include "countryside days" in accessible area and inviting lead

diffusion of new technologies in the agricultural sector amongst small farmers.	Developed "Fruits for exporting" project involving collection of genebanks, improving agricultural productivity (pruning, mineral nutrition, irrigation) and effective harvesting procedure and management of post-harvest operations including quarantine procedures. Training on the maintenance of demonstration plot, drip irrigation,	farmers that have used new techniques. Familiarisation with limitations of existing techniques and sustainable alternatives for example offering high genetic quality mango plants to replace poor varieties.
Incagro Strengthening of the market for innovation services	Administers competitive tendering for innovation projects: Allocated funds for 580 projects in 1st year, mainly producer associations, including "Strengthening the Mango Production Chain" in Piura from 2004-2006. Administered project in cooperation with an NGO and a private firm (Instituto de Gestión de Cuencas Hidrográficas) providing credits for machinery, assistance with irrigation projects and other measures that are concerned with environmental sustainability. Provides training to producer organisations to reduce waste products and how to market fruits.	Change agent: Provide framework with which planning can take place for improvements in production or diversification. Ability to assess innovation projects for their sustainability and provide management support and assist project manage these.
CITES Research Body Network of organisations that support small and medium businesses (SMEs).	Build a network between the business community, the state and universities in areas such as bananas, mangos and algarobbina. Facilitators of research and development work in the production chains in which they operate. Setting standards for a quality product. Supply of specialised training including project for production of dried mangos in Chulucanes and organic mango production with small producers associations Agravida and Apromalpi. Bringing informal business into formal area through registration. Instrumental in establishing laboratories for grape production for wine and Pisco for 100 SMEs.	Change agent: Providing technical know-how for new products for example grape production and dried mango. Use of tools of pilot projects, such as laboratory tests and analysis and computer-assisted design.

[i] 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. 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).

[ii] 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).

[iii] 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.