

**Learning and innovation in Developing Economy Clusters: Comparing Private and Non-Profit Intermediaries in Cluster Governance**

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**Abstract**

In this paper we ask what role governance of intermediary organisations plays for enhancing the upgrading of producers in emerging agricultural clusters. This is an important question because the argument is increasingly made that broad multiparty governance can be effective at creating both vertical and horizontal ties and restructuring network relations. We argue that organisational governance matters, but that rather than just focussing on the agency of single organisations, intermediary activities will emerge from the interaction and negotiation between expectations of other actors, the degree of embeddedness of the intermediary in the cluster and the actions of other intermediaries undertaking overlapping roles. Two case studies of emerging clusters in developing country settings are discussed– the mango cluster in Piura, northern Peru and a cluster of palm oil producers in central Colombia, that include organisations with different governance structures.

**Keywords**

Intermediary, Cluster, Development, Agriculture

**Introduction**

The important role intermediary organisations play in strengthening connections between local producers and between local producers and global value chains in emerging economies has been recognized by an extensive literature (Bell and Giuliani, 2007; Caniels and Romijn,

2003; Clarke and Ramirez, 2014; Felzensztein, 2008; Kilelu et al., 2013; Mmari, 2015; Poulton et al., 2010; Shou and Intarakumnerd, 2013; Szogs, 2008; Szogs et al., 2011; Visser and Atzema, 2008; Watkins et al., 2015). These intermediaries can take different vertical (between different value chain actors) and horizontal coordination roles (between producers), and hence are important in forging contractual arrangements. Intermediaries are also argued to help technological upgrading of producers by improving the supply of services (Poulton et al., 2010), in order to boost cluster performance and enhance compliance with quality standards in global value chains (Iizuka, 2009; Klerkx et al., 2012; Perez-Aleman, 2010).

However, there are also strong arguments which suggest that understanding the relationship between intermediaries and economic upgrading in developing economy contexts has become complex in part because, as Moss (2009) has argued, the breadth of the economic activities that can benefit from upgrading has opened up new spaces for intermediation and many organisations with varied incentives are drawn in. Diverse intermediaries have different objectives, stakes and interests, different internal governance modes and different positioning in networks. Moreover, some intermediaries position themselves as ‘neutral’ and ‘honest’ and claim to provide facilitating roles by bringing together stakeholders and promoting collective action (Hellin, 2012; Klerkx and Leeuwis, 2009), while others have a key normative interest in achieving policy goals and business goals and actively lobby for and translate interests of those they represent (Goldberger, 2008; Hargreaves et al., 2013; Yang et al., 2014), or may aim to gain control over the relationships they mediate (Dhanaraj and Parkhe, 2006; Obstfeld, 2005). This is often connected to their governance set-up, i.e. whether they are government organizations, NGOs, or sector representatives with related governance modes (e.g. hierarchy, collective decision making). In networks and clusters often different intermediaries are active (Kilelu et al., 2013; Parag and Janda, 2014; Stewart and Hyysalo, 2008), and their activities may be complementary or

conflicting, and may serve the same audiences but for different purposes and with different motives. The above suggests the need to open up a debate on the influence of different intermediaries and how organisational governance relates to other features of agglomerations in clusters.

We tackle this question in the context of the influence of intermediaries in enhancing the upgrading of different producers in emerging agricultural clusters. By organisational governance we refer to the rules, principles and traits that define how decisions (and the motivations for taking decisions) are made in organisations (McDermott et al 2009). However, we also follow Moss (2009), who defines governance as the collective pursuit of public, common or individual interests and that a defining asset of intermediaries is their ability to reap collective benefits. Organisational governance is therefore in part determined the purpose for which the organisation was originally established and the ownership structure. Hence for example public sector organisations are usually established to provide public goods or services.

However, organisations are not static, their roles can evolve and new functions layered on. For example, the argument has been increasingly made that governance rules and principles can be “latched or layered” on to intermediaries (McDermott et al 2009) and in particular that intermediaries with a public-private governance (PPG) can have “multiparty” governance by combining a private sector drive to establish cross-cutting ties with different organisations outside the cluster whilst at the same time the public sector ethos can ensure there is participatory governance, facilitating inclusion of small producers in the adoption of new organisational and technological innovations (Safford 2007, Zuckerman and Sgourev 2006). We argue that this process of “malleable” governance can occur not just with PPG organisations, but with a range of other intermediary organisations, producing important outcomes for clusters.

We therefore reflect that whilst much research has been undertaken on roles and functions of intermediary organizations (Gassmann et al., 2011; Hakkarainen and Hyssalo, 2016; Howells, 2006; Katzy et al., 2013; Smedlund, 2006; Van Lente et al., 2003), far less research has been undertaken on how the organisational identity and structural positioning of intermediaries in clusters can be a key driver for (strategic) behaviour of intermediaries (Goldberger, 2008; Klerkx and Leeuwis, 2009).

Two case studies of emerging clusters in developing country settings are presented—the mango cluster in Piura, northern Peru and a cluster of Palm oil producers in central Colombia. In both clusters, small producers play a significant role and intermediary organisations are critical in articulating these networks for the provision of collective action (coordination of supply, gaining certifications for exports, adopting best practices). We discuss intermediaries with three types of ownership (governance) patterns: private organisations, producer associations and an organisation with a public-private governance. In light of this context our enquiry is guided by the following questions.

- What roles do specific intermediaries play in the upgrading activities of local producers and how does the internal governance of the intermediary (public, private, or PPG) influence the actions and impact of the intermediary in the cluster?
- How does the position of the intermediaries in the cluster vis-à-vis other organisations, influence its impact in the cluster?
- How does organizational set-up, internal governance and normative orientation of the cluster influence the impact of the intermediary?

## **Debating Intermediaries and Governance**

The question of how public services should be delivered to communities and by whom has been widely debated, but there appears to be little consensus on which sort of organisations might be more preferable for different tasks (Markelova et al 2009; Batley and McLoughlin, 2015). Poulton et al (2010) point out that during the 1980s and 1990s the private sector was preferred as the primary provider of business services as it was deemed to be more efficient. However, whilst this tended to improve outputs to markets in high productivity areas, as intervention of state bodies was rolled back, it weakened market access in more remote areas. The argument is now more commonly made that intermediary organisations based on public-private principles have advantages for the delivery of public goods and services. Within a development context, an example of this argument is illustrated by McDermott et al's (2009) study of two clusters in the wine industry in Argentina, where great stress as an explanation for the success of sectorial transformations has been placed upon the intervention by government support institutions (GSIs) or as Sabel (1994) called "Developmental Associations". These, it is argued, are able to understand and work with commercial realities, which encourages them to establish lines of communication and cross cutting ties between different social and geographical producer communities. The mandated requirement of these intermediaries to have "participatory governance", whereby resources and membership of boards is made up of representatives of the state, the regulator, the private sector, phytosanitary organisations and producer associations on the governing and advisory boards ensures that the process of upgrading is inclusive of smaller producers. The contrast is drawn with sectors that rely exclusively on producer associations which, whilst also playing important intermediary roles of coordination, prioritize their members (Gouët and Van Paassen, 2012; Watkins et al., 2015; Yang et al., 2014). This leads them to be more likely to

preside over insular and vertical networks that benefit their members rather than all the actors within a cluster. McDermott et al (2009) also provide a scenario where producer associations can provide collective information, but will more likely represent narrow and insular networks because their governance is control of information. Hence re-ordering will keep the basic network closed. These arguments are used to provide support for the benefits of enhancing governance forms that are broader and more inclusive such as empowered inclusion, multiparty governance and mutual monitoring (Sabel 1994; Schneider 2004). Further examples include McEvily and Zaheer (1999) and Owen-Smith and Powell (2004) who describe the establishment of public research institutes and training centres that help firms access new knowledge because of their mandates to provide collective resources and collaborate with firms from distinct localities.

Markelova et al. (2009) on the other hand see a positive role for intermediation to facilitate collective action by providing information, technical assistance and building capacity, but recognise that there is little consensus about who should undertake this role. Commercial agents may have conflicts of interest over the distribution of surplus (Ribot 1998), whilst non-governmental organisations (NGOs) may be good facilitators for collective actions, but less appropriate for good performance and be tempted to intervene too actively (Berdege 2001). Therefore no particular organisation has a predetermined advantage.

On this basis, the significance of intermediaries lies not just in making connections, as emphasized for example by Sapsed et al (2007), but by undertaking a range of activities, including brokering i.e. connecting dissimilar groups (Belso-Martínez et al 2015). We may go further by adding that by doing so, there exists the potential for transformational change as relationships between groups are re-ordered. Hence, collective action can no longer be viewed as centrally directed and instead is regarded as relational, fluid and contingent (Moss, 2009). Therefore, intermediation not only is able to create new sets of institutions with a

variety of stakeholder groups, but can also provide a window for shifting governance relationships between relevant actors, for example by influencing the pursuit of collective goals (Goldberger, 2008; Yang et al., 2014, Moss 2009).

### **Beyond the governance of the ego**

An important assumption upon which the above arguments rest is the prominence given to the agency power of intermediaries. This is not unreasonable in many developing economy cluster contexts where skills generally are low and there is a dearth of specialised services (Clarke and Ramirez, 2014). In these contexts reliance on PPG organisations is attractive to policy makers because it gives local leverage to particular interventions.

The structural features of this agency power emanates partly from its deliberate role as a “strategic intermediary” to establish links with new types of actors and bring their associated knowledge into the cluster and to mediate between different interests (Medd and Marvin, 2004). The emphasis on deliberation is therefore of particular relevance for addressing the governance dimensions of intermediation because it also signifies the legitimacy to introduce new agendas and methodologies. And yet, the above account would be less able to explain the resilience of closed clusters despite the existence of PPG organisations, or indeed how intermediaries with very different governance rules open up clusters and lead successful upgrading. We outline below three factors that suggest an understanding of intermediary influences may go beyond the agency of the “ego”.

Firstly, the relational structure of the cluster that arises from its history, values and culture is likely to play an important role and influence the development of cooperative relations and public infrastructure. Tsai (2007) for example, in contrast to McDermott, points beyond the formal institutions of accountability, to the level of civic participation in groups

that need to be both all encompassing (open to all) and embedding (incorporate local officials). These groups ensure that local officials share moral obligations and interests of the local community. The above discussion recalls past debates over the primacy of agency over structure. Here we signal only that there is a dynamic in which the intermediary as an agent can influence the structure, but that the agent can in turn be influenced by the normative structure, and indeed changes are likely to be filtered through this normative structure.

Secondly, we point to a range of studies which suggest that in different localities there often exist a diversity of intermediaries that can typically be stimulated to enhance interactions and opportunities for innovation (Intarakumnerd and Chaoroenporn, 2013; Kilelu et al., 2013; Stewart and Hyysalo, 2008). Thus, the space for intermediation can be occupied by organisations with different governance principles. Some intermediaries are government induced to stimulate economic development and innovation (Bell Jr and Juma, 2007; Kivimaa, 2014; Negoita and Block, 2012). For example, Perez-Aleman (2000) traces how the state in Chile promoted greater openness of the business associations in the footwear and agri-business sectors and encouraged large “mother firms” to assume the responsibility of upgrading small suppliers that enhanced the collective capacity. Rantisi’s (2014) study of the Montreal fur and garment industry also highlighted the role of trade associations in creating “local pipelines” to reduce the cognitive distance between two geographically related but fragmented sectors in the context where the cluster lacked lead firms. Other studies have shown some intermediary organizations are private but based on collective governance such as commodity boards and producer and industry organizations (Klerkx and Leeuwis, 2008a; Ton et al., 2007; Watkins et al., 2015), whilst others are private or NGOs (Goldberger, 2008; Klerkx et al., 2015). Therefore intermediaries need to be seen in the context of both the nature of the organisation, the community and its traditions, eschewing single explanations. Therefore practices are likely to evolve from complex synergies (Rhodes 1997) between

actors that vie for similar spaces, which may explain how lock-in to pre-existing institutional structures can exist.

Intermediaries may also vary in terms of the degree of embeddedness (Granovetter and Swedberg 2001) they have in the cluster. For Granovetter embeddedness referred to a detailed understanding of the mechanisms and processes of the social construction of institutions and local business networks. This ties in closely with our view of governance that goes beyond formal networked action, but of how organisations coordinate production strategies, develop standards and link knowledge of local producers inside and outside the cluster.

## **Methodology**

Our principle research question is the following. How does the governance of intermediary organisations influence their role in the upgrading activities and adoption of new technologies of local producers? The empirical study is based on an analysis of two agricultural clusters made up of medium and small-sized agricultural producers. These also contain intermediaries with different governance structures and are the focus of the study.

We analyse this question in two stages. In a first stage, social network analysis (SNA), is used to provide a structural analysis of the position of actors in the cluster and their relationships (Wassermann, & Faust, 1994). This allows us to observe which intermediaries are more central or marginal and infer through the links they establish the influence they may have on other actors. It also provides information on the influence and position of other organisations in the cluster (further details of SNA analysis below).

The information for the SNA was gathered through two identical surveys, one for producers (17 in the palm oil, 26 in the mango cluster), and one for service organisations (9 in the mango cluster, 5 in the palm oil). Analysis of survey data was undertaken through

social network analysis (SNA) techniques that permit visualization and measurement of the structures of relationships and the strategic of positioning of actors in these relationships. The survey data was gathered in both clusters through identical face-to-face surveys. The question asked to firms was: “from whom did your organisation (or business) receive technical assistance and how important was this to your organisation”? Respondents were provided a list of organisations (producers, services, universities, consultancies) and an open section to name other organisations from whom assistance had been received and to then identify and rank organisations from whom assistance was received from 1-5 in ascending order of importance. From this information it was possible to produce a network map using open source software, Pajek, for social network analysis.

The second stage of the analysis involved interviews with key organisations in the cluster to understand how governance influences the practices of intermediation. These interviews build on the inferences provided by the social network analysis carried out earlier, but allow us to address questions such as the governing style used by different intermediaries and how the normative orientation of the cluster influences the intermediaries in the cluster. The interviews in the palm oil cluster involved two ground visits in Colombia and eight semi-structured interviews. Because of the reduced numbers of actors present in the Palm Oil cluster from which SNA information was gathered, these interviews included representatives of large refinery firms and small producers of two Palm Oil clusters adjoining the cluster that is the focus of the study. Although SNA was not conducted in these, the interview suggested a similar network structure i.e. a dominant refinery firm surrounded by a number of small level producer suppliers. Interviews were also conducted with high level officials of CENIPALMA and FEDEPALMA, the Colombian Palm oil’s official producer association (the former being the technology arm of the latter) and two interviews with CENIPALMA employees working in the field, one of whom was also shadowed over two days in the same

palm oil cluster that was surveyed. Two interviews were also held with small farmer representatives and two interviews were also held with executives of large palm oil companies. In the case of the mango cluster, twenty semi-structured interviews took place with owners of small and medium-sized mango firms and directors of the main intermediaries including APEM, PROMANGO, the producer associations and with PROMPERU, a public-private intermediary agency that helps producers of mango. The producer association congresses of APEM and PROMANGO were attended in Piura and detailed notes made as observers.

### **Case Studies**

An important challenge for emerging clusters in less economically developed countries is meeting international certification standards required to penetrate new international markets and establishing early warning signals on worldwide technological and commercial developments (Bessant et al, 2003). In Latin America this challenge is compounded by the high proportion of small producers that dominate some export-oriented products. This poses problems in diffusing knowledge and difficulties with poor infra-structure (McCormick, 1999).

The two clusters we study reflect this reality. They are the palm oil cluster in the municipality of Puerto Wilches in north east Colombia and the mango cluster in the Piura area of Northern Peru. These clusters share a number of features, but also show important structural differences. A number of different organisations undertake intermediary roles and include public organisations, private organisations and producer associations. We refer to these clusters as “emerging clusters” because there exist opportunities for penetrating export markets and adopting new productive capabilities through ‘learning-by-exporting’ (Gereffi,

1994), but this combines with the numerical dominance of small firms and micro enterprises that have few resources to invest in upgrading. The global value chain literature places much emphasis 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 Knorrinda, 2001). However, in this case, the task of upgrading and in particular incorporating new producers falls on the shoulders of local firms, local institutions and local intermediaries.

## **Introduction to clusters and social network analysis**

### **The Peruvian Mango Cluster**

The Peruvian mango sector represents an important export sector in Peru and Piura in the north is the most important growing region. This cluster has a long history of providing for the domestic market prior to it beginning to export. As export production opened up the network changed significantly. Two important producer associations were formed, the “Asociacion Peruana de Productores y Exportadores de Mango” (APEM) for medium sized exporters and PROMANGO for smaller-sized growers. The members of these make up around 30% of growers and 60% of production. The rest are micro producers. Table 2 and figure 2 show that there exist a number of service organisations at the local level that include SENASA, the phytosanitary government body and PROMPERU, that help develop export links. Producers are therefore largely split between members of APEM that grow and export fruit and PROMANGO members that sell their produce to APEM members for export. A key competence is reaching certification standards necessary for exports, combating fruit plagues such as fruit fly, incorporating a greater control and improvement in the detail of production processes and technologies and establishing good networks with a range of buyers from different export markets.

Table 1 shows the outdegree centrality values of the main service providers in the mango cluster. Outdegree centrality represents the number of links emanating from the organisation in question i.e. how important is this organisations in terms of provider of knowledge in the cluster. As shown, SENASA, the phytosanitary organisation with knowledge of treating plant disease is the most important provider of knowledge. APEM and PROMANGO, the two industry associations, are the next most important. In addition there are another 13 organisations, including private consultants, producers, government departments, universities and certification organisations that are present in the cluster and provide significant services to others. PROMPERU, the main public-private intermediary established to promote new technology and exports plays a significant role but is behind the most central organisations.

Out degree Centrality	Organisation	Type of organisation
2	Agro 19	Mango producer
2	La Molina	University
2	Vinas Varona	Private consultant
6	Control Union	Certification Organisation
12	INIA	Government Service
6	UNP	University
11	Ministerio Agricultura	Government Service
17	PROMPERU	Government Service
15	National Mango Board	Overseas Industry Association (US)
10	INCAGRO	Government Service
9	SGS	Certification Organisation
14	ADEX	Government Service
17	PROMANGO	Local industry association
22	APEM	Local industry association
26	SENASA	Government Service

Table 1: Centrality of knowledge providers in the mango cluster

Figure 1 below provides a network map of the entire cluster. APEM and PROMANGO are clearly shown at the centre of this network, receiving from a wide range of organisations and linking together small producers. PROMPERU by comparison is in a more marginal position. We focus the discussion on the cases of the two dominant producer associations APEM and PROMANGO and PROMPERU as a PPG organisation.

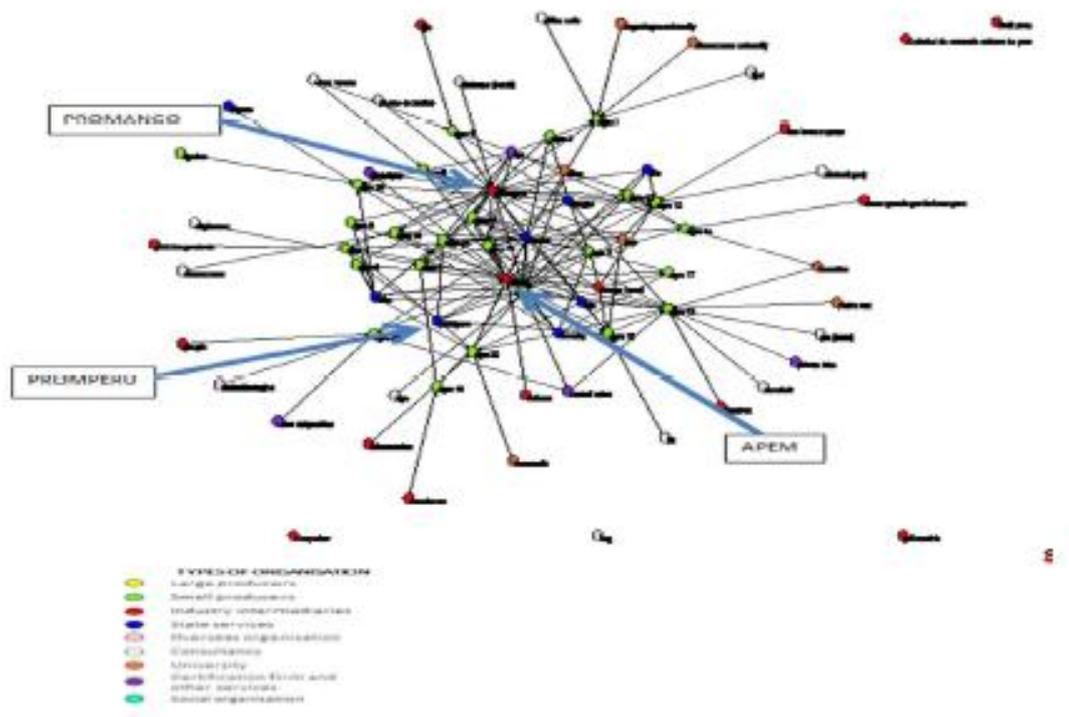


Figure 1 Social Network Analysis Map of the Mango Cluster

Our discussion centres on the influence and position of three organisations: APEM, PROMANGO and PROMPERU. PROMPERU (The Commission for the Promotion of Peru) was established in 1993 and although it is dependent on the Ministry of Commerce, it acts as a public-private organisation through its provision of both financial and organisational support to exporting firms. Its directorate is made up of a mix of public and private sector representatives. The mission of PROMPERU reflects two important principles in the Peruvian political discourse as put forward by a succession of Peruvian governments. The first is to promote export-led growth in the Peruvian economy and secondly to make this growth inclusive of poorer groups of society.

PROMPERU has worked in several agricultural sectors encouraging knowledge acquisition and industry organisation needed for export success. In addition to accessing commercial intelligence it works with industry actors on market penetration strategies. It also

has a special emphasis on supporting SMEs as this is recognised as an important sector within the Peruvian economy. PROMPERU's most influential period in the mango cluster was at the end of the 1990s when it used its links to open up the international markets for mango producers. Initially it attempted to establish one local association for all mango producers as a single point of contact for the industry to lower costs through economies of scale and a route to encourage cooperation and joint learning. However, this failed and seed money was provided firstly for APEM and shortly afterwards PROMANGO. According to a PROMPERU representative the separation of these bodies was to do primarily with personalities. As a PROMPERU manager commented:

*'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. They (APEM and PROMANGO) do not have a different strategy, and they do not have a different way of proceeding'.*

And yet, the differences between small growers and medium-sized exporters are actually significant and structural. This is based in part on tensions in market transactions (information asymmetry, price, timing of payment, quality). However, as will become clear, these reveal more fundamental differences between individual and collective approaches to the use technology, the transfer of knowledge and the values of solidarity and inclusion between the two communities of producers. These have led to the development of parallel business models. With few resources to buy fertilizers, small producers have been in a favourable position to move into the organic market which is naturally suited to them because it requires few substantial changes in the way the crop is produced. PROMPERU developed

its skills to provide technical knowledge on certifications, and extended this to two associations of micro producers, Apromalpi in the Chulacanes region of Piura and Agrovida that have been able obtain organic certification.

The experience of PROMPERU highlights the importance that a PPG intermediary can have by supporting collective action among different groups of producers, including those reliant on small-scale production. Its governance is defined by its mission to open up the cluster to new markets, combining business acumen with commitment to support niches as well as commodity production and markets. PROMPERU therefore created the formal network that has transformed this region into an export hub. Nevertheless, the architecture of this network has reproduced rather than replaced the historical structural cleavage between medium-sized and small producers. Once the export supply chains became established, PROMPERU's role became more peripheral and APEM assumed the main exporting role.

A defining feature of APEM (Peruvian Association of Mango Exporters) is its strong commercial and business focus, which is a reflection of the pioneering export firms that first set it up. Its core competency is helping firms serve international export markets, primarily the USA and Europe. In its early days it worked on improving the infrastructure, including the port of Paita which serves the Piuran cluster. Since the mid-2000s, APEM has, with support from PROMPERU, developed markets in East Asia including Japan, China and, since 2014, South Korea. This has involved moving into better packaging and more general product aesthetics through the selection of the Kent mango variety for export to South Korea (Fresh Fruit Portal, 2014). A major step forward has been the establishment of a Standards Committee in the early 2000s, made up of exporters, producer representatives and a local university researcher, that meet regularly and evaluate international quality norms for mangos. It produces a 'technical norms' document for producers, providing guidance on sweetness level, fibrosity and colour in addition to specifying maximum limits for pesticide

contamination. APEM has been particularly effective at preventing the flooding of the US market and subsequent fall in prices by coordinating with other mango exporters in South America to monitor volumes being released for export. The market intelligence it obtains is closely guarded and treated as a collective “club” good, accessible only to APEM members.

As a representative for medium-sized larger exporters, its governance reflects its members commercial interests. There has been some fundraising to facilitate certification of small producers (that sell to APEM members), but engagement with PROMANGO for example is minimal and quality development centres on consolidation and vertical integration, rather than through an inclusive-based network. Indeed, a number of APEM firms have acquired land from small producers.

Like APEM, PROMANGO is a producer association that was formed in 2002 with seed money from PROMPERU. Unlike APEM, it represents smaller producers that have little direct access to international markets. PROMANGO members have had difficult relationships with large exporting firms over a number of years and this was crucial in shaping how PROMANGO was constituted. Its members are primarily concerned with the challenges of producing (rather than selling) for the export market under difficult soil conditions and an erratic local climate. Much knowledge is tacit. The annual congress of PROMANGO is dominated by discussion of treatment of diseases, management of fruit and diversification into other products. These practices have spawned a strong sense of community and as a result, the actions of PROMANGO are primarily based on strengthening the network of producers and enhancing collective actions. For example, the first hot water treatment machine was purchased between all members and its use is shared by all members of the association. PROMANGO therefore has played a critical role as a bridge builder for previously fragmented producers. As the director of PROMANGO stated

*'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.... Through forming PROMANGO, we started to share all types of information, group together what each firm was doing, and in this way we created a network between the organizations members'.*

Decision-making processes tend to be open and members are kept together by *bounds of solidarity* has facilitated the sharing of some public goods. In this shared technology is not just about production, but of inclusion, since producers can have different abilities to upgrade. This contrasts sharply with APEM members that work together for the express purpose of expanding markets and strengthening individual practices.

With limited resources, PROMANGO has enabled all of its members to obtain EUREPGAP certification, which is significant since the European market is expanding and pays a higher price than the US market. As its producers have developed, PROMANGO has also worked on better coordination of the components of the mango production chain. Previously members' production had concentrated around the month of January, leading to over-production, which affected the revenue it earned. Experts from Israel and Brazil were invited and visited the farms of members, providing advice, which helped members to lengthen the production period from November to March.

The discussion of the mango cluster has highlighted cluster evolution as the outcome of new opportunities, ongoing tensions between groups and negotiations between intermediary organisations. Rather than imposing a set of top-down solutions as might have been the case in the past, the state has intervened to “steer” a set of cluster actors towards the international market. The networks that have been formed mirror structures of power and is reflected in the creation of two networks around APEM and PROMANGO. APEM's business

orientation is outward looking and emphasizes cross-cluster cooperation but does not represent the cluster as whole. Indeed it could be argued that the asymmetry of information between large and small-sized producers has been magnified as small producers remain vulnerable to climate and price fluctuations in a way that large and medium firms have been able to insulate themselves against. Hence, the historical fragmentation has become more entrenched through the development of APEM.

The influence of PROMPERU has been constrained by resource limitations, geographical distance and the difficulties of working in a cluster with a complex power structure. Nevertheless, it has used its position to make the small producer networks visible and to carve out an independent route for access to international markets<sup>1</sup>. Without PROMPERU'S aid, small producers may well have remained on the margins of the network.

### **The Colombia Palm Oil Cluster**

Colombia is the world's 4th largest producer of palm oil. However, unlike production in Malaysia and Indonesia that is dominated by large firms, it is small producers have in the last decade begun to play a significant role in production. In 2012 18.7% of the palm oil land was cultivated by small producers (through the so-called "alliances"), up from 3.7% in 1999 (Córdoba 2011). This has important implications for the large refinery firms that produce as well refine palm oil, for whilst ten years ago the refinery firms bought just 30% of the fruit from outside (the rest they grew themselves), today that figure has risen to 70% (Córdoba 2011). The mutual dependence (and tensions) between small producers and refinery organisations is therefore critical to understand the palm oil industry in Colombia.

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<sup>1</sup> Its agency arises partly from its legitimacy as a neutral actor in the local power structure and agent of the ministry of commerce (and seed money resources) and secondly its competence in establishing links with outside organisations such as exporters and marketing organisations.

At the time of the interviews, knowledge transfer around new technologies and new organisational practices has been dominated by the spread of the *Pudricion del Cogollo* (PC), (translated *but root* disease), an airborne disease affecting tropical climate areas that has wiped out large numbers of palm trees. Large resources, including R&D spending by CENIPALMA, have been devoted to developing alternative disease resistant trees and prevention measures to stop the spread of the PC.

Critical to the adoption of this protocol is the “UATTAS”, the national institutional architecture drawn up by CENIPALMA for technology transfer. This involves creating an alliance between small producers and a neighbouring refinery firm for preventative treatment of trees and vigilance. Each UATTA is supported by one agronomer per 3000-5000 ha and one technical assistant per 1000-1500 ha and involves provision of technical services, including adoption of ISO 9000 certification. The refinery firm acts as the intermediary for the small producer, transferring practices from CENIPALMA. Technology transfer therefore is designed in a top-down manner. The network architecture of the palm oil cluster in figure 2 shows this clearly. There is a refinery organisation that we call E1 in the middle of a network of small producers. CENIPALMA, the industry association, brings knowledge in from outside the cluster and provides knowledge to E1 and has a direct link to some of the small producers.

In contrast to the mango case study, the palm oil cluster shown in table 2 and figure 2 below therefore shows a fairly simple hub and spoke structure with information largely centralised around two nodes. The small producers are almost totally dependent on E1 for access to new knowledge. Moreover, there are very few bilateral links between the organisations themselves.

Out degree centrality	Organisation	Type of Organisation
2	FEDEPALMA	Government service
6	SENA	Government service
15	CENIPALMA	Industry Association
15	E1= Refinery and producer	Private Producer

Table 2: Centrality of Knowledge Providers in the Palm Oil Clusters

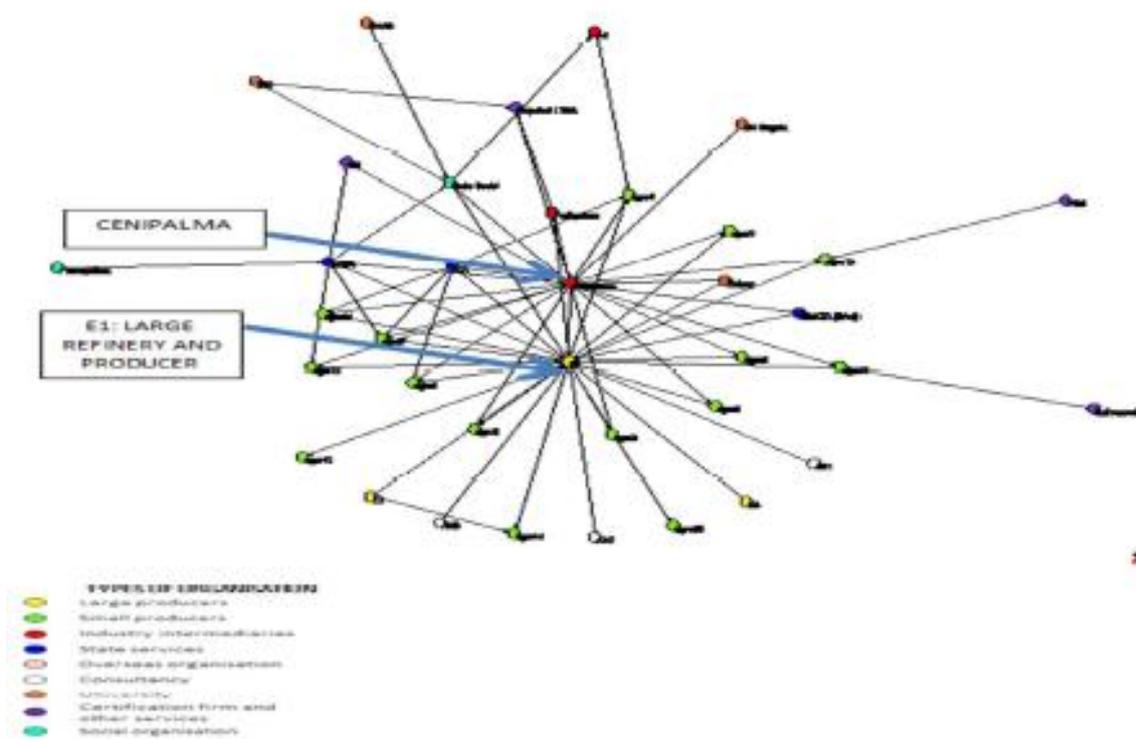


Figure 2: Social Network Analysis Map of the Palm Oil Cluster

We focus the discussion on the role of the industry association CENIPALMA and the refinery firm E1 as intermediaries in the knowledge transfer process with small producers. As indicated earlier, the programme of technology transfer has been designed by CENIPALMA. Its national coverage allows it to transcend narrow local interests and it has advanced international cooperation agreements with palm oil related centres of excellence around the world. The 2015 international palm oil congress held in Cartagena in Colombia brought

together 1700 practitioners, 100 company representatives and expert speakers from 30 countries. 90% of the speakers were from overseas. CENIPLAMA has a specialised R&D laboratory in Barrancabermeja staffed with postgraduates technicians and is recognised as one of the top science centres in the country. It also has agricultural extension staff with specialised knowledge in Palm oil and the technicians are therefore strongly embedded in the sector. There is little representation of small producers in CENIPALMA or FEDEPLAMA, its sister organisation, as most of the subscriptions are made by large refinery firms.

The UATTA framework for technology transfer reflects an effort to rationalise the fragmented nature of production in Colombia with many small-sized producers. This means there is high reliance not only on agricultural extension workers in the different areas of the country, but also on technical specialists employed by the refinery firms. This is posed as a win-win situation for large and small producers. Refinery firms receive a steady supply of raw material from small producers, who in turn receive technical assistance to improve productivity and prevent disease. CENIPALMA states that there are currently 100 “strategic alliances”, in so-called “inclusive business” partnerships (Córdoba 2011). However, a major problem is that “the technical teams in the plantations do not work as a strategic unit, but rather as individuals” Córdoba (2011). This reflects the difficulties of establishing uniform norms in highly contrasting climate and soil conditions, but also the diverse local relations between small producers and refinery firms.

If we take the case E1, this where a privately owned organisation is drawn in to acting as an intermediary. Its role needs to be considered in the light of the changing relationship between large landowners involved in agroindustry (some of whom have historically been

based in the palm oil, others that have diversified into the sector from livestock or bananas) and subsistence farming<sup>2</sup>.

In our interviews we were able to discern contrasting attitudes by the large refineries towards their intermediary functions. Figure 2 demonstrates the case where the large refinery firm has stepped in to assist small farmers in the adoption of new techniques and other assistance such as the provision of bridging loans and donations to local community schools. It is this model that CENIPALMA has hoped to institutionalize across the industry based on the close physical proximity between refinery firms and small firms. However, as intimated, a feature of the industry is the variation in relationships between firms in cluster. As a CENIPALMA official commented:

*“There are some nucleos where the leading company is only really interested in buying the fruit, it is not interested under which conditions this is produced, but there are cases of projects such as Indupalma, where there is a contract between the anchor firm and where the whole sanitary scheme is run by the anchor firm, the ally is just waiting to pay off the credit and they then take charge of their plantation. So in some places it is working in others it hardly exists...this is very new and requires a change in the scheme of things”.*

Where the UATTAS function, the motivations for the refinery firm to support small producers therefore reflects a combination of paternalism – a desire to help the conditions of small farmers– and a more pragmatic awareness of the need to invest in the surrounding

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<sup>2</sup> Land ownership in rural areas and agriculture in general in Colombia have historically been a source of tension between those involved in agroindustry, where agricultural production is primarily a business and a section of whom at times have used fraudulent or violent means to expand control of the land, and smaller producers who consider work on the land a means of making a basic living. This was especially the case in the period 1990 and 2010 where in some areas a reconfiguration of land ownership took place as a consequence of expropriation of land for palm oil use (Vidal, 2011)

farms to stabilize supply and halt the spread of the PC disease. Occasionally this bypasses or layers on top of the UATTA through peer to peer producer to producer relationships between a large refinery firm and local producers.

However, it is also common for refinery firms to show reluctance to involve themselves in national institutional agreements to provide collective services. This view was underlined by an executive of a neighbouring refinery firm that, when asked to intermediate for small producers commented:

*We don't feel responsible for their survival, and small producers don't see us as having the authority to make them".*

According to the respondent, apart from buying the fruit, the refinery firm's relationship with its small cluster of neighbours was at the most lending money for fertilizer or other costs.

The governance style of each organisation clearly comes through in the palm oil cluster study. CENIPALMA is an industry intermediary set up with a deliberative function to provide collective service goods to its members. Its governance style is dictated through the medium of technical and scientific expertise which is used to assert its authority. For example, when asked about how the specific anti-PC practices it developed was justified to users, a CENIPLAMA official was clear:

*In sanitary terms, it has to be done via the scheme we developed that unifies criterion. Everybody has to speak the same language. So if there is a user and he says "I have this experience of working on this disease" ....no sir, we are not going to do that, we*

*have to follow the norms developed from the agronomic committee. We have to have a unified criteria.*

CENIPLAMA's framework for intermediation is therefore driven by a technology-push logic and the UATTA is built on increasing productivity that permeates across geographical and contextual boundaries. This rationalises practices across the industry and, although it does not have the authority of a government ministry, within the industry its style at times resembles that of a hierarchy.

The intermediary actions of the refineries reflect a combination of pressures and expectations. Some clearly recoil at being cast in the role of intermediaries (perhaps following past experiences of less than loyal small producer allies<sup>3</sup> and because it gets in the way of their refinery activities). Other refineries will undertake the provision of collective services in a paternalist fashion to create reciprocal local ties. This reflects its governance, but also the expectations of the rest of the industry that it needs to help contain the spread of the PC disease.

## **Discussion and Conclusion**

Our initial analysis of network structure underlines the central position that intermediaries hold for the development of agricultural clusters. The interviews also highlighted their pivotal roles in the provision of collective goods, the opening up clusters to outside expertise and as facilitators of change and innovation.

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<sup>3</sup> It is fairly common for small producers to renounce local agreements to sell to the nearest refinery and instead accept a slightly higher price from a different refinery.

Producer associations were the most visible intermediaries in both cases studies. In some quarters producer associations have been critiqued for being inward looking (McDermott et al, 2009), however our discussions of APEM and PROMANGO in the mango cluster and CENIPALMA in the palm oil cluster, highlighted bonding activities to consolidate networks and important brokerage roles to open up clusters to outside knowledge, which corresponds with findings elsewhere highlighting these roles (Devaux et al., 2009; Yang, 2013). Their source of legitimacy derives partly from their role as the principle agent of the communities of producers, but also from the high level of embeddedness and local knowledge of the cluster. However, this case also demonstrates there is not a linear or fixed causal relationship between organisational governance and its influence on the surrounding cluster.

The case of PROMPERU is significant because of its role as an organisation established by the Peruvian state to stimulate innovation and inclusion in the mango sector. Its legitimacy derives from its contacts and direct link to the Ministry of Agriculture. Nevertheless it has not had the same of degree of embeddedness in the mango cluster as the producer associations. Consequently knowledge asymmetries between larger and smaller producers have been reproduced (and indeed reinforced) by the producer associations, with the reluctant acceptance of PROMPERU. E1 contrasts with the above cases. It questions its legitimacy to be an intermediary, although in practice small producers are more dependent on it than in our other examples. The paternal style it uses reflects previous relationships that have been based on reciprocal favours.

We conclude the discussion with three points. The first is that intermediaries work across the often impermeable boundaries between different actor groups, arenas of action, and geographical scales. In doing so they open up clusters to opportunities for radical changes in production strategies. However, contrary to what we might have expected, the

basic social architecture of the network - the division between medium and small-sized producers - is retained, indeed reinforced. This is related to our second point that, as Medd and Marvin (2008) commented, far from limiting themselves to being arbiters and neutral, intermediaries can play an important role in break down insularity and re-ordering and defining relationships. Nevertheless, the lack of local embeddedness means PPG intermediaries that have been established outside the cluster can also have limited reach. Finally, organisational governance exerts a marked influence on how the agency of intermediaries is exercised. However, intermediary organisations are also influenced by both the normativity of relations in the clusters and the map of different organisations working in overlapping spaces. In this sense the evolution of the cluster emerges from the negotiation between these different organisations, resembling earlier findings by Kilelu et al. (2013). This task is particularly challenging given that governing in networks requires diplomacy rather than command (Rhodes, 1997). We are therefore at one with Moss (2009), when he reflects that the full value of the governance approach perhaps lies in its recognition of the complexity of institutional structures, social relations and decision-making processes rather than the provision of explanations that rely on the power of single organisations.

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