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Industry Clusters and Food Value Chains: Can the Literature on Local Collective Failure be used as a Guide for Assessing and Overcoming Value Chain Failure?

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Abstract

In this paper the literature on industry clusters as a response to local collective failure is reviewed as a way of enhancing knowledge about how failure of food value chains to perform efficiently can be analysed and overcome. The conclusion is that there is much in the local collective failure literature that assists in an understanding of, and is consistent with, the concepts of value chain failure, value chain externalities and value chain goods. Four potential areas for enhancing the analysis of value chains by accessing this literature are noted: defining the boundary between chain failure and local collective failure; improving joint action among parties interested in overcoming chain failure; augmenting the processes of knowledge creation and application in value chains; and improving the governance of value chains. The key point is that the ability of local collective or value chain partners to produce chain goods and internalise positive chain externalities depends directly on the nature and intent of the joint action by the partners: will they cooperate or not, and, if they do cooperate, how and to what extent will they do so? These issues of coordination of economic activity and the nature of the relationships between partners go to the heart of governance within both local communities and value chains.

1. Introduction

In recent writings the authors have been concerned with describing and understanding the notion of food and agricultural product value chain failure (Grant et al. 2013, Fleming et al. 2015b, Griffith et al. 2015). ‘Chain failure’ is defined as the sub-optimal performance of the whole value chain because of under-investment in ‘chain goods’ and the presence of ‘chain externalities’. A chain good comes from the broader concept of a club good (Sandler 2013). A club good is a sub-type of a public good, without the condition of non-excludability (Griffith et al. 2015). Investments in the provision of chain goods are made on the basis that they will help to correct for chain failure and so increase the level of chain surplus (aggregate consumer willingness to pay minus aggregate value chain costs) available for distribution to the value chain partners. Examples might include actions taken jointly by the value chain, or by the chain leader or chain governing agency, to improve the vertical flow of market information or to implement a product grading scheme.

In developing our understanding of these multi-faceted concepts, we have scanned many different literatures. Here, we report on one set of literature, the cluster literature, which seems to have many parallels with the value chain concepts we are describing.

In the next section, we show how value chains and clusters are inter-linked. Then we discuss some common themes that have been developed in the literature on clusters and value chains. They help to formulate lessons from the cluster literature that can be applied in value chain analysis, which are outlined in section 3. A key area for improvement is the need to define the boundary between chain failure and local collective failure, which is the topic of section 4. Other areas with potential to improve value chain analysis, discussed in sections 5 to 7 respectively, are joint action among parties interested in overcoming chain failure, the processes of knowledge creation and application in value chains, and the governance of value chains. The main conclusions drawn from the study are presented in the final section.

2. The Value Chain – Cluster Linkage

Australian food and agricultural product value chains differ markedly in terms of spatial and vertical distances and linkages. Given the size of the nation, the types and locations of agricultural production systems and the numbers and distribution of the population, most producers are a long way from the processors and the consumers of their raw materials. Many final consumers are overseas. Australia is also a large food importer, so producers and processors are overseas. It is clear that there is an explicit spatial distribution of food producers, food consumers and participants at some intermediate links, within Australian food value chains.

However, these raw material producers and value chain partners are not evenly distributed across the landscape. Specific types of production systems and/or access to specific types of value chain resources mean that clusters of firms develop around the raw material source or around the source of other types of required inputs. Clusters are common in many food industries, and have been shown to generate positive economic impacts for the firms involved (Fleming et al. 2015a).

The term ‘cluster’ is sometimes used in a general or non-spatial sense, which differs from what we normally regard as a cluster. For example, Perkins (2013) referred to government funding of RD&E in the beef industry in Canada, called the ‘beef cattle industry science cluster’, that resembles an Australian Cooperative Research Centre (CRC) rather than a spatially defined cluster. We follow the definition of clusters used by the Institute for Strategy and Competitiveness (2013) as ‘*geographic concentrations* of interconnected companies, specialised suppliers, service providers, and associated institutions in a particular field that are present in a nation or region’ [emphasis added].

In some circumstances, clusters of food value chain participants may be best served by interventions that correct for local collective failure. In a similar manner to the definition of chain failure, ‘local collective failure’ is defined as the sub-optimal performance of the local economy because of under-investment in ‘local public goods’ and ‘local club goods’, which also come from the concept of a club good. Such goods may include actions taken by local government to improve infrastructure. Alternatively, in other circumstances, these same participants may benefit more from interventions that correct for value chain failure, such as actions taken by the value chain leading firm to improve the vertical flow of market information. Given this synergy between the two sub-types of market failure, in this paper we focus on how value chain organisation and operation can be improved by adapting concepts and ideas from the cluster literature, and by defining the boundary between chain failure and local collective failure¹.

¹ It is also worth noting that in some circumstances food value chain participants may be best served by drawing on concepts and actions from the environmental governance and sustainability literatures. This is touched on in the final section but addressed in depth in Fleming et al. (2015).

3. Common Themes in the Literature on Clusters and Value Chains

Some common themes exist in the literature on clusters and value chains that can help in developing a full set of analytical tools on market failure at different levels of aggregation. It is worth defining failure at a local as well as chain level to provide a clear separation between its sources and remedy in different domains. Locality is defined in economic space by the boundary around some disaggregated level of the national economy such as region, district, city, town or village. The local economy at this level is subject to two main forms of failure in the guise of 'local public goods' and 'local club goods'. The former affect all the population of a local economy whereas the latter affect a specific group in that population.

'Joint action', to use the terminology of Schmitz (1999), is used to produce and provide these goods, notably from the exploitation of agglomeration economies² associated with proximity. For local public goods, the main agency is the local government authority (LGA), or council. Dollery, Grant and Kortt (2012, p. 55) used Oakerson's (1999, p. 15) description of local public goods as having distinctive characteristics and a reliance on 'the availability of specific time-and-place information, such as neighbourhood conditions, to support effective production choices'. Grant et al. (2013) argued that the distinctiveness of local public goods and the advantages that can be derived from their production and provision have echoes of Porter's (1998) cluster model.

To capture the economies of proximity, Johansson and Quigley (2004) emphasised the need to identify the source and nature of the benefits. They categorised agglomeration economies into three (often interconnected) basic cases:

In the first place, an entire industry may benefit from agglomeration, since the size of the agglomeration provides sufficient demand to allow individual firms with internal scale economies to develop differentiated products. Second, an individual firm may benefit from the option to buy more specialised inputs at lower transactions costs from differentiated input suppliers within the region. Third, an individual firm may benefit from information spillovers outside the market that arise from proximity within an agglomeration.

(Johansson and Quigley 2004, p. 4)

Along similar lines, Parr (2002, p. 159) identified three forms of external economies derived from agglomeration: (1) external economies of localisation (the co-location of several independent firms in the same industry); (2) external economies of urbanisation (the co-location of firms in different, unrelated industries that exploit scope economies); and (3) external activity-complex economies achieved by a specific set of firms that have linkages (such as those in a value chain) that derive from productivity gains induced by their co-location.

Increasing returns to scale from the capture of external economies (Schmitz 1999) are frequently associated with scope economies. The nature of this relationship is consistent with the first basic case of Johansson and Quigley (2004) of the development of differentiated products by firms in an industry, and with the second type of agglomeration outlined by Parr (2002) of the co-location of firms that exploit scope economies.

The distinction between local public goods and local club goods is often an empirical one. Johansson and Quigley (2004) observed that their third basic case can affect the productivity of an individual firm (or, by extension, a group of firms) or the productivity of an entire region. The latter case in an LGA warrants an intervention by the local government authority while the former may induce a group from the locality to form a club to capture the external benefits.

² We define agglomeration economies as increases in the total factor productivity of a firm that are brought about by the concentration of economic activity in a specific location or a defined geographical region. Agglomeration economies may be internal or external to a firm, with the implication that internal agglomeration economies can be fully captured by the firm and require no joint action. External agglomeration economies would require the provision of local collective goods - public or club.

While there is a huge literature on clusters, Taylor (2005, p. 69) outlined some of the theoretical and empirical shortcomings of the cluster literature, which are well summed up by his following statement:

Currently, economic geography, along with many other areas of the social sciences, is firmly linked to a theoretical approach that seeks to explain local economic growth in terms of the embeddedness of business enterprises in small-firm social networks. These networks are conjectured to mobilise knowledge, stimulate innovation and create competitive advantage through enhanced productivity. Variants of the approach are labelled as 'regional innovation systems', 'innovative milieu', 'learning regions' and, of course, 'clusters' (Porter, 1998, 2000). These increasingly self-referential, institutionalist literatures emphasise the social construction of economies, the importance of social capital and the fundamental role of institutional structures in shaping and driving those economies. The layers of reasoning in these approaches amount essentially to a 'soft' version of the endogenous growth theory that economists have built around the stylised facts of 'local human capital', 'specialisation', 'competition' and 'agglomeration' (Glaeser 1995, 2000). The 'embeddedness' approaches, however, use a different but equally stylised set of facts as explanators; 'institutional thickness', 'trust', 'learning' and 'social capital', for example. It can be suggested that what has been created is an institutionalised theoretical straightjacket, a complex edifice that is weakly and selectively grounded in reality.

Stimson, Stough and Roberts (2006) weighed in on the shortcomings of cluster policy and research, and Grant et al. (2013) declared that cluster analyses lack conceptual and theoretical rigour.

Many authors have attempted to broaden the appeal of clusters. Hochman (2011) argued that the literature on agglomeration had focused too narrowly on primary agglomeration caused by direct attraction effects. He widened the focus to include secondary and tertiary agglomerations that arose because of the presence of the primary agglomeration. His analysis is of particular interest because of the way the primary agglomeration attracts clubs once the secondary agglomeration has occurred, and these clubs provide facilities. The same process may occur where there is secondary and tertiary agglomeration of value chains where follower value chains are attracted by an original one.

Ingenious efforts have been made to overcome the problem of confinement to proximity by adding non-spatial concepts to the analytical framework. For example, Capello and Faggian (2005, p. 78) introduced the concept of 'relational space', which they defined as 'relationships – market relationships, power relationships and cooperation – established between firms, institutions and people that stem from a strong sense of belonging and a highly developed capacity of cooperation typical of culturally similar people and institutions'.

Similarly, Schmitz (1999, p. 469), stretches the concept of cluster beyond spatial issues by including vertical forms of joint action, namely 'producer and user improving components' and 'alliance across value added chain'.

So, while there has been some broadening of cluster theory to account for vertical linkages, and application in empirical analysis (see the extensive list of references cited in Giuliani et al. (2005)), it is our view that the concept of chain failure has a stronger theoretical framework and basis for making policy recommendations and appropriate collective action involving chain members. Hence, value chain failure should be treated as a focus for analysis that is distinct from local collective failure.

However, despite the shortcomings of cluster theory and its application in empirical analysis, mentioned above, there is still much in the cluster literature that assists in an understanding of, and is consistent with, the concepts of chain failure, chain externalities and chain goods as defined by Griffith et al. (2015). Four potential areas for enhancing the analysis of value chains by accessing this literature are:

1. Defining the boundary between chain failure and local collective failure
2. Improving joint action among parties interested in overcoming chain failure

3. Augmenting the processes of knowledge creation and application in value chains
4. Improving the governance of value chains.

In the fourth area, we distinguish between the literature on clusters and the literature in another spatially defined area of study: Australian agri-environmental governance.

4. Defining the Boundary between Value Chain Failure and Local Collective Failure

The literature on clusters contains much on identifying and exploiting any economies associated with proximity, notably external economies. Schmitz (1999) summarised the history of clustering dating back to Marshall (1920) and popularised more recently by Krugman (1995). He referred to Krugman's (1995) three main reasons for industrial clustering as labour market pooling, access to intermediate inputs and technological spillovers, and averred that they remain valid but are nevertheless insufficient to explain 'the strength of clustering firms' (Schmitz 1999, p. 468). The reason for their insufficiency, according to Schmitz (1999) quoting Mishan (1971, p. 2), is that the 'effect produced is not a deliberate creation but an unintended or incidental by-product of some otherwise legitimate activity'. What is needed in the mindset of Schmitz (1999, p. 469) is a 'deliberate force at work, namely consciously pursued joint action'. The literature on joint action is discussed below.

Agribusiness firms often and increasingly participate in local clusters as well as in national or global value chains (Pietrobelli and Rabellotti, 2004). A question often asked is whether those factors that lead to 'strong' clusters also lead to highly performing value chains. Put another way, if consciously pursued joint action can overcome local collective failure, can it also overcome value chain failure?

In one of the seminal papers in the field, Giuliani et al. (2005) used data from 40 case studies of industrial clusters in Latin America to examine the relationship between the collective efficiency of the cluster and the extent and nature of value chain upgrading undertaken by the firms in the clusters. About half of the clusters produced food or processed agricultural products. They concluded 'that collective efficiency makes a difference and affects enterprise upgrading, but the impact is different, and follows different routes, in different groups of sectors.' (p. 566). They found that in the food clusters, a crucial role is played by collective initiatives, that is, by consciously pursued joint action. They called for rigorous empirical research to better understand these types of linkages.

This research indicates that in general there is no clear boundary between value chain failure and local collective failure, but there may well be a clear distinction in specific case studies.

An Australian example of an attempt to capture local public goods and chain goods where food value chains converge and overlap is the East Gippsland Food Cluster. Each of the 42 members (East Gippsland Food Cluster 2016) pays a fee to belong to the cluster plus a levy based on its size. Members tend to be clustered spatially – to capture local public goods – but they are spread throughout the food value chain – from farm, viticulture and seafood production to processing, wholesaling, food safety and quality, and various lines of retailing – to capture chain goods. The nature of these goods can be seen from the benefits from membership that the cluster lists: knowledge sharing; networking; joint procurement opportunities; professional development; new business opportunities; access to relevant information; advocacy; collectively supporting the East Gippsland region through good business citizenship; and marketing (East Gippsland Food Cluster 2016). By promoting a common set of values of collaboration, innovation, excellence, sustainability and fairness, the region is able to build a reputation from which all food value chain participants located in the region can benefit.

Another Australian example, this time of the secondary and tertiary agglomeration of value chains in the manner that Hochman (2011) described for clusters, is the capture of spillover benefits among chain members in experience markets. This case study concerns the inter-industry promotion of the

region designated as the Victorian wine trail. The presence of wineries has attracted other tourist industries. Experiences associated with visiting a region are translated to potential customers through cross-promotion and exploiting scale and scope economies in offering promotional services. In addition to wine tourism services, the experience market spans hospitality (accommodation, restaurants and cafes and outlets for purchasing food), travel, scenic visit and adventure services that are bundled together for the purpose of promotion. While most benefits from promotion are likely to be captured by the industries in the value chain, substantial leakages of benefits to the general economy are likely to occur that induce the government to subsidise promotional campaigns. The Victorian state government (Tourism Victoria 2012) invests heavily in the promotion of the services, attractions, facilities and events to be found along the wine trail. More generally, it promotes a wide range of services associated with the wine tourism sector in Victoria online through the Tourism Victoria (2014) website, using taxpayers' funds.

The development of programs such as those under the banner of Victorian tourism is financed by the typical funding model used for club goods: a two-part tariff. It comprises, first, membership of a 'club', usually called an association, which covers the costs of administration and activities such as generic promotion and representation at relevant policy forums. These organisations usually operate at the supra-chain level (so-called 'peak bodies'), in the way that Tourism Alliance Victoria operates for all value chains associated with tourism in Victoria. The second part comprises fees for specific services such as workshops, business advice, networking, the provision of information and advertising (such as the above example) that are pertinent to tourism and which tend to be specific to a value chain. They are usually offered on a full cost recovery basis because the benefits can be captured by the firms buying the services.

5. Joint Action

Schmitz 1999, (pp. 475-477) discussed the impetus to joint action, contrasting government intervention and 'private self-help' in response to market failure.

It is ironic that in an age where neo-liberalism triumphed, the sequence of external economies → market failure → government intervention remained unquestioned. Perhaps the main reason is that *mainstream economics does not know how to handle joint action* [emphasis added].

(Schmitz 1999, p. 476)

It is precisely this problem with 'mainstream economics' that we believe can be resolved by identifying chain failure. The resolution, referred to in general terms by Schmitz as 'private self-help', can be instigated by involving members of the value chain just as market failure is resolved through government intervention on behalf of all individuals in the general economy. Schmitz (1999, p. 477) asserted that 'It is hard to build economic theory with joint actors', but if the nature and causes of chain failure are properly diagnosed, this difficulty is reduced. Game theory can aid understanding of the conditions under which joint action would be worthwhile. The literature and empirical examples that Schmitz cited have the hallmark of the sorts of intervention within the value chain that a chain failure focus would suggest.

One area of interest relating to joint action to produce chain goods and internalise positive chain externalities is in the development of the concept of 'collective efficiency'. Schmitz (1999, p. 466) defined this concept in the context of clusters as 'the competitive advantage derived from local external economies and joint action'. He made two salient observations about it, namely '(a) that economic viability can neither be understood (nor fostered) by focusing on individual enterprises and (b) incidental external effects are not sufficient explanation and that the effects of purposeful joint action are an essential second component' (Schmitz 1999, p. 470). Schmitz distinguished between static and dynamic external economies and static and dynamic cooperation effects, and in this respect it is useful to resort to basic microeconomics and revisit the definition of 'dynamic efficiency', which Hubbard et al. (2012, p. 9) noted occurs within firms 'when new technologies and innovation are

adopted over time'. The definition of Hubbard et al. (2012) can be extended to describe the dynamic efficiency of an interdependent group of firms or industries.

6. Augmenting the Processes of Knowledge Creation and Application in Value Chains

There is a degree of confluence of ideas about knowledge networks, knowledge creation and upgrading³ from the literature on embedded local growth and clusters and the literature on value chains. An example is the study by Bathelt, Malmberg and Maskell (2004) on the different layers of knowledge among firms in related industries that are transferred through a value chain (or what they term a 'pipeline'). Humphrey and Schmitz (2000) formulated a useful typology of upgrading in value chains: process upgrading (transforming inputs into outputs more efficiently); product upgrading (moving into more valuable product lines); functional upgrading (obtaining new superior functions); and intersectoral upgrading (applying existing competence in a new sector). Giuliani, Pietrobelli and Rabellotti (2005) emphasised the role played by leaders in the global value chain in transferring knowledge along the chain. Schmitz (1999, p. 478) observed that clustering 'draws out the less exceptional, and more common "ordinary" entrepreneurs [because] it makes it possible to advance by taking smaller and calculable risks'. He might have added that value chains perform the same service. Preissl and Solimene (2003, pp. 206-207) discussed how large firms in clusters provide collective goods such as research, development and extension (RD&E), although Taylor (2005, p. 73) cautioned about the propensity for large firms sometimes to act in a predatory manner.

A recurring theme in the cluster literature is that innovation is not just about formal RD&E and that innovation systems are learning systems:

To account for knowledge generation in this industry, it is necessary to pay attention to different types of activities and indicators other than formal RD&E and patents. RD&E and patent statistics are ill suited to this industry, where experimentation, learning, trial and error and other means for generating new knowledge are mostly informally undertaken and measured.'

(Giuliani, Morrison and Rabellotti 2011, p. 203)

7. Improving the Governance of Value Chains

A major way in which the resolution of chain failure differs from market failure is the lack of an established set of institutions to remedy the situation. Having identified opportunities to add value in the value chain by remedying chain failure, there remains the question how this value-adding intervention is to be generated, that is, who are the agents of change? One approach, by no means limited to the value chain literature, is to point to the potential for leadership. In essence it is argued that a leader or leaders can perform a catalytic role, not only around product innovation but also in terms of the durability of governance arrangements (see, for example, Grant et al 2011). However, here the theory of industrial districts promulgated by Lane (2002) is handy and (arguably) more precise. Lane (2002) takes what he calls a 'complexity perspective' to argue that a spatial unit, in this case a district:

... may be defined in terms of two kinds of structures: networks and scaffolds. At the nodes of the networks are individual entrepreneurs/artisans and firms. The links between the nodes consist of processes of recurring interactions. The networks carry the competences through which the district gathers and interprets information about products, production technologies and markets; produces and sells artefacts; and develops concepts for new artefact functionality, new markets, and new artefact types. The network structure undergoes constant transformation as the district generates new products and explores new markets. The transformation processes rely on various scaffolding structures, which may be regarded as the institutions that provide both a meta-stable identity *and* the possibilities for renewal and change to the district.

³Following Giuliani et al. (2005, p. 552), upgrading in a value chain is defined broadly as 'innovation to increase value added'.

(Lane 2002, p. 65)

Substitute ‘chain’ for ‘district’ and it requires only a little imagination and creativity to apply this perspective to value chains. Lane (2002) then explains two important types of scaffolding structure – interaction loci and emergent rules and roles – and discusses how districts innovate by outlining two perspectives on innovation from the literature on complexity: ‘recombination’ of learning agents and ‘generative processes’ that enable social systems such as firms and value chains to overcome the limits placed on their growth. Generative relations and processes ‘enable the participation ... and the convergence of the incentives of a variety of actors [read value chain members from our perspective] able to put in place complementary actions converging towards the realization of a common, innovative goal’ (Antonelli 2010, p. 3).

Giuliani et al. (2005) attributed a central focus to the concept of governance in value chains in their discussion of the links between the concepts of clusters and value chains. They distinguished three types of governance that are important: ‘(a) network implying cooperation between firms with more or less equal power which share their competencies within the chain; (b) quasi-hierarchy involving relationships between legally independent firms in which the rest of the actors have to comply; and (c) hierarchy when a firm is owned by an external firm’ (Giuliani et al. 2005, p. 551).

The nature of cooperation within the value chain is important to implement remedies to chain failure. Antonelli (2010, p. 5) observed that ‘the generative potential of a relationship depends upon the ‘aligned directedness’ of the agents – whether they are all interested in operating in the same region (or in neighboring regions) of agent-artifact space [or, in our case, cooperating in a value chain]; and their ‘mutual directedness’ – whether the agents are interested in interacting with each other’. In this respect, Schmitz’s (1999) point about the relevance of game theory and the meaning of cooperation in this context is worth revisiting. Manzini and Mariotti (2002) coined the expression, ‘tragedy of the clubs’, to illustrate how the potential for creating a negative externality arises when members of a value chain undertake joint action that results in what they termed a collective inefficiency. The process parallels the tragedy of the commons – hence the title of their article. They show how equilibrium can be reached in which there is excessive entry in the joint production and exploitation of an excludable good. But the result depends on the operation of a non-cooperative game by forming a coalition and dividing the surplus generated from the output produced. The key to avoiding this form of ‘tragedy’ is in the nature and intent of the joint action by club members: will they cooperate or not and, if they do cooperate, how and to what extent will they do so. This issue goes to the heart of governance within the value chain chain.

8. Conclusion

In this paper we have focused on how food value chain organisation and operation may be improved by adapting concepts and ideas from the cluster literature.

The review has shown that there is much in the cluster literature that assists in an understanding of, and is consistent with, the concepts of chain failure, chain externalities and chain goods as defined by Griffith et al. (2015). Four potential areas for enhancing the analysis of value chains by accessing this literature were noted: defining the boundary between chain failure and local collective failure (the literature on clusters has a wealth of material on identifying and exploiting any economies associated with proximity, notably external economies); improving joint action among parties interested in overcoming chain failure (the literature on collective efficiency explains large firms in clusters providing collective goods such as research, development and extension); augmenting the processes of knowledge creation and application in value chains (the theory of industrial districts); and improving the governance of value chains (Antonelli’s concepts of aligned directedness of the agents – whether they are all interested in operating in the same region (or in neighboring regions) - and their mutual directedness – whether the agents are interested in interacting with each other).

The key point to emerge is that the ability of local collective or value chain partners to produce local collective goods or chain goods and internalise the positive externalities which affect them depends directly on the nature and intent of the joint action by the club members: will they cooperate or not and, if they do cooperate, how and to what extent will they do so?

These issues of coordination of economic activity and the nature of the relationships between club members go to the heart of governance within both local communities and value chains. And it is no surprise that many agribusiness firms are part of both networks, so there is constant interaction between the concepts of value chain failure and local collective failure and the measures available to remedy deficiencies.

The next challenge, following the advice of Giuliani et al. (2005), is to define ways to specify and test methods for making both sets of concepts operational in specific case study situations.

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