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Food Value Chain Coordination in Practice: European and Australian Case Studies of the Creation of Chain Good Innovations*

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ABSTRACT

Food value chain businesses form alliances with horizontal and/or vertical partners to take collective action to either overcome or ameliorate chain failure, or to take advantage of new opportunities available due to innovations in products or processes. The desired outcomes from the collective action would not be possible to achieve if these businesses acted independently. While such alliances and collaborations may take many forms, depending on the degree of commitment, the kind of governance and infrastructure linkages, they can often be thought of as “clubs” for the purpose of economic analysis. Several different types of clubs can be identified, thus the path to collective action chosen by clubs may vary according to existing capabilities and the scope for collaboration, particularly in relation to the potential for value-creating innovation. The result of the collective action is the provision of a chain good or service, which usually leads to greater and more valuable chain coordination. By collectively identifying, funding and acting to capture positive externalities associated with innovation, businesses in many parts of a food value chain can widen opportunities to increase whole-of-chain surplus as well as private profits. In this paper five mini-case studies are presented to demonstrate the breadth of past collective actions undertaken by businesses in food value chains, two in Europe and three in Australia. These are the Euro Pool System, and Global Standards certification in Europe and globally, as well as Meat Standards Australia, an Australian beef organic producer alliance (OBE Organic®), and the supply of food to households during Covid-19 lockdown in Australia. Each case study yields insights into the rationale of how businesses in different food value chains in different countries have acted as a club to use their joint resources to internalise positive innovation and coordination externalities.

Key words: *value chains; clubs; chain goods; coordination; innovation.*

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1 Introduction

Our motivation in undertaking this exploratory analysis comes from trying to understand, from an economist's perspective, the separate and inter-related roles played by two concepts - value chain coordination mechanisms, and research, development and extension (RD&E) investments - in overcoming or ameliorating chain failure and so generating high performance food value chains. It follows from the idea that food value chains can often be considered as "latent clubs" (Fleming et al., 2018), that is, systems having the potential for improvement through collective action.² Following an outline of value chain coordination mechanisms and RD&E investments, we introduce the relevant analytical tools of club theory, which are closely related to analytical tools commonly used by economists.

2 Coordination mechanisms in food value chains

Standard textbooks on supply chains (e.g. Chopra and Meindl, 2013) often do not place much analytical attention on chain coordination mechanisms per se. The components of the coordination mechanism, the so-called drivers, such as logistics and revenue management, do have analytical economic frameworks that are able to be optimised, but as yet there is little explicit guidance on how to design and implement a whole-of-chain coordination mechanism that leads to a high performing food value chain. Accordingly, a more explicit focus on chain coordination as a high-level objective for well-performing food value chains is desirable. In fact, there seems to be a need for a more direct way of deciding when and how to invest in better chain coordination.

3 Research, development and extension in food value chains

Innovations³ are widespread in food value chains and in general it pays for individual businesses to act independently to innovate in a variety of ways. However, one part of innovation, more specifically, RD&E in agricultural and food value chains, has long been recognised as having also strong public good characteristics (e.g. Pannell and Roberts, 2015), justifying government intervention and funding. Much of this government involvement has taken place at the farm level where these public good characteristics are strongest.

Furthermore, there are some areas of innovation that would lead to higher whole-of-chain surplus in case of collective action by businesses in the chain. Without chain collaboration, opportunities are being missed. Accordingly, innovations in those areas may not fall in the domain of a pure private nor a pure public good but can be considered as club good. Benefits from the collective action by some chain members commonly extend to others in the chain, further increasing chain surplus.

Fleming et al. (2018) identified four types of clubs for taking collective action in food value chains: (1) horizontal clubs comprising businesses that take collective action across a single or multiple cross-sections in the value chain; (2) vertical clubs, which consist of businesses that form a strategic alliance for collective action along a single value chain within a network of chains; (3) clubs that specialise in a single product or multiple products in the value chain; and (4) clubs focusing on a single input/activity or multiple inputs/activities. So, in practice only some chain members may participate in the club. Even then, other chain members are likely to benefit from club activity that result in leakages throughout the chain. The authors concluded that the kind and scope of collective action chosen by clubs may vary according to the objectives of the chain actors, particularly in relation to the potential benefits linked to respective innovations. Examples of the four types of clubs are presented in a section below on mini case studies.

By collectively identifying, funding and acting to capture, club related gains – so called positive club externalities - associated with innovation, businesses in many parts of a food value chain have incentives to collaborate.

² We use the term "club" as an over-arching term to encompass all forms of collective action taken by firms, as opposed to a specific type of collective action. It enables us to analyse decisions by firms to engage in such an action through an economic lens, using the concepts of externalities and public goods/bads.

³ We follow one of the most commonly cited definitions of innovation that adequately conveys its broad nature: "An innovation is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organisational method in business practices, workplace organisation or external relations." (OECD, 2005, para. 146).

This holds as long as the widened opportunities lead not only to an increase in chain surpluses but as well to an increase in profits at the level of the single enterprise.

4 Perspectives on response to chain failure

Our perspective is that a lack of collective action in food value chains can lead to chain failure. Thus, our objective is to examine how businesses within food chains have overcome chain failures by acting collectively as clubs (Fleming et al., 2018; Griffith et al., 2017; Malcom et al., 2017). In this respect the concepts of clubs, club goods and chain goods seem to provide a useful framework for economists to analyse how value chain businesses work together to implement innovations and deal with chain failure, across a wide range of contexts and types of decisions.

5 Chain failure and chain goods

Following the discussion in Malcolm et al. (2017), the concept of chain failure is analogous to the concept of market failure that is used widely in the microeconomics literature. Bannock et al. (1984) defined market failure as a “situation in which economic efficiency has not been achieved through imperfections in the market mechanism” (p. 262), where economic efficiency is the “state of the economy in which no one can be made better off without someone being made worse off” (p. 125), commonly known as Pareto optimality.

Chain failure is defined “as a situation in which a value chain fails to maximise chain surplus because it supplies a suboptimal level of throughput and value” (Griffith et al., 2017, p.150). An economically efficient value chain is one in which no chain participant can be made better off without another participant being made potentially worse off. It can be determined by ascertaining that chain economic surplus is at a maximum. The degree to which chain economic surplus is less than its potential maximum value shows the extent of chain failure. In principle this can be determined by applying the standard microeconomic concepts of the production possibilities curve and expected iso-revenue curves (Mounter et al., 2016).

Chain failure occurs if investments that would lead to improved products, services and processes are not possible or not profitable for single chain actors and are thus neglected. As a consequence, products, services and processes are not created, and thus positive chain externalities do not accrue. These chain externalities do accrue when there is joint investment in processes such as information systems, and grading and certification systems, that allow customers’ willingness to pay to be more efficiently identified and met by securing a close collaboration up and down the chain.

Club goods and chain goods

A chain good can be considered analogous to a club good (Buchanan, 1965; McNutt, 1999; Sandler and Hartley, 2001; Sandler, 2013), where the respective club covers all or some members of a value chain (see Fleming et al. (2018) for a detailed discussion) and overcomes on a voluntary basis the dilemma of collective action.

A club good is a sub-type of a public good, and populates the space between a public good and a private good. McNutt (1999) sees club goods as public goods without non-excludability, while McVitie et al. (2009) note that club goods have private attributes but can become rivalrous in use due to congestion in case of unlimited access. Accordingly, core characteristics of chain goods are excludability and non-rivalry.

Sandler and Tschirhart (1980, 1997) and Sandler (2013) have reviewed the long history and rationale of club theory. Fleming et al. (2018, p.167) argue that useful insights can be gained about the operations of value chains by considering them as “latent clubs”. Club theory can be used to examine how to increase the surplus of a food value chain using collective action within a club good framework. Such goods are “chain goods”.

Chain goods are those goods and services that enable coordination across partners in a value chain. They resemble what used to be known as the facilitating functions of agricultural markets (Kohls and Uhl, 1980, Chapter 2). The four key groupings of facilitating functions are usually categorised as standardisation, financing, risk-bearing, and market intelligence (Kohls and Uhl, 1980, Chapter 2). If these types of services and processes are missing from the value chain, the chain partners cannot make decisions to increase profit of the whole chain. If chain partners see a chance to provide collectively such

goods and services, then forming a club that comprises the whole chain or a subset of the chain may be an efficient way to do it.

We now move to the five mini-case studies where we look back at some past investments in value chain coordination mechanisms that have been collectively provided by chain businesses acting as a club.

6 Case Studies

The following five mini-case studies - two from Europe and three from Australia - demonstrate the breadth of collective actions that have been undertaken by members of food value chains. These are the Euro Pool System and Global Standards certification in European countries, and Meat Standards Australia (MSA), the Australian beef organic producer alliance (OBE Organic®), and the chain response to a potential food crisis from the impact of the coronavirus, COVID-19, in Australia.

Each case study yields insights into the subject of how businesses in different industries in a food value chain have acted like a “club” to use their joint resources to internalise positive innovation externalities that would not have been possible to achieve were these businesses to act independently. We do not estimate the net benefits to firms from engaging in a club nor do we comment on which form of collective action is optimal. Instead, we rely on circumstantial evidence and assume from the revealed preferences of those collaborators that it has been worthwhile for them to take the actions they choose.

6.1 Euro Pool System⁴

Much of the fresh fruit and vegetables that is grown in the warmer climates of southern Europe is consumed in the high population centres in northern Europe. Logistics has always been important in these value chains. However, as the large German and Dutch retailers expanded their operations across borders and offered more variety and commitment on quality to their customers, pressure to increase the efficiency of the chain was passed back to the suppliers of these retailers. In 1992 three cooperative auction houses in the Netherlands, Germany and Belgium formed an alliance to improve the logistics of packaging fresh produce for transfer in European value chains of fruits and vegetables. This alliance was named Euro Pool System (EPS). Its business was to provide to its members standardised, reusable, stackable plastic trays that could be filled “on farm” and subsequently used to display produce on supermarket shelves, as well as the associated operational knowledge.

EPS therefore began life as a horizontal club comprising three entities (on behalf of many hundreds of individual members) taking collective action across multiple cross-sections in the fresh produce value chain. It was incorporated in 1996, with the auction houses continuing their involvement as shareholders. During the next two decades, EPS has expanded its operations to 50 depots in 27 countries and the range of products using their folding reusable trays has been increased to include fish, meat, baked and convenience products. Annual rotation of trays has expanded rapidly and reached almost 1 billion by 2016 (EPS, 2017). While EPS calls itself the de facto standard for packaging, many chains do not use the EPS trays. Lidl is one prominent example.

EPS (2017) emphasises the need for “close collaboration among retailers, EPS and other supply chain partners” and its “intensive relationship with clients” to improve what is a complex and challenging set of conditions in fresh produce value chains. To this end, its system entails a club-like form of collaboration that involves all members of fresh food value chains but which is centred on one activity in these chains – use of the trays. The process begins with fresh food producers and ends with fresh food retailers returning the trays. The provision of trays by EPS is initiated by an order for trays typically by a producer of fruits and vegetables or, increasingly, other fresh produce, who puts down a deposit and pays EPS a rent for each crate – step 1 in an 8-step system described in EPS (2017). The cycle of tray usage is completed in steps 7 and 8 when retailers return empty trays to the EPS service centre, for which they are credited, and the trays are checked and prepared for their next use. EPS offers the option to integrate its service activities directly into the independent distribution centres of value chain members that use large volumes of trays. This option eliminates the transport of empty crates back to an EPS service centre.

The tray rental is a quasi-membership fee for shared services – termed an entry fee by Pindyck and Rubinfeld (2012) – that is paid by value chain members for participating in the system. It is, in effect, the first part of a two-part tariff system, and is a variable amount because it is charged to all “club” members according to their use of trays. EPS also offers a suite of services to chain members on a fee-for-service

⁴ We are grateful to Dr Robert Reiche for detailed discussions about Euro Pool.

basis, the second part of the two-part tariff. Innovation is at the core of this second part, which covers services “such as the handling and consolidation of waste packaging, pallets, displays and unsold product” (EPS, 2017) and entails the use of state-of-the-art information technologies such as 2D barcode labels on trays. It enables members of the “club” to convert latent demand for services into effective demand by sharing services that otherwise would not have been satisfied, which enhances knowledge throughout the chain thereby expanding the potential for chain improvement and higher surplus.

The benefits of the system⁵ as outlined by EPS (2017) are: guaranteed availability of trays and efficient order picking; high levels of cleanliness and hygiene; efficient logistics; CO₂ reduction; and online pool management that enhances members’ control over packaging flows and financial transactions. EPS (2017) assert that the blue and green trays they provide have the advantages over packaging rivals of negligible product loss or damage, easy handling, quick use, greater product capacity, low folded profile, optimal tracking and tracing, perfect stacking with other types of packaging, perfect product presentation in shops, ability to withstand heavy loads, and an estimated 10-year life of trays that are fully recyclable.

Thus, in this case study, a chain failure was overcome by the provision of a chain good through the collective action of relevant value chain partners and the ongoing use of innovations in materials handling and tracking.

6.2 Global Standards certification in European countries⁶

As the range of goods available to consumers expanded rapidly in the post war period and the recording of transactions moved towards electronic processes, the lack of explicit and unique identification of individual products became increasingly problematic. As a consequence, supply chains at the time were severely hampered in achieving efficient operations. After much debate, in 1973 industry leaders in the United States selected a single standard for product identification. This was the barcode. The industry organisation, GS1, was created to administer the standard. A similar debate was occurring in Europe and in 1977 the European Article Numbering Association was formed. In subsequent years EAN became GS1 Europe and then in 1990 the two GS1 organisations merged to form a single standard for product identification in almost 50 countries. Today, GS1 has a presence in over 150 countries (GS1, 2018b).

GS1 is a “neutral, not-for-profit, global organisation that develops and maintains the most widely used supply chain standards system in the world” (GS1, 2018a, p.2). It was set up as a club between retailers and supply chain partners. Today in Europe, GS1 is a collaboration of 46 local GS1 organisations, including Russia and many of the countries in the former USSR, Israel and South Africa. Across the globe, GS1 claim they have close to two million user companies with local member organisations in over 110 countries.

The benefits of GS1 are stated to be to “increase the efficiency of your supply chain; ensure fast end-to-end traceability in a cost-effective way; reduce spoilage of food; meet the needs of the new consumer; and provide one solution serving various purposes.” (GS1, 2018c, p.3). In effect, the GS1 barcode can be described as a uniform product identification system that is the basis for an efficient information flow along value chains and networks.

Again, a two-part tariff arrangement is used. A membership fee based on turnover provides access to the GS1 standards, while individual businesses which need specific solutions pay user charges for that. And again, a chain failure was overcome by the provision of a chain good through the collective action of relevant value chain partners and the ongoing use of innovations in electronics.

6.3 Meat Standards Australia⁷

Meat Standards Australia (MSA) is a voluntary grading system designed to predict beef eating quality that was introduced in the domestic market in Australia in 1999/2000 (Griffith et al., 2009). The MSA grades are based on the taste panel responses of untrained consumers (Griffith and Thompson, 2012) while the system itself uses a “total quality management approach”, from animal genetics through to cooking method (Polkinghorne et al., 1998; Thompson, 2002).

⁵ As mentioned above, we do not attempt to measure the net benefits of this case (and following cases) of collective action, assuming their revealed preference to continue with the action implies positive net benefits. Of course, deciding whether to engage in such an action would normally require, *ex ante*, a full empirical analysis of its estimated economic and social benefits and costs.

⁶ We are grateful to Dr Richard Lehmann for detailed discussions about GS1.

⁷ The material presented here has been summarised from Mounter et al. (2016).

The rationale for investing in the original RD&E that underpinned the MSA model was that beef consumers in Australia in the early 1990s were turning away from beef because they could not be guaranteed the eating quality experience they were willing to pay for, each time they purchased beef. Eating quality was subjective and based on vague notions of breed, age and feeding regime, and there was no relationship between consumer preferences, willingness to pay, and the offered quality differentials. Ways of classifying carcasses and therefore ways of describing quality varied across suppliers. Brands were little used at the retail level. Thus, prior to 2000, the Australian fresh beef value chain was not able to deliver the product that consumers wanted, so chain surplus was less than it could have been.

The solution to this chain failure was the development of MSA, which is a chain good. As pointed out by Griffith et al. (2009), Doljanin (2016) and Griffith and Thompson (2012), the value of the MSA scheme is derived at the retail level where consumers are willing to pay premiums for beef cuts that are guaranteed tender (MSA-graded beef) in contrast to ungraded beef marketed through the conventional grid system where minimal inducements are offered for eating quality improvements. The feedback on carcass quality received by registered producers combined with adherence to MSA standards facilitates product consistency over the value chain. Thus, the MSA scheme is able to create a new source of value by delivering guaranteed quality, and to capture and transmit that value back through the chain. The evidence shows that all participants in the value chain for MSA beef share in the additional value created by the introduction of the MSA scheme (Griffith and Thompson, 2012).

The chain failure resulted from both the absence of a well-functioning beef grading scheme, and asymmetric information leading to “adverse selection” – supply of too much low-quality beef and not enough high-quality beef (Pindyck and Rubinfeld, 2012, p.598). As well, the investment required to undertake the collection of data in the field and in the processing plant of many thousands of animals and the more than 100,000 consumer taste tests was simply too large to be contemplated by any one business in the beef value chain or even by the whole network. That is, the transactions costs were too high. A strong argument could therefore be made for a public contribution to funding, as outlined by Swann (2003). Public funds allowed the initial RD&E required to understand the science and to develop and trial a prototype scheme, but the cattle industry now covers almost all of the operations of MSA.

6.4 OBE Beef⁸

As indicated above there was a lack of uniform and objective beef grading on the domestic market up to 2000. There was as well a chain failure in export markets for Australian beef, in that the then current beef marketing arrangements were not delivering rewards for quality product on export markets. In particular, a high-quality organic beef market was emerging in Japan but capturing the extra value required coordinated action. So in 1995 a club was formed by 30 beef producers in outback Queensland and the Northern Territory who owned over 7 million hectares of organic pastoral country, specifically to market organic beef to Japan (OBE Beef, 2018). They formed strategic alliances with processors, transport companies and a Japanese wholesaler to secure quality over the beef value chain thereby capturing a higher market value. It is claimed that they receive a 30 per cent premium for their product in Japan.

The various alliances within the OBE Beef organic club provide a range of chain goods that any producer acting individually would be unable to create: specialised accreditation, aggregation, branding, marketing, education and communication functions.

Part of the market premium received by the club members is levied as a fee to provide the specialised services. Thus, the individual members act together to jointly provide horizontal and vertical chain goods for the benefit of the whole alliance.

6.5 Supplying food to households during covid-19 lockdown in Australia

This final case study was a short-term, strategic response to a global threat – the COVID pandemic; was narrowly targeted with a single clear performance outcome – securing supply of food and essentials to consumers; and entailed large potential spillovers to the aggregate economy and whole of Australian society, requiring federal government collaboration. The club good for members of food value chains was, directly, the guarantee by food retailers of continued access to food consumers.

Food value chain members located between retail and production also benefited indirectly from the guaranteed derived demand for their products.

⁸ The material presented here has been summarised from Malcolm et al. (2017).

The activity of a cross-section of retail club participants is best described as a form of action research in that a form of food distribution and coordination had to be applied that had not been attempted before, requiring a rapid learning process so that the system could be modified as events unfolded. As Powell (2020) observed, supermarket firms “were moving fast but flying blind, with no chapters in their crisis handbooks on how to deal with a global pandemic”.

The robustness of the Australian food marketing system to a virus pandemic in terms of its ability to continue to meet food consumption needs in Australia rested on collaboration between some key chain members and a limited but decisive government intervention. Analysing and managing these risks to the system *ex ante* is next to impossible for individual firms in the system acting alone, which otherwise are able to handle uncertain outcomes with well-behaved distribution functions either independently or through contracts with other members. The response by the federal government needed to be coordinated with a whole-of-chain response led by key members in the chain (supermarkets and a logistics firm), in collaboration with government agencies.

Powell (2020) dramatically described the series of events that ensued from the establishment of a Supermarket Taskforce in response to a national government lockdown:

“In a world turned on its head by the deadly COVID-19 pandemic, the response from Australia's supermarkets was nothing short of extraordinary. It included daily phone calls between the country's top grocery executives; and wartime-esque disaster planning involving senior cabinet ministers that nearly saw millions of Australians put onto home-delivered rations.....Rivalries and differences were set aside in an unprecedented period of co-operation, with the executives devoted only to keeping customers fed. Disasters were avoided, shortages of key goods were minimised and the country's most vulnerable were protected.” (Powell, 2020)

The Department of Home Affairs convened the Taskforce “to resolve issues impacting supermarkets” and comprised “representatives from government departments, supermarkets, the grocery supply chain and the ACCC” (Australian Competition and Consumer Commission) (ACCC, 2020). Supermarkets collaborated to ensure vital covid-19 protection measures such as in-store cleaning and social distancing were in place (Powell, 2020). Despite all these efforts, Australia's food value system was stretched to its limits by April 2020. Powell (2020) explained the challenge put by the federal government to supermarkets on Saturday, 28 April:

“... how could they provide food to two million vulnerable Australians if they were unable to leave the house? It was the government's worst-case scenario, and an unfathomable task for the companies' ill-suited online delivery systems.” (Powell, 2020)

According to Powell (2020), Australia Post and logistics firm DHL were co-opted on Sunday 29 April to organise a box of food items to be delivered to homes in need. “By Monday, the service was live.” (Powell, 2020). A food shortage crisis had been averted.

7 Concluding Comments

In the five case studies presented above it has been shown that value chain businesses in different industries and in different countries have formed ‘clubs’ to act collectively to achieve specific chain coordination objectives in the industries in which they are engaged. These objectives could not have been achieved by these businesses acting individually. The clubs have been both horizontal and vertical, both input and product focussed, and both short-lived and long-lived. In practice, the evidence shows that the concepts of clubs, club goods and chain goods seem to provide a useful framework for economists to analyse how value chain businesses work together to implement innovations and deal with chain failure.

However, the case studies have also shown that these clubs have changed quite markedly over time. Business models and governance models have evolved, and while four case study clubs have expanded their operations across regions and across products, the nature of the expansion has been at different rates. The fifth club is to be terminated once its single objective is achieved.

Some of the differences may be due to the links mentioned earlier between innovation and coordination. Certainly GS1 and Euro Pool have been able to take advantage of the spectacular advances in electronics and information technology to refine the value chain coordination mechanisms they use and to add value for their members. The innovation in MSA is that it was the first meat grading scheme to have animal and carcass characteristics directly linked to consumer taste preferences and so be able to capture consumer willingness to pay for quality beef. OBE Beef is a more traditional producer alliance and is less reliant on rapid technological changes. However, even with access to state-of-the-art innovation, the chain goods are not universally adopted. Both GS1 and Euro Pool have competitors for their offerings.

Some differences may also be due to the degree to which the objectives of all club members are aligned. Again, GS1 and Euro Pool have a narrow and specific focus on particular value chain inputs – product identification processes, and fresh produce packaging, respectively. Every member of these two clubs is vitally interested in the efficient use of those processes. Both MSA and OBE beef have a specific focus on a particular value chain output – high quality beef – and every member of these clubs is vitally interested in that product. However, the MSA alliance is a much more diverse club. Members undertake their business in different regions, at different levels of their value chains and at different scales of operation and levels of specialisation. Some of their business objectives may be closely aligned with the MSA concept, but others may not. This puts additional pressure on capturing the value from working together.

The fifth case is interesting in that the supermarkets were operating individually from upstream partners when collaborating with federal government agencies. Yet they provided leadership for these firms and acted in accordance with their interests because all members had a single objective that was very closely aligned: get food to all vulnerable households as quickly, cheaply and safely as feasible. But even in this apparently straightforward process towards attainment of a single objective, not everybody in the food value system was satisfied. Small firms at the retail stage in the food value chains felt left out, to their detriment and potentially compromising the safety of consumers from COVID-19 because they felt consumers faced a lower risk of catching the virus when shopping in their stores rather than large supermarkets (COSBOA, 2020):

“Our understanding is that people need to stay away from each other as best they can, yet we see the big supermarket chains of Coles and Woolworths becoming hubs for people to purchase material while the smaller supermarkets, convenience stores and service stations in the suburbs are treated as secondary outlets.” (COSBOA, 2020).

While the evidence suggests that these concepts do apply across a wide range of contexts, a number of research issues are raised relating to the way such clubs are designed, implemented and governed. Equity considerations are also important as in the fifth case study where large firms act on behalf of value chain partners. Furthermore, there seem to exist differences in the optimal size of those clubs. While in cases such as GS1 the positive network effect of the club always further increases with its size, in cases such as OBE Beef there likely is an optimal size of the club with chain benefits declining beyond that point.

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