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## Consciously Pursued Joint Action: Agricultural and Food Value Chains as Clubs<sup>1</sup>

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### ABSTRACT

Certain members of a population consciously and deliberately decide to take joint action to provide particular types of goods or services that are at least partly excludable and at least partly congestible because it is too costly to provide such goods individually. These goods are called club goods or collective goods. We first define some key concepts in club theory and public choice. This includes the prospects for determining the optimal level of membership of a club, how to determine the optimal level and range of provision of services by a club, and consideration of the dynamics of club membership. Then we examine the ways in which club theory can help provide an alternative approach to recognising and overcoming market failure in agricultural and food value chains. We note that useful insights can be gained by considering value chains as 'latent clubs'. That is, they are systems that exist but which are either inactive or have not been fully developed, but which have the potential for improvement through collective action. If value chain members do exploit an opportunity to reap the rewards of collective action, then forming a club that comprises the whole chain or a subset of chain members offers an efficient organisation design to do so. We find that all of the calculus that has been identified for clubs can be applied to agricultural and food value chains. However, there are two particular issues that require further consideration. One is the nature of risk in agricultural value chains, and how it is related to member preferences, and the other is the form of collective action to be taken by agricultural value chains in the future.

*Keywords: clubs; collective action; value chains; chain goods; chain failure*

### Introduction

Successful value chains create and increase chain surplus, where chain surplus is defined as the difference between aggregate customer value and the cost to the value chain of meeting their customers' requirements (Chopra and Meindl, 2013, p.3). As described by Mounter et al. (2016a, p. 1), to do this they must spend time and effort on designing and planning how their chain will be structured and operated. This might be done by a chain governor acting on behalf of all participants (such as an industry organisation), by a dominant firm (say a large manufacturer or retailer), or in some countries, by a government institution. Alternatively, it might be done collaboratively through all partners contributing to the chain vision. Whichever way it is done, it is a complicated process, especially in global value chains with many firms and many channels, so value chain coordination procedures and the governance mechanisms that sit behind them are of critical importance.

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Because of this complexity, the ability of food value chain participants to benefit from creating value is constrained by the potential for misalignment between the financial incentives for individual firms and the collective incentive for the whole chain. This misalignment is similar in some ways to, but different in other respects from, the typical under-investment in public goods found in the general economy or in 'old world' commodity markets (Griffith et al., 2015).

Thus, market failure abounds in agricultural and food value chains. Typical areas of value chain organisation and operation prone to market failure include the following:

- Strategic research, development and extension,
- Regulation of markets and transactions within the value chain,
- Enhancing consumer and channel knowledge,
- Chain sustainability,
- Education and training in value chain analysis, operation and management, and
- Chain governance and relationship management.

While such a list provides a useful means to assess where intervention and/or investment is needed and justified, the usual approaches to recognising and countering these market failures tend to be piecemeal and independent, without a clear focus on overall chain surplus (see also the related discussion in Griffith et al., 2017). A more systematic approach is required.

Our objective in this paper is to examine the ways in which club theory can help provide an alternative approach to recognising and overcoming market failure in agricultural and food value chains. In the next section, we define some key concepts in club theory and public choice. This includes the prospects for determining the optimal level of membership of a club, how to determine the optimal level and range of provision of services by a club, and consideration of the dynamics of club membership. In section 3 we examine how the theory of clubs can be applied to understand and explain collective action in an agricultural and food value chain. Section 4 examines further issues for consideration, while the paper ends with conclusions in section 5.

## **The Theory of Clubs**

### **History**

Sandler and colleagues (for example Cornes and Sandler, 1996; Sandler and Tschirhart, 1997; Sandler, 2013) have been reviewing this area of the literature for many years. In the most recent paper, he documented the almost 50 year history and rationale of club theory, demonstrating how its application can inform a wide range of collective actions that benefit club members. He identified influential thinkers about the theory of clubs, most notably Buchanan (1965) who is credited with developing the concept. But at the same time, Olson (1965) was coincidentally writing about collective action by groups (see also Olson and Zeckhauser, 1967; Cooper, 1967), and earlier writers such as Tiebout (1956), Wiseman (1957) and Mohring and Harwitz (1962) were analysing related issues in the area of public expenditures. Sandler (2013) also described a wide range of applications of the theory of clubs, including jurisdictional design, highways and other transport infrastructure, military alliances, recreation, telephone systems, global communication networks and dealing with intergenerational issues.

### **Key concepts in club theory**

What is a club? A Buchanan club is defined as 'a decentralized, voluntary organization sharing an impure public good that is excludable and congestible' (Sandler, 2013, p.281)<sup>2</sup>. Another definition is that a club is 'a voluntary group deriving mutual benefits from sharing one or more of the following: production costs, the members' characteristics, or a good characterized by excludable benefits' (Sandler and Tschirhart, 1980, p.35). So a club is an entity (an organisation, a group, an institution) but the formation of the entity is tied closely with the nature of the "public" goods and services that the entity provides.

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<sup>2</sup> See the glossary at the end of the paper for related definitions.

Also, while its voluntary nature is a defining characteristic of a club, some form of compulsion may be involved to prevent free-riding. This usually involves some form of membership fee which allows entry into the club and the goods and services it provides.

There are several other concepts closely related to the formation of a club. One is that of an “encompassing group” (Olsen, 1965). According to McGuire (2015, p.40), “An encompassing group internalizes in its own decision calculus a portion of the costs and benefits its actions impose upon the economy in which it is embedded. If a group is *completely or perfectly encompassing*, it will include calculation of *all* the benefits and costs its actions impose on the *entire economy*, and thus will impose no distortions on that economy; instead in this case it will perfectly represent or reflect the economic interests of everyone.”

Another is that of “collective” or “joint” action. Collective or “consciously pursued joint action” is action taken jointly by independent entities in whose interest it is to do so to achieve a common goal or for competitive advantage but for whom, individually, the costs of taking such action outweigh the individual benefits. Ostrom (2002, p.5) observed that ‘all collective action problems share an initial characteristic that excluding non-contributors to a collective benefit is a nontrivial cost’. Collective action leads to the notion of “collective efficiency” (Schmitz, 1995).

A third related concept is that of a “strategic alliance”. Varadarajan and Cunningham (1995, p.282) defined a strategic alliance as ‘the pooling of specific resources and skills by the cooperating organisations in order to achieve common goals, as well as goals specific to the individual partners’. Some of these goals may relate to the provision of excludable and partly congestible public goods, and elsewhere we have shown that strategic alliances fit under the broad umbrella of clubs (Malcolm et al., 2017).

Finally, the idea of a “hybrid” organisation or institution is relevant here. Hybrid institutions are “complex organisational forms [with] many stakeholders performing jointly tasks that neither the market nor the individual firm can achieve.” (Carbone, 2017, p.1). Carbone goes on to argue that food supply chains should be framed as hybrid institutions (p.20).

To summarise, certain members of a population consciously and deliberately decide to take joint action to provide particular types of goods or services that are at least partly excludable and at least partly congestible because it is too costly to provide such goods individually. These goods are called club goods or collective goods. Thus a club good is ‘a partly rivalrous public good, characterized by excludable benefits’ (Sandler, 2013, p.267). According to Sandler (2013, p.68), ‘club goods must possess some rivalry and sufficient excludability’. A collective good is a public good ‘defined with respect to some specific group’ in a population (Olson, 1971, p.14). Olson observed that ‘some goods are collective goods to those in one group and at the same time private goods to those in another, because some individuals can be kept from consuming them and others can’t’ (Olson, 1971, p.14). Sandler (2013) pointed out that ‘club goods do not encompass all impure public goods, where benefits are partly excludable and/or partly rival’. The defining difference is the ability of clubs to operate ‘a sufficiently inexpensive exclusion mechanism to charge users for the congestion that their use causes’ (Sandler, 2013, p.268).

A categorisation of the various types of public and private goods, along with examples, is provided in Table 1.

**Table 1. Nine Types of Private and Public Goods**

	Excludable	Selectively Excludable	Non-Excludable
Rivalrous	Pure private good	Impure public good/club good	Common resource
Partly Rivalrous	Impure public good/club good	Impure public good/club good	Impure public good
Non-Rivalrous	Quasi-public good	Impure public good	Pure public good

Source: Adapted from Hubbard et al. (2012, Figure 15.7).

Pure private and pure public goods are in the top left and bottom right corners respectively. A quasi-public good, which is non-rival and excludable, is in the bottom left corner, and a common resource, which is rival and non-excludable, is in the top right corner. The other five categories are all impure public goods – some combination of at least selectively excludable *or* at least partly rivalrous. According to the definitions given above, three of these are where club goods reside – some combination of at least selectively excludable *and* at least partly rivalrous.

Olson (1965) (cited by McGuire, 2015, p.36) outlined five factors for considering ‘the crucial dimensions along which analysis of voluntary provision of public goods must be pursued’ (that is, the provision of a club good). These criteria, which have been used by a number of researchers (for example, Cornes and Sadler (1996)) are:

- (1) the size of the group (club);
- (2) disparities in income and preferences among group (club) members;
- (3) openness or closedness of the group (club) to new members – which he called “inclusive” or “exclusive”;
- (4) the fashion in which individual contributions are settled, involving such issues as sequence of allocative moves, possibility of re-contracting, bargaining, commitment, and repetition; and
- (5) the effect of joint provision or tying of a private good to a public good limited to members of the group (club) which thereby holds the membership captive – issues we now call impurities or imperfections in publicness (McGuire, 2015, p.36).

#### **Determining the optimal level of membership of a club**

Siqueira (2001, p.383) observed that ‘club theory is consistent with the voluntary approach to the provision of collective goods ... [and] provides an analytical framework for demonstrating that collective goods can be provided according to first-best principles, without the need of a central government’. This analytical framework provides a sound basis on which to determine the optimal level of membership of a club.

The basic first-best principles originally spelt out by Buchanan (1965) were reproduced by Sandler (2013, pp.268-272). Sandler noted that ‘Clubs are replicable and partition the population into a set of clubs, each with the optimal number of members’ (Sandler, 2013, p.268) whose utility functions can be specified. Members’ utility increases by consuming more private and club goods as the cost of supplying club goods declines with increased membership, but decreases beyond some membership level as congestion sets in (although this decline is possibly offset by the internalization of network externalities).

Sandler specified the resulting first-order conditions as a provision and membership condition where the marginal rates of substitution and transformation between private and club goods are equated. He interpreted these conditions to mean that ‘each member equates the marginal benefit of the club good, evaluated in terms of the numéraire, to the marginal cost of the club good’ (Sandler, 2013, p.269). The optimal membership size and the optimal provision of services are co-determined.

Sandler (2013, pp.273-274) broached the important topic of member heterogeneity, a vital consideration for considering clubs in food value chains. He quoted McGuire (1974) who "... demonstrated that his clubs cannot optimally accommodate different types of individuals. This follows because members must utilize the entire quantity of the club good. To accommodate different tastes, utilization patterns of members must be allowed to differ, which comes with more advanced models ...". Without this accommodation, McGuire correctly indicated that clubs must be segregated with identical members. So what has started as an innocuous assumption has become an implication that could mistakenly direct policy to segregate clubs.

More recent studies have developed ways of accounting for the heterogeneity of club members. Sandler (2013, section 5) acknowledged that 'most real-world clubs ... serve members, who possess dissimilar tastes and needs'. He went on to explain how these varied tastes and needs could be accounted for in an efficient manner: "These differences primarily manifest themselves in terms of varied utilization. An easy way to accommodate heterogeneous or "mixed clubs" is with a single club that serves a subset of the population, who are members ... The optimal membership requirement distinguishes members from non-members; that is, those individuals with the greatest willingness to pay join the club until membership charges outweigh membership benefits... The toll condition is the key new ingredient for mixed clubs. All members pay the same congestion-internalizing toll when crowding is anonymous, but the total tolls paid by each member vary according to their revealed visits. ... Thus, total tolls are individualized based on revealed use."

Sandler (2013, section 5) makes a strong distinction between anonymous and non-anonymous crowding: "When members' attributes affect crowding, crowding is non-anonymous and tolls must be tailored to the user" (DeSerpa, 1977; Glazer et al., 1997). Under these circumstances, club design becomes more difficult. Consider a learned society. Really smart or accomplished members may offer more positive externalities from their presence than any crowding that they cause, so that their membership fee or toll may be negative, resulting in a subsidy! Most members of the society have to pay tolls because their crowding dominates. In some clubs, the refinement of the notion of a visit may be a more practical means to account for non-anonymous crowding. ... even non-anonymous crowding can sometimes be circumvented through provision decisions (i.e., club goods tailored to the members' attributes) or finer utilization measurement."

A problem frequently encountered in clubs is asymmetric information, which can lead to an expansionary bias in club membership, a notion originally put forward by Sandler and Tschirhart (1997) and supported by Siqueira (2001) on the basis that 'agency costs increase the overall cost of provision and therefore tends to raise the benefit of cost sharing among members' (Siqueira, 2001, p.383).

### **Determining the optimal level and range of provision of services by a club**

A club can determine the optimal level of provision of goods or services by employing a two-part tariff. It provides a means to maximise the extraction of consumer surplus by the club from its members and is an important way for a club to satisfy the wants and utilities of heterogeneous sets of members. In most clubs, members vary in the services they require and in the levels of impact that particular forms of market failure have on their welfare. This is perhaps the main source of breakdown of club cohesion where some members feel that they receive little benefit from their membership while seeing other members benefit greatly. While this source of perceived inequity will never be totally removed, a flexible club is able to provide a variety of services that enable members to choose those services that best suit their purpose, thereby substantially alleviating the problem. The more heterogeneous the membership of a club, the lower the membership fee is likely to be and the more varied the services offered to overcome the various forms of market failure. On the other hand, efficiency of provision of services suggests a smaller rather than larger number (Cook, 1995; Royer, 1999). Pindyck and Rubinfeld (2001, p.388) provide a simple example of an optimal two-part tariff.

The quality of club governance is crucial. Moral hazard, often interacting with transaction costs, principal-agent problems and information asymmetry, can lead to free-riding and over-servicing in clubs. Siqueira (2001, pp.384) made the following observations in this respect:

"... in clubs where multiple visitation is feasible, the absence of monitoring or implementing a per-visit fee by club officials due to high transaction costs can lead to increased utilization of the club by users ... . Even in the absence of multiple visits, if exclusion and monitoring are relatively costly so that these activities are imperfectly implemented, there exist temptations for potential users to free ride, to use the club without

paying ... even where exclusion is relatively costless, problems of moral hazard are still likely. For instance, in clubs with a manager or operator in charge of services or maintenance, their actions or effort may be imperfectly observable or not verifiable by third parties. In such situations, where the manager is risk averse, this leads to more than just the usual trade-off between weak incentives and reduced risk sharing on one hand and strong incentives and increased risk sharing on the other. Because of the possibility of cost sharing among members, increased costs associated with higher power incentives can be shared among more members, but this in turn, tends to be offset by increased crowding or congestion."

Siqueira also noted that where club members cannot closely monitor a club manager's actions or efforts, and where the manager is risk-averse, a challenge lies in getting the manager to fulfil their contract requirements 'and shifting some of the burden of risk towards the agent' (Siqueira, 2001, p.384). He observed that the 'increased cost of providing the agent with stronger performance incentives can be offset per member through increased cost sharing [but] this needs to be weighed against the tendency towards more crowding ... as a result of increased membership' (Siqueira, 2001, p.384).

### **Dynamics of club membership**

Being a member of a Buchanan club is a voluntary choice, unless members collectively vote to do otherwise, and being a member implies that the benefits flowing from the membership outweigh the costs incurred. If the costs of taking collective action outweigh the benefits received, then voluntary members will choose to cancel their membership. This might be due to changes in the value of the club good relative to the value of the same good acquired privately, changes in club fees and charges, changes in the tastes and preferences of the member, or changes in club rules such that non-anonymous crowding becomes an issue. Thus, movement in and out of clubs over time is commonplace.

Some clubs might be seen as essentially permanent business structures. This might happen because the chain failure leading to the creation of the club is of such importance or of such scale that a major institutional response is required. Multinational defence treaties, multinational free trade agreements and the like are the extreme examples. For these types of clubs there is often the need to have formal legal agreements and a strong government legislative framework. On the other hand, many clubs are set up with short life spans to meet a specific need. Here the chain failure leading to the creation of the club might be of low importance or the scale of the failure might be localised. A small group of members might then get together, agree on a solution and finance and implement it, and then disband. The same group might reform to tackle the next issue, or a new combination of members might emerge.

Disparate members' objectives or interests may contribute to instability in membership, and hence in capacity to generate fees to maintain services or raise capital for investments. Varied interests might represent commercial variety – members or potential members recognise or value services differently – or temporal variety – members' discount rates differ over time. Especially for long-lived clubs, dealing with intergenerational issues is crucial. Intergenerational clubs are clubs where "[m]ultiple generations of members share the club good, which is subject to atemporal crowding and intertemporal depreciation [degradation of the club good through its use]" (Sandler, 2013, p.280). The same set of issues that might lead voluntary members of a club to choose to cancel their membership are relevant for intergenerational choices, especially the notion of different members of different ages having markedly different tastes and preferences.

### **Agricultural and Food Value Chains as Clubs**

In his review of almost 50 years of club theory, none of the examples provided by Sandler (2013) mentioned agricultural or food value chains or anything close to them in terms of the nature of their operations. But we believe that useful insights can be gained by considering value chains as 'latent clubs'. That is, they are systems that exist but which are either inactive or have not been fully developed, which have the potential for improvement through collective action. Club theory, then, could be applied to examine ways to increase the value added (surplus) of an agricultural or food value chain by collective action taken within a club format.

A value chain is a latent club in the sense that its members are independent entities that interact with each other – exchanging information, inputs, services and products – but need not engage in collective action even though they have the potential to do so. So long as they interact as independent entities, they would not take

actions that are privately unprofitable but which are profitable to them as a group or sub-group in the chain, thereby forgoing collectively profitable opportunities. If members do exploit an opportunity to reap the rewards of collective action, then forming a club that comprises the whole chain or a subset of chain members offers an efficient organisation design to do so.

A typology of clubs in food value chains may include the following five elements:

1. Horizontal clubs comprise entities that take collective action across a single cross-section or an aggregate of multiple cross-sections in the value chain<sup>3</sup>.
2. Vertical clubs comprise entities that form a strategic alliance for collective action along a single value chain within a network of chains.
3. Clubs may focus on a single product in the value chain (say, bread wheat) or multiple products (say, bread wheat and durum wheat).
4. Clubs may focus on a single activity (say, R&D) or multiple activities (say, R&D and certification for food safety) in taking collective action.
5. Clubs may vary according to which firms in the chain could potentially collaborate.

This means that the appropriate composition of such clubs may vary, from whole-of-chain membership to horizontal or vertical strategic alliances existing within parts of the chain. As noted above, a strategic alliance is a generic concept in strategic management of which clubs may be considered to be a sub-set (Malcolm et al., 2017). Whole-of-chain membership of a club is only likely to be feasible and profitable in very simple food value chains.

If value chains can be considered as clubs, then the concepts of chain goods and chain failure follow (Griffith et al., 2015, 2017; Malcolm et al., 2017). A chain good (a club good in a value chain) is partly rivalrous and selectively excludable within that value chain; and chain failure is a failure to achieve economic efficiency in a value chain because of imperfections in market mechanisms that prevent the optimal provision of chain goods. And while market failure often results from failure to internalise social externalities, chain failure often results from failure to deal with chain externalities.

A unifying feature of our presentation of agricultural value chains as clubs is the endogenous adoption of collective modes of operation. Adoption centres on net benefits in terms of reduced transaction costs and internalised externalities. Adoption of the club model, however, entails a number of management steps associated with achieving club formation, maintaining club membership, and achieving club sustainability and viability. Each step has implications for members' fee structures and for levies on subgroups of members for receipt of specific club functions.

Fee structures, continuing the earlier discussion of two-part tariffs, might be set in agricultural value chains in association with up-front fixed fees to enable functionality in fundamentals such as production and market access, while variable fees might refer to the costs of delivery into markets. For longer term investment, levies on the membership will avoid fragmentation only where variation in member type is managed: Cook (1995) referred to producer co-operative fragmentation where "horizon" and "portfolio" problems were not overcome. Horizon is associated with disparate club members' tastes for the future, notably that long term investments may offer little appeal to club members near retirement, so they will be unlikely to receive the services generated from current investment. Portfolio recognises member differences on one hand: some services are more lucrative or less risky than others and club members will know this to varying degrees; and accounts for risk on the other: club members may manage their own portfolios of activities and use diversification in risk management, but clubs themselves are steeped in a fee-for-service model that solely satisfies member demand. Royer (1999) has argued this risk perspective as being influential in sustainability of farm co-operatives.

All of the calculus mentioned above that has been identified for clubs can be applied to agricultural and food value chains. However, in doing so, the form and operation of value chain governance is crucial (see for example Microlinks, n.d.; Carbone, 2017). This refers to the relationships among the buyers, sellers, service

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<sup>3</sup> There is a synergy here with club goods provided in a spatial context. There is a growing literature on both clusters being set up as clubs to provide whole-of-cluster goods and services, and local public goods provided by local government authorities. See Mounter et al. (2016b) for a review.



providers and regulatory institutions that operate within or influence the range of activities required to bring a product or service from inception to its end use. Governance is about power and the ability to exert control along the chain - at any point in the chain, some firm (or organization or institution) sets and/or enforces parameters under which others in the chain operate.

Thus, following Sandler (2013), it would be technically feasible for the chain governor to specify a provision and membership condition where the marginal rates of substitution and transformation between private and chain goods are equated. This can be done by employing a two-part tariff, which both allows the means to maximise the extraction of consumer surplus from chain members and satisfies the wants and utilities of heterogeneous sets of members. This is especially found in agricultural and food value chains in which there is a throughput of many differentiated products. Many value chain service providers have a flat fee for the basic or minimum level of service, and add-on fees for higher levels of service.

Thus a chain governor, like a club manager, is able to provide a variety of services that enable members to choose those services that best suit their purpose. This focus on clubs' production and delivery of services is indicative of club function rather than form, and our discussion has stayed clear of advocacy of forms beyond the schematic specification of a club typology in food value chains as outlined above. Form may well be simultaneously a generator and a result of governance, as agricultural value chain characteristics such as transaction network configuration, ownership of unique resources and demand for information all position or require governors in the chain. Risk in agricultural value chains may best be treated this way, in particular by subsets of club members voluntarily assuming risks in return for profit and by club fragmentation being a consequence of the risks being unable to be beneficially internalised either as an externality or as a transaction cost.

### **Issues Requiring Further Analysis**

If in an agricultural and food value chain there are recognised impediments to the maximization of chain surplus, there are a number of options available to value chain participants to overcome these impediments. In some situations and in some environments, governments may be called on to intervene, while in other cases a dominant firm such as a large retailer might choose to implement a new policy or a new practice that becomes "the new rules of the game". Other options relate to negotiated outcomes between value chain partners. But how do value chain partners choose which option would best suit them? We argue that such choices do occur, and that they are optimal responses to chain failure based either around transaction cost theory or the internalisation of an externality.

In the discussion above we have argued that various alliances within a food value chain are often formed endogenously in a club structure with the aim of overcoming chain failure, if sufficient information is available so that the marginal rates of substitution and transformation between private and chain goods are equated. Whether such a club needs to be formed to deal with the chain failure, or whether private actions among chain members (a Coasian solution) would be sufficient to avoid its occurrence, revolves around the issue of transaction costs. If a private solution is taken (the benefits of private action outweigh the transaction costs to them), with a view to maximizing their private profits, there is no commitment about the impact on chain surplus and chain governance concerns do not arise. This is simply a private commercial negotiation between two parties to a transaction.

According to Dahlman (1979, pp.161-162), a Coasian solution "... explicitly attempts to ascertain the economic consequences of alternative ways of organizing the allocation of resources. The analysis thus directs attention to the point that institutions fulfill an economic function by reducing transaction costs and therefore ought to be treated as variables determined inside the economic scheme of things. The question then ultimately becomes: how can the economic organization be improved upon by endogenous institutional rearrangements?"

Coasian solutions often do not work to the benefit of the whole of society, and in our case particularly to members of the food value chain, especially if the assumptions of perfect information and equal bargaining

power do not hold. On the issue of perfect information, Hahnel and Sheeran (2009) made the important point that the application of Coase's theorem relies on negotiation in a situation of incomplete information rather than a market solution, and outcomes depend on factors such as the relative bargaining strength of the parties, the milieu in which their negotiations take place, the frequency with which they take place, and the potential for applying different aspects of game theory. Not only does complete information have to be available to both sides of a negotiation, but also it has to be common knowledge to avoid perverse incentives being created that adversely affect others (in our case, other members in the value chain). A priori, the limitations of a Coasian solution make it likely that a club solution would be more efficient and equitable, but that may not always be the case.

In circumstances where transaction costs outweigh the benefits from chain partners pursuing a Coasian solution, the formation of a club – either across the whole chain or a designated part thereof – may enable transaction costs to be reduced across all interested parties to a point where they are now outweighed by the benefits of joint action.

Risk in agricultural value chains has occupied some of the narrative of our paper, in association with member preferences. Two key risk considerations then remain unexamined. First is the static effect of the extent or nature of risk on the nature of clubs formed; and second the more dynamic effect of iterative development of clubs to accommodate and allocate risk. Further analysis of these situations is likely to be highly context-specific, particularly with regard to the nature of final consumers' demand and the governance exerted in the chain.

Another area of contention for food value chains as latent clubs concerns the variety of power relationships within a food value chain. It is particularly of concern where oligopsony and oligopoly are present in those food value chains.

## Conclusions

An advantage of using club theory rather than the more pragmatic strategic alliance framework to study the operation of a food value chain is its rigorous analytical framework to: (1) determine the optimal number of clubs, club size, level of provision of services within a club and fee structure for heterogeneous club members; and (2) identify chain failure and the potential for its removal or alleviation by providing chain goods, eliminating chain bads, and internalising chain externalities.

The basis for our approach in this paper is that, in respect of food value chains, Pigouvian taxation is not the sole means of internalising an externality and that the provision of goods and services that possess public good attributes need not be the sole province of governments. This is to say, first, endogenous adjustment of actors within food value chains can align marginal benefits and marginal costs of service delivery, and, second, that club operation delivers both the costs and the benefits to members who are simultaneously payers of costs and receivers of benefits.

Such endogenous forces of adjustment can and do overcome entry and maintenance costs to bring the club into being by way of two-stage tariffs. We have associated these with the two fee-paying regimes of agricultural production and marketing, being lump sum payment and volume-based payments. Various emphases on these two represent approaches to achieving and using economics of scale, and so refer to the size of club and its relationship to fee types and levels.

Beyond size and cost structure, stability of clubs is implicated by the tension between club member variety in objectives and unanimity in demand for club services. We have extended agricultural co-operative research work in terms of horizon and portfolio problems as fragmentation mechanisms for clubs. We also suggest that interpretation of the correction of chain failure as a club function assists in explaining sustainability and stability of agricultural value chains. Members' nuanced understanding of the benefits of club membership – i.e. collective action – puts an effective brake on fragmentation and guides club managers or their analogous agricultural value chain governors.

Our proposed typology of club-motivated agricultural value chains exists in an iterative arrangement alongside past collective action, both successful and unsuccessful, and possible future collective action. Those in the past have disintegrated due to forces of scale, technology and consumer tastes, while those in the future are subject to the same influences. Club design, particularly its mix of services and fee setup, may harness such disruptive forces.

Our discussion presents a club as a structure with much to advocate for agricultural value chains. However, our discussion is not one of form but rather of function. The form to be taken by collective action in the future by agricultural value chains is generally of less interest to stakeholders than is the functionality of value addition and its allocation among members of a club or chain.

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## Glossary of Terms

*Pure public good:* A pure public good is non-rivalrous and non-excludable.

*Impure public good:* An impure public good satisfies the criteria of a public good in being non-rivalrous and non-excludable to some level but not completely.

*Non-excludable good:* A good is excludable if somebody can be prevented from using it. Conversely, 'If the benefits of a good are available to all once the good is supplied, then its benefits are non-excludable' (Sandler, 2013, p.265).

*Non-rivalrous good:* A good's benefits are non-rival when a unit of the good can be consumed by one individual without detracting, in the slightest, from the consumption opportunities still available for others from the same unit. Non-rivalry means that the marginal cost of extending the good's benefits to another consumer is zero (Sandler, 2013, p.265).

*Congestion (crowding):* 'Crowding or congestion involves a detraction in a club good's quantity or quality from increased utilization by the sharers. ... The presence of congestion means that the extension of user rights to another individual implies a nonzero marginal cost, which, in turn, justifies the need to restrict users or members. In contrast, there is no need to restrict the number of consumers for a non-rivalrous good, because society prospers from extending consumption to anyone who obtains a positive marginal benefit.' (Sandler, 2013, p.266).

*Anonymous crowding:* crowding in a club caused by members who cannot be distinguished from other members.

*Non-anonymous crowding*: crowding in a club caused by members' attributes (Sandler, 2013, p.275) and these members can be identified.

*Free-rider problem*: The free-rider problem occurs when those who benefit from resources, goods, or services do not pay for them, which results in an under-provision of those goods or services. According to Sandler (2013, pp.265-266), 'Nonexcludability of nonpaying benefit recipients leads to the free-rider problem', which requires club intervention to prevent its occurrence assuming the transaction costs of intervention do not outweigh the benefits from resolving the problem.

*Collective efficiency*: Schmitz (1995) defined collective efficiency as 'the competitive advantage derived from local external economies and joint action'.

*Coasian solution*: A Coasian solution is an agreement reached between parties that is attained by means of a mutually advantageous bargain between them (Harrison et al., 1987, p.388).

*Network externality*: A network externality or network effect is "... the effect that one user of a good or service has on the value of that product to other people. When a network effect is present, the value of a product or service is dependent on the number of others using it." (Shapiro and Varian, 1999).

*Transaction costs*: 'Transaction costs represent resource losses due to imperfect information' (Dahlman, 1979, p.148). The three types of transaction costs typically mentioned in the literature – search and information costs, bargaining and decision costs, and policing and enforcement costs – reduce to this simple definition according to Dahlman (1979). Williamson (1981) identified the key determinants of transaction costs as frequency, specificity, uncertainty, limited rationality and opportunistic behaviour.

*Two-part tariff*: A club membership fee is charged and, in addition, prices are paid by members for specific services that the club offers.

*Toll*: a fixed charge for the right to consume a specified good or service, traditionally used as a term for the price paid for using transport infrastructure.