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Stakeholder Collaboration Models for Exporting Perishable Agricultural Commodities in Asia

MILESTONES 11-13 REPORT

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ABBREVIATIONS

AHP	Analytical Hierarchy Process
ASC	Agricultural Supply Chain
ASCC	Agricultural Supply Chain Collaboration
ASCM	Agricultural Supply Chain Management
CQ	Central Queensland
IT	Information Technology/ies
GM	Genetically Modified
LT	Leadership Theory
MFM	Macadamia Farm Management
QLD	Queensland
R&D	Research and Development
RDT	Recourse Dependency Theory
RFID	Radio Frequency Identification
SC	Supply Chain
SCC	Supply Chain Collaboration
SCM	Supply Chain Management
SCMS	Supply Chain Management System
SCOR	Supply Chain Operations Reference model
ST	Stakeholder Theory
TCE	Transaction Cost Economics theory
TU	Theory of Uncertainty

EXECUTIVE SUMMARY

This report presents an analysis of potential agricultural supply chain collaboration models appropriate for the avocado, lychee and mango industries in the Queensland horticultural sector. These models were prepared through a qualitative research approach, utilising direct engagement with the stakeholders as well as a stakeholder collaboration workshop. The design of the workshop activity was informed by a literature review, project scoping discussion with farmers and representatives of relevant industries, government and non-government organisations, as well as pilot testing. A key activity in the workshop was to ask clusters of stakeholders to focus on one horticultural product (e.g. avocado, lychee or mango), to identify existing and potential linkages amongst the entities in the supply chain, and their preferences for collaboration models in the sector. This task was repeated individually as well as in a groupwork format for each fruit.

The key finding arising from this research process was that there were four categories of issues relevant to stakeholder collaboration models in Queensland horticulture. The first category related to the production and includes land availability, water supply availability, capital investment, cost of production, quality produce, genetics and green production system/regulation. The second category is related to logistics and processing. This category covers transport and technology needs, advanced agricultural technology and value-added products. The third category is related to marketing the products, including market access to certain medium and high-income consumers in Asia, brand and traceability and market discovery. The fourth category is the mode of collaboration which includes horizontal and vertical collaboration.

The findings revealed that there is already some collaboration happening in the horticulture sector of Queensland. The study identified potential mechanisms for greater horizontal and vertical supply chain collaborations in exporting perishable commodities from Queensland. As well, the study found that individual horticultural industry representative bodies (such as Growcom) or processors are important in facilitating horizontal collaboration among farmers. Furthermore, it appears that vertical collaboration within agricultural supply chains in Queensland could be best led by either a single entity or a combination of several leaders, most likely being either processors, a genetics company and/or lead investor.

With regards to mango supply chains for international markets, the stakeholders identified that this is already well-established in Queensland. However, horizontal collaboration is needed between small and medium scale farmers as well as value-added production facilities. This is particularly important to deal appropriately with any excess production occurring during November-January (i.e., the peak mango harvesting season across Queensland). Although the mango industry already has several different supply chains for exporting their produce to international markets, more strategic collaboration among

the genetics industry, primary producers, processors and exporters is required in the longer term. This could be both process and management-oriented collaboration, which would achieve the benefits of continuous and consistent supply, reducing risk and more resilience in the international market.

For the lychee industry, stakeholders described the existence of comparatively new supply chains with access to a few Asian markets such as Singapore, Hong Kong and Malaysia. Lychee is a high-value and high demand commodity across a wider spectrum of Asian markets than are currently being accessed. Therefore, the stakeholders recommended developing collaboration models led by producers, as well as technology and/or genetics firms, to generate access to other markets. Lychee has a wide range of varieties and not all of them are currently produced in Queensland. A genetics and technology provider could support the lychee industry by producing different varieties for different markets.

Stakeholders discussing the avocado sector noted the existence of a complex supply chain and that there is already an appetite to simplify the current processes. As the demand for avocado is increasing in the Asian markets, Queensland producers cannot supply extra demand from international markets without a significant increase in production. Therefore, the stakeholders suggested that resource providers (e.g. Government, industry groups) and investor-led collaboration models would be best placed to achieve vertical integration of growers, processors and exporters, in order to position the industry well to supply to high-volume Asian consumers.

In addition to fruit-specific models, the workshop participants identified that horizontal collaboration amongst farmers generally, in addition to vertical collaboration, has an important role to play to achieve effective agricultural supply chain collaboration and to increase export volumes to Asian markets. The stakeholders could not reach a consensus view about a particular governance mechanism to underpin such collaboration; however most suggested that the government (state and/federal) should facilitate the horticulture industry in the process of horizontal collaboration, particularly for product and contract standards, market access and conflict resolution. This particular research project was heavily focussed on identifying models appropriate for three specific industries (i.e., avocado, lychee and mango), however, the results are expected to also be broadly generalisable to other perishable and tropical fruit industries in northern Australia.

This study has finally developed an action plan to translate the findings into practices. The action plan is divided into seven actionable steps including: developing leadership, quality control, contract management, forecasting and market analysis, policy and protocol development, brand development and export.

SECTION ONE

INTRODUCTION

1.1. Introduction

The efficiency of agricultural supply chains (ASC) is an important issue for businesses and governments because of the need to provide food to an increasing world population and disruptions in traditional supply chains. The world's population is projected to reach about 10 billion by 2050 (UN, 2017), which triggers the search for efficient, cost-effective, affordable and sustainable agri-food supply chains. The main objective of a supply chain is to satisfy the demand for quality products or services to consumers, in an appropriate timeframe and at an appropriate cost. A supply chain network includes producers, processors, transporters, wholesalers, retailers, and consumers as well as third-party logistics providers such as governments and private providers (Awad and Nassar, 2010). However, supply chains for less-perishable agricultural commodities (e.g. grain) differ from those of perishable agricultural commodities (Yan et al., 2017), given that temperature and timeliness during the processing and transport network have direct impacts on the freshness of the perishable commodities.

Effective supply chain management is characterised by inter-enterprise cooperation among all parties who are either horizontally or vertically involved in the supply chain. Supply chain collaboration (SSC) can be simply explained as the collective efforts of two or more parties to achieve common strategic goals and sharing both profit and risks. Such collaboration between parties in the context of perishable agricultural commodities could potentially offer greater competitive advantages (Liao et al. 2017), better coordination (Masten and Kim 2015) and enhanced risk management systems (Quoc Le et al., 2013). Other key benefits of collaboration include business innovation (Wong et al., 2013, Hsieh et al., 2010) and improved inventory management (Tsou, 2013).

This research report focuses on the theoretical, conceptual and contextual domains of agricultural supply chain collaboration (ASCC) as well as developed agricultural supply chain collaboration models for the horticulture sector in Queensland, with a specific focus on avocado, lychee and mango.

1.2. Aim, Scope and Organisation of the Study

This report presents an analysis of possible agricultural supply chain collaboration models that would be appropriate for avocado, lychee and mango industries in the Queensland's horticulture sector. These models were prepared through direct engagement with relevant stakeholders as well as a stakeholder collaboration workshop. Although the models are focussed on three specific industries, the overall findings are also expected to have some degree of translation to other perishable and tropical fruit industries in Queensland.

The report is organised by presenting the introduction (section 1) and a summary of key concepts and theories relevant to SCC (section 2). Section 3 provides details of the research method, followed by the results and analysis in section 4. Section 5 concludes the report with some recommendations.

1.3. Background of the study area

Queensland is mostly a tropical and subtropical region, featuring grassland and desert in the west and productive coastal areas to the east. The east coast is vulnerable to tropical cyclones, while the west is prone to longer periods of dry conditions. Rainfall is highly variable across Queensland, with long term annual average rainfall being 628 mm (DES, 2019). Global climate change is already impacting on the Queensland weather, having increased the severity of extreme weather events (DAF, 2018). For example, in recent years, Queensland has frequently experienced severe droughts in most of its regions, as well as inland crossings of several severe tropical cyclones and tropical lows.

Queensland's agricultural sector is highly diverse, producing horticulture, livestock, dairy, broadacre crop, sugar cane and aquaculture. Currently, about 135 thousand hectares of land are used for perennial and annual horticulture production (Figure 1). A recent report from DAF (2018) indicates that there are about 34.5 million hectares of land which could be potentially used for horticulture production. By production tonnage, banana is by far the state's major horticultural product, however the highest export volume occurs in mandarins and melons (Table 1).

Table 1: Production volume of horticulture commodities in Queensland

Horticultural products	Production in QLD (tonnes)	Export Volume from QLD (Tonnes)
Mandarins	86,183	44,374
Melon	71,694	12,445
Mangoes	39,158	5,583
Oranges	3,775	1,579
Avocados	47,670	1,118
Apples	39,398	995
Grapes	8,871	865
Strawberry	39,289	530
Stone fruits (Apricot, cherries, Nectarines, peaches)	4,752	99
Lychees	2,607	NA
Pineapple	75,242	NA
Banana	364,969	NA

(Source: Hort Innovation, 2019)

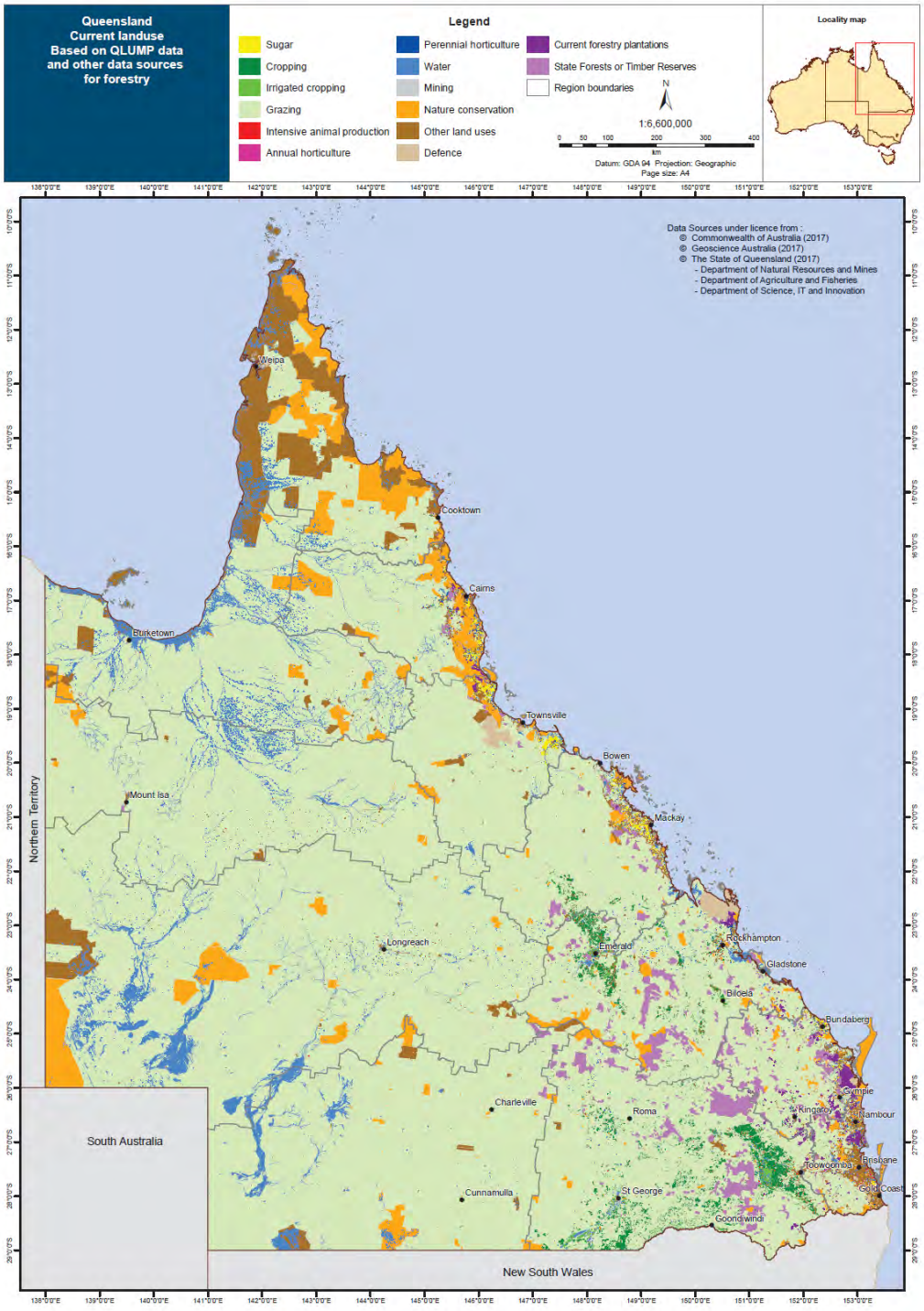

Figure 1: Queensland's Land use

(Source: DAF 2018)

SECTION TWO
THEORETICAL DOMAINS AND CONCEPTUAL FRAMEWORKS FOR AGRICULTURAL SUPPLY CHAIN COLLABORATION

Several economic and social theories provide the context for developing agricultural supply chain collaboration (ASCC) models. This section summarises some relevant theories that supported ASCC model formation. The purpose and motivation behind the collaboration is first discussed in this section followed by the mechanisms of ASCC. Then, a brief summary of five theories is discussed followed by a conceptual framework for ASCC model has been developed.

2.1 Purpose of Agricultural supply chain collaboration

Agricultural supply chain collaboration refers to a joint initiative of two or more discreet organisations involved in the supply chain to work together in order to achieve shared objectives or goals through joint planning (Armayah et al., 2019, Cao and Zhang, 2011). Agricultural supply chain collaboration can be either strategic or opportunistic (Figure 2) and this depends on the collaboration culture as well as success in each level of collaboration.

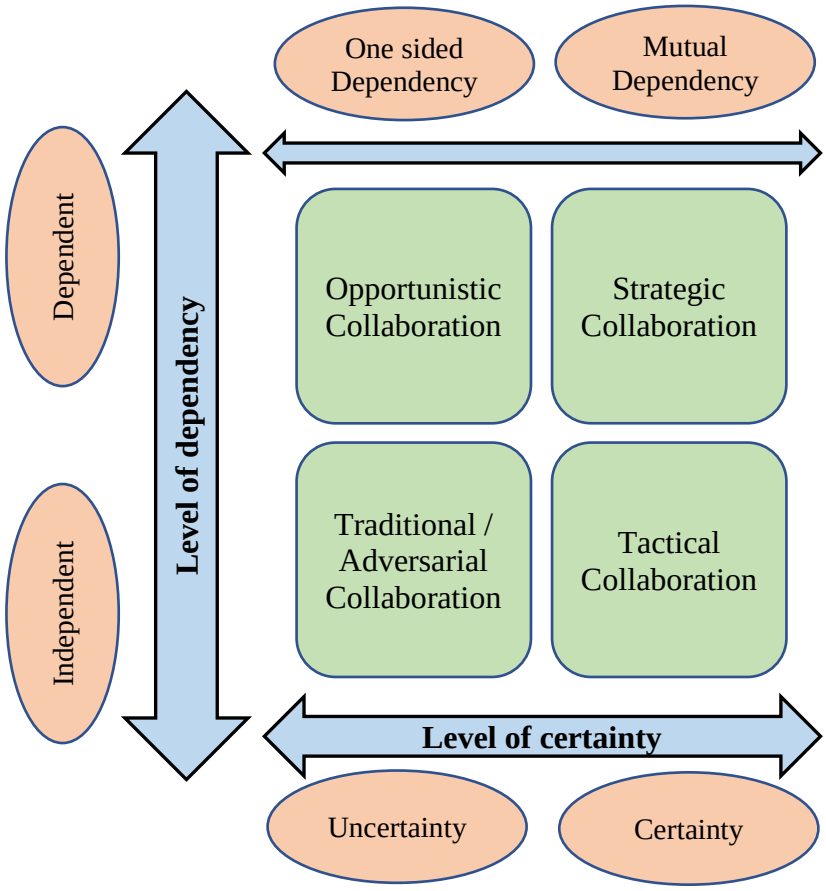

Figure 2: Purpose of collaboration

(Source: Adopted from Cousins, 2002)

In the opportunistic case, the collaborators attempt to achieve short run outcomes in terms of return on investment but are unlikely to share risk and uncertainties. In such a scenario, collaboration can occur ad hoc and so is easy to establish, however it is difficult to develop trust among partners, so the collaboration may not be sustained over time. In the case of strategic collaboration, however, there is mutual understanding and trust developed over time, to gain long run returns. Sharing resources and information are common in strategic collaboration and normally parties agree to share risks and uncertainties. This model leads to a better governance approach for the supply chain but usually takes time to establish.

2.2 Mechanisms of ASCC

The main aim of supply chain collaboration (SCC) is to achieve various forms of competitive advantage. To gain those advantages, a range of mechanisms have been applied since the early 20th century, and these have continued to evolve, with the latest focus being synchronised collaboration (Figure 3).

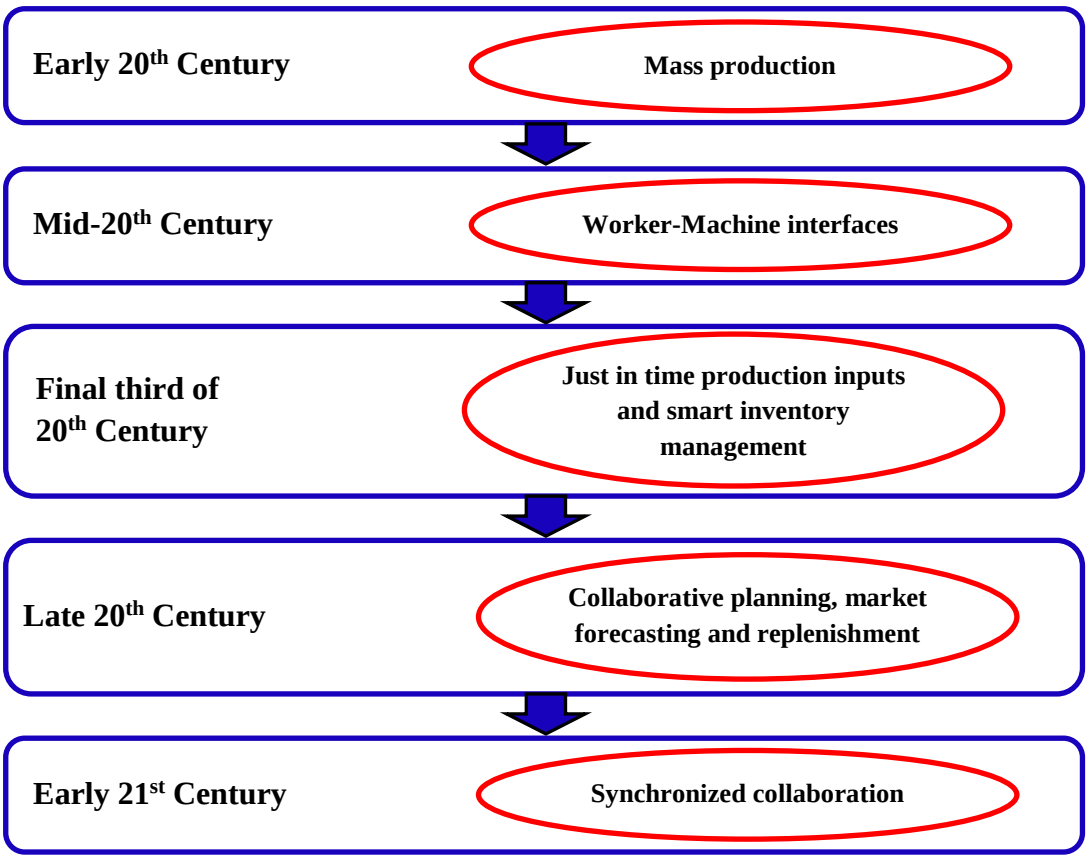

Figure 3: Evolution of SCC mechanism

Source: Based on, Cao et al. 2010, Nimmy et al., 2019

There are two stages of collaboration in agricultural supply chains. The first is horizontal collaboration and this is mostly required to ensure availability and quality of supply to end users (i.e., customers). At their most basic form, mechanisms of horizontal collaboration start with identifying interested farmers who would like to cooperate at least by sharing resources and information (Figure 4). The more evolved

form of collaboration is vertical collaboration, which can involve participants from pre-production through to consumption. This stage can also include the financial and legal aspects of the ASCC. A collaborative group is likely to place emphasis on consolidation and integration with the vertical supply chains (Figure 4).

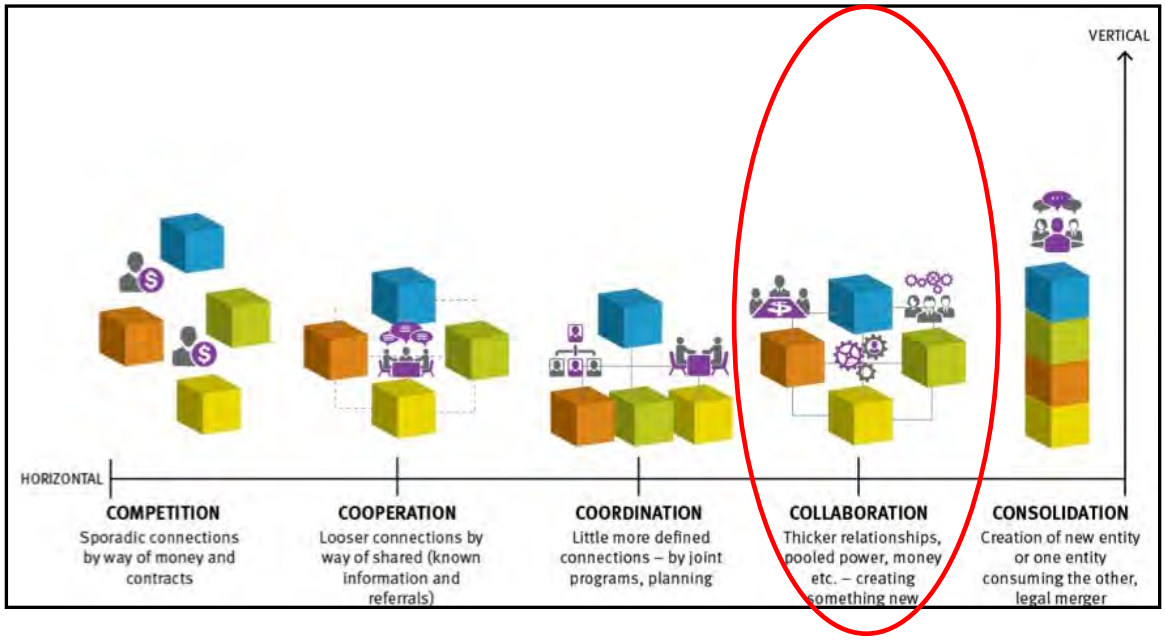

Figure 4: Evolution of supply chain collaboration

(Source: adapted from Keast, R., 2016. P. 159)

Agricultural supply chain collaboration usually involves two collaboration approaches: process integration and collaborative communication (Figure 5). Transparent communication and inclusion of relevant parties are essential for effective SCC. Even before collaboration is adopted, multilevel communication will help to understand the role of different actors and their expectations from the SCC. On the other hand, the process of integration for SCC involves goal congruence, decision synchronisation, resource sharing and incentive alignment (Cao et al., 2010).

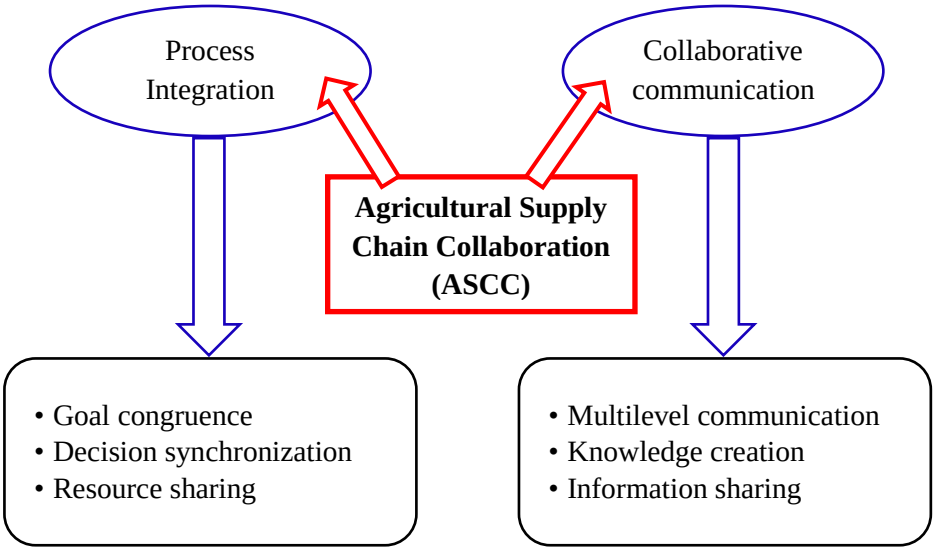

Figure 5: Approaches to conceptualize ASCC

An effective SCC can be achieved through different approaches based on the requirement of the participating organisations (Nimmy et al., 2019). A standalone process of integration or collaborative communication approach could not achieve successful SSC as it requires integration of both approaches in many cases, particularly in agricultural supply chain collaboration (Figure 5). Paulraj et al. (2008) indicate that miscommunication is one of the key reasons behind unsuccessful collaborations. Through collaborative communication, supply chain partners could develop a proper channel of information sharing that will lead to joint knowledge creation. This would facilitate joint decision-making and provide long run competitive advantage for all collaborators.

2.3 Theoretical domains for supply chain collaboration

The most widely used theories that support the development of ASCC models are the theory of uncertainty and risk (TU), resource dependency theory (RDT), transaction cost economics (TCE) theory, stakeholder theory (ST) and leadership theories (LT) (Figure 6).

2.3.1 Theory of Uncertainty and risks (TU)

Uncertainty is a central concept of contingency theory which specifies that an organisation or a business performance is contingent on the fit between its structure, processes and environment (Flynn et al., 2016). Uncertainty is a multilevel phenomenon, existing at individual, group, functional and organisational levels (Carter et al., 2015). Four sources of uncertainty are physical manifestations, perceptions, behavioural response repertoire and social expectations. Uncertainty does not exist in isolation considering only one member of the collaboration. When a supply chain member faces uncertainty, its reliance on SCC may be lessened or amplified depending on its organisation structure, consistent with contingency theory's focus on the fit between structure, processes and environment. In agricultural supply chains, risk management is crucial as it involves additional sources of natural and market uncertainties compared to manufacturing supply chains (Behzadi et al., 2018). The uncertainty could occur in both supply side and demand side of ASC. In the supply side, uncertainty could occur due to production, extreme weather, diseases and pests. In the demand side, it could occur due to market failure, financial crisis or changes in consumer sentiment. Uncertainty could also be created by the external environment and governments that set regulation, for example, strict environmental policies on production (O'Keeffe, 2016).

2.3.2 Resource dependency theory (RDT)

Resource dependency theory (RDT) was developed by Pfeffer and Salancik (1978) through their seminal work "*The external control of organisation: a resource dependency perspective*". This provides a better understanding of organisational power and how the organisation interacts with their environment (Wry et al., 2013). RDT suggests that the survival of firms is strongly related to their capabilities of reducing uncertainty of resource supply (O'Keeffe, 2016). In agri-business, resources

include the raw material, physical asset, transport, financial resources and, to some extent, political resources (e.g. negotiation power in international trade). In RDT, it is assumed that firms would like to reduce any form of uncertainty that currently exists in their environment. A firm could be exposed to certain level of uncertainty and risks through the relationship with other firms, competition with other firms and dependency on other firms for key resources (Carter and Rogers 2008). RDT provides a detailed insight into these types of uncertainty and risks and also provides guidelines to minimise or mitigate them. RDT also helps to develop conceptual understanding on how to develop an altered business climate which is favourable for the firm (Wry et al., 2013). RDT also provides a platform for joint ventures and other organisational relationships (Barringer and Harison, 2000). The basic principles of RDT (Hillman et al. 2009) to foster collaboration are:

- Developing a transparent model of power and resource sharing;
- The constraints of interdependency network with other organisations;
- Joint planning and actions to solve problems related to uncertainty and risks; and
- Identify and develop new patterns of interdependency.

2.3.3 Transaction Cost Economics theory (TCE)

The theory of Transaction Cost Economics (TCE) addresses why firms are founded and how they are governed and structured hierarchically (Williamson 2010). A transaction is defined as the transfer of a pre-product or semi-manufactured product or service from an upstream to a downstream manufacturing stage (Bremen et al., 2010). These transactions stimulate a farm's activities either in the form of vertical integration or through market mechanisms (Cao, et al. 2010). The monitoring costs for both cases may arise from the uncertainty due to the self-interest and opportunism of any parties in the integration and potential deviations from common goals. Transaction costs could depend on the type of information shared and the mode of communication and coordination, which includes initiation, negotiation, execution, adaptation and controlling stages. The key concept of the theory is that transactions need to be completed with minimum costs involved. This relates transaction costs to the transaction governance and the mode of vertical integration or collaboration across value-adding stages. According to TCE, low transaction costs favour market exchange while high transaction costs favour hierarchical governance structures (Bremen et al., 2010). TCE can be applied in critical decision point of purchasing including 'make or buy', 'single or multiple sourcing', 'selecting supplier by using supplier portfolio' and 'supplier negotiation'.

2.3.4 Stakeholder theory (ST)

Stakeholder theory was developed by Freeman (1984) by integrating different concepts including the influence of stakeholders on corporate planning, system theory and corporate social responsibility. Freeman (1984) offered a realistic approach to enhance an organisation's performance through the engagement of stakeholders. Three major themes of stakeholder theory are given below (Laplume et al., 2008):

- Stakeholder definition: According to Freeman (1984), stakeholders are any group or individual who can affect or is affected by the achievement of the organisation's objectives or business performance
- Stakeholder action and responses: For better performance of an organisation, the managers should involve the stakeholders more efficiently by predicting the influence of the stakeholders on strategic development. Stakeholder influence can be determined by the power and legitimacy of the stakeholders and these are dependent on rational structure, contractual forms and institutional support.
- Firm action and responses: By developing trust and strong relationships, firms can achieve maximum support from the stakeholders. A strong interconnected stakeholders' network will increase the management capability of the firm in response to uncertainty and risks (Figure 6).

Stakeholders may be integrated into the supply chain through both vertical and horizontal collaboration. Identifying relevant stakeholders and the possible form of collaboration are critical for the success of the SCC. Stakeholder theory and its application in the SCC allow all the parties to recognise the benefits of collaboration and their contribution toward achieving competitive advantages.

In SCC, organisations or businesses need to adopt strategies that allow them to change the organisational behaviour of the stakeholders (Co and Barro, 2009), the activities associated with various operations and/or product development processes within the supply chain (APICS, 2018).

2.3.5 Leadership theory

Leadership can be defined as the influence of an individual on the other members or groups of an organisation towards achieving organisational goal (Northouse, 2007). The initial concepts of leadership theory were developed on the personal trait of individuals, and it was believed that the ability to lead is inherent. However, with the ground-breaking research of Stogdills (1948), the focus of leadership research was shifted towards the behavioural factors of leaders. Some other leadership theories, including contingency and situational theories, were developed to identify and investigate different leadership approaches in a different scenario. In SCC, the main goal is to achieve a competitive advantage, and it is believed that leadership is one of the key contributors to attain that (Waldman et al., 2001). Leadership and power are sometimes used as exchangeable terms, and effort was given to identify different types of the power relationship between buyers and suppliers (Cox et al., 2004). Defee et al. (2009) did not agree that power could be considered the only foundation of supply chain leadership, and instead defined supply chain leadership as a new concept. Later, Gosling et al. (2016) concluded that individual leaders could also contribute to cross firm boundaries in the SCC context. Existing literature on the supply chain leadership is more focused on two types of leadership techniques: transactional and transformational (Defee et al. 2009, Gosling et al. 2016). These two types of leadership techniques are also categorised as strategic leadership and this can contribute positively on internal and external supply chain collaboration (Birasnav and Bienstock, 2019). For example, Dubey et al. (2015)

indicated that leadership behaviour is the main component in the collaboration with the suppliers for the Indian manufacturing industry. A mature leadership approach will provide the appropriate market responsiveness for the individual organisation as well as the collaborative group (Luu, 2017). Market responsiveness implies that strategic and operational measure are taken by the leader to respond to the market signal, opportunities and threats (Wei et al., 2014). The appropriate level of market responsiveness will reduce the uncertainty and risk in the supply chain collaboration. Figure 6 illustrates the theoretical domain of agricultural supply chain collaboration and inter-relationship among the different theories.

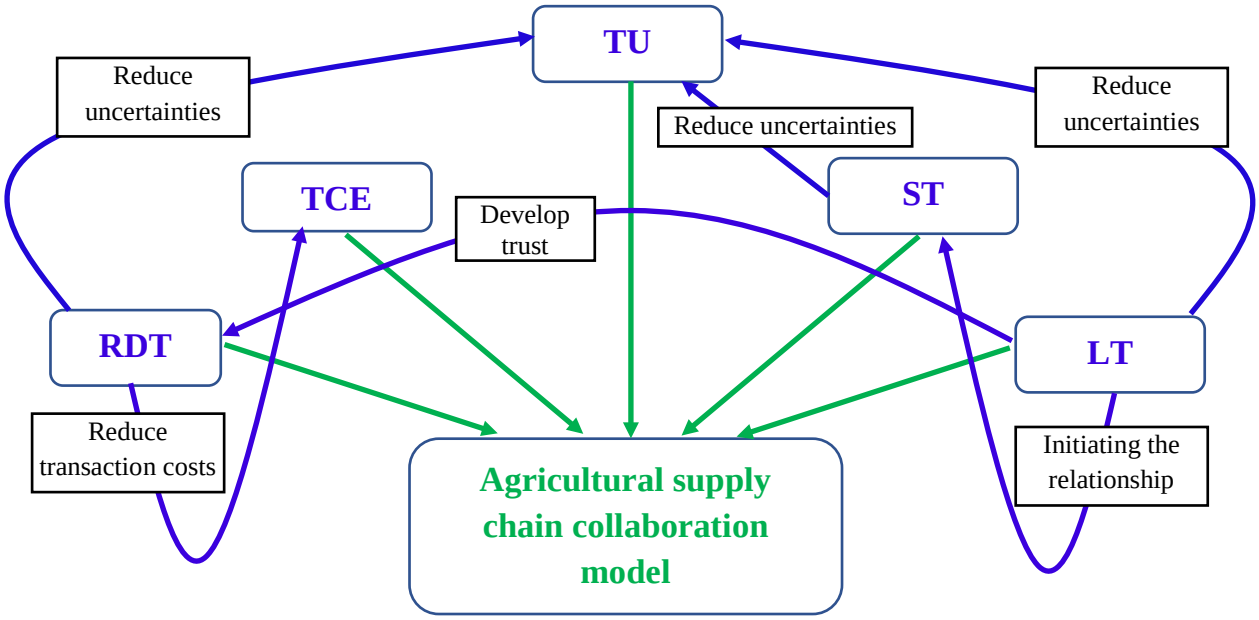

Figure 6: Theoretical domains of agricultural supply chain collaboration

(Source: Developed by the authors based on Pfeffer and Salancik (1978); Freeman (1984); Barringer and Harison, 2000; Co and Barro, 2009; Bremen et al., 2010; Carter et al., 2015; Flynn et al., 2016; O'Keeffe, 2016, Gosling et al. 2016)

2.4 Conceptual framework for ASCC

Agricultural supply chain collaboration involves risk and uncertainty as well as trade off and choice of producers (i.e. farmers). Therefore, to ensure regular and consistent supply to the market, availability, quality and credibility of any produce is very important and needs to be ensured by all supply chain partners. A framework that supports both horizontal and vertical collaboration is necessary for developing a sustainable ASCC (Matopoulos et al., 2007, Dania et al., 2016). Figure 7 proposes a conceptual framework of agriculture supply chain collaboration.

Horizontal collaboration amongst farmers helps to supply the right amount of produce at the right time, a scenario not otherwise possible for individual growers alone. Horizontal collaboration includes farmers, growers and growers' associations who may be involved collectively in a supply chain (Figure

7). Vertical collaboration engages farmers, farm input service providers, processors, wholesaler, retailer, exporter and consumers who are directly involved with the supply chain (Figure 7).

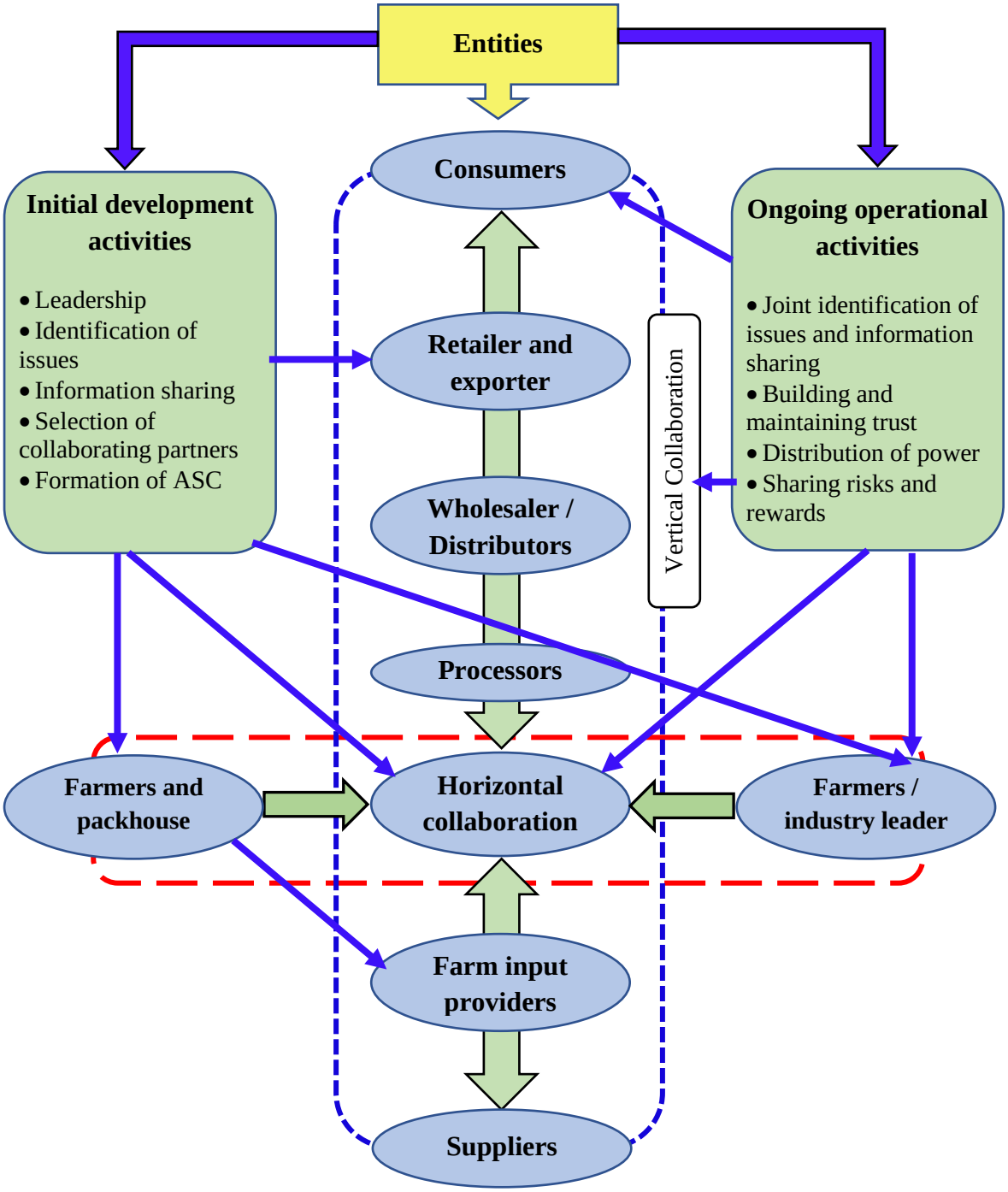

Figure 7: Conceptual framework of agricultural supply chain collaboration

(Source: Based on Barratt, 2004, Matopoulos et al., 2007, Liao et al., 2017)

In SCC two main activities are designing and governing supply chain activities (before collaboration) and establishing and maintaining supply chain relationships (during collaboration). Key actors for these two activities are indicated with solid blue lines in Figure 7. Information sharing and technologies need

to be initiated by the producers as they have the relevant resources and production data. Collaboration partners can be selected from upstream and/or downstream, while leadership could be developed from the producers and/or industry body. All the components of establishing and maintaining SC relationships are related to the actors of the supply chain. Trust building with consumers is essential for the success of SCC. The next section of this study describes how this conceptual framework was used to develop and explore prospective agricultural supply chain collaboration models for the three selected horticultural products in Queensland (avocado, mango and lychee).

SECTION THREE
AGRICULTURAL SUPPLY CHAIN MODELS IN AUSTRALIA

Different actors (from growers to retailers and consumers) play important roles in the formation of both horizontal and vertical collaboration of agricultural supply chains. For instance, primary actors such as producers and consumers, internal actors such as processors and retailers, and external actors such as genetics companies, industry groups or selling agents contribute directly to the supply chain development and operation. This section describes several past and present agri-food supply chain models evident in Australia, followed by some recent examples observed in Queensland.

3.1 Traditional Agricultural Supply Chain Models

Original models of Australian agricultural supply chain development were driven by passionate producers. In a famous example, John MacArthur established the Merino sheep industry in the early 19th century. This is known as a **visionary model,** which has at its core the leadership of a driven producer who initiates the whole process. Another model involves the processor as the instigator, as exemplified by the Australian beef and sugar industries. In this **processor model,** the processors take all the production and find domestic and international markets for the products. However, retailers can also play a vital role in the supply chain. In the **retailer model,** the retailers develop the links between the consumers and producers and are the major coordinators of the supply chains, as shown by the Australian examples of Woolworth, Coles and Aldi. An alternative model is the **industry model** typified by the Australian Wool Corporation**,** where the industry itself took charge of accepting all the produce and managing and selling it to international customers. A similar approach to the industry model is the **agricultural board model** which are often statutory-based and set up by the government. The Australian Wheat Board is an example of a statutory board model that was widely used for many commodities in Australia until the 1980s. Another way of coordinating the supply chain is through selling agents or exporters. These entities can provide important roles in assembling product to match the requirements of an international customer. The Australian live export industry operates through **the selling agent model**. Figure 8 illustrates different traditional models for ASCC in Australia.

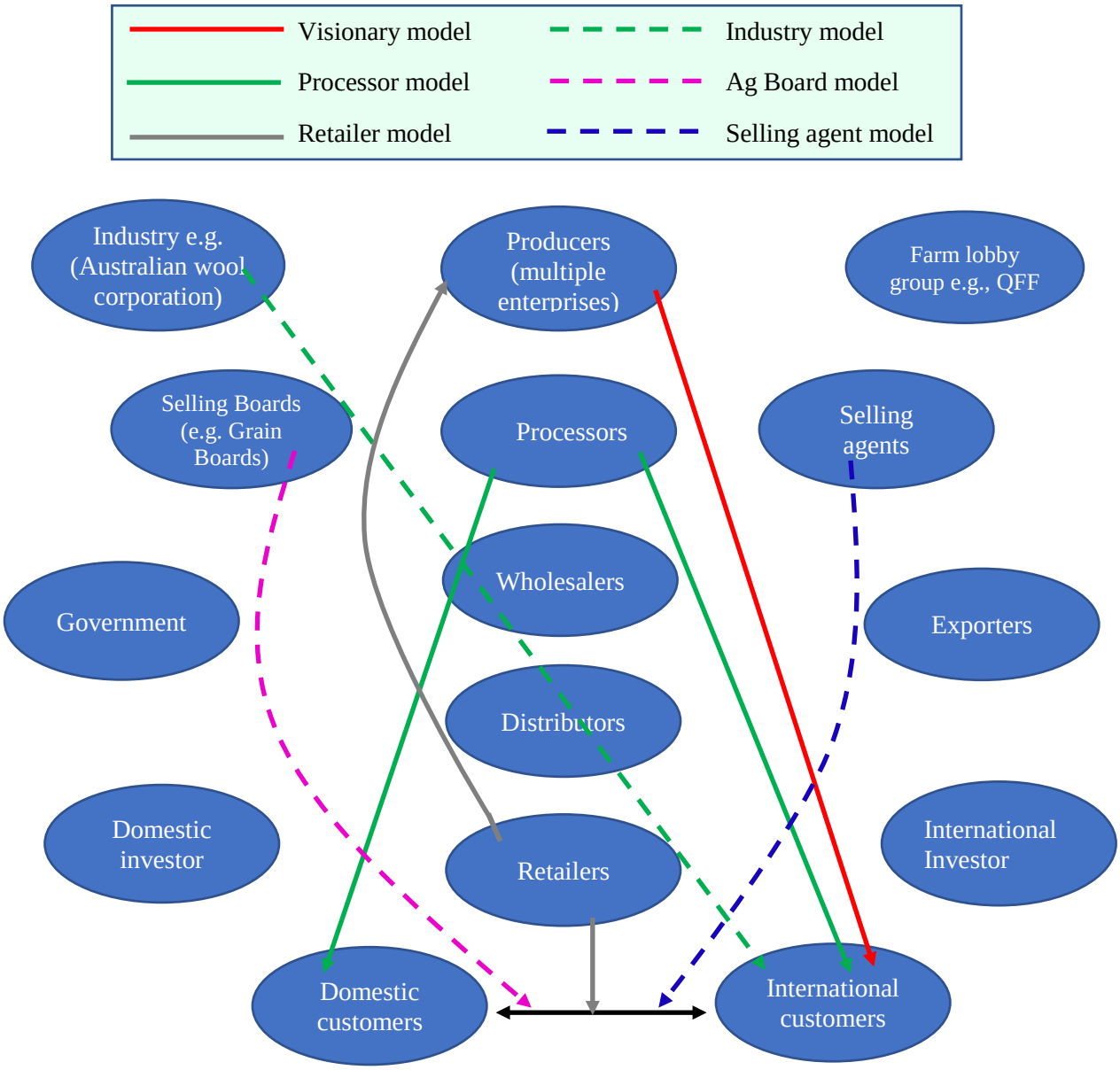

Figure 8: Key traditional agricultural supply chain collaboration model in Australia

3.2 Neo-classical Models

Genetically modified (GM) crops have become important in some areas and countries. For example, in the United States of America, most of the corn and soybeans are GM crops where the GM company holds the property rights over those crops. In some cases, these genetic companies act like supply chain coordinators, where the coordination is coming from an upstream supplier. Plant breeders and GM producers are examples of **genetic models** of supply chains, as distinct from other upstream coordinators which generally can be classified as a **technology model** (e.g. information or processing technologies).

During the mid-20th century in Australia, an important model for agricultural development was to build irrigation districts through new water resources. The **resource-based models** capture development through the supply of new water and land inputs.

Sometimes supply chains are driven by specialist management expertise, which can be termed as a **business expert model**. An example of this is McDonald's in the fast food sector, which has developed a new way of considering the supply of food through to consumers.

The **transportation-led model** is another example observed in supply chains. The key idea behind this model is that a supply chain emerges around a better or novel transport link. State and federal government often initiate infrastructure to develop transportation-led models in intensive cropping areas. In the **foreign investment model,** an international investor assumes a key position in the supply chain, often by investing in two or more vertical stages. For examples, Vestey Bros (UK) were the largest landowners in Australia for many decades in the 1900s and had large beef processing facilities.

Another model could be the **large producer model**. This occurs when there is a large producer in an industry who is dominant enough to manage their own supply chain and to coordinate supply to markets. An example here is Manbulloo Limited, which operates six mango production farms across Northern Australia and exports to about 12 countries.

The other form of supply chain development involves cooperation where two or more actors in different stages join together to initiate and lead a supply chain (**Hybrid cooperative model**). Tropical Pines in central Queensland provides an example of this, where a cooperative of growers controls the processing and distribution of their pineapples. Another example could be the traditional dairy model, which involves farmers' cooperatives running a dairy product factory. This enables farmers to control both production and processing stages and then supply to the market.

Figure 9 illustrates all neo-classical models collectively demonstrating the different options for one or more groups to provide coordination and leadership in an agricultural supply chain. In both cases of traditional and neo-classical models, the collaboration revolves around producers. However, in traditional models, the main approach was to profit maximization and the collaboration was generally led by producers or processors. On the other hand, the neo-classical models are more focused on sustainability and driven by different actors including genetic companies, technology providers and business experts.

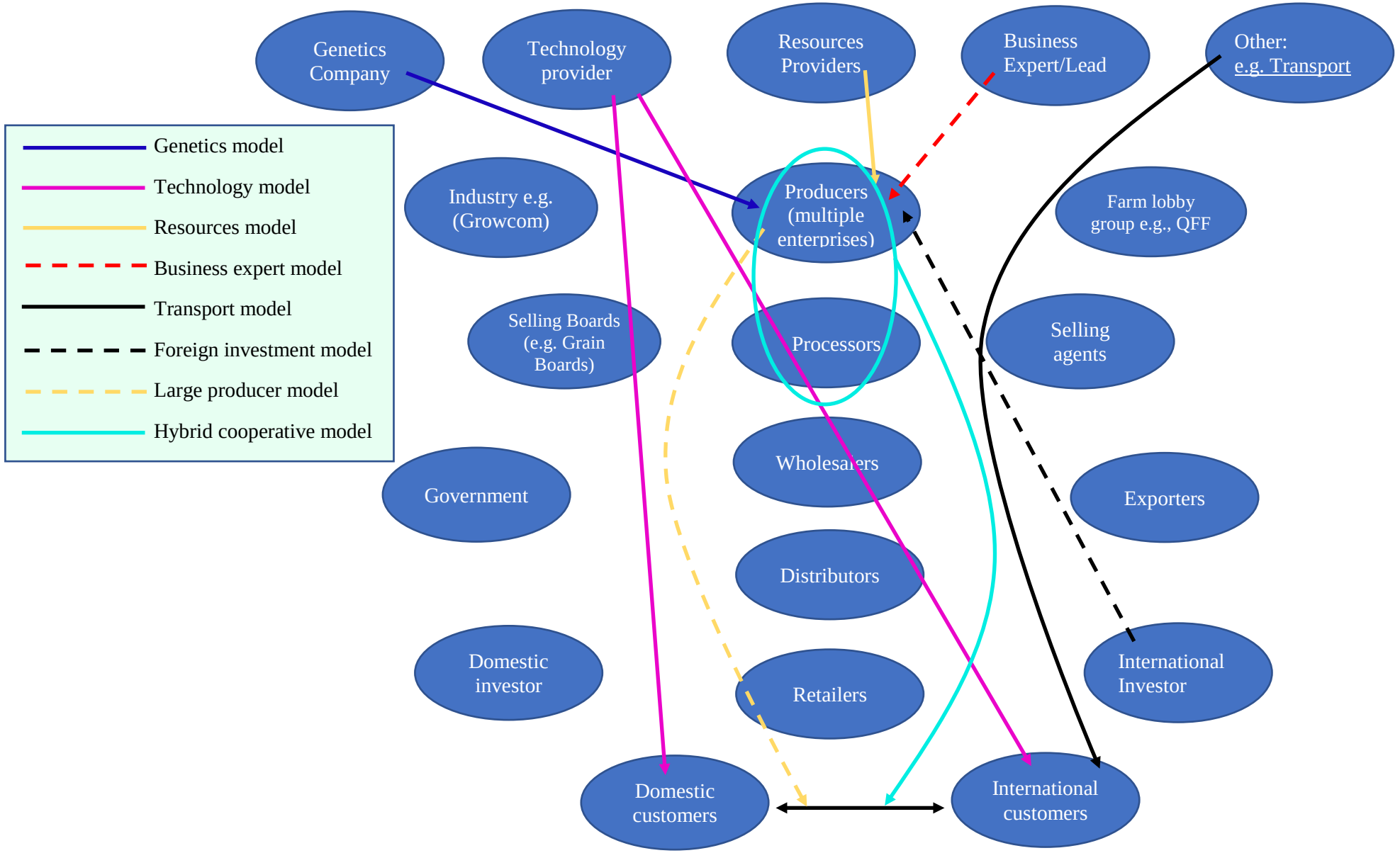

Figure 9: Key neo-classical models for agricultural supply chain collaboration in Australia

3.3 ASCC models in Queensland

The agricultural area of Queensland consists of a diverse range of soil types and weather conditions, which provide growing conditions for a variety of agricultural products. Agri-businesses in Queensland have developed supply chains for their products for the domestic market as well as for export purposes. However, there are relatively few collaborative efforts amongst the supply chain, and most are focused on domestic markets (Figure 10). In horizontal collaboration multiple organisations manage production, operation, marketing and distribution separately and collaborate with other entities on the same level of supply chain (e.g. collaboration among the producers). In contrast, a single enterprise could control production, operation marketing and distribution in a vertical collaboration model. A mix of horizontal and vertical collaboration is reflected in the hybrid model.

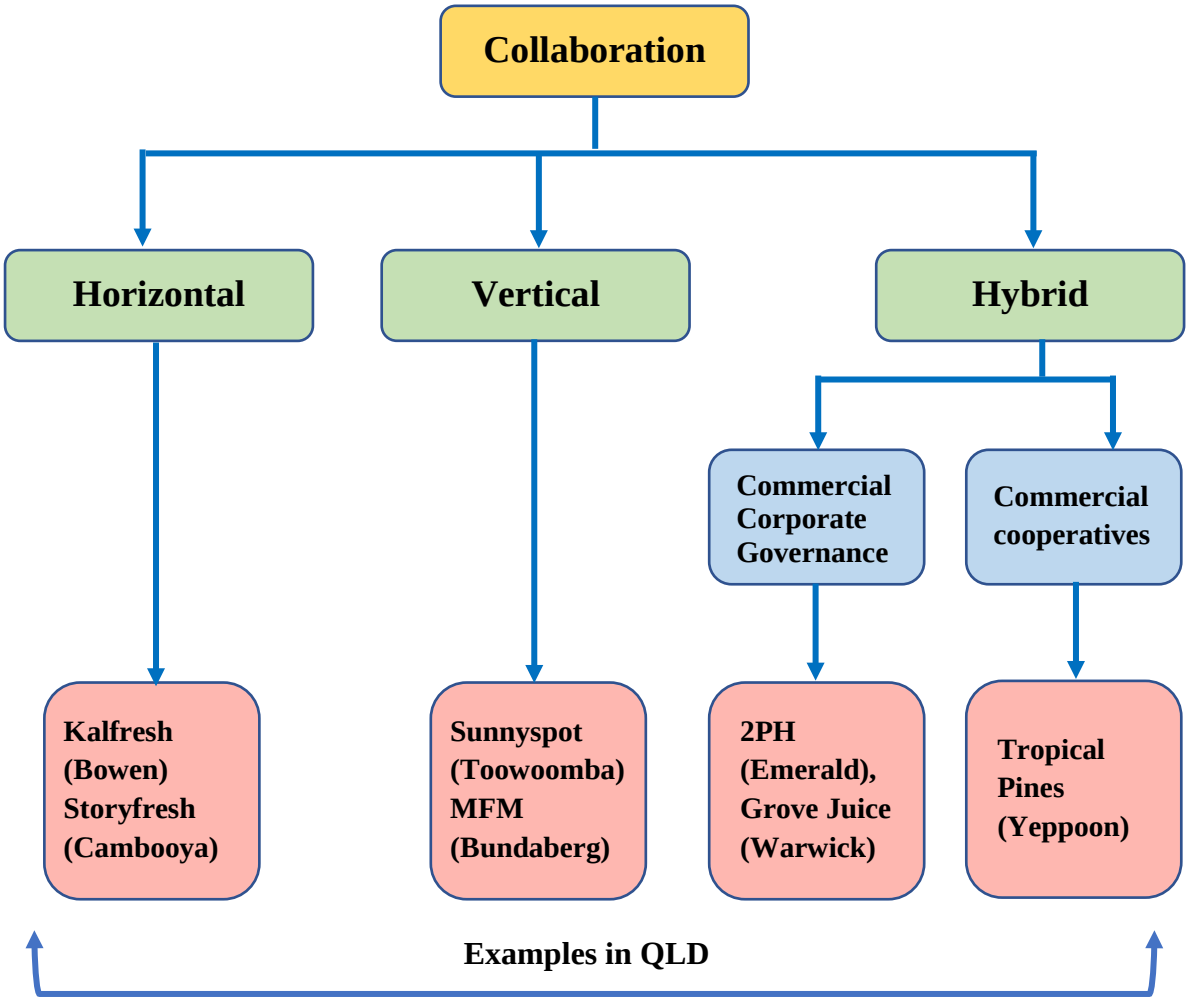

Figure 10: Different types of agricultural supply chain collaboration in Queensland

In Queensland, collaboration amongst producers has been developed mostly to fulfil the domestic demand and not many are targeted towards international markets. The success of these collaborative efforts in local supply chains indicates that there is potential to develop strong relationships with international buyers through collaborative processes.

SECTION FOUR
RESEARCH APPROACH AND METHODS

This research involved a qualitative approach which included a literature review on theory and practice of agricultural supply chain collaboration, scoping interviews with farmers, industry and other relevant stakeholders, a pilot test of developed workshop tasks and a stakeholder workshop to develop a stakeholder collaboration model for three selected horticulture products in Queensland (Table 2). Emphasis was given to both horizontal and vertical ASCC including production, logistics, processing, marketing and export, and coordination, and to categorise the relevant issues at each of these stages. Data regarding individual perceptions on the mode of collaboration was also collected. The collected data was analysed and presented in graphical and tabular form to interpret the findings.

Table 2: Research Methods and purposes

Methods	**Purpose**
Reviewing relevant theories and concepts	▪ To identify the key issues, strategy, operation and behavioural components of ASCC and the tools to develop ASCC
Workshop design (by the researchers)	▪ To identify the specific importance of different issues, identified during the literature review, in the case of horticulture products (Mango, Lychee and Avocado) ▪ To illustrate a framework for the SCC for horticulture products
Pilot testing of workshop design	▪ To validate the appropriateness of the design and models through the industry partner of the project
Finalising workshop design	▪ To accommodate the inputs from the industry partners, through the piloting, in the workshop design and model
Stakeholder engagement	▪ Relevant stakeholders were invited to attend the workshop and provide their comments as they have the current knowledge on the issues and barriers of SCC for the selected horticulture products
Data analysis	▪ To present and visualise data in an organised way to draw some conclusions and to recommend the way forward

4.1 Workshop design

The workshop process was designed to analyse several key issues in forming both horizontal and vertical collaboration among the parties involved in the supply chains of horticulture products of Queensland. A number of issues were identified through the literature review and scoping meetings

with the regional horticulture producers (Table 3). During the workshop the participants were asked to provide their opinion and to rate the importance of presented issues (see Table 3), specifically for the three selected horticulture commodities: mango, lychee and avocado.

Table 3: Issues related to different stages of supply chains for horticulture products

Stages	**Issues**
Production	Land availability, water supply availability, capital investment, cost of production, quality produce, environmental footprint, green production system/regulation
Logistics and processing	Processing facilities, transport & logistics, direct government support, foreign direct investment, domestic investment, technology and innovation
Marketing and export	Market access, market discovery, brand and traceability
Coordination	Coordination among actors at different levels in the supply chain (such as growers, processors, exporters, investors etc.), coordination among growers (same level in the supply chain)

The title of the workshop was "Exporting perishable commodities to Asia: Developing a stakeholder collaboration model". Through this workshop, the research team investigated the problems within the existing supply chains including policy and regulation for exporting the selected commodities to the Asian markets. There were three segments of the workshop, commencing with expert presentations on some topics relevant to the workshop theme; and then two data collection components directly involving the participants with individual and group tasks. In the third stage of the workshop, the research team split participants into three groups by horticultural product depending on their expertise and interest. The participants were asked to identify the most suitable links among the entities to indicate their preferred collaboration models for the sector. The same task was repeated individually and in group form for the three selected horticulture products. The schedule of the workshop is provided in Appendix A.

4.1.1 Participants

To ensure the involvement of all relevant stakeholders, the research team invited about 50 potential participants to join the workshop. The invited participants were from Australian and Queensland government departments, local governments, regional economic development organisations, peak agricultural bodies (e.g. Growcom, HortInnovation), Austrade, Trade and Investment Queensland (TIQ), local farmers' association(s), and exporters or forwarders. The potential participants list covered experts from different sectors who are directly or indirectly involved with the horticulture supply chain,

and particularly those representing the three case study fruits (avocado, mango and lychee). The diversity of the participants ensured the inputs from different perspectives towards the ASCC and collaboration model development.

4.1.2 Tools development

The conceptual framework for ASCC model (Figure 7) was used as the basis for developing and testing the workshop tools. First, an extensive literature review was conducted to identify different issues and barriers relevant to collaboration among the parties involved in the supply chain. The review also revealed some factors that may affect collaboration efforts. Second, based on the available data from the literature, the research team developed a set of questions to investigate the perceptions of stakeholders and identify the importance of different issues for the selected supply chains. During this process, it was important to acknowledge that the supply chains of individual horticulture products are different from each other. Hence, the research team asked each participant to rate the importance of different issues for the three horticulture crops considered.

4.1.3 Piloting and finalising tools

In the next phase of tool development, the questionnaire was supplied to the industry partners of the research project. As the industry partners were directly involved with a hybrid collaboration in the horticulture supply chain, their inputs helped the research team to finalise the workshop tool for collecting data.

4.1.4 Expert presentations

The workshop comprised of three segments with the first one involving expert presentations. The research team invited four experts to represent views from universities, industry peak bodies and exporter/forwarders. Theses presentations highlighted the existing issues on exporting horticulture product to the Asian market, including policy and government priorities. A brief question and answer session was held after each presentation and the discussion was recorded by the research team, as this helped to enrich the dataset on stakeholder perceptions about supply chain collaboration.

4.1.5 Data collection from individual stakeholders

The individual tasks were used to identify the importance of the different issues in the current supply chains of three selected horticulture commodities. In addition, each participant was asked to indicate the potential collaboration linkages among the actors (both internal and external) to develop a sustainable export supply chain. The key actors who participated in the workshop are listed in Table 4.

Table 4: List of actors involved in horticulture supply chain

Categories	Actors in the supply chain
Support provider	Genetics company, technology provider, business expert/leader
External industry body	Peak industry body (e.g. Growcom), farm lobby group, selling board, selling agent
Investors	Domestic and international
Policymaker	Local, state and federal government
Actors in vertical supply chain	Supplier, resource provider, producers, processors, wholesaler, distributor, retailer
International market	Exporter
Consumers	Domestic and international

4.1.6 Group data collection

The workshop participants were divided into three groups, each covering one of three fruits. Participants were invited to join in an open discussion for about one hour, using the same exercise and questions given for developing collaboration models to the individual participants. In addition, the research team set two group tasks featuring horizontal and vertical collaborations. The two main questions for this part of the workshop were:

- How could multiple growers (particularly small and medium scale growers) be better horizontally coordinated in the supply chain, to ensure a production volume suitable for export?
- How could small and medium size growers in Queensland be best linked into a vertical supply chain, to ensure their access to export markets and sustainable growth?

For both cases, the key question was disaggregated into nine sub-questions related with collaboration: structure/steps, incentive, mechanism, influential actors, relationship, activities, governance, risk and any other relevant factors. Details of the workshop tools and questions are provided in Appendix B.

4.2 Data presentation and analyses

This research was aimed at understanding stakeholder's perceptions and tasks to develop ASCC models for exporting agricultural commodities in Asian markets. To summarise the data and to identify the key findings, the research team undertook a systematic data analysis approach, as described below.

4.2.1 Tables and graphs

Data regarding the importance rating of different issues of the supply chain were presented in graphical and tabular form for better visualisation. Outcomes of the rating exercise were converted into percentage

format to facilitate comparisons. Graphs were developed for different stages of supply chain to better explore the issues associated with each one. However, the data from three selected commodities were kept together in graphical and tabular form to identify the differences among them.

4.2.2 Overlaying

In the individual task, participants were asked to physically draw the linkages among the actors, on a hard copy illustration of the existing supply chain system. This made it possible to demonstrate the participant's perceptions of existing and prospective collaboration. To combine and summarise the data, the research team adopted an 'overlaying approach' where the individual hard copies were synthesised to develop a new set of illustrations, highlighting the key actors and the linkages among them (according to participant's views).

4.2.3 Narrative analysis

During the group task, participants were asked to join an open discussion and develop a combined ASCC model for one of the three chosen commodities. Participants also took part in a discussion on how horizontal and vertical collaboration could be coordinated. The research team undertook a narrative analysis to evaluate these data. Through the narrative analysis, the key challenges in SCC have been identified and that will be used for the next stage of the research which is a farmers' survey.

SECTION FIVE
FINDINGS AND ANALYSES

This section presents the findings from the analysis of the collected workshop data. After a brief description of the participants, this section focuses on the three main components of the workshop, a discussion on expert presentations, and findings from the individual and group tasks.

5.1 Participants

The research team invited 50 potential participants for a six-hour workshop. However, only 28 persons attended physically and one through the virtual platform. Most of the participants were representing farmers groups, state government officials and researchers.

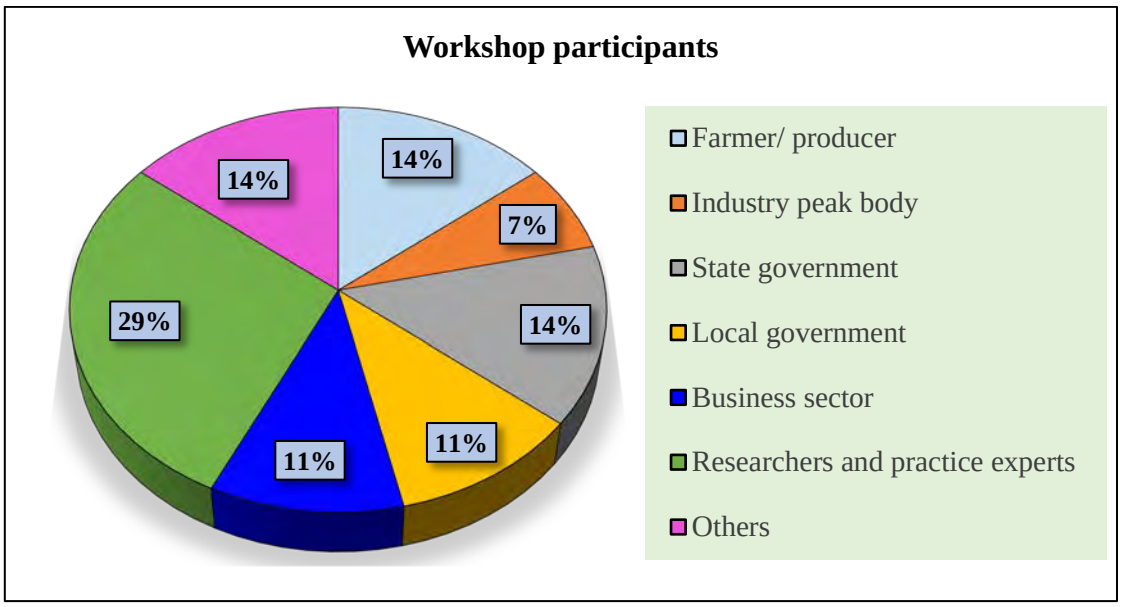

Figure 11: Percentage of workshop participants

5.2 Expert presentation

The research team invited four experts to deliver short presentations on the policies, opportunities and mechanism of agricultural supply chain collaboration for exporting high value perishable agricultural commodities (HVPACs) in the Asian markets.

First, an Australian expert on northern agriculture development presented an overview of the agricultural supply chain priorities and collaborations in northern Australia. The motivation for and readiness of farmers towards exporting perishable commodities from northern Australia, particularly from Queensland, were identified as the most important issues for ASCC initiation. This discussion emphasized the industry-led research collaborations with a strategic focus to increase wealth and employment opportunities and to improve production and supply chain efficiencies through ASCC.

ASCC aims to achieve enhanced wellbeing of the northern community. However, some policy and risk issues were discussed, as northern Australian agriculture sector requires de-risking strategies including policy development for northern Australia. This includes lifting investment by connecting supply/demand efficiently; ensuring planning is demand-focussed; building value within the supply chain; digital and technology enhancement; good governance and real collaboration/collaboratives in supply chain design and development; cross northern collaboration for scale/flexibility.

The importance of value-added agricultural products in the supply chain was identified as a key issue for overall horticulture sector development in Queensland. However, this session did not suggest any preferred model for ASCC but emphasised the importance of collaborative decision-making towards the growth of the whole region.

Another expert on export promotion and management presented a topic on foreign direct investment (FDI) with a specific focus on China. China's food security situation was highlighted in this session. Currently, China is moving from self-reliance to strategic investment leading to value-added product development. In addition, China is investing in other countries agri-food sectors to reduce the environmental degradation of their land.

An expert from a Chinese association linked to export promotion presented information about the issues and opportunities of market development in China. This session concluded that there are opportunities to develop long-term supply agreements and build relationships with Chinese enterprises along the entire agribusiness and food-value chains. However, profiling and understanding the Chinese consumer (including variations across the Chinese provinces) is crucial to successfully launch an agricultural product to Chinese market. For developing successful collaboration and exporting high value perishable agricultural commodities (HVPACs), six suggestions were highlighted in this session: early protection of intellectual property rights; develop company profiles and product information in Chinese; appoint agents or distributors or have own marketing staff in China; have regular contact with relevant government, industry bodies and customers; pay attention to regional, provincial, and local differences; and have a basic understanding of import regulations and procedures.

The last presentation was delivered by a manager of a federal government department, who oversees trade and investment in the horticulture sector in Australia. The role of HortInnovation in the horticulture industry was discussed in this session. HortInnovation provides supports in research and development (R&D), marketing (including international marketing) and trade. There is significant demand in the Asian market, and it was noted that in any given year, the entire horticultural production of Australia could only meet the demand of Tokyo (not Japan). So, one of the challenges for Australia is to identify the targeted market as well as horizontal collaboration to supply the market. The forecasted growth rate of the value of the horticulture products is about 6% which is higher than the broader agricultural sector. In this session, the key challenges identified for growing the horticultural industry

are high cost economy with strong currency (comparatively); while there is relative proximity to Asia, there is also substantive freight cost to trade; limited industry and financial resources in a global context; and the national production base doesn't compete with volume players internationally. It was also noted that getting market access was much more complicated now than before, and also more time-consuming. Key components to be considered before initiating a market access application are alignment to commodity-specific export strategy; supply capability; complete treatment data sets; and market demand.

It was noted during the session that average time for approval of a market access application is about 11 years from the submission (after developing the treatment data) to export. However, there are some free international markets, where product entry is more streamlined. It was recommended that producers should target these free markets while developing appropriate protocols for market access to the premium markets. The following mechanism and factors were identified from the expert presentations.

- Importance of demand-focused future planning
- Horizontal collaboration for making greater volume of supply
- A requirement for flexible collaboration/collaboratives in supply chain design
- Research gap in value-adding opportunity
- Promoting FDI as China's food security situation has changed in recent years
- Study the targeted market extensively
- Develop close relations with the local and regional governments of the targeted market.
- Develop supply capability to meet the market demand.
- Act early to get the market access approval

5.3 Individual tasks and models

In the second segment of the workshop, all participants were provided a questionnaire to complete. They were asked to draw the linkages among key actors in the supply chain to indicate their preferred form of a collaboration model. In the first part of the individual exercise, participants identified the importance of different issues in four basic categories; production, logistics & processing, marketing & export and coordination. The participants measured the importance on a five points scale: 1 = not at all important, 2 = slightly important, 3 = fairly important, 4 = important, and 5 = very important.

The participant responses indicated a number of critical issues in the production stage (Figure 12). Likert percentages in the figures did not add up to 100% due to some non-responded questions. The participants identified water supply availability, cost of production and quality of produce as the three most critical issues across the selected horticulture sectors.

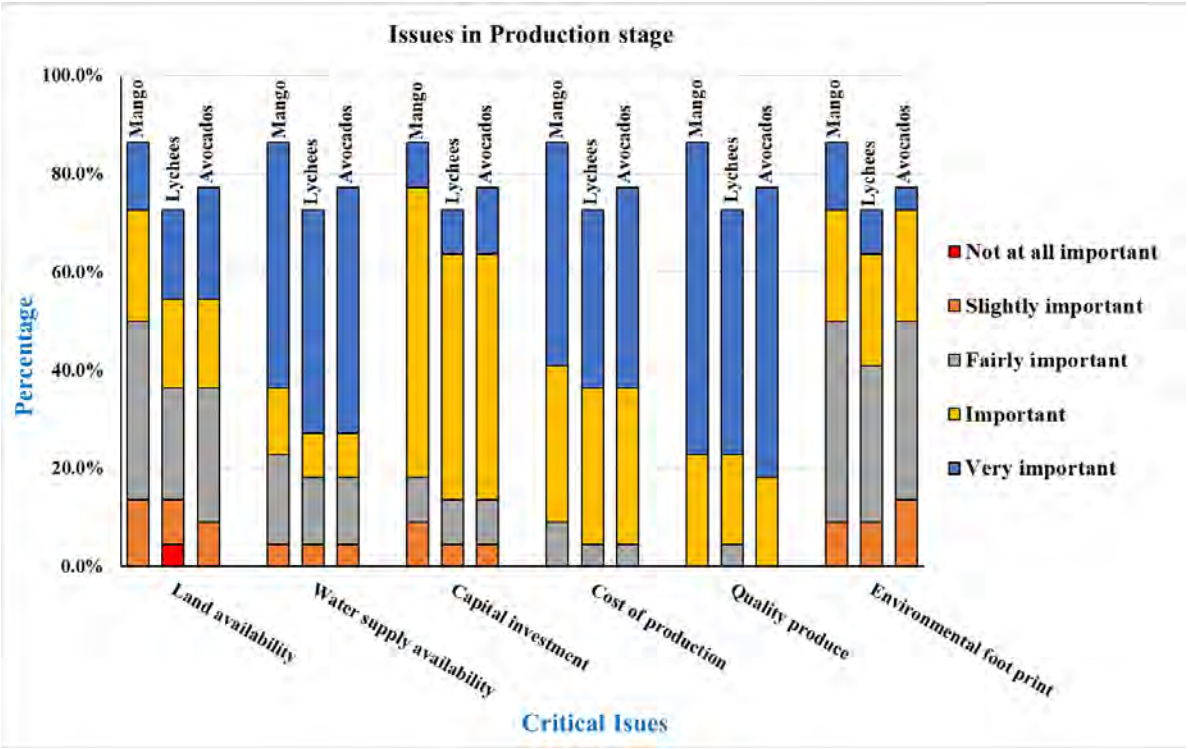

Figure 12: Importance of different issues in production stage

It is understandable that water availability is a key issue for horticulture production in a sub-tropical and tropical climate. However, the participants did not consider land availability as critically as the water supply. One of the important findings of the study is the perception of the participants towards the quality of the produce. More than 86% of participants considered that maintaining the quality of mangoes was highly critical (important or very important), only 68% and 77% of participants thought similarly for lychees and avocados, respectively. The cost of production was also viewed as important across the three crops. Participants also did not regard environmental footprint as a critical issue, with only about 40% of respondents considering it important, irrespective of the type of the produce.

The second set of issues studied during the workshop were the logistics and processing stage of the supply chain. Amongst these, transportation and technologies were the most important issues identified (Figure 13). Interestingly, none of the participants thought that direct government support and foreign investment were very important for the future growth of the horticulture sector. However, on average 48% of respondents believed that domestic investment is vital for this sector. One interesting finding is that the participants assigned less importance to processing facilities. Through the presentation, in the first session of the workshop it was identified that treatment and/or processing is crucial for access to export markets. This finding indicated that there may be a need to educate producers and some other stakeholders about export protocols and the importance of processing facilities in export supply chains.

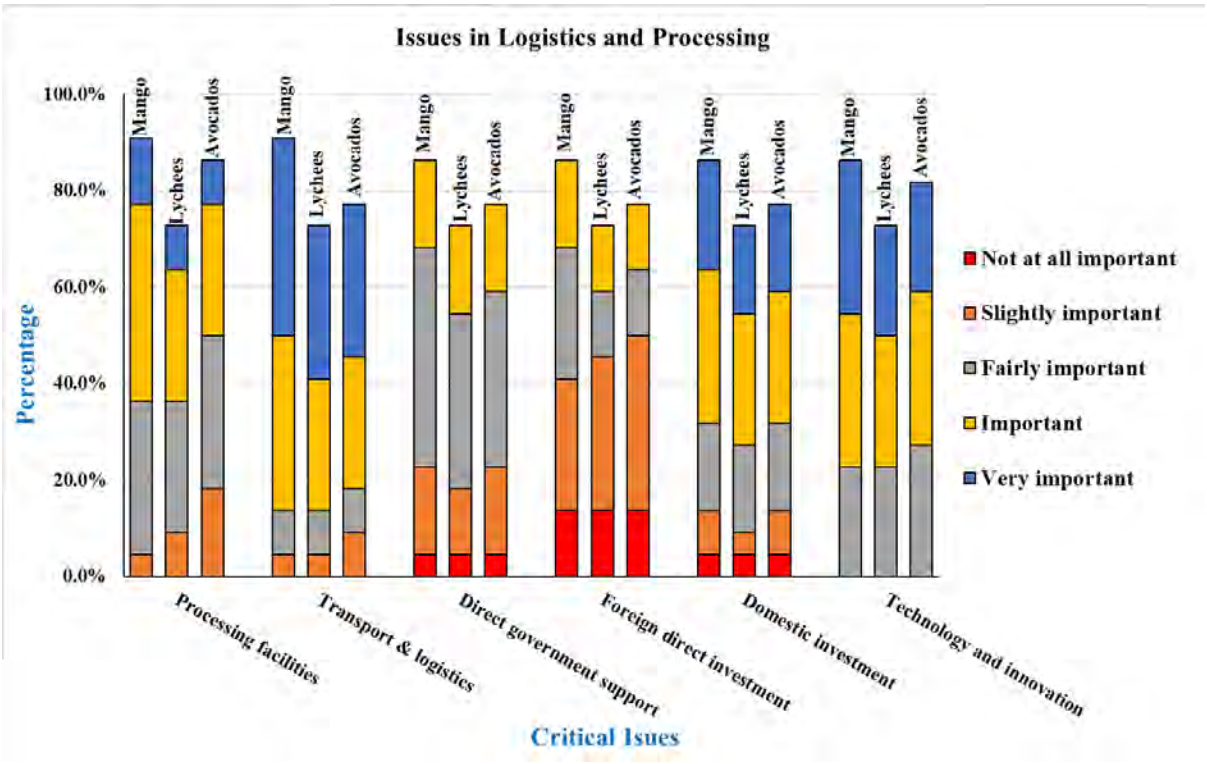

Figure 13: Importance of different issues in logistics and processing

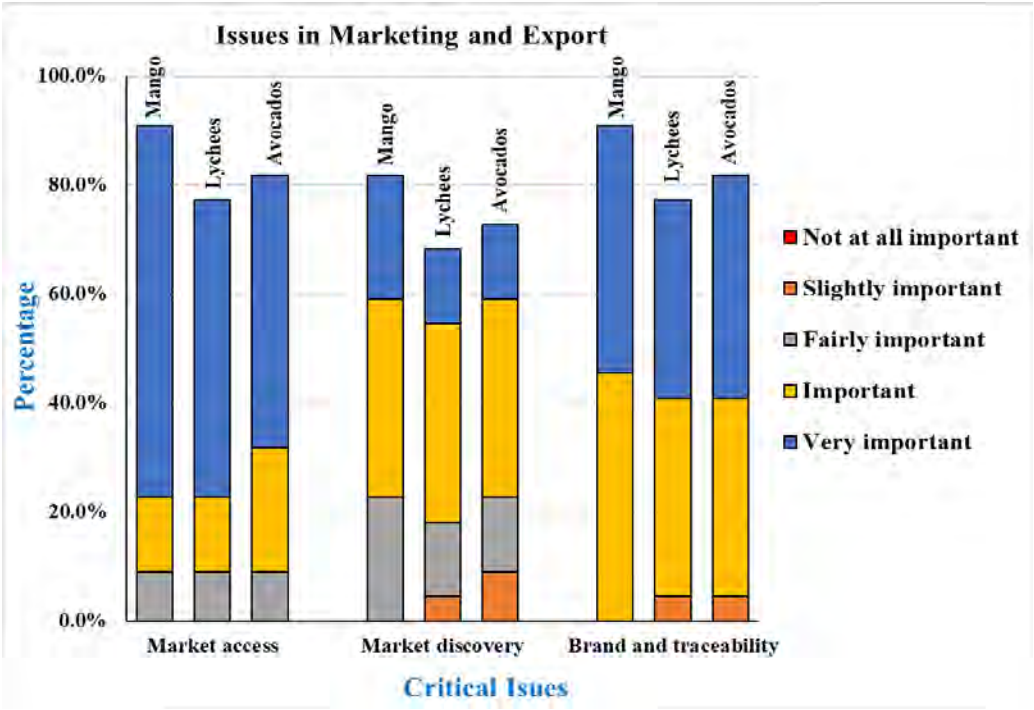

Figure 14: Importance of different issues in marketing and export

The participants provided their opinion on three key issues of marketing and export (Figure 14). Exporting horticulture into a specific international market requires access to that market. Though all

three selected horticulture products have the market access to some export destinations, participants considered market access as critical for the Asian market. On average, about 75% of respondents rated market access as critical (very important or important). This outcome is not surprising as there was substantial discussion on market access during the first session of the workshop. The results also suggested that the market discovery was not rated as important as market access. Most stakeholders were aware of the increasing number of middle-class populations in Asia and the potential markets with high demand. Additional market discovery is not required at this stage since Australian horticulture industry is not capable to meet the demands of the existing markets, let alone the new one. The participants assessed brand and traceability as the most important issues in this category with an average critical score of 80%. Branding is important as it will highlight the origin of the product and create more opportunities in the export market.

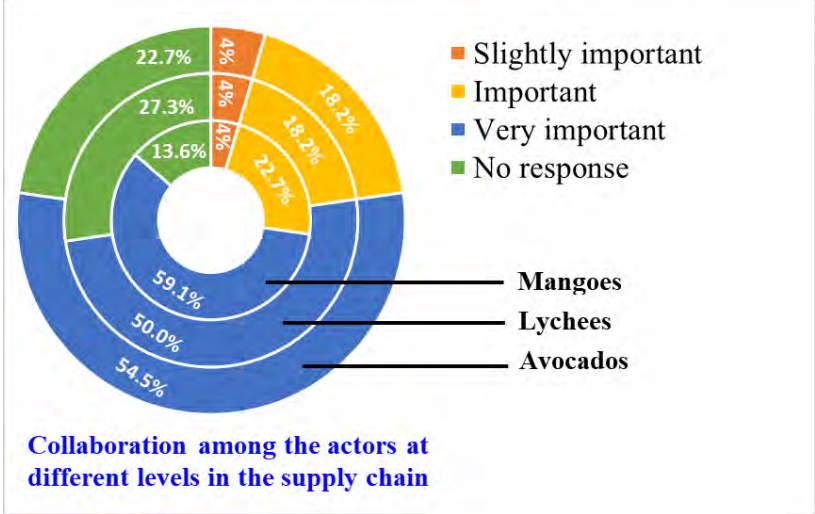

Figure 15: Responses on the collaboration at different level

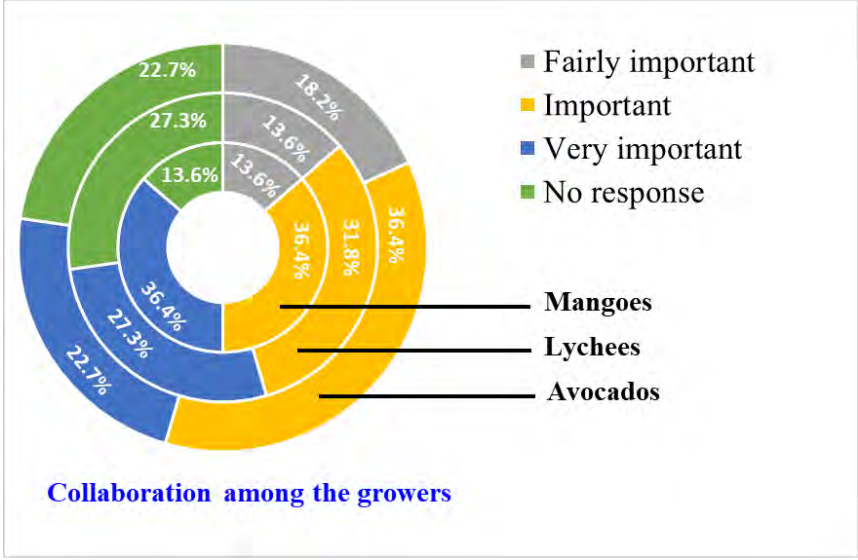

Figure 16: Responses on the collaboration among the growers

The current study focused on developing a stakeholder collaboration model to facilitate the supply chain for the international market. In the individual task section of the exercise, the respondents were asked to indicate the importance of the coordination in two directions, first among the actors at different levels in the supply chain and secondly the coordination among the growers. Apart from a small number of participants, all who responded rated the importance of vertical coordination highly (Figure 15). By comparison, the participants were not highly convinced enough about the need for coordination among the growers (Figure 16).

In the later part of the individual task, the participants were asked to indicate the key actors of the supply chain and how should they be linked to developing a SCC. The results are presented in this section separately for three selected products.

5.3.1 Mango supply chain collaboration model

The outcome of the Mango-specific data collection exercise is illustrated in Figure 17 which indicates the preference of two major groups of participants. The solid lines in the figure indicate a strong relationship while the dotted line indicate a moderate relationship. Most participants identified producers, selling agents, exporters and retailers as the key actors to reach international consumers. About 41% of respondents indicated that selling agents would be vital to draw a linkage among the producers and exporter and/or retailer. They also indicated that the selling agent could act as an exporter to supply the product directly to the consumers via retailers. However, 27% of participants acknowledged a similar relationship but unlike the first group they thought that the selling agent is not an essential actor in an export supply chain. Both groups recognised the importance of genetic companies and technology providers in the ASCC.

One interesting outcome of this exercise is the need to add packhouses in the model which was not initially included by the research team. The research team thought the processors would be more appropriate actor for the export supply chain, however, the participants thought differently. The majority of the participants indicated that the packhouse facility should be linked with the producers and act as a single actor. This exercise also indicated the preference of the participants to avoid wholesaler and distributors in the supply chain. The results also did not indicate any relationship between the producers and government and/or industry body.

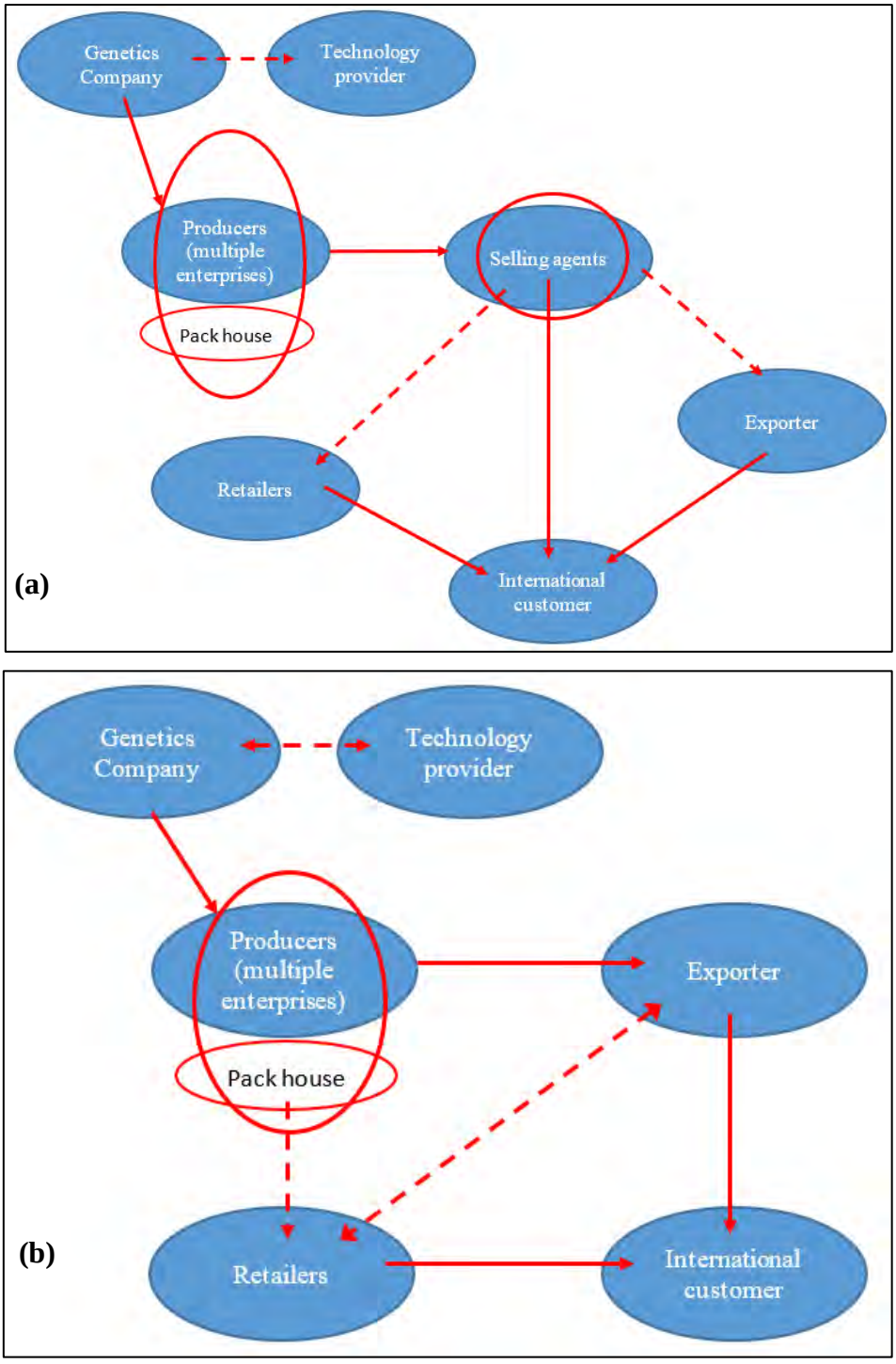

Figure 17: ASCC for Mango a) response of 42% participants, b) response of other 27% participants.

5.3.2 Lychee supply chain collaboration model

Figure 18 illustrated the outcome of this exercise for lychee, which is different from the case of mango. Like the case of mango, most of the participants identified producers, selling agents, exporters and retailers as the key actors to reach international consumers. Along with these actors, the participants identified the importance of domestic and international investors. This is reasonable as the lychee

industry is not as stabilised and mature as the mango industry. Like the case of mango, there is some uncertainty in the role of a selling agent in the lychee supply chain, as reflected from the responses. The inclusion of packhouses is also visible in these set of outcomes. Some of the participants indicated there should also be involvement of genetic companies and technology providers in the SCC.

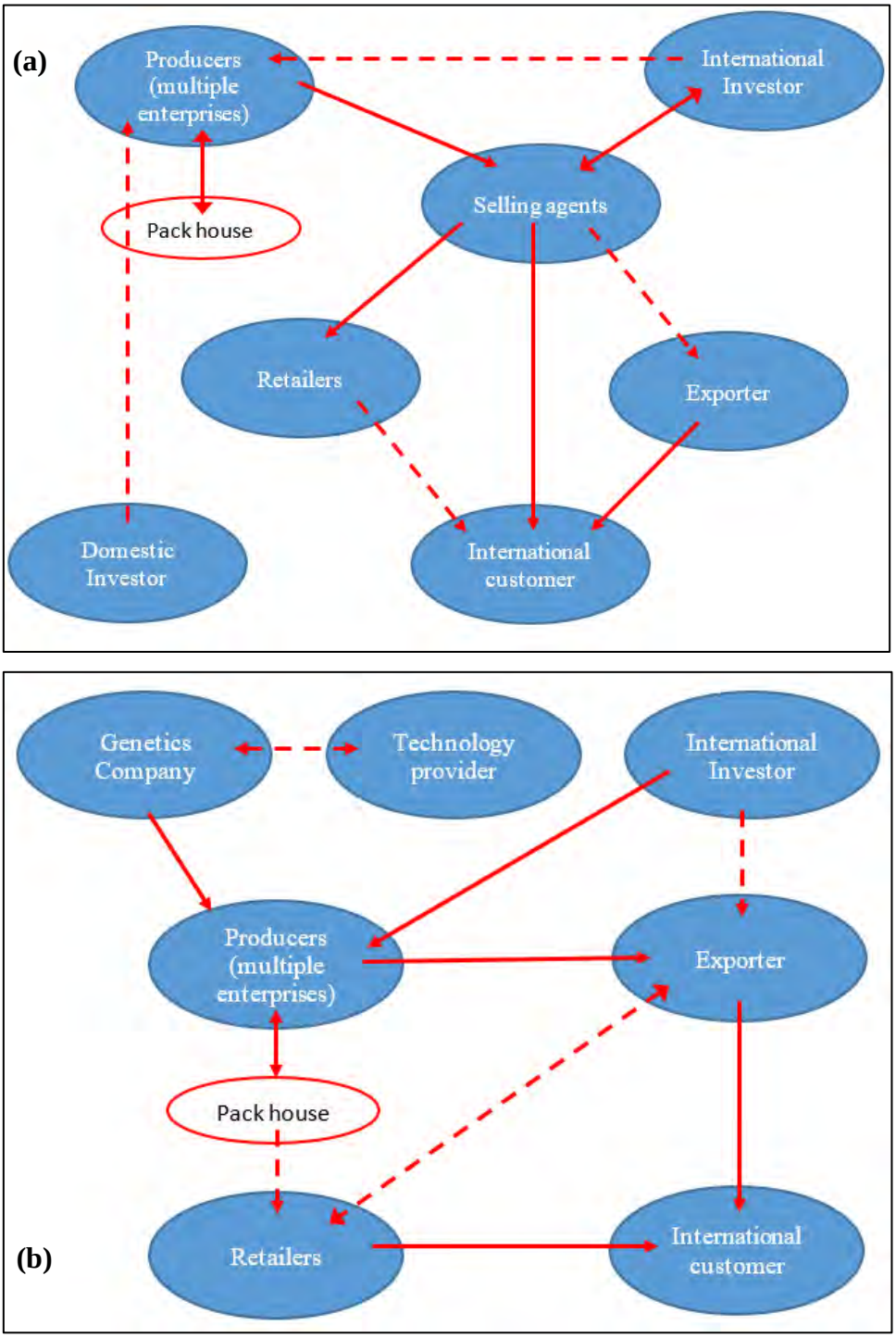

Figure 18: ASCC for Lychee a) response of 45% participants, b) response of 18% participants.

5.3.3 Avocado supply chain collaboration model

Figure 19 indicates the preference of the participants on the SCC for the Avocado industry. Like the case of lychee, most of the participants indicated that the involvement of domestic and international investors is required for an effective SCC.

Individual task outcomes Avocados:

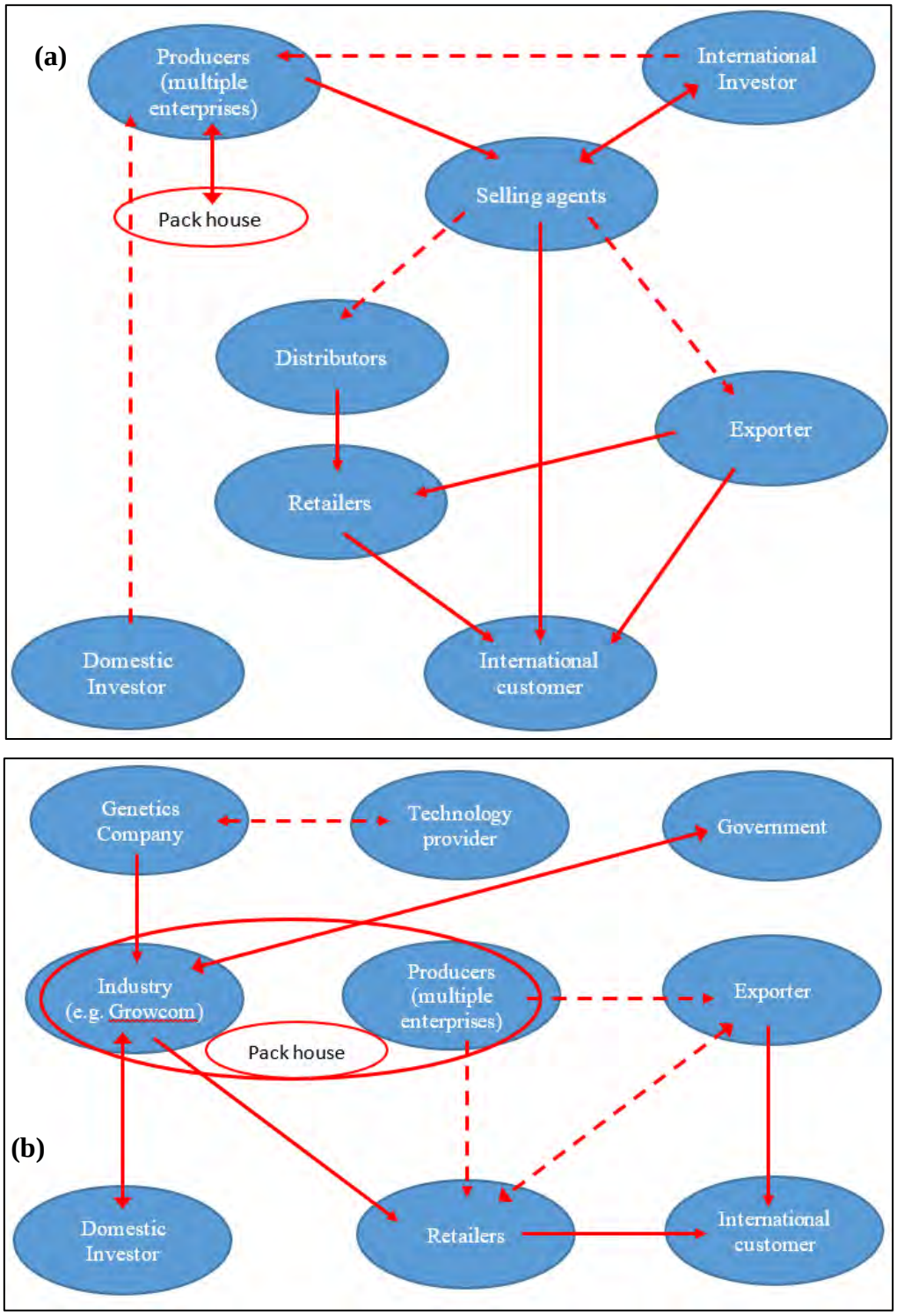

Figure 19: ASCC for Avocado a) response of 45% participants, b) response of 18% participants.

About 45% of the participants were inclined to adopt a typical collaboration model like the case of mango and lychee. However, 18% of respondents preferred greater involvement of government and industry bodies to develop the supply chain and enable it to capture the export market. Some participants also indicated that involvement was required from the genetics companies and technology providers.

5.4 Group discussion and the proposed models

In the final segment of the workshop, all the participants were directed into one of three different groups to develop a prospective agricultural supply chain collaboration model for each of the selected horticultural products. The participants were asked to join in an open discussion session to identify what is required to develop an export-oriented supply chain collaboration model. The outcomes of these group tasks have been discussed in this sub-section. In the first part of group discussion, the same diagram (see Appendix 2) from the individual task was used to identify which actors could best coordinate/lead the supply chain and what will be the key relationships with the other actors within the supply chain. In the second part of the group discussion, the participants were asked to provide their opinion on the entire mechanism of horizontal and vertical collaboration. The full task description is given in the appendix.

5.4.1 Mango group discussion and the proposed model

More than one hour of discussion was held on the structure and mechanism of ASCC for the mango industry in Queensland. The model presented in Figure 19 was developed by the agreement of all or the majority of the participants within this group.

In developing this model, the discussion was held to find an authentic example of collaboration that is currently used to export HVPACs to the Asian market. The group provided examples such as Manbulloo mangoes exporting mangoes to the Asian market. However, this single company-led vertical supply chain might not work in the context of small and medium scale mango growers in Queensland. That is why the group members instead suggested horizontal collaboration among the small and medium-scale farmers (figure 20) followed by making a strong partnership or collaboration with the fruit grading and/or protocol processors (figure 20). Particularly the mango producers in this group wanted to bypass the wholesaler in an attempt to avoid unnecessary costs (see Box 1), with the other members in the group agreeing with this mango grower's intention.

Box 1: Key comments

From a grower: "*We're talking about going to exporters. I went straight to an exporter…Every time it goes through one of these [exporter or forwarder] guys, it costs us money*".

From an overseas partner: "*You (producers) probably don't have direct access to your consumer. So, you have to bear with them (retailer/exporter) --- and they got a cut on profit margin from you*".

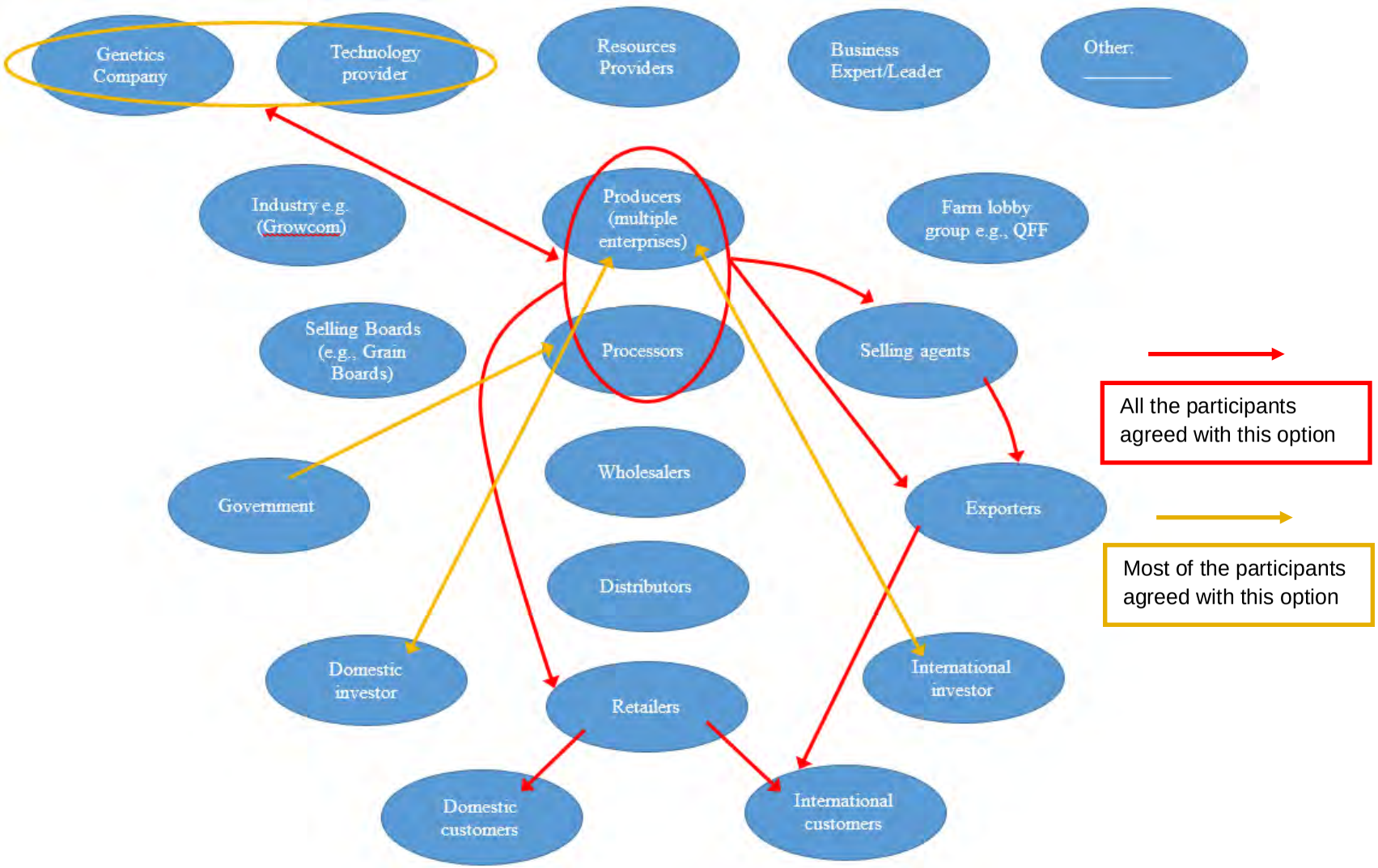

Figure 20: Prospective or existing linkages amongst actors involved in a collaborative supply chain for mango industry, as identified during the workshop activity

The group emphasized that a medium-scale grower can afford to operate a grading and processing shed, and this can be offered to smaller growers on a fee basis. As such, the growers can together go to the exporter or export fruit processors (e.g. where heat treatment or radiation treatment is applied) and avoid unnecessary commission costs that are ordinarily paid to the wholesaler. The group agreed that there are lots of like-minded small mango farmers, and someone from them should lead or initiate this type of collaboration.

From the producer's standpoint, fruit grading is an issue as lower graded mangoes are sold at a much lower price in the domestic market, including some instances where it is lower than the production cost. Sometimes the lower graded produces are also unwanted by domestic retailers, despite the fact that the premium and lower grade products generally taste the same and the difference could only be the colour (Box 2).

The importance of genetics and technology providers was also discussed by the participants. "Calypso[1]" mango and heat treatment were discussed as examples of these cases respectively. For example, one of the government officials informed that heat treatment is mandatory for access to the Chinese, Korean and Japanese markets, thus meaning that involving a technology provider is an essential step in the export-oriented supply chain. Furthermore, the mango producers added that the marketing strategy had strongly underpinned the success of the Calypso mango (Box 2), thus suggesting that an effective supply chain must be driven by entities who have good marketing expertise.

Box 2: Key comments

From a government officer: *"Chinese don't really say first grade and second grade, they say premium mangoes. So, producers send premium mangoes in there … but as you pointed out for lower grade in a third grade in fourth grade, [the] producer ended up with "where am I going to sell?*".

From a grower: *"This is the problem that …. I go with the direct export, it is me here. I'll go with a direct exporter, but he only wants one and two [grade] and I'm left on the domestic market getting absolutely slammed from a three and four [grade mango]".*

From a grower: *"Calypso (mango) for instance, … I don't believe it's half as well [taste] as …. a KP or an R2E2, but they market it so well, and it looks good on the shelf".*

All the participants agreed that the producers should initiate the supply chain collaboration. However, they added that producers should also have direct access to the exporter and not through other 'middlemen' (Box 3). It was also argued that it could be a multiple leader led collaboration and not necessarily an individual has to initiate the collaboration (Box 3).

[1] Common name for the scientific variety B74

Box 3: Key comments

From a researcher: *"So either it goes on the corporate systems or any corporate governance systems whatever the system is, but we really need to link them (producers and processors), so the processor can directly access to the exporters*".

From a government officer: *"So I think the question is not who's going to lead it because at different points everyone has a different leadership role. It's not one leader. It's multiple leaders. But when do you rise to be the leader at this point?"*

Some members of the group also discussed the current trend of foreign direct investment and its role in the development of the mango industry. There was some disagreement on whether the foreign investors should initiate the supply chain collaboration (Box 4). Participants suggested that communication and information sharing should be both ways amongst the parties. None of the respondents felt that the industry body was an essential actor in the supply chain, however, they can provide resources and information for successful multiparty collaboration.

Box 4: Key comments

From a mango producer: "*I went straight to an exporter. What we're finding is these people cost us as producers money, I think we need some international investment (to minimize the cost)*".

From a government officer: *"We're seeing investors come in, they want integrated supply chain. So, they're buying the farms to produce and they're controlling every aspect right through to value-add into domestic and international markets"*.

From another government officer: *"I brought in some potential investor … in the last 18 months, but there are also issues because they are motivated people and are looking into the farm but aggregating a supply is a difficult and challenging (for them)"*.

The participants agreed that collaboration needs to be developed among the like-minded mango growers even where these are from a different region. Emphasis was also given on the transparency of the collaboration model in terms of pricing, information sharing and risk-sharing. As discussed earlier, the participants also agreed that achieving better prices for lower graded mangoes should be a key feature of any supply chain development work. Furthermore, during the discussion on the supply chain mechanism, participants noted that it is really important to collect reliable data and analyse those data to create better forecasting models for demand, production and weather events.

5.4.2 Lychee group discussion and proposed model

A group of nine participants engaged in the discussion on the structure and mechanism of developing an ASCC to export lychees from Queensland. The following model (Figure 21) was developed by the agreement the participants within this group.

Figure 21: Prospective or existing linkages amongst actors involved in a collaborative supply chain for lychee industry, as identified during the workshop

Some participants thought that the producers and exporters were pivotal for effective export of lychee product and believed that the relationship between them should be developed based on trust (Box 5). They recognised lychee as an emerging export industry; as such, lychee growers should also step forward to position themselves as an exporter in future. The participants noted that an 'in-house exporter' or in other words an exporter amongst the producers, would provide more flexibility and control over the supply chain of lychee (Box 5).

Box 5: Key comments

From a producer: "*I would say agent (exporter) as they have more knowledge. So, we take their lead on that… Lychee as a perishable product need lots of care in the supply chain. By myself we may not be able to handle all the requirement. The coordination through the agent (exporter) is required for continuous supply to the market*".

From an industry partner: *"So Industries typically tend to transition from using an exporter or market agent and start to have those people in house, whether they become a champion business and develop the brand itself and that's quite successful for most Growers because there's greater control of influence over the products"*.

Another key link identified during the discussion was that between the producers and the technology providers (Box 6). The research and development section of the technology providers are providing support to the producers in term of value-adding and innovation. However, commercialisation is still an issue for all horticulture products. Genetics companies are also providing support to producers with new species that might provide the opportunity to supply to new markets. Notwithstanding this benefit, there was a reservation amongst the producers, who held concerns about the loss of control over production (Box 6).

Box 6: Key comments

From an industry partner: "*The new product offers more to the grower than the regular processing product from wastage, even arguably more that premium product. One of the challenges is industry can engage in R&D but we cannot commercialize*".

From a producer ""*Let's say like, this lychee that's coming out of China…they're (genetic company) growing them out in greenhouses currently by the thousands, ready to plant them out, ready to tell us growers to plant them and then we supply them. Yeah, so that concerns me (losing control)"*.

The importance of the retailer was also discussed in this session. A retailer can actually create a brand which is sometimes very important for the export market. In contrast, an exporter may not put effort

into developing a brand for a certain product. Most stakeholders held views that the retailer and the producers could both influence the entire supply chain (Box 7).

Box 7: Key comments

From a producer ""*So my experience is that the two people that matter most producers and the retailer…. exporters have no willingness … to actually create a brand. Producer typically is able to provide instruction to a certain level ... down the chain and the retailer up the chain…. The actors in the middle, they are critical but they're not the decision maker"*.

A group of farmers could develop an association and engage an export agent to explore market opportunities for a selected commodity. Such associations for marketing could act as principal actors in the collaboration system. The marketing association could collect produce from different growers and then market it with the same brand. The key to such association is long term commitment. During the discussion, it was identified that the price in the export market is the main incentive for the initiation of a collaboration. This results in small growers being interested in exports, which they can only realise through coordination and collaboration.

International market protocols and standards were noted as the main mechanism to gain access to the international market and the lychee producers should know about those even before developing a supply chain collaboration. Other perishable industries have examples of successful collaborations that brought export produce to an international market (e.g. the mango industry achieved ACCC approval to work collectively to get protocols for exporting to the USA). It was felt that the lychees industry should follow this model and develop their own collaborative models. One participant identified that the absence of a proper business structure is one of the key issues of developing a supply chain collaboration. The other big challenge is the production volume which is currently not enough to fulfil the demand of the US market, where the lychee industry has existing market access. Most of the participants agreed that there should be some export strategies which could attract the small and medium growers to work together to fulfil the demand of the export market.

Another participant discussed the structure and mechanism of the vertical supply chain and agreed that all actors should be cognisant of the upstream and downstream steps of the supply chains that they are positioned in. It was acknowledged that industry groups could play an important role in the vertical supply chain as they have knowledge about the resources available. According to the participants, predictability and risk reduction are two main motives in vertical collaboration. Forecasted demand and strong awareness of consumer expectations may also lead to a successful collaboration. Participants agreed that linking growers in an area or developing a grower group could be a prerequisite for effective collaboration. However, the participants identified a lack of business skills among the local producers as a shortcoming, albeit one that can be overcome with continual skill development.

5.4.3 Avocado group discussion and proposed model

A group of nine participants was engaged in the discussion on the structure and mechanism of developing an ASCC to export avocado from Queensland. The following model (Figure 22) was developed by the agreement of all or the majority of the participants within this group.

The participants indicated that the consumption rate of avocado in Australia is still on the lower side compared to other avocado consuming countries. They also acknowledged 'Avolution' and 'Sunfresh' brands, who are maintaining a year-round supply of avocado in the domestic market. For the international market, participants recognised that it is essential to conduct market research prior to export. For example, international consumer confidence is heavily centring around safe food, which is a plus point for Australia. However, to meet growing international market demand, CQ needs to scale up avocado production.

All the discussion group members agreed that producers should lead the supply chain collaboration for the avocado industry, however, some added that they first need to have the desire to grow. In terms of risk, the organisation leading the supply chain takes on the risk and thus deserves a greater share of the benefits from the collaboration. The participants discussed the role of the other actors and concluded that apart from the producers, no other actors are suitable for a leading role in the collaboration (Box 8).

Box 8: Key comments

From a government officer: *"It could be any one of these parties. [All] I need is either a big enough ego or big enough desire to go to convince everyone else in the system because you can't just say it's dependent on The Growers*".

From a researcher: *"Industry board … is a little bit of a challenge because [in] Australia, we've moved away from them"*.

From a government officer: "*So I say industry is driving it; government and research bodies have the support mechanisms. You've got producers even with the capabilities of being able to invest in the further down the line supply chain or international investors coming in"*.

It was noted that producers and processors may work in combination to lead the supply chain. Also, producers, packhouses and exporters can, in fact, be the same organisation (such as the Sunfresh and Avolution examples). Some organisation may also have their own marketing agent.

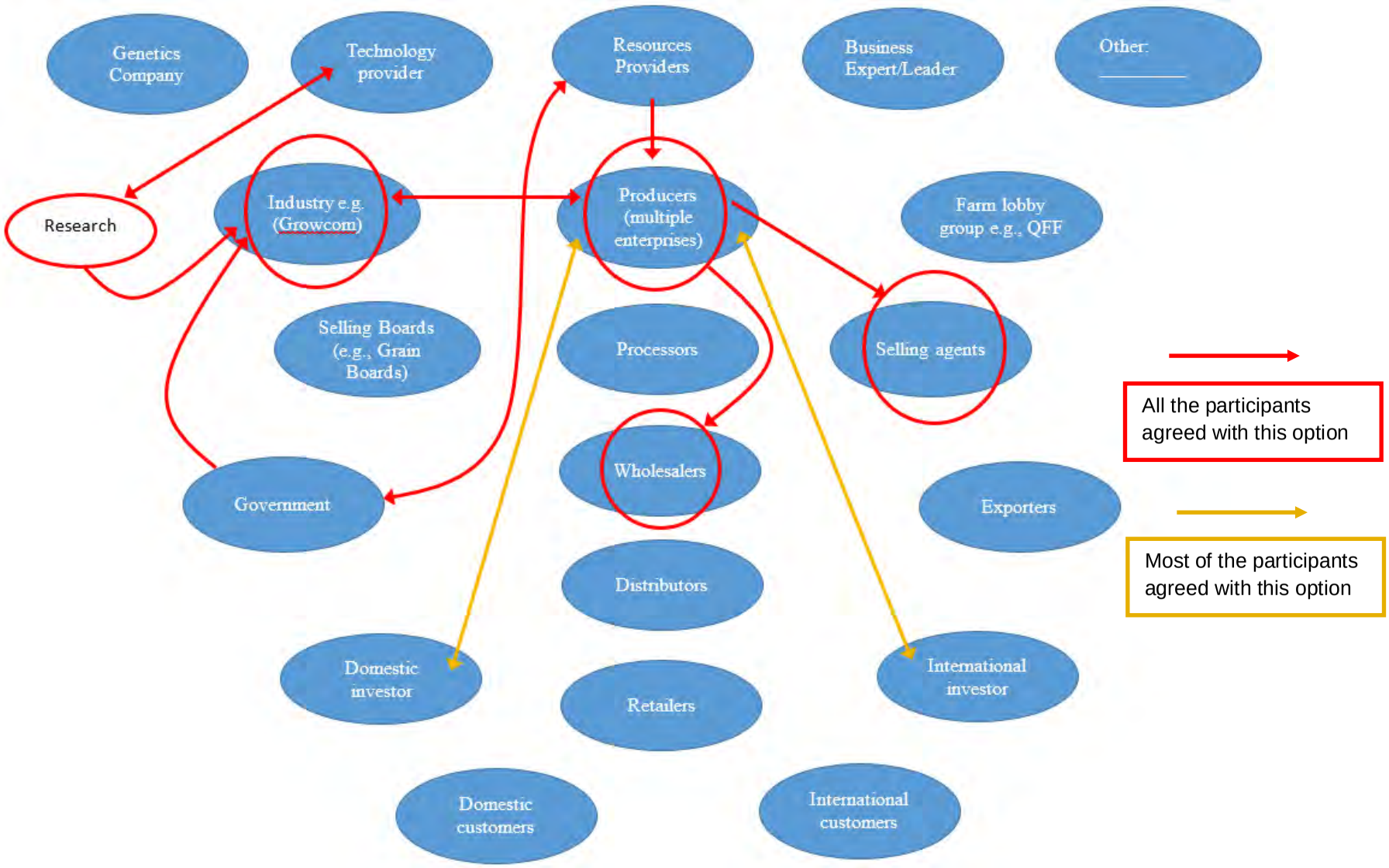

Figure 22: Prospective or existing linkages amongst actors involved in a collaborative supply chain for avocado industry, as identified during the workshop

Some participants thought that the role of wholesalers is important; and that distributors can undertake marketing within that same role. Domestic and international investors should be there to help 'scale-up' the volume. Moreover, for supply chains to work, it was recognised that risk (to producers) should be ended 'at the farm gate' – with transparency being an invaluable feature of the supply chain. Participants suggested that another option could be selling to a consolidator; in this scenario, it was accepted that the extra party would take the dominant share of good margins, but they also take the risk.

According to the opinion of the group members, vertical collaboration would provide producers with total control over their product, but it also requires them to have knowledge and skill on every single facet of the supply chain. By comparison, horizontal collaboration involves a choice of whom to align with – the neighbours, or growers from another or quite a different region (the latter being useful in allowing producers to span different growing seasons and de-risk against adverse weather events).

The participants agreed that the structure of the collaboration necessarily depends on the appetite of the players (e.g. growers or other actors), access to capital (e.g. foreign investment, joint venture, family-owned) and the concept of resource sharing. Market benefit and access to market intelligence were identified as key incentives to form supply chain collaboration. Considering the mechanism, it is essential to hold a consistent price and to avoid market fluctuations. Communication among the growers and processor is another important mechanism to initiate the collaboration. Quality control and changing the attitude toward collaboration are identified as the ingredients in an effective governance mechanism. The participants also identified the value of collaboration in helping to overcome some current risks for the avocado industry, such as fruit fly infestation or oversupply leading to domestic price crash (particularly in absence of a suitable export market).

5.5 Discussion on issues and mechanisms of ASCC

One of the purposes of the stakeholders' workshop was to identify the issues and mechanisms of agricultural supply chain collaboration (ASCC) for the avocado, lychee and mango industries in Queensland. As the discussion was held in three separate groups of participants, the data for three products of focus were collected separately. Key findings of these three groups discussions are presented in Table 5. This table identifies the issues of ASSC for each of the three products, summarised into nine categories: quality, resources, international competitors, collaboration, consumer behaviour, market access, infrastructure, risk and support.

Table 5: Stakeholders' perception of key issues in agricultural supply chain

Key issues	Specific issues	Avocado	Lychee	Mango
Quality of product	Appearance (Colour & size)		√	√
	Taste			√
	Combination of appearance and taste	√		√
	Consistent yield	√	√	√
	Shelf life	√		√
	Disease freeness	√		√
	Quality control	√	√	√
Resources	Water	√		
	Information & training	√	√	√
	Labour (sourcing)	√		
	Research and development (R&D)	√	√	√
	Genetics	√	√	√
	Capital	√		
International competitors		√	√	√
Collaboration	Selecting partner	√	√	√
	Drivers	√	√	
	Leadership	√	√	√
	Management role	√		
	Complex process			√
Consumer behaviour	Consumption trend and pattern	√	√	√
	Preference	√		√
Market Access	Identification	√	√	√
	Entry	√		
	Export readiness	√	√	√
	Domestic vs International	√	√	√
	Market exposure / Premium market	√	√	√
	Market power			√
Infrastructure	Development of enabling infrastructure	√		√
	Facility sharing	√		√
	Fruit treatment facility		√	√
Risk	Investment	√		√
	Price	√	√	√
	Cost of production		√	√
	Market saturation	√		
	Extreme weather	√		√
	Disruption in supply chain	√	√	√
	Conflict	√		√
Support	Lack of export support	√	√	
	Long term plan	√	√	√
	Financial stability	√		
	Government tax regulation			√

Most participants identified product quality as a major issue. Quality can be defined based on its physical appearance, taste, shelf life and disease freeness. Consistent yield and quality control systems are two relevant issues, which can affect product quality. Lack of resources is also a major issue in

ASCC. Insufficient information and limited effort in research and development are common phenomena in all three industries. Currently, Australia is exporting mangoes, avocadoes and lychees in small volumes, but there is significant international competition in the premium markets.

All participants of the workshop recognised that limited collaboration among farmers and the other actors is an issue that affects exports of perishable commodities to Asian markets. Under both horizontal and vertical collaboration, leadership and the selection of partners are the starting points to initiate collaboration. Market access and lack of enabling infrastructure for collaboration were identified as major limitations. One of the key questions participants raised was whether the selected product industries have all the elements required to achieve export readiness. Price fluctuations and disruptions in the supply chain were frequently mentioned during the workshop. Other limitations identified were lack of support from different entities including government and industry bodies.

In the current section of the report, the framework of collaboration (i.e., collaboration structure) was developed based on the responses of participants during the individual and group tasks. The suggested frameworks are presented in Figures 20-22.

Apart from the structure of the collaboration, several mechanisms for developing and maintaining collaboration have been drawn from the group discussion. Broadly they are identifying and reaching consensus on collaborative tasks, coordination, marketing and governance and adhering to policy and planning. All discussed mechanisms for horizontal and vertical collaboration are listed in Table 6 and 7, respectively. These mechanisms indicate the pathways for developing and maintaining collaboration. First, at least a few leaders or actors need to understand the structure of the collaboration, which includes the identification of potential collaborator at all levels of the supply chains. The most important actors are producers, processors, genetics companies, technology providers and industry bodies. Cross-regional collaboration and multi-industry collaboration were suggested as options to achieve both horizontal and vertical collaboration.

Several collaborative activities were identified through the thematic analysis. In horizontal collaboration, sharing is identified as the main mechanism. This includes information sharing, resource sharing, risk sharing and profit sharing. In vertical collaboration, some other activities were discussed, and one common activity suggested by the participants of all three groups was a joint venture. Getting support from government and industry was also categorised as a collaborative task. Negotiation with the potential importer for a reasonable product and price contract is also a part of the collaborative activities in vertical supply chain collaboration.

Table 6: Functions and mechanisms to achieve horizontal collaboration for ASCC models

Key function	Specific mechanism	Avocado	Lychee	Mango
Collaborative initiations	Initiator to lead and partner selection	√	√	√
	Framework for collaboration	√	√	√
	Cross regional collaboration	√		√
Collaborative activities	Communication among the collaborators		√	√
	Information sharing: production inputs and standard	√	√	√
	Information sharing: market access and demand	√	√	√
	Price setting		√	√
	Risk sharing	√	√	√
	Profit sharing among growers	√	√	√
Coordination	Business network among growers	√	√	√
	Role of industry (or government) in horizontal collaboration	√	√	√
Governance	Government supported R&D program	√	√	√
	Equity in power distribution	√	√	√
	Joint venture	√	√	√
	Corporate governance	√		√
Marketing	Clean, green and fresh slogan	√		
	Global brand for Australian produce	√		√
	Regional brand		√	
	Trademark property rights and brand security	√	√	√
	Traceability and quality control	√	√	√
Others	Lesson learned from the existing models of other horticulture industry	√	√	√
	Commercial behaviour of producers			√

Coordination and good governance are two essential mechanisms to deliver successful collaboration. The role of the industry groups in devising or developing coordination and a governance framework is essential for both horizontal and vertical collaboration. Equity in power distribution and transparency are very important for the sustainability of the collaboration. The workshop participants also placed emphasis on government-supported R&D programs for both collaboration and supply chain enabling infrastructure. In vertical collaboration, development and adherence to policies and regulations are one of the key governance mechanisms. Policies and regulation could relate to agricultural production, biosecurity and/or exports.

Table 7: Function & mechanisms to achieve vertical collaboration for ASCC models

Key function	Specific mechanism	Avocado	Lychee	Mango
Collaborative initiations	Partner selection (actors in different level)	√	√	√
	Framework for collaboration	√	√	√
	Multi-industry collaboration	√		√
Collaborative activities	Cross industry communication		√	√
	Risk sharing	√	√	√
	Industry and government cooperation in cold supply chain development	√		√
	Joint venture	√	√	√
	TIQ and AUSTRADE involvement in market access	√		
	Profit sharing: structure and accountability		√	√
	Commercial agreement: Product and price contract with importers	√	√	√
	Transparent and efficient leadership			√
	Regular analysis on return of investment			√
	Maintain consistent relationship between producers and consumers			√
Coordination	Role of industry in vertical collaboration	√	√	√
	Business connection & matching	√	√	
	Strategic transportation planning	√		
	Strategic infrastructure	√		
Policy and governance	Policy and Regulation: agriculture biosecurity and export	√	√	√
	Government supported R&D program in ASCC	√		√
	Equity in power distribution	√		√
	Maintaining the principle of corporate governance	√		√
	Support and advocacy	√	√	
	Export protocol development	√		√
Marketing	New market discovery	√	√	√
	Trademark, property rights and brand security	√	√	√
	Traceability and quality control	√	√	√
	Professional marketing			√
Others	Lesson learned from the existing models of other horticulture industry	√	√	√

The management of branding, trademarks, traceability of produce and property rights are integral parts of both horizontal and vertical collaboration. Australia's clean, green and fresh environment provides a strong base for marketing from the branding perspective. The workshop participants suggested

establishing an Australian brand for avocado and mango. However, the participants of the lychee group leant more towards establishing a regional brand. Participants referred to existing models in other horticulture industries (e.g. citrus industry) and suggested that lessons could be learnt from their successes.

Some drivers that can affect collaboration mechanisms either positively or negatively were mentioned in the workshop (Table 8).

Table 8: Drivers affecting the mechanism of ASCC

Collaboration	Drivers	Avocado	Lychee	Mango
Horizontal	Government and industry: engagement and incentive	√	√	√
	Counter seasonal advantages	√	√	√
	Foreign direct investment	√		√
	Attract domestic investors		√	√
Vertical	Government and industry: engagement and incentive	√	√	√
	Foreign direct investment	√		√
	Strong price in the international market	√		√

The engagement of government and industry was viewed as vital in collaboration. They can engage in both horizontal and vertical collaboration models under various forms including network development, training, developing enabling infrastructure and providing incentives. Investment from domestic and international entities could inject cash flow and trigger collaboration in each of these selected industries.

5.6 Pathways for translating proposed ASCC models into practice and policy

Governments, policymakers and researchers are interested in translating research into practice. The current study has analysed the agricultural supply chain collaboration models for three selected horticultural industries. The outcome knowledge points are the structural framework for collaboration, potential issues in collaboration and mechanism of collaboration. The dissemination process of knowledge outcomes are public reports, public forums, conference papers and referred journal articles. The translation pathway of created knowledge is demonstrated in Figure 23. The first step of knowledge transfer is adapting the knowledge in the local context. Adaption could be done through a trial run of the developed collaboration structure and mechanism on any selected horticulture industry. During the adoption of the created knowledge, if relevant stakeholder and collaboration organisations face any barrier, the problem should be investigated again through the knowledge creation process.

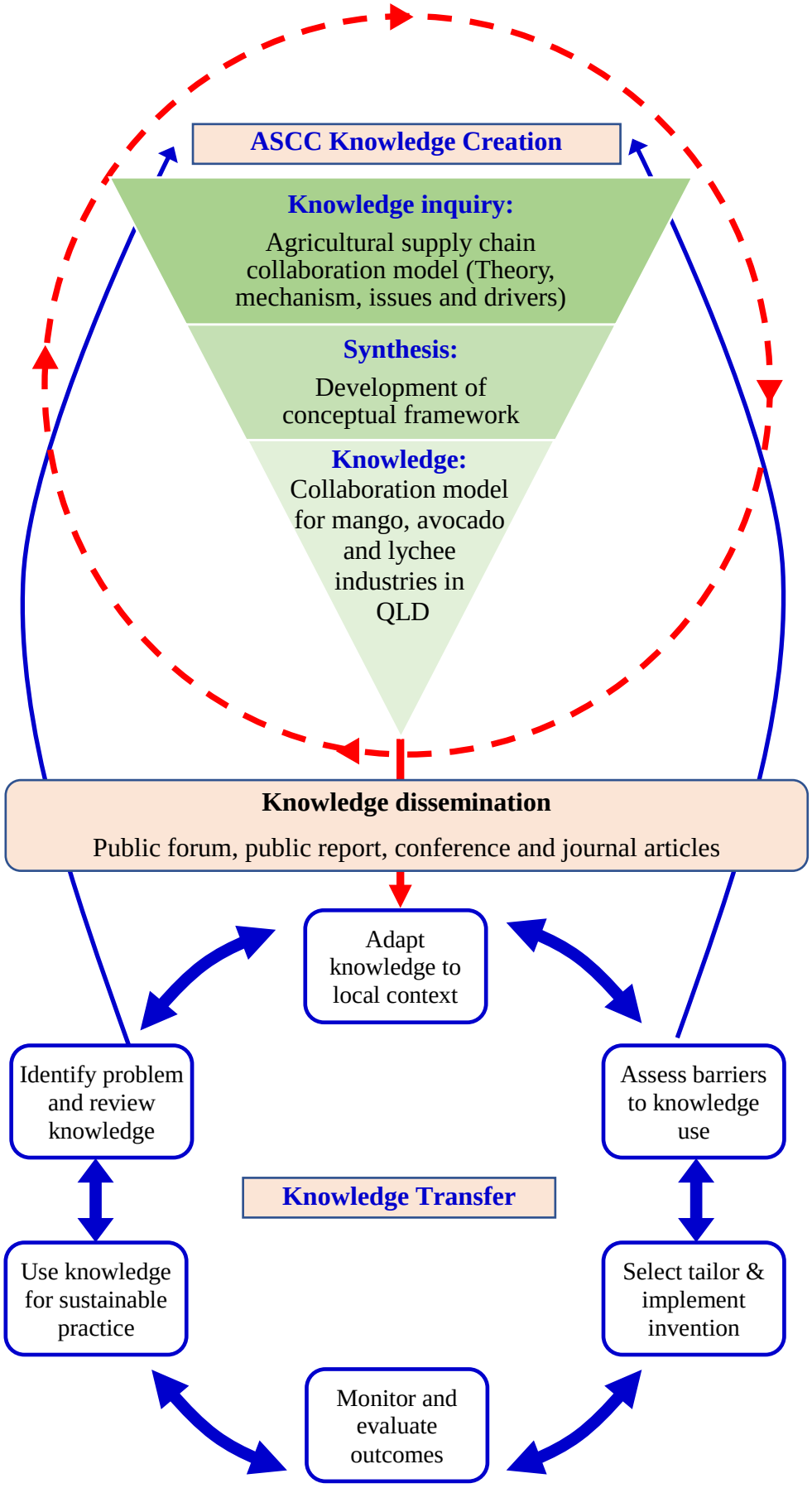

Figure 23: ASCC knowledge creation and translation pathway

After resolving issues and achieving a successful trial run, created knowledge can be communicated to the industry. At this stage, the collaboration model could be implemented in all three selected industries with a wider scope. Implementation of new knowledge requires continuous monitoring and evaluation. A well-performing collaboration structure and mechanism needs to be appraised by an industry and that will lead to take-up by other relevant industries. Throughout the entire knowledge transfer process, if any new issues arise which need to be solved, that can be sent back to the knowledge creation process by translating the problem into a research question.

In the current stage of the study, the findings of the study (knowledge) are ready to be adapted to the local case study contexts. Remaining stages of knowledge transfer will be carried on either during the next phase of the study or through separate research projects. Adaptation of the developed knowledge requires some prerequisites and action plan, which have been discussed in the next sub-section.

5.7 Action plan for translation of research findings

The transfer of research knowledge requires an action plan for the relevant stakeholders. An action plan has been developed below for all the parties involved with the collaboration. The tentative time frame of the execution of the action plan is 2 to 5 years. Engagement of all the collaboration actors in the supply chain and relevant government department and industry bodies is crucial for the successful execution of the action plan. Figure 24 illustrates the summary of the action plan. The action plan is divided into seven actionable steps including: developing leadership, quality control, contract management, forecasting and market analysis, policy and protocol development, brand development and export.

During the project workshop, all the participants agreed that horticulture producers should take a leadership role to initiate collaboration. Other external stakeholders including industry bodies, technology providers and genetic companies could also act as a catalyst to develop such leadership. It is important to select strategic partners and create a consensus and willingness towards forming collaboration. This can be achieved through effective communication and information sharing, where industry bodies, like Growcom, can play a matchmaker role.

Throughout the group discussion during the workshop, it was revealed that there is a lack of understanding of product quality requirements for export. Product quality is another critical issue for successful collaboration. Awareness of the importance of product quality can be created through workshops and training. Alternatively, exposure to other participants in the vertical supply chain, such as through participation in international trade fairs, will also build better knowledge and connections.

A third issue that provides a strong base for effective collaboration is ongoing completion of responsibilities. These can be organised or enforced through different mechanisms, such as trust, personal relationships and contracts. A formal contract should include the tenure of the collaboration,

individuals' responsibility, resource sharing guidelines and profit and risk-sharing mechanism. Industry bodies and government agencies may provide templates or support on the development of such a contract.

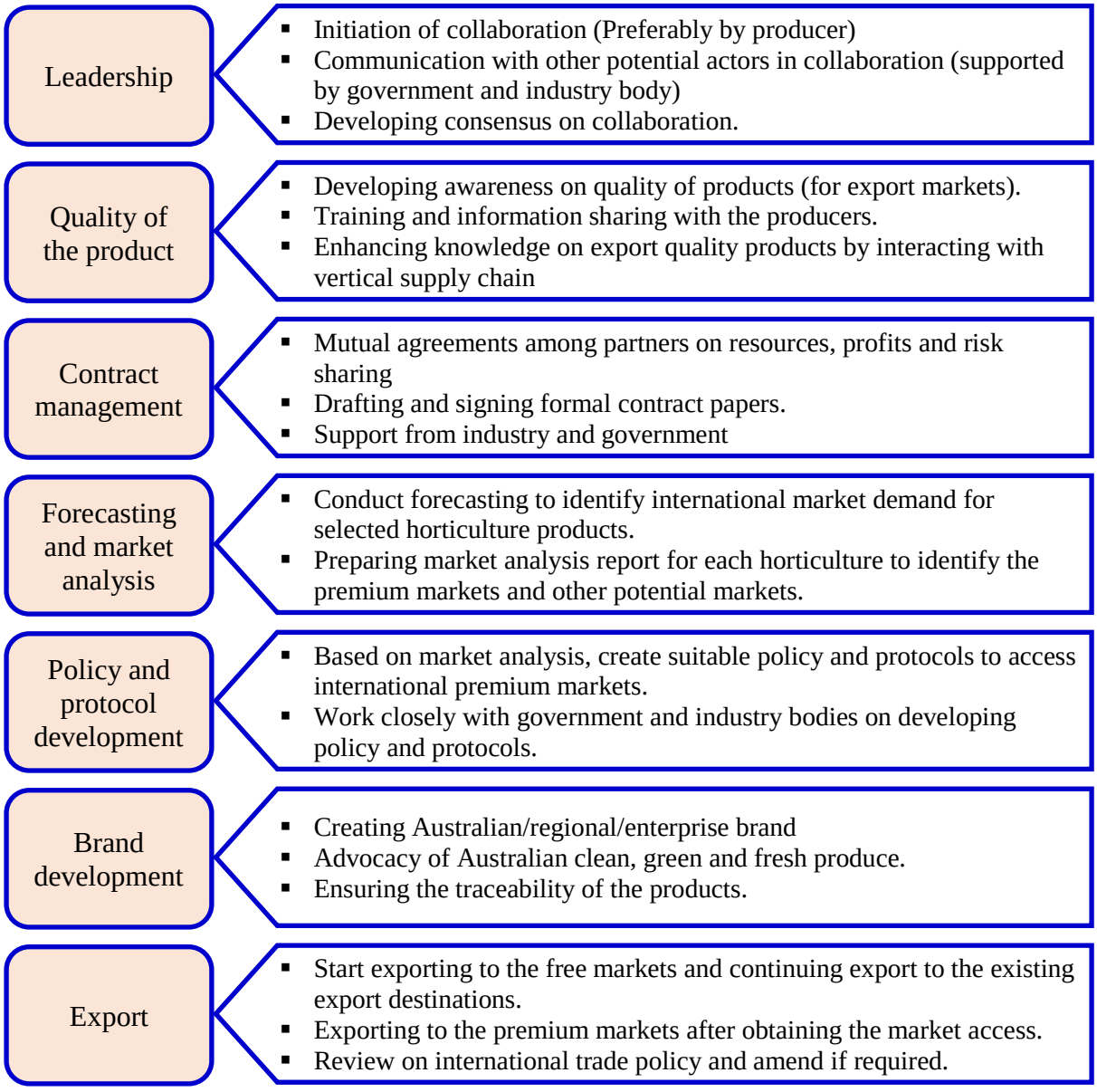

Figure 24: Action plan for translation of research findings

Accurate forecasting and market analysis are prerequisites to enter in any export market. Based on market analysis, a collaboration group may also need to propose adjustments or development of export protocols to export markets. It is very important to work closely with government and industry bodies on developing policy and protocols. Traceability, branding and monitoring are also important to gain and maintain access to new markets. Traceability helps to achieve quality assurance and to gain

consumer trust, branding allows various product attributes (such as quality) to be packaged to build consumer recognition, while monitoring enables quality control and process improvement to be built into the systems.

SECTION SIX
CONCLUSION AND RECOMMENDATIONS

This study linked a number of different theories of supply chain collaboration to develop prospective collaboration models for three agricultural commodities in Queensland. The research was produced through the use of a stakeholder workshop supported by literature review, desktop analysis of past and present practices, and scoping discussion with the industry, farmers and governments. This study identified three categories of issues. The first category includes cost, quality and water supply required to grow the commodities. The second category is related to transport and technology needs including logistics, advanced agricultural technology and innovation in genetics and value-added products. The third category is related to product marketing, including market access to certain medium and high-income Asian countries, brand development and recognition, traceability and market discovery.

This study identified a number of possible mechanisms for horizontal and vertical supply chain collaboration in exporting perishable commodities from Queensland. This study found the role of an individual horticultural industry association (such as Growcom) or a processor is very important for horizontal collaboration among the farmers. A passionate producer or a combination of several supply chain actors such as processors and/or genetic company or investor can lead the vertical collaboration in agricultural supply chain in Queensland.

The stakeholders identified that mango supply chains for international markets are well established in Queensland. However, horizontal collaboration is needed between the small and medium scale farmers to ensure consistent supply of product into the international market. Value-added production facilities are also required to process any excess production during November-January each year, i.e., the peak mango harvesting season across Queensland. Although the mango industry already has several different supply chains to export their produce to the international market, further strategic collaboration amongst the genetic industry, primary producers, processors and exporters is required in the longer term. This could represent both process and management-oriented collaboration.

The lychee industry has a comparatively new supply chain with access to a few Asian markets such as Singapore, Hong Kong and Malaysia. Lychee is a high-value and high demand commodity in Asian markets; therefore, the stakeholders recommended that is important to develop collaboration models led by technology, genetics companies and producers to generate access to other markets.

The avocado industry has a complex supply chain and the stakeholders are looking to simplify the processes within the existing supply chain. As this is a highly valued commodity in the Asian markets,

Queensland cannot cope with extra demand from the international market without increasing production. Therefore, the stakeholders suggested resource providers and investor-led collaboration models would be useful to vertically integrate the growers, processors and exporters.

The workshop participants identified that horizontal collaboration among farmers has an integral and important role in addition to vertical collaboration in agricultural supply chain collaboration (ASCC) to increase the export volume of these three fruits in Asian markets. However, all stakeholders could not reach consensus agreement about the correct governance mechanisms; although most suggested that government (state and/federal) should facilitate the industry bodies in the process of horizontal collaboration, particularly for product and contract standards, and market access, and conflict resolutions. Although the models have been tested for three industries (i.e., avocado, lychee and mango), they are expected to be relevant for other perishable and tropical fruit industries in Queensland. This study has finally developed an action plan to translate the findings into practices. The action plan is divided into seven actionable steps including: developing leadership, quality control, contract management, forecasting and market analysis, policy and protocol development, brand development and export.

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APPENDICES

Appendix 1: Workshop schedule:

A.1.1718097 EXPORTING PERISHABLE COMMODITIES TO ASIA: DEVELOPING A STAKEHOLDER COLLABORATION MODEL

WORKSHOP 1: Tuesday 26 March 2019, Building 34, Room G.08, CQUniversity Rockhampton North Campus, Bruce Highway, Qld

Session	Description
From 8:30 am	Coffee
9am -9:15 am	Welcome, Acknowledgement of TOs, Safety and housekeeping Intro to project; Introductions including what sectors are people from etc.
9:15 am -10:30 am	Expert Presentation 1: An overview of the agricultural supply chain priorities and collaborations in Northern Australia (15 minutes with questions and discussion) Expert Presentation 2: Collaboration with Chinese investors/importers: Opportunities, Expectation/Antecedents and Barriers – (20 minutes with questions and discussion) Expert Presentation 3: Market development in China for agricultural commodities (20 minutes with questions and discussion) Expert presentation 4: Market Access – (20 minutes with questions and discussion)
10:30 am – 10:45 am	Morning tea
10:45 am –10:55 am	A framework of collaboration
10:55 am – 11:15 am	Individual task: Priority mapping
11:15 am –12:30 pm	Group work: Developing collaboration model for exporting perishable commodities: Purpose, power, process and outcome
12:30 pm – 1:00 pm	Summary, Next Steps, Thanks and Close
1:00 pm – 2:00 pm	Lunch, networking and close

Appendix 2: Workshop tools

EXPORTING PERISHABLE COMMODITIES TO ASIA: DEVELOPING A STAKEHOLDER COLLABORATION MODEL

Collaboration is a process in which autonomous actors interact through formal and informal negotiation, jointly creating rules and structures governing their relationships and ways to act or decide on the issues that brought them together; it is a process involving shared norms and mutually beneficial interactions (Thomson and Perry 2006).

Please think about mango, lychee and avocado in relation to supply chain development for exporting these commodities to Asian markets, particularly to China, Hong Kong, Singapore, South Korea, Japan, Malaysia, Vietnam, Thailand and Indonesia while you are completing the tasks below.

INDIVIDUAL TASKS (20 MINUTES)

A/Q1. Which stakeholder group do you most closely identify with? (Please tick one)

a. Farmer/primary producer
b. Industry peak body
c. National government
d. State government
e. Local government
f. Business sector
g. Regional planning group
h. Researcher
i. Other (please mention):_____.

A/Q2. How important are the following issues of supply chain development for international markets, in relation to CQ's perishable commodities (e.g., mango, avocado and lychee)?

Scale: 1 = not at all important,

2 = slightly important,

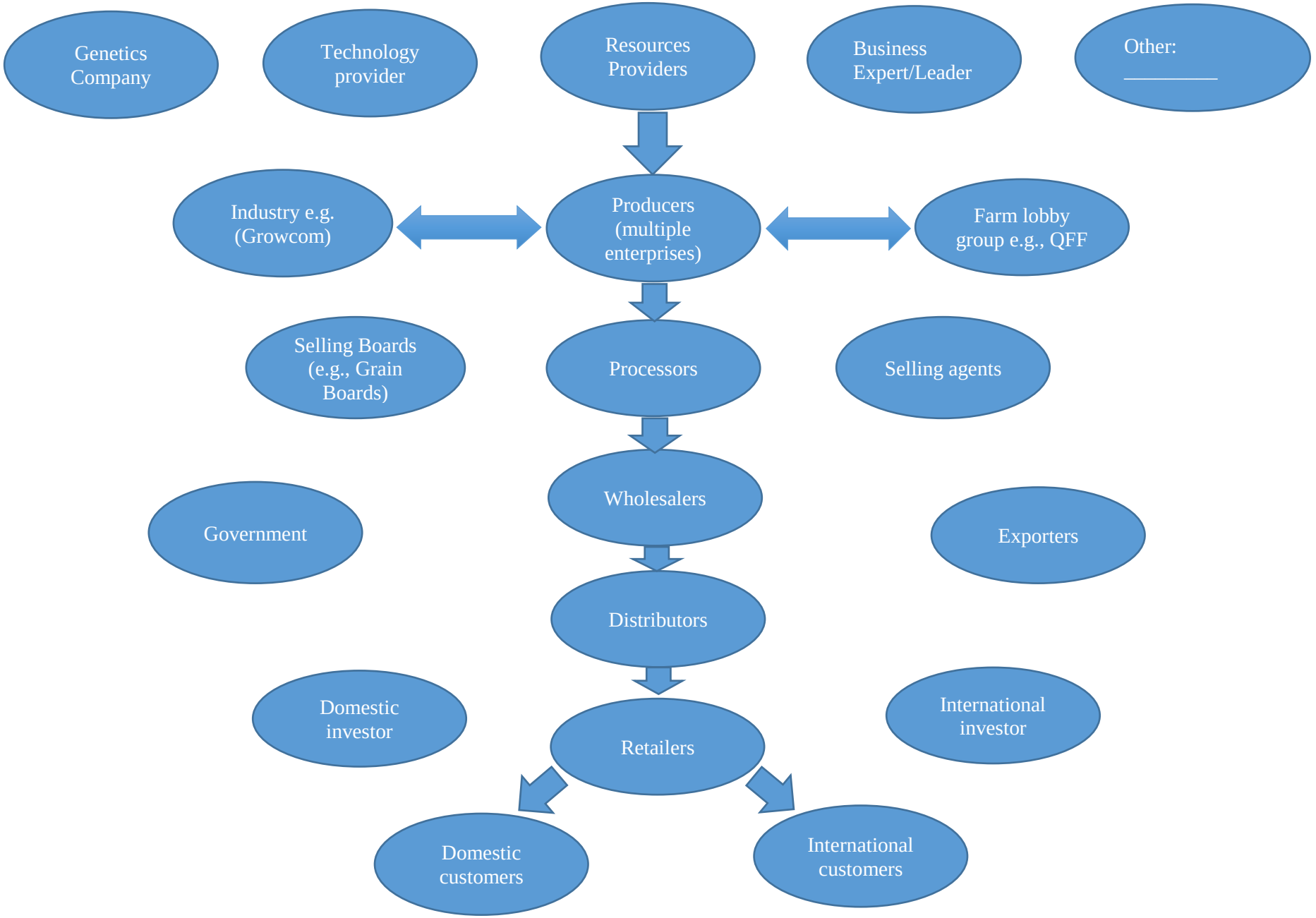
3 = fairly important,

4 = important, and

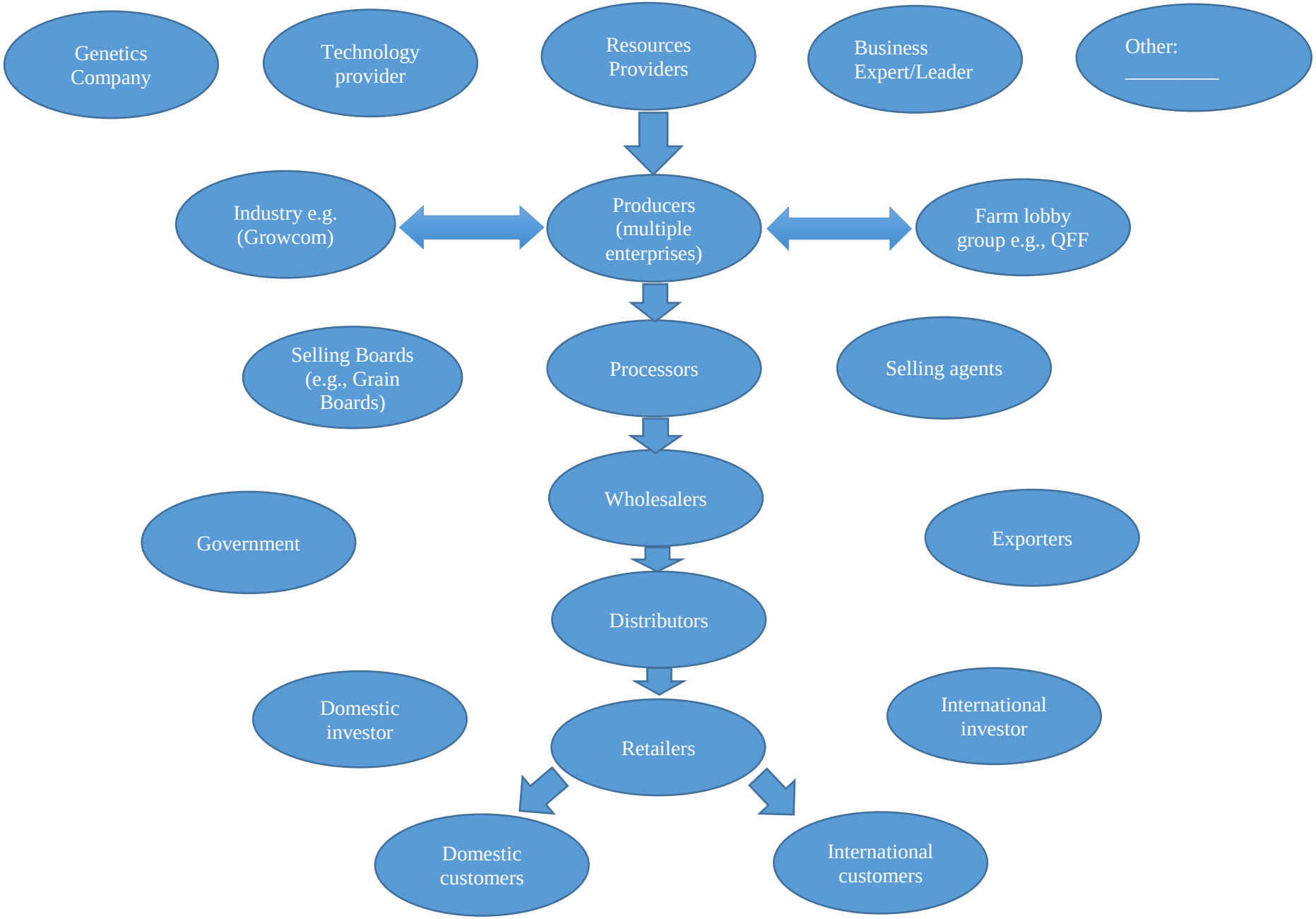
5 = very important

Stages	**Issues**	**Mango**	**Lychees**	**Avocado**
Production	Land availability			
	Water supply availability			
	Capital investment			
	Cost of production			
	Quality produce			
	Environmental foot print, green production system/regulation			
Logistics and processing	Processing facilities			
	Transport & logistics			
	Direct government support			
	Foreign direct investment			
	Domestic investment			
	Technology and innovation			
Marketing and export	Market access			
	Market discovery			
	Brand and traceability			
Coordination	Coordination among actors at different levels in the supply chain (such as growers, processors, exporters, investors etc.)			
	Coordination among growers (same level in the supply chain)			
Other	Other (Please specify)			

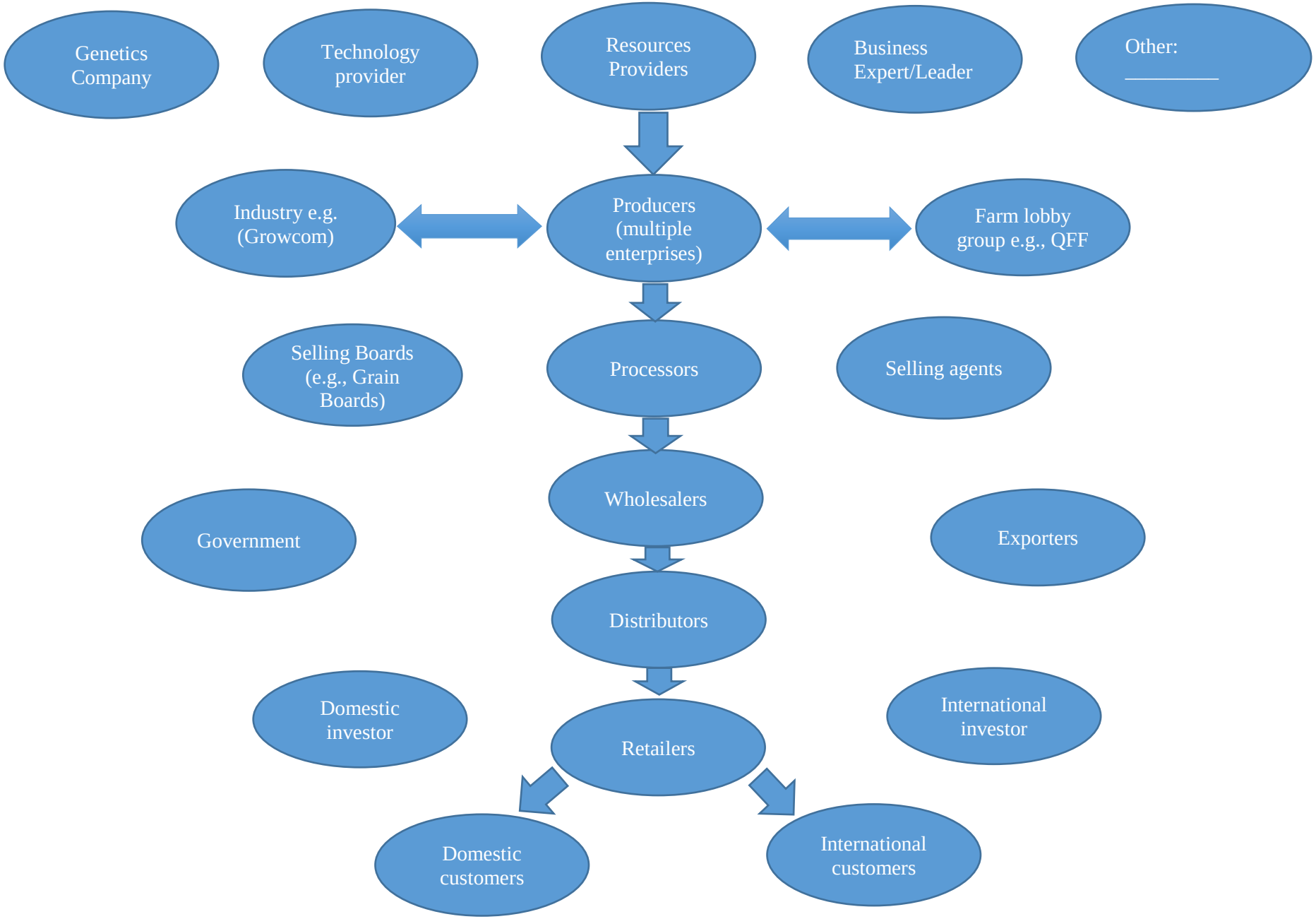
A/Q3. The below diagram shows the system of different actors (or groups of actors) in the CQ supply chain. Please circle the actor that has **most** ability to form or develop a supply chain between central Queensland and domestic/international markets for **MANGOES** and draw the most important linkages to other actors.



A/Q4. The below diagram shows the system of different actors (or groups of actors) in the CQ supply chain. Please circle the actor that has **most** ability to form or develop a supply chain between central Queensland and domestic/international markets for **LYCHEES** and draw the most important linkages to other actors.



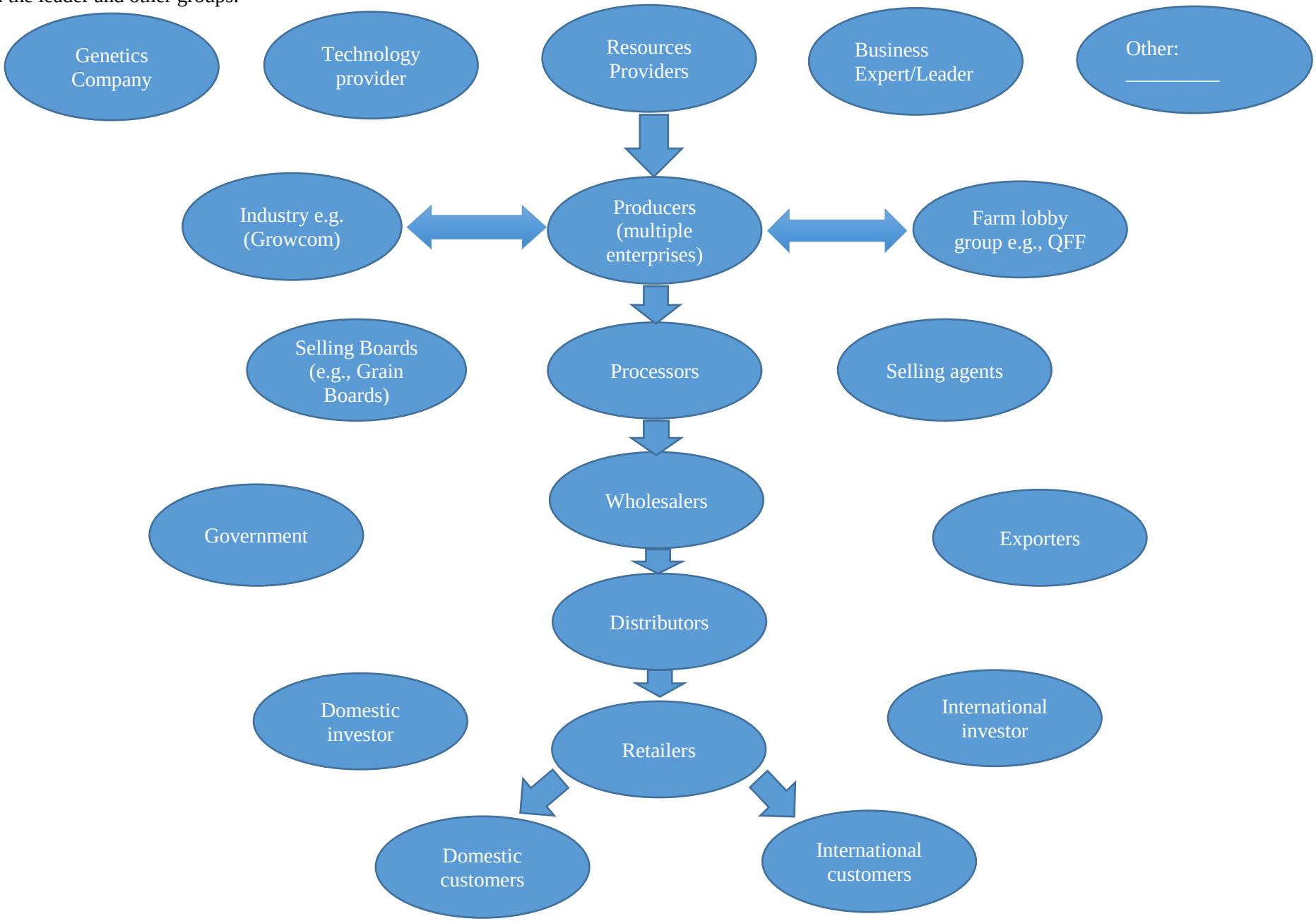
A/Q5. The below diagram shows the system of different actors (or groups of actors) in the CQ supply chain. Please circle the actor that has **most** ability to form or develop a supply chain between central Queensland and domestic/international markets for **AVOCADOES** and draw the most important linkages to other actors.



GROUP TASKS: 1 HOUR AND 15 MINUTES.

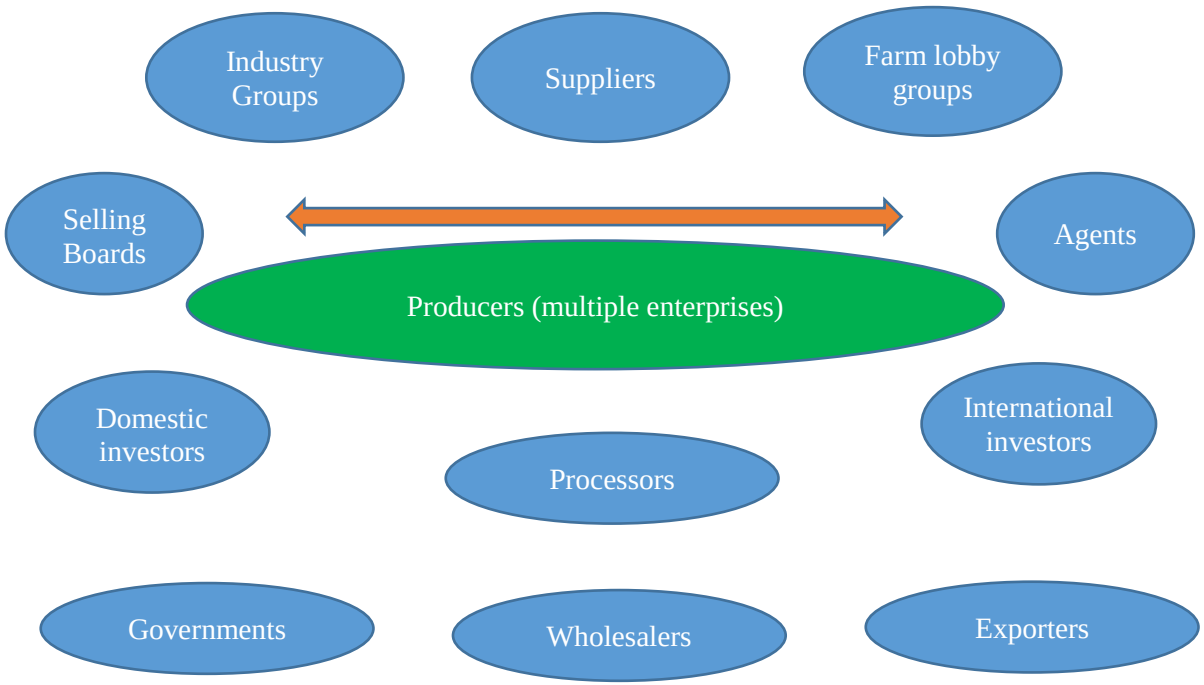
We now want to identify a group consensus on the way to develop supply chains for one fruit. FRUIT for this exercise: _____

B/Q1. Which group(s) could best coordinate/lead the supply chain? Please use a pen or pencil to circle a group (s) and also draw lines to illustrate the key relationships between the leader and other groups.



B/Q2. An export supply chain typically requires reliable and continuous production of large quantities to meet demand. In the CQ context, this means that some farmers (particularly small and medium scale growers) need to work together to produce such volume. Can you please tell us how multiple growers could be coordinated into such a supply chain? (**Horizontal coordination**)

What is the right structure needed? *E.g. cooperative, commercial market?*



What else should be considered?

What are the incentives needed to coordinate growers to supply a market? *E.g. Prices, contracts?*

What are the risks to consider?

What are the mechanisms needed? *E.g. Electronic markets, market information?*

What actors/groups can help most to coordinate production?

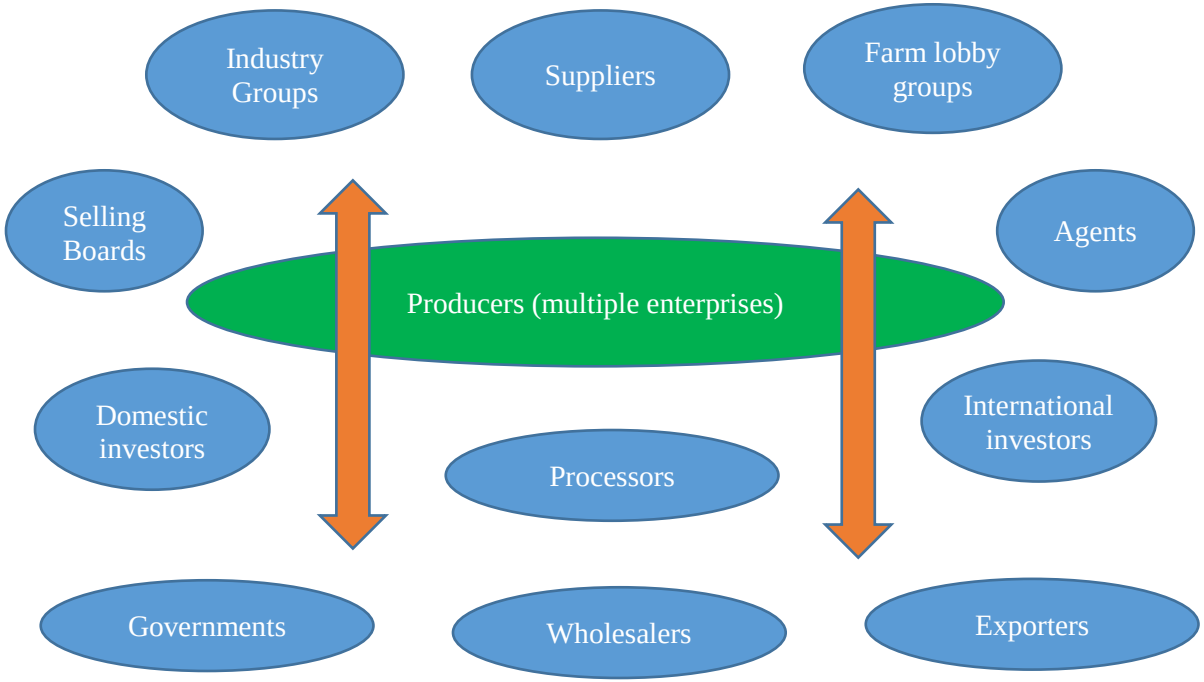
What are the key relationships needed to link producers together?

What are the activities needed to get horizontal cooperation?

What governance mechanisms are needed to link producers together?

B/Q3. Now please consider how small and medium size growers in central Queensland should be best linked into a **vertical** supply chain (**Vertical Coordination**).

How many steps of the supply chain should producers be linked to?



What else should be considered?

What are the incentives needed to involve producers into different parts of supply chain? *E.g. Prices, contracts?*

What are the risks to consider?

What are the mechanisms needed? *E.g. Electronic markets, market information?*

What groups/stages are most important to link to?

What are the key relationships needed to link producers to supply chain?

What are the activities needed to get vertical cooperation?

What governance mechanisms are needed to link producers to supply chains?