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Can cooperative business models coordinate horizontal and vertical supply chains? A case study in the Australian pineapple industry

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EXECUTIVE SUMMARY

The horticultural sector plays a key role in rural development in Australia, providing employment opportunities and contributing to local economies. Despite the importance, the sector faces a number of challenges such as increasing costs, fragmented production areas and supply coordination. In this context, efficient supply chain management, through supply chain collaboration, can help to resolve such problems.

Supply chains involve both collaboration and competition pressures; collaboration because goods and services have to pass repeatedly along successive stages of the supply chain, and competition because there is ongoing pressure to perform actions more efficiently. These supply and value chains normally involve independent businesses contracting for different stages of activity. Cooperative arrangements can also solve the simultaneous need to collaborate and compete, however their use in Australian agriculture has dwindled to the point that they are relatively rare. However, some of the challenges facing Australian agriculture, such as the need to coordinate the aggregation of fragmented production and meet quality assurance standards, are collaboration rather than competition problems that may suit cooperative models.

This study aims to explore the potential for cooperative models to solve current challenges in Australian agriculture. This study also examines the business sustainability of a hybrid cooperative business model and its determinants drawing on an analysis of a pineapple supply chain in Queensland. For this purpose, a cooperative business, Tropical Pines Pty Ltd (Tropical Pines), is used as a case study as it is a hybrid cooperative-business model that successfully coordinates production and marketing across Australia. This research uses a qualitative research approach, thematic content analysis, to identify key lessons about the operation of Tropical Pines. Using a semi-structured questionnaire, 12 individuals representing different stages of pineapple supply chain actors were interviewed and the material was then analysed.

Tropical Pines generates both horizontal and vertical collaboration through the supply chain through coordination of a small number of growers and pursuing multiple outlets for marketing through to the retail sector. Horizontal integration through the coordination of grower supply is most important for the sustainability of the business. Mechanisms that give them an advantage over a standard business model include information sharing, decision synchronization, and incentive alignment. Leadership, information sharing, trust, market forecasting, risk sharing, accountability, and provision of agronomic and other support to growers are identified as key factors that distinguish this cooperative model from more standard business models. Achieving both horizontal and vertical integration maximises resource utilisation and returns to growers, as well as reducing market uncertainty and maximizing product

consistency. However, there are also higher costs involved with cooperative models, particularly the focus on communication and engagement required to maintain the trust of growers. These costs increase with the size and complexity of the cooperative, which creates a tension because size and scale are often required to generate the efficiencies and market power necessary to deliver benefits.

The hybrid cooperative-business model of Tropical Pines is currently limited to domestic production and consumption in the Australian market. However, there is potential for this model to also be used to develop new products and access export markets, such as through the creation and marketing of value-added products that might appeal to international consumers. These research findings indicate that there is some potential for these types of hybrid cooperative-business models to be used to help other industries develop. This can be done through:

- Identifying the unique characteristics of particular industry
- Identifying the benefits of integration to the particular industry
- Initiating with horizontal integration to develop hybrid business model
- Starting with small number of growers
- Maintaining information sharing and transparency of business
- Sharing the information on new innovations

However, there are some differences between pineapples and other horticultural crops that may limit the transferability of this business model, and a key barrier may be the initial development of trust that provides the 'glue' in cooperative arrangements.

Key words: Collaboration; hybrid business model; agricultural supply chain

1. INTRODUCTION

1.1 Introduction

The horticultural industry in Australia plays a vital role in the rural economy, providing employment opportunities and contributing to local communities. Despite the importance, the horticultural sector faces a few challenges such as increasing costs, fragmented production areas, distance to market and supply coordination. In this context, efficient supply chain management, through supply chain collaboration, can help to resolve such problems. While many supply chains have attempted collaboration only a few have been successful. Most are limited to agricultural sectors in developing countries (Mojo et al., 2015; Sultana et al., 2020).

Supply chains involve both collaboration and competition pressures; collaboration because goods and services have to pass repeatedly along successive stages of the supply chain, and competition because there is ongoing pressure to perform actions more efficiently. These supply and value chains normally involve independent businesses contracting for different stages of activity. Cooperative arrangements can also solve the simultaneous need to collaborate and compete, however their use in Australian agriculture has dwindled to the point that they are relatively rare. However, some of the challenges facing Australian agriculture, such as the need to coordinate the aggregation of fragmented production and meet quality assurance standards, are collaboration challenges rather than competition problems that may suit cooperative models.

The aim of the research in this report is to explore the potential for cooperative models to solve current challenges in Australian agriculture. This study aims to examine the business sustainability of a hybrid cooperative business model and its determinants, drawing on an analysis of a pineapple supply chain in Queensland. For this purpose, a cooperative business, Tropical Pines Pty Ltd (TPPL), is used as a case study as it is a hybrid cooperative-business model that successfully coordinates production and marketing across Australia. This research uses a qualitative research approach, thematic content analysis, to identify key lessons about the operation of Tropical Pines. Using a semi-structured questionnaire, 12 individuals representing different stages of pineapple supply chain actors were interviewed and the material was then analysed.

Efficiency gains through supply chains can be generated through better matching of consumer demands with production processes and through reducing the costs of production, coordination and delivery (Rajeev et al., 2017). While technological advances and innovation can be important for improving efficiencies, new supply chain and business models, including models based on cooperative structures,

may also deliver advances (dos Santos et al., 2020). Against this background, there have been few studies on vertical supply chain integration, particularly to the context of Australia's horticulture sector. This study will address some of these research gaps by identifying the strengths of the hybrid cooperative-business model of Tropical Pines, understanding how it operates across both horizontal and vertical supply chains, and identifying the factors that make this model successful in the pineapple industry. The study output will help inform the pineapple industry, horticulture sector and the Queensland Government about how a small industry sector can cooperate to find the appropriate price and market for their produce.

1.2 Aim and scope of the study

This research aims to examine the business sustainability of the hybrid cooperative-business model and its determinants for the pineapple supply chain through a case study of Tropical Pines. This research aims to answer the following questions:

- How can the pineapple industry with established growers cooperate to achieve business efficiency with adequate market access?
- How do growers collaborate horizontally (with other growers) and vertically (with packers, processors, wholesalers, and retailers)?
- What are the benefits, opportunities, and risks of the hybrid cooperative-business model employed by Tropical Pines?
- What are the potential opportunities or barriers that would influence other key horticulture industries to adopt the hybrid cooperative-business model in Queensland?

The rest of the report organized as follows: Section 2 provides a brief introduction to the pineapple industry in Australia including the pineapple value chain followed by an overview of the Tropical Pine operations. Section 3 discusses the data collection and empirical approach. Section 4 discusses the key findings of the research followed by results that are discussed in section 5. Concluding remarks together with policy implications are provided in section 6.

2. PINEAPPLE PRODUCTION IN AUSTRALIA

2.1 Background

There are approximately 80 commercial pineapple enterprises in Australia and all of them located in the State of Queensland (Qld) except one in Northern Territory (NT) (PHA, 2018). Major growing regions are south-east Queensland (particularly the Sunshine Coast hinterland, Maryborough and Wide Bay areas), the Yeppoon area and North Queensland, including Mareeba and Mossman (Figure 1). Pineapples are mostly summer fruits in many countries in the world, but Australian farmers can grow them all the year-round because of several climatic zones within the growing belt (Hort Innovation, 2018).

Figure 1: Pineapple growing regions in Australia
(Source: https://aussiepineapples.com/about/growing/)

About 35 million pineapples are produced each year (Australian Pineapple, 2019), which is equivalent of 76,000 tonnes (Hort Innovation 2019), with 99% of them produced in Queensland. Currently 61% of the total production are sold as fresh pineapple in the domestic market, about 38% are used for juice and other processed products and less than 1% are used for fresh export (Hort Innovation, 2019; PHA,

2018). The annual value of pineapple production is about $54 million (Hort Innovation 2019). Since 2012, the Australian pineapple processing sector has declined, due mainly to competition from cheaper imported products and increased market shares in the domestic fresh market (Hort Innovation, 2017). Australia imports both preserved pineapples and pineapple juice (19,495 tonnes and 4,184 kilolitres respectively in 2018) while simultaneously exporting fresh pineapple and juice (125 tonnes and 1,600 kilolitres respectively in 2018) (Hort Innovation, 2019). Currently Australia exports fresh pineapples to New Zealand (81%), New Caledonia (12%), Nauru (4%) and Singapore (3%) (Hort Innovation, 2017). There is high demand for fresh pineapple in the international markets, but price remains a significant barrier because of high labour costs in Australia. However, there are opportunities to export value-added products (Hort Innovation, 2017, pp. 11). After harvesting, the fruit has a general shelf life of two weeks (TPPL, 2016), so new value-added pineapple products such as concentrated juice, nutraceuticals and powder would create new demand among the consumers.

Currently per capita pineapple consumption is 1.9 kilograms in Australia (Hort Innovation, 2019), which is lower than some developed nations; for example, this is 3.5 kilograms in USA (USDA, 2019). The majority of the consumers (about 69%) decide to buy pineapple while shopping, rather than planning to purchase earlier (Hort Innovation, 2017). There is limited consumer knowledge in Australia about the health benefits of pineapple consumption such as high levels of vitamin C, vitamin B6 and potassium, being an excellent source of manganese, bromelain (which helps to treat indigestion and reduce inflammation) and high levels of both soluble and insoluble fibres (Hort Innovation, 2017). Another barrier to consumption is the effort required for removing the skin (Hort Innovation, 2017).

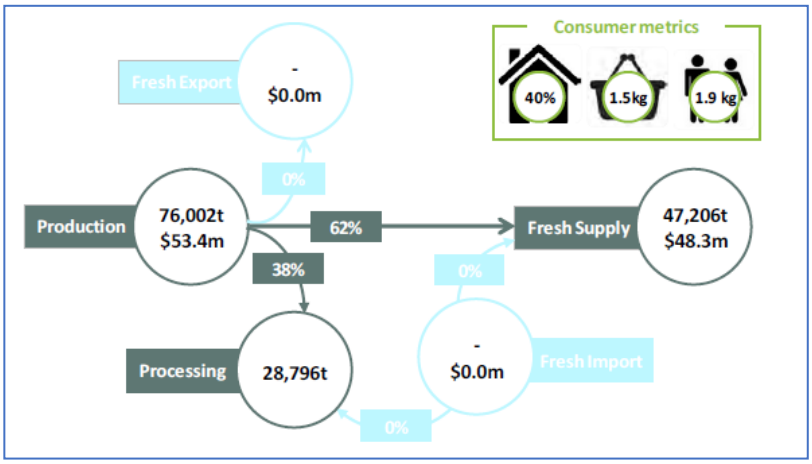

Figure 2: Current supply chain of the pineapple industry in Australia (2018)
Source: Hort Innovation, 2019, p. 182

The pineapple industry has adopted three major marketing strategies to grow the sector: (a) building consumer engagement and improving perceptions of pineapples, (b) consumer awareness program that is designed to reduce misconceptions about pineapple colour and seasonality links to taste and

sweetness of pineapple, and (c) better collaboration with relevant industries (Hort Innovation, 2017). Their strategic investment plan also aims to ensure produce is of the highest quality, and to drive market growth through strategically targeting new and expanding export opportunities, and stimulating domestic consumption (Hort Innovation, 2017). An in-depth strength, weaknesses, opportunities and threats (SWOT) analysis of pineapple industry in Australia is provided in Appendix.

2.2 Pineapple supply chain

Sustainability of the fresh pineapple supply chain depends on year-round availability and profitability of operations. There have been a number of studies assessing domestic opportunities. QDAF (2013) investigated production costs and methods related to different pineapple crop cycles, while Rolfe et al. (2006) identified the demand for a potential valued added pineapple product within Australia i.e., fresh cut and packed fruit. Hines and Samuel (2007) investigated the perfect pineapple supply chain programme that was initiated in late 2002 which involved producing value-added products such as slices (or rings), pieces, cut (small pieces), crush, or pulp for juice from a single facility. This was a grower led cooperative programme, but they did not have dominant power in the supply chain (Figure 3) and struggled to compete against low-cost value-added products entering into Australia hence the company was suffering with declining profits each year since 2003. Hines and Samuel (2007) concluded that power and dependency factors, risk, trust, ownership and governance structures, and commitments were the key factors that reduced the profitability of this value-added company's products over time (Figure 4).

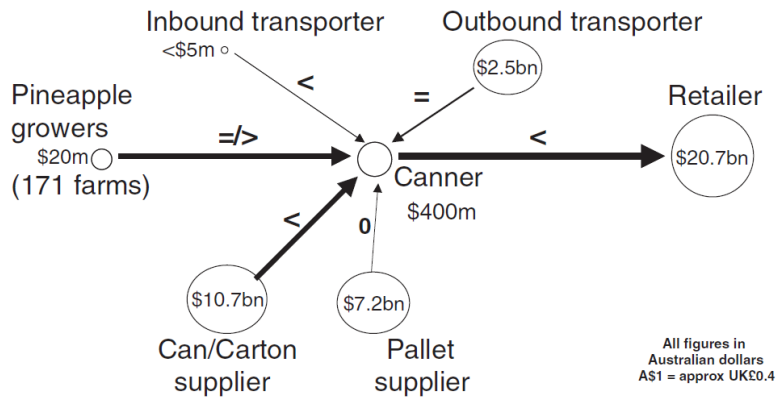

Figure 3: Power regimes within the perfect pineapple supply chain in Australia
Source: Hines and Samuel, 2007, p. 121.

	Power and dependency	Risk	Trust	Ownership and governance structures	Commitment
Retailer ✓	Power over canner and outbound transporter	Little risk	Traditional arm's length, starting to use new close relationship language	Publicly quoted	**High at senior levels, medium at process owner level**
Outbound transporter ✓	Interdependence with canner	**Risk of losing distribution contract in retailer's primary freight initiative**	Good relationship with retailer and canner	Publicly quoted	High at each level
Canner ✓	Power over packaging suppliers and inbound transport	**Losing market share to imported product**	Good relationship with all players, sometimes arm's length with growers	Historically keeps grower directors in the dark	High at each level, skills gaps at process level
Inbound transporter	Dependent on canner	Risk of reduced pineapple business	Close relationship to canner	Family owned	**Low at first as strategic discussion at too high a level to engage**
Growers ✓	Strategically over canner	Risk of canner losing market share	Love–hate relationship with canner	**Own / direct canner but historically kept in the dark operationally**	High at both levels
Pallet supplier	**Independence from canner**	Risk of new technology in one-touch replenishment	Good relationships	Publicly quoted	Medium
Can supplier	Dependent on canner	Risk of losing business	**Playing the negotiating game**	Publicly quoted	Initially low
Carton supplier	Dependent on canner	Risk of losing business	**Playing the negotiating game**	Publicly quoted	Initially low

Figure 4: Involvement and influences in the perfect pineapple supply chain programme in Australia
Source: Hines and Samuel, 2007, p. 123.

A number of international studies have addressed issues around production, collaboration, value chains, marketing and waste management of the pineapple industries in the major pineapple producing countries (Suzuki et al., 2011; Djatna and Luthfiyanti, 2015; Nakthong et al 2017; Roda et al., 2017; Fischer and Wollni, 2018; Banerjee et al., 2018; Maneentr et al, 2018; Sangua and Lekasawasdi, 2018 Banerjee et al., 2019; Prado and Spinance, 2019). Hort Innovation (2017) developed an investment strategic plan for the pineapple industry, where they emphasised the opportunities to revitalise the industry lay with value-added products and access to the international markets as well as increasing domestic consumption.

2.3 The role of cooperatives in supply chains

One of most efficient ways of developing relationships between farmers and supply chain operators is collaboration through marketing channels; this is particularly important for small and medium scale producers in an agricultural sector. Collaboration in creating value for each stage of supply chain development is more likely to be an iterative and cyclical process than making direct-action plans (Keast, 2017, p. 161). Supply chains perform complex functions, where different stakeholders have to align incentives, information and decisions so as to coordinate production and distribution tasks. While standard market mechanisms provide a template for these arrangements, the atomistic nature of decisions taken makes coordination difficult, particularly when strategic decisions need to be taken. In

contrast, collective decisions among supply chain stakeholders may increase efficiency (Rota et al., 2018; Lee et al., 2007). Collaboration allows coordination, adaptation and relationship building (Nakandala and Lau, 2019).

Figure 5 demonstrates that collaboration typically involves closer relationships between entities than simpler competition models.

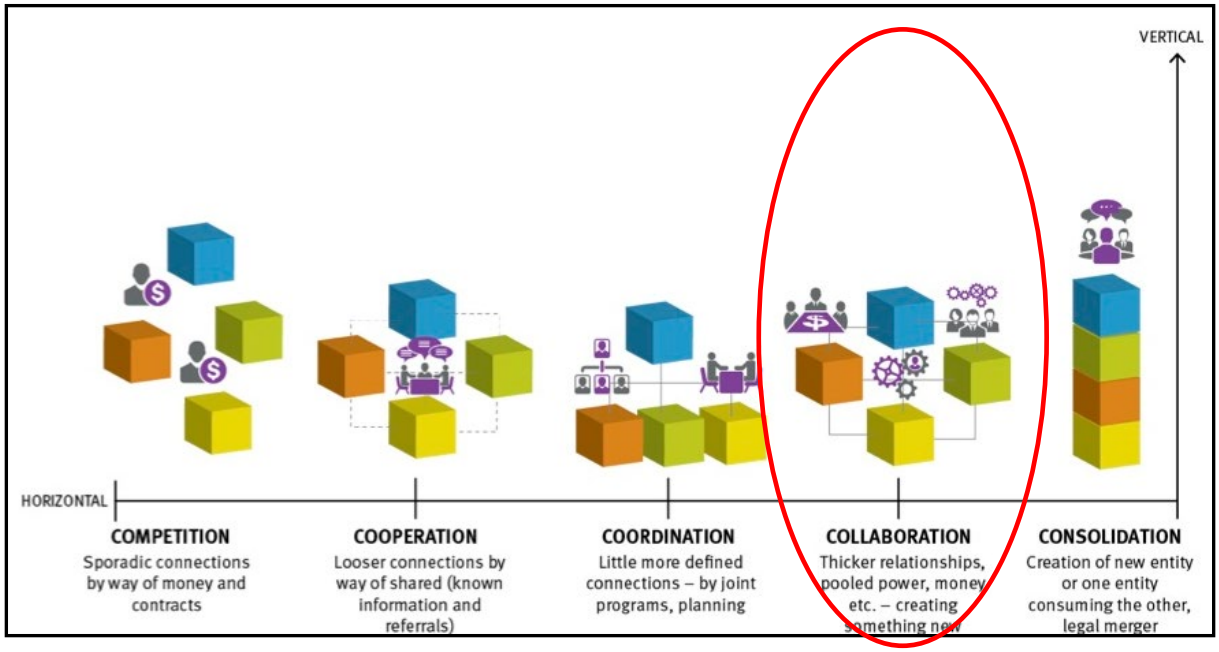

Figure 5: Generic supply chain collaboration models
Source: Adapted from Keast, R., 2016. P. 159.

Contract and commitments between collaborative partners are crucial in collaborative models. Fischer and Wollni (2018) investigated the effectiveness of the contract relationship between pineapple farmers and processors and/or exporters in Ghana. They found risk sharing, timing of payments and power of negotiation play important roles in long-term and stable relationships for vertical collaboration between the farmers and processors and/or marketers i.e., farmer-buyer relationships. For instance, in an organic agricultural industry, a cooperative supply chain was successful in the Egyptian cotton industry (Rota et al., 2018). However, such empirical studies on successful stories are limited in Australia, although Nakandana and Lau (2019) identified cooperation between retailers in the horticultural sector.

Analysing the peaches market, Despoudi et al. (2018) show that supply chain collaboration reduces the postharvest losses and maintain the quality of products, while Alho (2015) shows that vertical collaboration reduces market uncertainty. While no supply chains are immune from natural variations and market forces, increased connectivity and communication between stakeholders can improve resilience (Liu et al., 2020). Cooperation can also facilitate functions that require strong integration

between sectors, such as improvements in food traceability (Giagnocavo et al., 2017). Trust and information sharing are crucial in supply chain collaboration (Panahifar et al., 2018). Salam (2017) identified trust and technological innovations as important determinants of organizational performance.

Competition and corporation have trade off: while competition increase the efficiency, collective approach can solve many other challenges in agricultural supply chain. Analysing beef processing industry in Australia, Ding et al. (2014) pointed out the importance of collaboration to maintain the quality of products solving regulatory issues in the industry. Small scale farmers cannot meet the quality requirement and maintain market power. For instance, in Australia two main retail chains handle more than 70% of retail market. The competitive advantage of agricultural supply chain can enhance as trust and sharing information being important drivers of collaboration (Jie et al., 2013). Agricultural supply chain integration can be in different stages which can be range from totally member control organization to managerial and cooperate model (Chaddad Iliopoulos, 2013). Traditional member control cooperatives need to consider homogeneity of members preference and adoption of clearly defined rules and regulations. With relaxation of members ownership, the business moves towards managerial decision making through a board of directors and CEO with formal organizational setting. Most of Australian cooperatives govern by the board of directors and CEO. The Tropical Pine is an example for corporation towards managerial but sharing the benefits among members.

2.4 The Tropical Pine Case Study

Tropical Pines and Pinata are two major fresh pineapple suppliers in Australia. Initially, Tropical Pines (formerly known as Valley Syndicate) was established by three farmer families in the Yeppoon district, central Queensland, in 1987. They started in an area where farmers were relatively close and already working with each other to share machinery. Currently, Tropical Pines consists of 20 growers and four large packing sheds (Hort Innovation 2017), has operations in northern Queensland, central Queensland, and southern Queensland, and supplies about 45% of the total fresh pineapple sold in Australian domestic markets. Nine grower families are shareholders and they supply about 65% of fruit into Tropical Pines.

Tropical Pines has a hybrid cooperative-business model where farmers send their produce the Tropical Pines and Tropical Pines manages the post-harvest supply chain. The company provides packing, sales and marketing, agronomy, logistics and administrative services (TPPL, 2016). In addition, they also help the farmers on risk management issues. While Tropical Pines is owned by shareholders and growers, the business employs professional management staff to handle the operations, marketing, finance, and agronomy functions. Decisions are made without bias towards individual members interests, but returns are averaged across growers by volume of supply (rather than matched to

individual grower inputs (Hooks et al., 2017). Essentially the Tropical Pines model links individual grower businesses with a packaging and marketing business, using a cooperative framework to provide information, marketing and support services that help growers and link them through to the vertical supply chain (Figure 6).

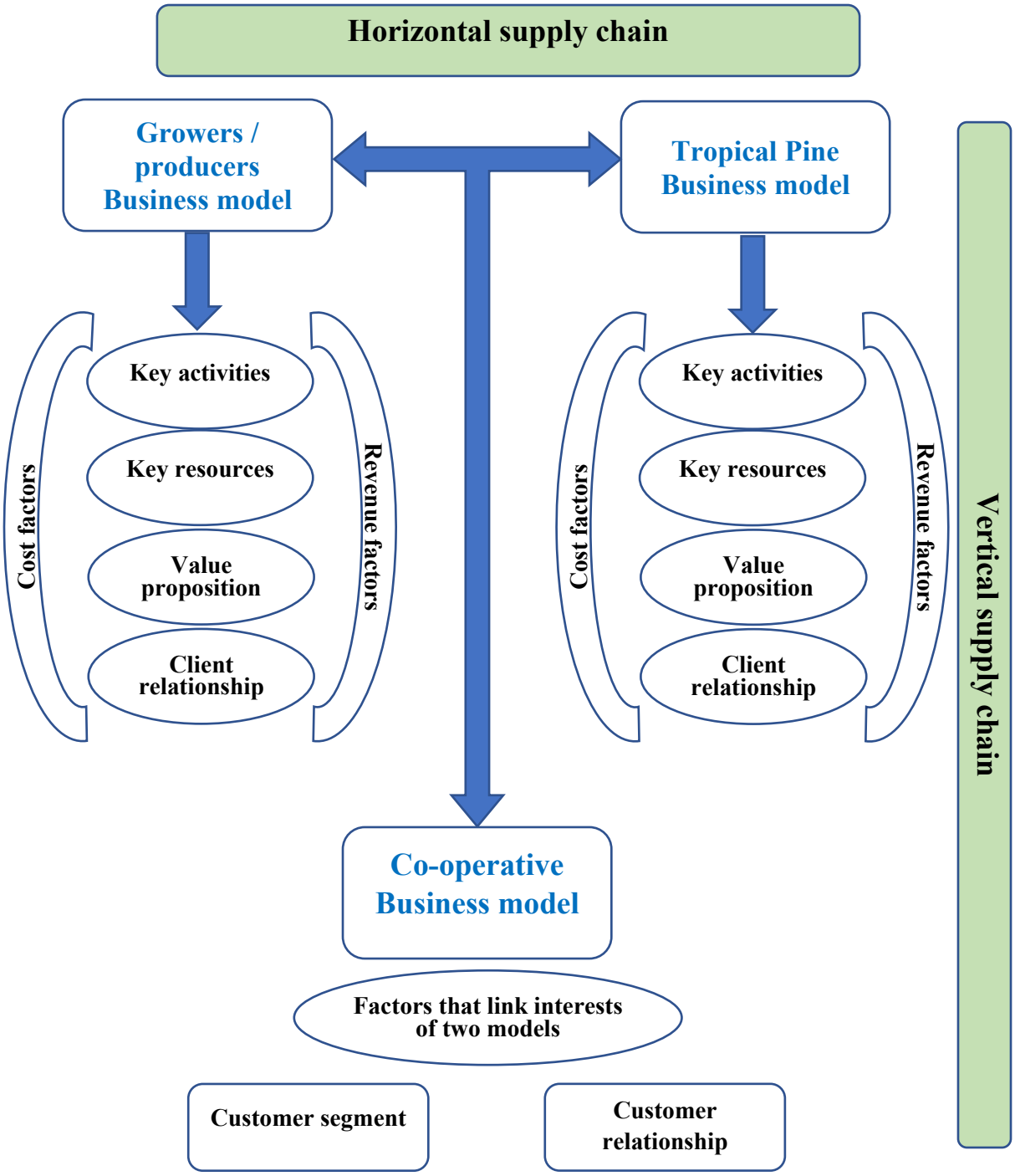

Figure 6: Conceptual framework for cooperative business model of Tropical Pines

The mission of Tropical Pines is “to make growers more profitable”. In their business model, the grower concentrates on farming and production through to delivering the fruit to the packing shade. From there, Tropical Pines manages the rest of the supply chain. One of the Tropical Pines’s internal KPIs is to generate a 50 per cent return to the grower of the gross wholesale price. Another KPI is to give growers a minimum of $1 for every single pineapple. As a part of the commitment, Tropical Pines pays the growers 28 days after fruit is delivered. Pricing is derived from a pooling system based on the size and variety of fruit, which allows fruit to be tailored to different markets. A traceability system maintains links between production and supply into different markets. Growers receive a share of the profit based on their production amount into the pool, but fruit size or variety are not linked to profit. Given this brief account of Tropical Pines, attention now turns to identifying the factors underpinning the Tropical Pines hybrid business model.

3. METHODS AND DATA

This research took an exploratory case study approach involving interviews with pineapple farmers and relevant stakeholders, and secondary data-based extrapolation. The study was designed and conducted to conform to the ethical guidelines set out by the Central Queensland University (Approval # 0000022064).

3.1 Data collection

Using a pre-tested semi-structured questionnaire, 12 individuals, representing different stages of supply chain, were interviewed through face-to-face and telephone, depending on location and convenience factors. The interviews were conducted to understand the stakeholders' experiences and perceptions about their role in supply chain and its connection with Tropical Pine's business system. The interview participants represented a cross section of the pineapple supply chain - growers, wholesalers, transporters, and retailers (Table 2). The sustainability of a corporative model depends on the degree of recognition and the role of the organization by all relevant actors (Hooks et al., 2017) which implies the importance of diversity in the selection of interviewees. Our sample consists of three Tropical Pine representatives having different roles within the organization (ID1, ID2, and ID11). Four growers were interviewed representing different regions of Queensland: Yeppoon, Sunshine Coast and Northern Queensland (ID3, DI4, ID5 and ID6). Growers can provide insight into horizontal supply chain collaboration. The downstream supply chain was also represented through wholesalers (ID7 and ID12), a retailer (ID7), and a transporter (ID9). Individuals interviewed represent their level of supply chain, providing for instance whole picture of wholesale business by wholesalers. To take a broader perspective, one local council representative (ID10) and one agricultural expert/ representative of the Queensland Department of Agriculture (ID8) were interviewed. The interviews were recorded with the consent of participants.

The participating growers had more than 13 years of experience in agriculture, particularly in the pineapple industry (Table 2). Most growers were in family agricultural businesses and had taken over from their parents, and some were shareholders in Tropical Pines (i.e. ID5). Two growers (ID3 and ID4) supply their products only to Tropical Pines, while one supplied only a portion of their crop (ID6). While all interviewees were provided with the same open-ended questions, the discussions were biased towards their expertise. For instance, one Tropical Pines representative discussed their strategies to maintain the corporative model as well as threats and opportunities in the pineapple industry. The local council and government representatives, on the other hand, had insights into the pineapple industry and various roles and support of government, while wholesalers (ID7, ID12) and the transporter (ID9) had

insights into market and relationship building along the supply chain. An important part of the analysis was to cross verify issues across multiple responses.

Table 1: Summary information about the interviewees

Identifier	SC role	State/ region	Nature of business	Experience		
				Agric	Pineapple industry	TPPL
ID1	TP Executive Director	Qld	Ex-Director/ TP			
ID2	TP Executive member	Qld	Member/ shareholder TP	11	11	11
ID3	Grower	Qld/ Yeppoon	Family business	21	21	21
ID4	Grower	Qld/ Yeppoon	Family partnership	13	13	13
ID5	Grower	Qld/ Sunshine Coast	Family partnership	30	18	08
ID6	Grower	Qld/ Northern Qld	Growing company	33	33	15
ID7	Wholesaler/ Grower	Syd	Family owned company	70	20	20
ID8	QDAF Representative	Qld	Government	28	28	
ID9	Transport company	Qld	Company	30	15	15
ID10	Local council	Qld/ Northern	Local Council	30	0.5	0.5
ID11	TP worker	Qld			4	4
ID12	Wholesaler	NSW	Company	26	26	26

Notes: TP = Tropical Pines; QDAF = Queensland Department of Agriculture and Fisheries

3.2 Data analysis

The information gathered through the interview were analysed using thematic content analysis, which can identify patterns in qualitative data/ information using predefined themes (Maguire and Delahunt, 2017). There are several methods of thematic analysis that range from manual coding to the use of software (Saldaña, 2009; Bree and Gallagher, 2016). Braun and Clarke (2006) have identified six important steps in thematic content analysis (Figure 7).

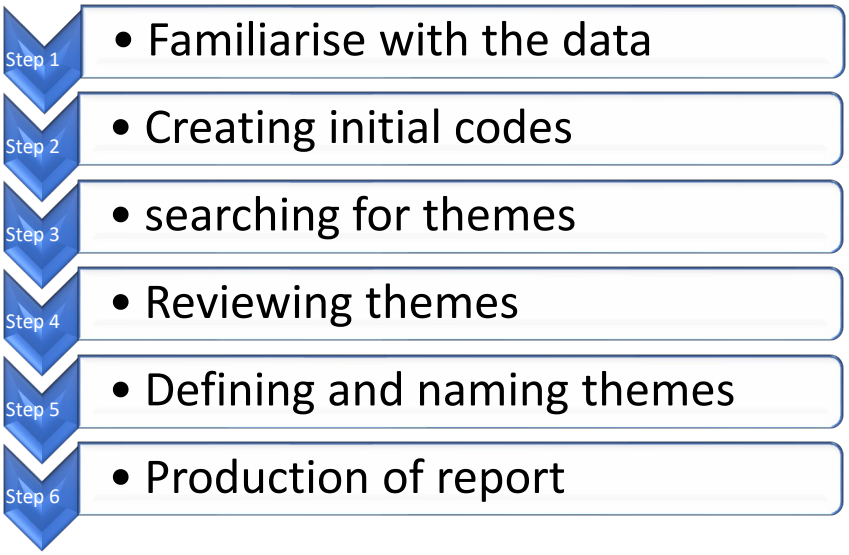

Figure 7: Steps in thematic content analysis

In qualitative research, the questions tend to be repeated in different formats to make sure the interviewee provides sufficient information and to allow verification. Because of these transcribed scripts are lengthy and generate substantial data, depending on the number of interviewees. In the first step of thematic analysis, interview data are transcribed and read several times to build familiarity and identify important keywords.

The second step is generating initial codes to enable the data to be organised in a meaningful manner (Figure 7). Code is most often a word or a short phrase that symbolises the summative meaning of attributes (Saldaña, 2009). In this study, researchers were interested in a predefined research issue – analysing the Tropical Pines approach to a hybrid cooperative-business model, which helped to guide the selection of codes. The coding of data was carried out using the RQDA package in the R platform (Estrada, 2017). Typically, there are a large number of codes, so in the third step codes can be categorized and organized into themes (Estrada, 2017). Once the initial themes were developed, they were reviewed and re-organized in the fourth step to better align them with the data and research objectives. The themes were defined and named in the fifth step, and the analysis finalized in the final step.

4. RESULTS

The semi-structured questionnaire used for the interview consisted of two main sections: questions about the interviewee and their role, and questions about the pineapple supply chain including the status of the industry. For this purpose, 19 open-ended questions were used. The results are discussed with relevance to the hybrid cooperative-business model of Tropical Pines and its vertical and horizontal market integration.

4.1 Tropical Pines in the industry- Structure and operation

Tropical Pines started more than 30 years ago with three growers but now involves 20 growers (ID2). Few growers have left Tropical Pines over time. It is a business that deals with coordinating, processing and marketing aspects of pineapple production and sales, where a core focus is maximising outcomes for growers. The network and strength of relationship with stakeholders is depicted in Figure 8. The dominant linkage is between producers and Tropical Pines in the business model, as expected in a cooperative model between production and processing stages.

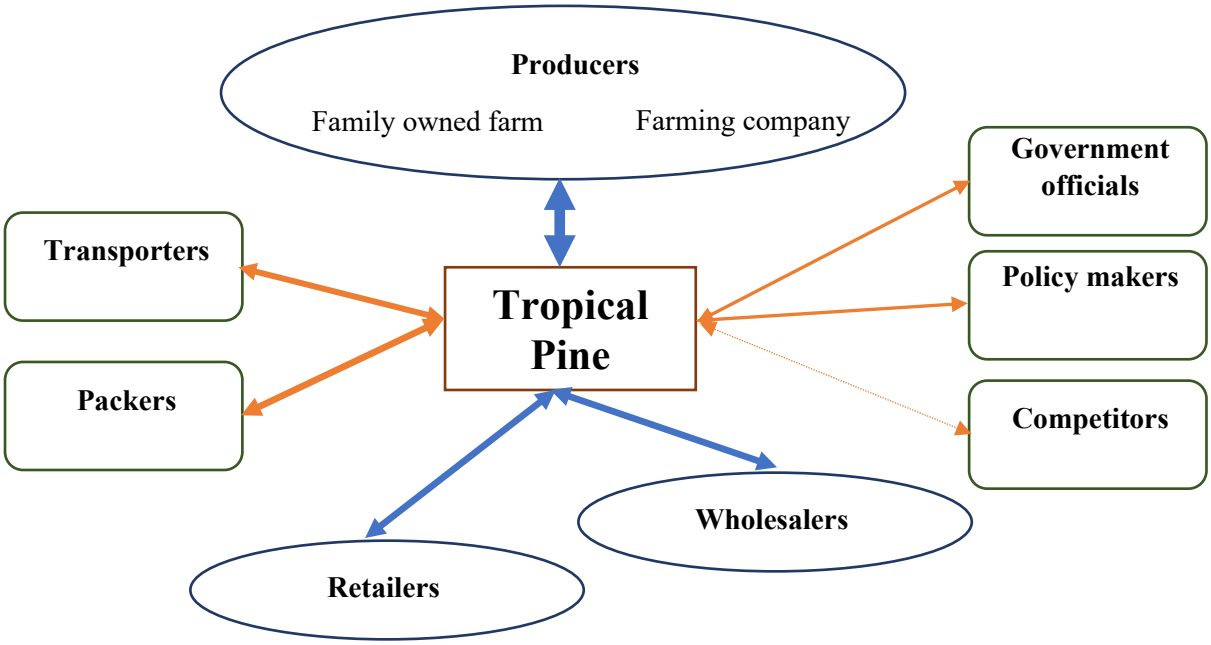

Figure 8: Tropical Pines operation model
Note: Arrow size represents the strength of the linkages

There appears to be four major reasons why growers maintain their support for the cooperative model. The first is that Tropical Pines has core goals of maximizing returns to growers, with its aim to return 50 per cent of the gross wholesale price to the grower. The second is that it provides a minimum price for fruit ($1 per pineapple) that appears to be important to growers even though the pooled pricing

model means that returns for the 'best' fruit is probably lower. A third reason is that Tropical Pines provides a number of services such as market intelligence, business systems and agronomic support apart from processing and marketing services (ID1, ID7, ID8). A fourth reason is that there is flexibility around involvement; while Tropical Pines has a horticultural production agreement with growers it is not a contract that locks growers into supplying all their fruit every year (ID2).

Other than a strong relationship with growers, Tropical Pines has built strong relationships over time with nearly 42 retailers and wholesalers in the downstream supply chain (Figure 8). The main two retail outlets in Australia (Woolworths and Coles) and other different retail chains are closely connected to Tropical Pines. The relationship development extends to other supply chain service providers (i.e. packages, transporters, crate suppliers), and government officials who are involved in the industry. Tropical Pines also maintains a business relationship with other competitors, which is facilitated for sharing resources such as packing sheds (ID8).

The interviews revealed that 45% of the fresh pineapple market share in Australia is handled by Tropical Pines, creating considerable market power. Nearly 60% of weekly production is pre-sold with agreements whereas the rest is going to the open market where the price fluctuates with market supply (ID7: "*A big percentage of what they're sending to customers, everything that goes to the supermarkets, is pre-priced*").

The governance and structure of Tropical Pines that was identified in the interviews is summarized in Figure 9. The board of directors discusses the operational and strategic matters and makes decisions with the CEO (ID11). The business structure is simple, so that individuals within the organization can be easily approached regarding the matters that arise (*ID11: "Definitely the board members basically speak to the CEO and then the CEO directly talks to the people around it. But it's generally a reasonably good split between the board members and the CEO.*").

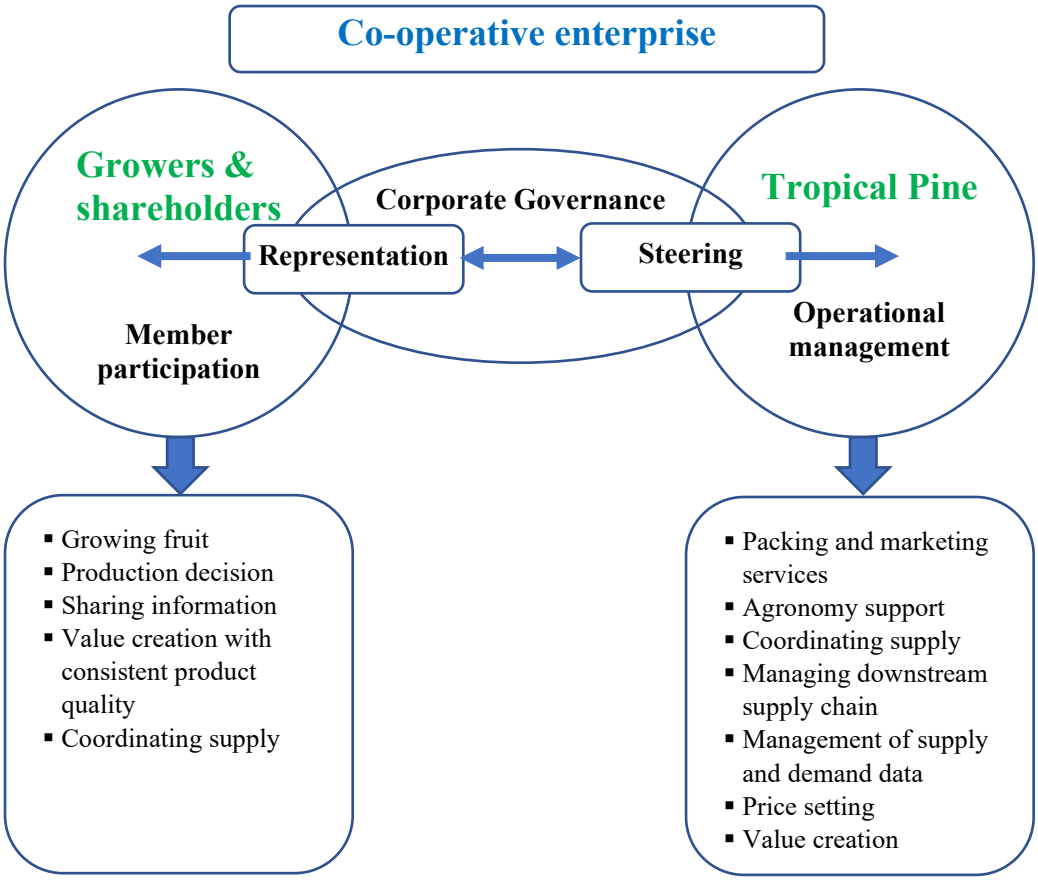

Figure 9: Governance structure of Tropical Pines
Adapted from Mazzarol et al., 2014

The most important link in the business model is the relationship between growers and Tropical Pines. The role of growers in this model is to produce fruit aided by agronomic support provided through Tropical Pines (ID1, ID9). Growers make production decisions, but value creation also involves adopting new innovations and coordinating production to meet market conditions, particularly in terms of smoothing supply over the year. Sharing and coordinating information about production with Tropical Pines and other growers is considered to be the most important factor in this collaboration. In turn Tropical Pines coordinates packaging, delivery and marketing and maintains the brand name as basic activities in the vertical supply chain. The business maintains a market information database (ID1) which it uses to make predictions of market behaviour and trends. All interviewees agreed that the sharing of market information through both horizontal and vertical supply chains was an important function. Quality information together with long term relationships with wholesalers and retailers and high market share were identified as key strategies to reduce price risk.

4.2 Hybrid supply chain of Tropical Pines: Coordination and collaboration

Information sharing, decision synchronization, and incentive alignment are the three pillars of collaboration (Rota et al., 2018; Simatupang and Sridharan, 2005). Through interview transcribed data, this study explored the importance of these factors in collaboration through Tropical Pines (Figure 9). The mapping showed that while all three factors were relevant, information sharing was the most important factor identified by participants.

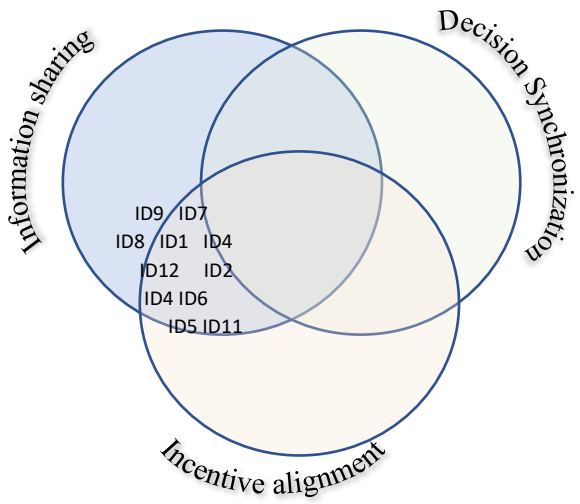

Figure 10: Factors affecting and level of collaboration of TPPL

Information sharing: Information sharing can underpin productive working relationships among different actors in supply chains (Nakandala et al., 2019; Panahifar et al., 2018). All interviewees agreed that Tropical Pines effectively and efficiently share information. The maintenance of a database and provision of market information and predictions provide benefits to all market agents along the supply chain (ID2, ID11). Growers are informed through agronomist and plan the crop according to the market requirement (ID11). Through annual meetings, growers have opportunities to share their experience (ID1, ID2, ID3). Wholesalers and other market agents also participate in annual meetings where they can discuss downstream supply chain issues with growers (ID7). Tropical Pines also help to link growers with the Queensland Department of Agriculture and Fisheries (QDAF) to receive relevant information about the latest agronomic developments ("ID8: *They certainly encourage their members to come along to the study group meetings*"). As the government representative pointed out the relationship and sharing of information among growers is exceptional in the pineapple industry compared to other horticultural and agricultural sectors (ID8).

Incentive alignment: Growers particularly agreed that Tropical Pines shares in the risks of production strives to achieve the best return for growers (ID5: "*The price is the end product, but the whole packing and marketing process, we're relying on them to do that for us to the best possible way*"). Another participant highlighted Tropical Pines strategy to support growers ("*The company is very passionate, the company - the people who work for Tropical Pines are very passionate about what they do to try and achieve the growers the best possible price they can achieve*"). Provision of market information and agronomic support provides a win-win situation in which Tropical Pines expects to maintain the quality and quantity of product while growers expect ongoing profits (ID7: "*I think they do particularly well, is have a consistent grade of quality all the way through the season, even though seasonally there's different predominant varieties that perform better in different periods of the year*").

Decision synchronization: While decisions are not made collectively with upstream and downstream individuals in the supply chain, Tropical Pines keeps stakeholders informed about decisions, helping to coordinate information (ID7). Tropical Pines consult experts in the field, for instance, marketing experts (ID1: *"…was a marketing lecturer at your Uni. They joined the Board by invitation and gave us the benefit of their wisdom and knowledge*". Within the organization, all members are encouraged to discuss strategies (ID11: "*we discuss that openly with everyone involved in our team*.").

4.2.1 Horizontal integration elements and mechanism

In its coordination role, Tropical Pines works with its 20 growers to provide agronomic and scheduling information to ensure quality and continuous year-round production. A core function of Tropical Pines is to make growers more resilient (ID2) (ID4: "*it's called a Mission Statement which basically it's to make growers more profitable.*"). Innovative marketing strategies together with other services, such as agronomic support and advice on business and tax issues, strengthen the bond between growers and Tropical Pines and build trust. Horizontal integration helps in providing continuous supply to standard quality which meets the consumer demand.

4.2.2 Vertical integration elements and mechanism

Supply chain strategies are shaped by both demand and supply forces at each level (Nakandala and Lau, 2019; Panahifar et al., 2018). Although Tropical Pines creates market power by coordinating a large portion of production, it also needs to collaborate with downstream stakeholders (Figure 9). Tropical Pines interacts with several stakeholders in the downstream supply chain, including wholesalers and retailers (ID6: "*I guess one of the other groups certainly are more chain store focused. Tropical Pines try to deal with wholesalers and chain stores equally*."). Nearly 60% of their products go through pre-determined contracts, including to the main retail chains, while 40% are sold on the open market.

Tropical Pines provides forecasting data to retailers and wholesalers (ID7) to help manage year-around supply and maintain relationships. As ID9 pointed out, Tropical Pines is efficient in coordinating logistics which strengthen the bond. The most strategic behaviour of Tropical Pines in vertical integration is collaboration with multiple outlets which manages supply variations, reduces marketing risks and increases bargaining power.

5. DISCUSSION

5.1 Key findings

This study reaffirms the literature that cooperatives heighten adaptability to market responses (Hooks et al., 2017). The analysis indicates that supply chain collaboration can generate efficiency, particularly through coordination and information flows both upstream and downstream in the supply chain. Horizontal integration is a key benefit, as it helps to coordinate the scheduling of production as well as to consolidate produce from the farm level at a single point in the supply chain. That consolidation generates market power and reduces the transaction costs of vertical distribution.

Producers remain in the cooperative arrangement with Tropical Pines because of perceived benefits, and are not formally locked into longer term contracts. This means that the cooperative has to maintain high levels of trust, relationships and performance on an ongoing basis to keep its members. It achieves this in a number of ways:

- The efficiencies generated from the scale of operations and market power provide higher returns to growers than if supply was atomised,
- Its pricing structure provides a minimum price per fruit
- It aims to have farmgate prices that are at least 50% of wholesale prices,
- It provides information, agronomy and other support services to growers,
- It involves growers in its decisions and planning
- It searches for innovations and opportunities.

5.2 Factors that influence the hybrid cooperative-business model

As interviewees rationalized there are several factors that influence to sustain hybrid business model. This sub-section aims to discuss them critically by comparing with other study findings, identifying the insight into the each of the factors include their short and long run implication to the governance and sustainability of hybrid business model for TPPL as well as for similar horticulture produce in Australia.

Leadership: The leadership of the founding members of the cooperative has been important. (ID10: "*certainly, as I mentioned before, the leadership of the former Director there certainly put trust and efficiency as part of their brand and why that's important, particularly in the international marketplace*."). Interviewees ID11, ID7, and ID8 explicitly stated that leadership is the main reason behind the success which is in line with other empirical findings (Gosling et al., 2016).

Trust and information sharing: Trust has developed over time as the size of the cooperative developed from its initial three members. Cooperation was possible in part because the pineapple industry in Australia is comparatively small relative to other agricultural industries (ID8). The development of trust appears to be related to factors such as the small size of the sector, the leadership style, the strong focus on information sharing, and the transparency of the business model. ID5: "*I believe it's the fact that they market the fruit at the honest best price*."

Accountability: Transparency and accountability are embedded in the Tropical Pines business model. Participants noted the importance of accountability for the long-term sustainability of the business ("ID8: *Transparency and accountability, well it appears to be open and transparent. They have, I'm pretty sure they have meetings where all their members are invited to come along and hear what managements got to say and ask them questions*." "ID12: *In terms of accountability, we meet up with - we do a season review every year").*

Forecasting: Forecasting of supply scheduling and market conditions is important to all stakeholders in the supply chain, and helps to underpin the success of Tropical Pines (ID6). Production planning and forecasting helps growers to schedule plantings and harvest so as to have a consistent flow of product onto the market and reduce post-harvest losses.

Efficiency: Attention to logistics and marketing are key components of efficiency (ID9: "*they've set up a just-in-time supply chain.*"; ID9: "*Yeah, look – very efficient. Their logistics is just in time*."; *ID6: "I probably think that the efficiency is okay. Like everything, it could be better, but you deal with systems that you've got in place. Sometimes they might not be 100 per cent efficient, but it's still better than what you'd have to spend to make it*").

Positioning the brand: Branding and quality positioning are important features of the Tropical Pines's business model. The cooperative searches for new ways of promoting the fruit to customers, such as the 'Halloween pineapple' initiative.

Agronomic support: Tropical Pines supports growers to have the best agronomic practices so as to ensure quality and timely production. All interviewees highlighted agronomic support as a main function of Tropical Pines (ID11: "*it's basically the company itself supplies an agronomist. He is well versed in the pineapple industry across the world"*; ID2: "*agronomy is first and foremost. Within that we have got the whole scheduling of the total crop*"; ID6: "*The most important, I think, is the agronomy support to be honest*").

Innovation: Tropical Pines searches for innovation, particularly in marketing. Market innovation, such as for new hybrid varieties, is aimed at increasing consumer satisfaction and support. The business supports innovation trials in the field ("ID6: *As growers do need to make changes, I think Tropical Pines will always be pretty supportive of that*").

Risk sharing: Weather fluctuations mean that the quality of the product is not always consistent, but Tropical Pines accepts all fruit from growers and then finds markets for them (ID2: "*In terms of minimum standards, it's critical, but we play this optimisation game in terms of we probably look after our growers a bit better than we look after our customers if I'm completely honest*"; ID8: *they're supporting the growers through economic services*"). Price fluctuations due to oversupply in the market are handled through forward sales contracts.

Proactive in protecting the industry: Tropical Pines plays a role in representing growers and the industry in various negotiations with government (ID5: *The other challenge that I think should be added to that is environmental and government regulation*.)

5.4 Barriers to implementation of the hybrid cooperative-business model

An important issue is to identify the potential for the Tropical Pines business model to be replicated in other agricultural sectors that face challenges into coordinating production into markets. Currently the hybrid cooperative-business model does not exist in other horticultural industries (ID8). Several reasons were identified why this does not occur including a lack of information sharing in other sectors (ID6, ID8), and the need for strong leadership to convince producers to change (ID8, ID10). Interviewees suggested that it would be easier to develop relationships and trust with a small number of stakeholders initially, and to manage any expansion by maintaining good governance and sustainability of the business.

6. CONCLUSION AND RECOMMENDATIONS

The pineapple industry, like other parts of the horticultural sector in Australia, is facing increasing competition and other pressures (see Appendix 1). Advanced supply chain management strategies such as market integration are becoming increasingly important to maintain profitability. Tropical Pines demonstrates a rare example of a sophisticated hybrid cooperative-business model that achieves efficiencies through information sharing, incentive alignment, and decision synchronization. This study identifies the important factors that underpin the long-term collaboration as: accountability, information sharing, trust and relationship development, leadership, and innovation in the market.

Tropical Pines has strong relationships in both horizontal and vertical dimensions of the supply chain, helping to explain why the model continues to exist. This study reveals that horizontal integration is more important than vertical integration in developing a hybrid cooperative-business model, particularly because of the importance of trust in maintaining grower commitments. Information sharing, transparency and a commitment to generating grower returns and innovation all appear to be major factors in making a cooperative more attractive than a standard business model in this case study. These factors are easier to develop when there are only a small number of growers, as good communication and interpersonal relationships appear to be essential to maintaining relationships. However, there are also higher costs involved with cooperative models, particularly the focus on communication and engagement required to maintain the trust of growers. These costs increase with the size and complexity of the cooperative, which creates a tension because size and scale are often required to generate the efficiencies and market power necessary to deliver benefits.

There is potential for the hybrid cooperative-business model to be applied in other horticultural industries. However, the unique characteristics of the relevant case study should be recognized. The hybrid model can be implemented if it is capable of generating improved efficiencies and delivering net economic benefits to growers. It appears to be best to start with a small number of growers so that trust relationships can be developed, although efficiencies can often only be generated once there are multiple members accounting for a significant proportion and diversity of supply. This tension helps to explain why cooperative arrangements are rare. However new technology and mechanisms that improve accountability and information sharing may help to trial new models of cooperative arrangements into other horticultural sectors.

Following recommendations can be drawn to initiate hybrid business model for horticultural sector development.

- Identify the unique characteristics of particular industry
- Identify the benefits of integration to the particular industry

- Initiate with horizontal integration to develop hybrid business model
- Start with small number of growers
- Maintain trust in grower's commitments
- Maintain information sharing and transparency of business
- Share the information on new innovations

Although this study provides valuable insight of governing factors of successful hybrid business model, it must be admitted that the study has several limitations that should be taken into account in generalizing the results and drawing recommendations. For instance, the study is based on a single successful story of a hybrid business model. Secondly the research is based on qualitative research approach, that alternatively verify the results conducting quantitative analysis. The research also assumed, different individuals represent different levels of supply chain, but descriptive analysis and the sample selection can be used to unbiasedness of this study. Supply chain is mostly characterised with management and social science behaviour which can be used to justify the qualitative approach for this kind of analysis. The social science approach is appropriate for analysing limited number of cases or observations. As future research direction it would be interesting to consider several case studies that provides combinations of level of success and carried out quantitative methods to justify the outcome.

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Appendix 1: SWOT Analysis of the Pineapple Industry

Threats and weakness

Threats and weaknesses of the pineapple industry in Australia can be discussed under different topics; natural factors (climate and weather), production, marketing and trade, and consumption (Figure A1).

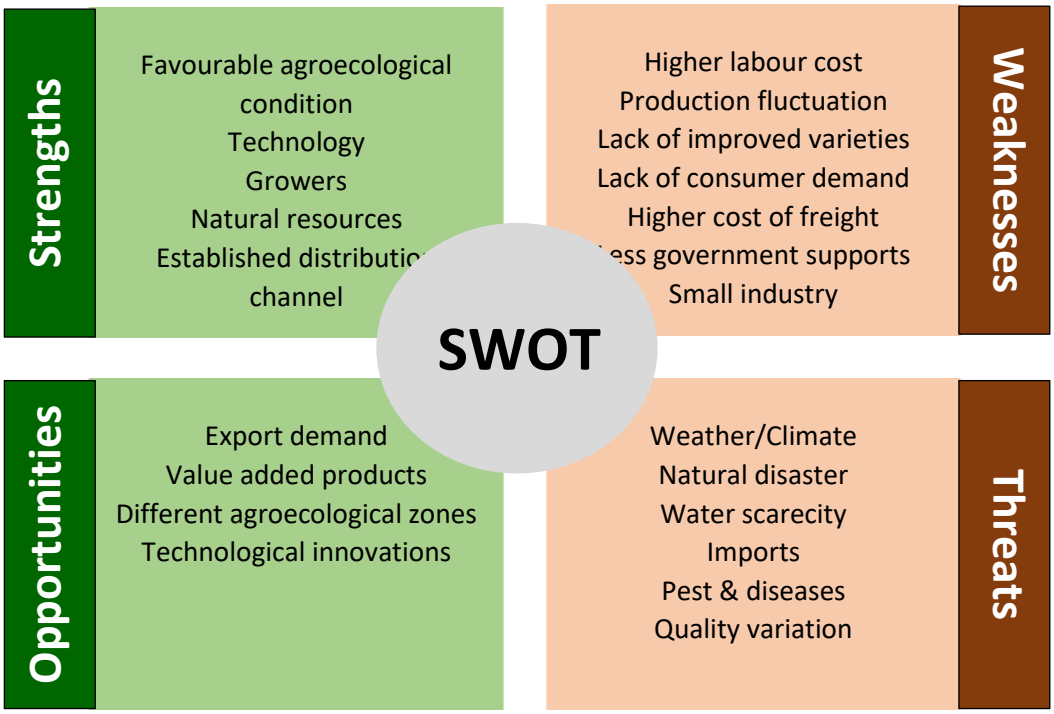

Figure A1: Analysis of pineapple industry in Australia

***Natural factors*:** The agriculture sector is highly vulnerable to extreme weather events and prevailing climate change. Nevertheless, Australia is recorded frequent climate-related disasters, such as floods, cyclones, bushfire and drought. In the recent past, multiple extreme weather events triggered the risk and uncertainty of production and maintenance of quality (ID5). On the other hand, water is an extremely limiting factor for agriculture in Australia. Consequently, continuous market supply and consistency of the quality has become a challenge. The climate change also associated with increasing threats of pests and diseases.

Pests and diseases problems to the pineapple industry is not exceptional due to many factors that may escalate with imports and illegal trade activities (ID6, ID8). The biosecurity threat has been identified by most of the interviewees regardless of the industry is currently secured. Contradictorily, some argue cheaper importation as the main problem rather than biosecurity (ID7). ID5 and ID9 also support the

argument; (see, "ID9: *One of the challenges I know they've had – they're trying to fight off imported products*.").

***Production*:** Pineapple is a labour-intensive crop, particularly for harvesting which is the major cost component other than freights (ID2, ID11). Despite technological innovation, still labour usage is higher in pineapple harvesting. The higher wage rate in Australia is a major challenge in competing with the international market. Pineapple is a seasonal product, in generally where the glut production is always possible which may reduce the grower's profit (See, "ID12: *oversupply from lots of different pineapple marketing groups is a big challenge as well*"). Moreover, as interviewees highlighted, natural flowering and lack of improved varieties are other important factors related to the production side. More importantly, a little government investment in this regard is highlighted by interviewees (ID10).

***Marketing and trade*:** Perishable nature of horticultural products and geographical distance between consumer and producer along with the seasonality are identified as a significant factor to be considered in the market. The fact emphasizes the requirement of efficient supply chain management. Scholars are increasingly highlight supply chain management, not only agriculture but other fields as well, to face competitiveness (for example, see, Nakandana and Lau, 2019). However, as interviewees pointed out, the retail sector in Australia is shrinking, led by main two retail chains.

Expansion of market access increased trade in fresh pineapple and value-added products. The importation of processed pineapple products is a major challenge for the local market. Other tropical countries are more competitive in fresh pineapple as well as processed pineapple production than Australia, mainly due to labour availability. Therefore, trade openness is not favored for local producers (ID7, ID9). However, it may increase the efficiency of existing producers and promote innovation which may create long term advantage. Less competitiveness of the Australian pineapple industry deters the access to export market. Presently, Australia exports small quantities for a few destinations; New Zealand, Singapore (ID8).

***Consumption*:** Pineapple consumption in Australia is comparatively low due to lack of consumer awareness of the nutritional value, difficulties of pealing, misunderstanding of the sweetness of different varieties (hybrid pineapple) (ID2). Unlike other fruits, the best consumption stage cannot be easily identified by the consumer, particularly the fruit selection is different for hybrid varieties (ID1). As ID11 highlighted basically consumers consider the color of fruit as an indicator to the level of ripening as practice in traditional varieties, however, these qualities are different for hybrid varieties. Seasonality in demand also unique in pineapple, having more demand in summer than winter (ID2) (See, "ID2: *Summer crop is easier to sell because people naturally think summer pineapples, that's good, but we*

actually produce more crop in some of the winter months which is much harder to sell so we're working very hard on the health benefits of pineapple and the properties of Bromelain and all of those things.").

Strengths and opportunities

Australia also deserves strengths and opportunities to survive and further expansion of the pineapple industry. Strengths and opportunities can be discussed under, climate, technology, resource availability, value addition, and export opportunities (Figure 7).

***Climate*:** While climate change is a global phenomenon, Australia has varying climate throughout the year which is the biggest advantage to keep continuous production. Many other competitors cannot avoid the seasonal glut and deficiency in their production while having different climatic zones Australia get this advantage.

***Technology*:** Tropical pineapple production is not new to Australia having well-experienced growers to involve. Moreover, advanced technologies have been evolved such as robotic application which is becoming popular in agriculture addressing production as well as environmental problems. With regards to the pineapple industry, several investments have been done to develop hybrid varieties.

***Value addition*:** Well established pineapple processing industries are linked with growers. There are several pineapple/ fruit processing businesses in Australia, which motivate to expand pineapple production. The demand for value added products in locally as well as internationally as an opportunity to the industry.

***Export demand*:** Economic development, particularly in developing countries increases the demand for food. Having natural resources together with the technology, Australia deserve a huge advantage to penetrate international market. However, the pineapple industry in Australia is not big enough to compete for the international market. While ID11 argues that it is possible to export if production increases, some others oppose as low productivity (ID5) and less competitiveness (ID12). Even though Australia deserves less opportunity to export fresh fruits, the value-added pineapple industry has a huge opportunity to access the export market. According to Some interviewees, further development of technology, such as robotic innovations, the competitiveness of the production will enhance.

Appendix 2: Interview Questionnaire

Evaluation of Hybrid Cooperative Model for Pineapple Supply Chain Development in Queensland: A Case of Tropical Pines

Purpose of the study: This project aims to examine the governance, economic and business efficiency and sustainability of hybrid cooperative model for pineapple supply chain development in Queensland through a case study of Tropical Pines. The findings may explain the causative factors of existing collaboration and institutionalize favourable policy guidelines for the improvement of the hybrid-cooperative model.

Part 1: Your background

1. a) How long have you been involved with the agriculture sector?

   b) How much of this has been with the pineapple production and/or business in Queensland?

2. a) Could you please tell me about the current organization you work for and your role within it?

   b) I am particularly interested to know your business relationship and interactions (both current and past) with Tropical Pines.

3. In what role you are working with Tropical Pines? (grower/retailer/supplier)?

   Part 2: Pineapple supply chains and Tropical Pines' mechanism and structure

4. What does Tropical Pines do well to coordinate between the growers?

5. What does Tropical Pines do well to coordinate the vertical supply chain (to market)?

6. Which is more important for Tropical Pines, horizontal or vertical collaboration?

7. What is unique about the Tropical Pines model and what makes it work well?

8. What is the leadership approach in Tropical Pines?

9. In your opinion, how well does Tropical Pines do in terms of trust and efficiency? Why are they important?

10. How important is transparency and accountability for Tropical Pines management?

11. What is the most important support you are having/providing through Tropical Pines?

12. What are the key marketing strategies (including market access) of Tropical Pines? How is it different to other competitors?

13. What are the challenges Tropical Pines and the pineapple sector facing?

    Biosecurity
    Traceability
    Consumer acceptance
    Product consistency

14. What are the opportunities in the future?

15. What is the most important role of Tropical Pines?

    a) Coordination /market power
    b) Marketing /vertical integration
    c) Trust / innovation & market info

16. What are the different forms of innovation?

    - Upstream suppliers: Genetics & Technology
    - Downstream: Information flow to consumers
      Branding
      Minimum standards
      Blockchain to provide detailed data
      Educating consumers
      Distinguishing by consumer group
      Different products

17. Is the co-op structure of Tropical Pines more resilient compared to other industries?

18. Is the model sustainable over the long term (in terms of succession and strategic planning)?

19. What are the key opportunities and barriers to adopting the hybrid cooperative model of Tropical Pines by other horticulture industries in Queensland?