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Understanding and Mitigating Risks for Pacific Island Agribusinesses¹

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Abstract

An efficient and flourishing agribusiness sector is vital for sustainable economic growth in Pacific Island Countries (PICs). Agribusiness plays a major role in poverty reduction, mainly in rural communities, and in delivering an improved trade balance in PICs. However, Pacific Island agribusinesses have generally failed to flourish and live up to their potential to be a major provider of employment and export income. A major factor adversely impacting on the sector is the risk environment in which Pacific Island agribusinesses operate. Risks may include those in production, the value chain, environmental impacts, markets, regulatory regimes and public policy. This paper explores how Pacific Island agribusiness managers can better understand and mitigate risks to increase business resilience. The study involves an identification and review of risks from selected relevant case studies of agribusinesses which are established in Fiji, Vanuatu and Tonga. This is followed by the development of a risk minimisation and mitigation framework and strategies for one of the case studies, Nature's Way Co-operative Fiji Limited. The Risks and Options Assessment for Decision-making (ROAD) approach is used to develop the risk assessment tool. It is a straightforward process model that can be readily adapted for use in the context of assessing and mitigating risks to agribusiness in PICs. The tool fits well with other analytical tools such as Value Chain Analysis. The application of an adapted risk assessment framework to a selected agribusiness is the key output of this paper.

Introduction

Background

Pacific Island Countries (including Fiji, Tonga and Vanuatu) are the home for production of clean, green, safe tropical agricultural commodities, many of which have comparative production advantages and prospects in the international marketplace. Agriculture is one of the most important industries in Pacific

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Islands and engages around 65 per cent of the population, primarily in subsistence agriculture (Anon, 2019). The agricultural-processing industries play a pivotal role in the processing and export of agricultural commodities. In Fiji the major agricultural exports include sugar, kava, fruits (mango, papaya and pineapple), copra, and vegetables including root crops (dalo, cassava, yams) (Anon, 2019). The agriculture-based industries contribute around 10 per cent to total GDP of Fiji and involve around 2,000 local communities (as at 2010) (Commonwealth-Network, 2018).

Agribusiness plays an indispensable role in the world's economy as a key source of food supplies (Golnar Behzadi, 2017). An efficient and flourishing agribusiness sector is vital for sustainable development and economic growth in Pacific Island Countries (PICs). Agribusiness also plays a major role in poverty reduction, mainly in rural communities, and delivering an improved trade balance in PICs which are key goals of Pacific Island governments and their development partners, including Food and Agricultural Organization (FAO), South Pacific Community (SPC), World Bank, IFAD and Australian Centre for International Agriculture Research (ACIAR) etc. (Thomson, 2017). The agribusiness sector also helps to expand domestic consumption through absorbing output from the industrial sector and providing both forward and backward linkages. The majority of PIC agribusinesses are small-scale businesses which are owner/managed by family members.

Pacific Islands agribusinesses have both comparative advantages and disadvantages. Fundamental problems associated with their operations relate to land access, lack of infrastructure, ineffective government policies, extreme climate events, the prospects of local market failure or changed international markets, lack of property rights, utility support, investment opportunities and better, more immediate returns in other sectors (such as tourism and retail). Indeed, durable and sustainable rural development is a challenging but vital task in the Pacific Islands and one which requires an ongoing R&D effort to catalyze and inform a more vibrant, diverse and viable agribusiness sector. Despite the challenges, agribusiness has the potential to grow including through new value chains in the agriculture, forestry and aquaculture sectors that are more efficient, more inclusive and which take advantage of new opportunities for primary production, value-adding, and marketing. Over the past two decades there has been considerable agricultural research undertaken by government and international research institutions, usually in collaboration with local NGO development partners, such as local farm organizations, to improve the agricultural sector in PICs, but there has been less attention to the development of agribusiness in PICs. New approaches are needed to improve agricultural production and to develop sustainable agribusiness components in PICs (Thomson, 2017).

Agribusiness Risk in the Pacific Islands

Pacific Islands agribusinesses have generally failed to flourish and live up to their potential to be a major provider of employment and export earner. The majority of Pacific agribusinesses are small-scale and family-owned business. The agribusiness sector plays a vital role in the development of the rural economy. A major factor adversely impacting on, and contributing to the failure of, the agribusiness sector in the Pacific is the challenging risk environment in which the Pacific island agribusiness operates. This is manifest in the general lack of understanding of agribusiness risk among existing and new enterprises, lenders and donors and Government agencies. There are, however, exceptions, with several notable PIC agribusinesses operating profitably, and in an ethical and environmentally-sound manner, over many years and decades.

In recent times, ACIAR projects like PARDI2 (Pacific Islands Agribusiness Research in Development Initiative) and its predecessor have examined and documented agribusiness success cases in Fiji, Vanuatu and Tonga. Invariably these agribusinesses have had to successfully plan for and address diverse challenges and risks. These risks may relate to production, extreme climate events, market changes/competition, and political/sovereign issues. These risks are substantial and when they eventuate can easily make an enterprise unprofitable, especially in developing economies. Successful businesses are important repositories of knowledge on how to plan for and mitigate agribusiness risks in the Pacific Islands, which is why they are being consulted, as here, for the purposes of designing a framework to assist existing and new Pacific agribusinesses to better assess risks (direct and indirect) - their likelihood, their impact and mitigation measures (Thomson, 2017).

This research project involves the identification and understanding of the agribusiness risks in Pacific Island countries (Fiji, Vanuatu and Tonga) and the development of a risk minimisation and mitigation framework and strategies to address these risks. This is done through addressing the following research question: how can Pacific agribusiness better understand and mitigate risk in order to increase their resilience?

The research question mainly focuses on identification and understanding of different risks associated with Pacific Islands agribusinesses and on developing a mitigating framework using the Risk and Options Assessment for Decision-making (ROAD) analytical tool developed by Professor Quentin Grafton and colleagues at the Australian National University (ANU) in Canberra.

Methodology

In order to evaluate the research questions, a review of the risk environment for Pacific Islands agribusiness was undertaken including a literature review, and consultations with agribusiness researchers, stakeholders (in government, the private sector, communities and NGOs) and successful agribusiness in Fiji, Vanuatu and Tonga. The findings are synthesized into a framework and tools for identifying potential agribusiness risks, controlling factors and mitigating measures to improve their resilience.

The characterisation of the risk environment and the development of risk assessment tools is explored using the ROAD analytical approach. The ROAD process enables decision-makers to comprehend and address complex risk. It is a system-based approach to risk assessment that allows the integration of different tools and types of knowledge. A key feature is the development of causal models of risk systems which provides a better foundation for decisions compared to other models (FE2WNetwork, 2019). ROAD is an iterative and adaptive analytical process that considers risks, opportunities and the decisions that improve outcomes for developing countries, particularly in the Asia-Pacific region. ROAD enables decision-makers to make risk-based responses to various threats (FE2WNetwork, 2019). It has five components:

- (i) determining the decision space, objectives and stakeholders, or scope;
- (ii) identifying the triggers to be assessed;
- (iii) assessing causal risks;
- (iv) analysing decision options involving controls and mitigating factors, including a summary and justification for the decisions; and
- (v) implementing decisions and reviewing outcomes (FE2WNetwork, 2019).

Modelling involved mapping likelihoods and consequences of specific risks using participation of key stakeholders, identification of trigger events and various management options, both anticipatory and post-impact. The ROAD tool was used in the selected case studies of Pacific Agribusiness to assess the risks, risk-causing events, consequences and mitigation measures and develop a hypothetical causal risk framework and strategies. The incorporation of adapted risk assessment frameworks into one of the agribusinesses was followed by the development of a risk assessment matrix, which indicates the likelihood, impacts and risk level of the selected agribusiness. The risk matrix also helps to prioritise the risks according to the level of action required.

Review of Successful Agribusinesses

The current project mainly involved the review of selected relevant case studies of agribusiness from Fiji, Vanuatu and Tonga (Manley, 2019).

Pacific Islands agribusinesses need to deal with multiple risks: risks may relate to production, the supply chain, the market, biosecurity, quality, trade, government policies, environmental impacts, political issues, and many more. These various risks are classified and grouped into four main categories:

- **Production and supply chain risks:** These are the risks which are raised at farm level.
- **Market risks:** The risks which arise in domestic and International markets.
- **Regulatory and policy risks:** The risks mainly due to government policies and regulations, including biosecurity risks.
- **Environmental risks:** The risks mainly due to extreme events such as cyclones, droughts and flooding.

Pacific Islands agriculture is vulnerable to extreme weather events: severe cyclones, prolonged droughts and extreme flooding are becoming increasingly commonplace events in Fiji, Tonga and Vanuatu. These countries have each experienced Category 5 cyclones² over the last 4 years with devastating impacts on the agriculture sector. The [World Risk Index 2018](#) ranks five Pacific Island countries among the top 20 most at-risk countries in the world, including Vanuatu and Tonga which are ranked first and second, respectively (World Bank, 2019).

The agriculture sector in Pacific Islands countries is dominated by smallholders with low volumes of production. There are multiple constraints to be addressed to operate in an International market, such as low volume of supply, transport costs, and distance from relevant population centres. In many cases, smallholders do not wish to expand their production volumes and would prefer to market domestically.

Pacific Islands agribusinesses are also constrained by the lack of a government agricultural research and extension service. The government regulations, taxation policies, legislation, procedures and enforcement considered to be the responsibility of various government departments and local bodies, and the biosecurity process all have a potential impact on agribusinesses.

Nature's Way Co-operative Ltd., Nadi, Fiji

² Tropical Cyclone Pam – Vanuatu 2015, Cyclone Winston – Fiji 2016, Cyclone Gita – Tonga 2018.

Nature's Way Co-operative (Fiji) (NWC) Limited was established in 1995. High Temperature Forced Air (HTFA) quarantine treatment of fruit fly host products are the key activity of the business, carried out under the Bilateral Quarantine Agreement (BQA) between New Zealand, Australia and Fiji.

NWC is a cooperative, with the exporters and producers comprising the members of the cooperative. The exporters mainly buy their fruit and vegetable products (papaya, eggplant, breadfruit and green mango) from other cooperative members who are focused on growing the BQA commodities.

The core business of NWC is the operation of its four HTFA chambers, which provide the mandatory quarantine treatment for fresh fruit exports. Major risks for this business include the following.

- 1) Production & Supply Chain Risks
 - NWC is faced with the continual challenge of insufficient primary supply of fruits from exporters due mainly to the restricted geographic scope of planters for the four main BQA commodities.
 - Preference of farmers for a more rapid-return commodity (rather than from longer-term perennial crops such as papaya and breadfruit).
- 2) Market Risks
 - The lack of sufficient produce supply and the challenge of expanding markets/improving market access.
 - NWC has limited control over market access challenges.
- 3) Regulatory & Policy Risks
 - Expansion of market access has been led by the government of Fiji principally through the biosecurity authority of Fiji.
 - Expansion of BQA commodity farmers require expansion of services.
- 4) Environmental Risks:
 - In recent years (2012, 2016, 2018) the supply problem has been compounded by severe extreme weather and climate events impacting the recovery of some of the commodities (and sometimes more than a year has been required to return to normal levels of production and export).

Agrana Fruits (Fiji) Limited, Sigatoka, Fiji

Agrana is a commercial food processor established in 1963 and owned by the Vienna-based Agrana Juice & Fruit Holding GMBH. The company processes tropical fruits (mainly banana, mango and guava) at its facility in Sigatoka, Fiji, to produce puree in both organic and non-organic certified forms. These aseptic purees are mainly exported to the company subsidiaries in Korea and Australia as food ingredients and domestically to large hotels and restaurants. Major risks for this business include the following.

- 1) Production & Supply Chain risks
 - There is a shortage of fruit supply particularly at farm-gate prices that the company is willing to pay (in order to maintain its competitiveness in export markets).
 - Here is a shortage of planting material for desired banana varieties.

- There has been a failure to implement best practice (GAP) by the grower/supplier network, particularly in view of organic certification and research services.
- 2) Market risks
- No proper access to the Domestic market because of the high price compared to others quoted and high dependence on the export market.
 - The domestic market, including hotels or restaurants in Fiji, are not necessarily sensitive to the quality of the product and prefer cheaper non-organic products.
- 3) Regulatory & Policy risks
- The company rates research and extension services as very important to their business; however, provision by government of, and access to, these services is considered inadequate.
 - Biosecurity processes are considered slow, and authorities are unable to give clear information at the outset on what the approval process is and how long it will take.
 - There is inadequate communication between the government, stakeholders and consumers.
- 4) Environmental risks
- Unpredictable extreme weather events (tropical cyclones and flooding) can severely restrict supply and damage/destroy nurseries and planting stock.

Tutu Rural Training Centre, Taveuni, Fiji

The Tutu Rural Training Centre is a not-for-profit training institution and active farm that promotes education, nutrition, and assistance to the isolated rural areas of Fiji. It was established in 1969 by the Society of Mary in Taveuni. The organisation focuses on supporting young people to attain rural self-employment and to make a positive and productive contribution to their communities combating issues revolving around food security and agriculture, and water and sanitation.

The main products of the organisation and its trainees are kava and dalo as well, increasingly, as fresh fruits and vegetables and value-added products like flour, fried chips produced from cassava and breadfruits, which are mainly domestically marketed to schools, families and some shops in Suva. Major risks for this business include the following.

- 1) Production & Supply Chain risks
- The lack of equipment to boost production.
 - Transportation is an additional constraint for the Centre as its roads require frequent repair, especially during the wet season.
 - Risk of pests and diseases or crop failure associated with monocultures.
- 2) Market risks
- Frequent market price fluctuations for the main products.
 - They usually sell their products at low prices, which is likely the limiting factor also for its products to find export markets.
- 3) Regulatory & Policy risks
- The commercialisation of the product mainly depends on others like students and the Fiji Government.

- 4) Environmental risks
 - There are already mitigating measures to overcome extreme weather and climatic risks, but these have yet to be implemented in a proper manner.

Nishi Trading Company Limited, Tongatapu, Tonga

Nishi Trading Company Ltd is a Tongan-based fully commercialised family company established in 1970 by Minoru Nishi Snr. The company strongly supports investment in local produce, working with farmers, government and others to expand the agriculture industry in Tonga.

Commercial farming, quarry, Nishi foods and farming supply stores are the main business activities of Nishi. The processed Nishi foods have good export markets and, also, they conduct commercial farming to grow watermelon, cassava, squash and other fruits which are mainly exported but also marketed domestically. Major risks for this business include the following.

- 1) Production & Supply Chain risks
 - Nishi's production can sometimes be constrained by insufficient quantity, and inconsistent quality, of the supply from contracted smallholders.
 - Nishi is also constrained by being unable to reliably access the preferred varieties of seeds and planting materials.
 - There is no proper payment to the out-growers in a specific period from the company, hence growers are switching to side markets.
- 2) Market risks
 - Fluctuations in the market price and exchange rates with NZ and AU dollars.
 - There is no technical marketer/dealer to market the products.
- 3) Regulatory & Policy risks
 - Lack of technical support from government and other organisations.
 - Gaps that exist in the general agribusiness space that affect Nishi are in areas of agribusiness policy and regulatory frameworks, alignment of duty and tax policy and biosecurity processes and requirements across various government ministries, and infrastructure for storage and transportation for the agribusiness sector.
- 4) Environmental risks
 - Extreme drought, flash floods, and tropical cyclones severely impact on primary production in Tonga.
 - Extreme events have also damaged Infrastructure, factory buildings and equipment (cost of damaged infrastructure to Nishi from TC Pam was more than Tonga Pa'anga 1 million) (Manley, 2019).

Klin Kava, Luganville, Santo, Vanuatu

Klin Kava is a family business involved in kava processing and exporting from Vanuatu for the past 13 years. Klin Kava is owned by Australian ex-pat John Fordham, and one of his sons.

The main product of Klin Kava is highly soluble 'Instant' kava powder which is exported to USA, NZ and other markets. One kg of 'instant' kava powder is made up into about 25-30 liters of kava drink in USA kava bars and elsewhere. Major risks for this business include the following.

- 1) Production & Supply Chain risks
 - It has been challenging for Klin Kava to maintain consistent supply of raw material due to supply/demand imbalances and damage to the kava crop caused by severe tropical cyclones.
 - There are several other Vanuatu kava buyers and exporters who operate in an unscrupulous manner (mainly adulterating the product) which jeopardizes the entire kava export industry, especially the supply chains to USA, Europe and Australia.
- 2) Market risks
 - The regulatory environment concerning the cultivation, sale and testing of tudei kava (varieties which have strong and often adverse impacts on consumers) needs to be strengthened. There is a high risk of Vanuatu losing its international market share if tudei and adulterated kava makes its way into the international market due to unscrupulous kava processors.
 - That there will be further kava bans implemented by EU (or in other markets) if the wrong kava varieties are grown and processed and/or poor and unhygienic processing practices are used.
- 3) Regulatory & Policy risks
 - The major challenges that Klin Kava have faced have involved mooted Government changes to legislation such as a proposed 50 per cent local ownership requirement, income tax hikes and a proposed levy (10%) by the Quarantine Department on kava exports.
 - There is limited support from Government for the kava sector, and limited government assistance to the private sector in Vanuatu in general. There is a need for education programs about sustainable growing of kava, using noble varieties and developing appropriate pricing levels.
- 4) Environmental risks
 - Cyclones and natural disasters have major adverse impacts on the supply of kava to Klin Kava, and there is an increasing risk of more intense tropical cyclones impacting on perennial crops in Vanuatu.

Risks and Options Assessment for Decision-making (ROAD) Process

ROAD is an iterative and adaptive analytical process that considers risks, opportunities and the decisions that improve outcome for developing countries, particularly in the Asia-Pacific region. It is a straightforward process model that can be readily adapted for use in the context of assessing and mitigating risks to agribusiness in the Pacific Islands. Figure 1 illustrates the ROAD process, which includes five components: (i) determining the decision space, objectives and stakeholders, or scope; (ii) identifying the triggers to be assessed; (iii) assessing causal risks; (iv) analysing decision options involving controls and mitigants, including a summary and justification for the decisions; and (v) implementing decisions and reviewing outcomes. Table 1 defines the terminology that is used. ROAD is superficially circular or

chronological in the sense that each component of the assessment (with steps within each) builds on previous components. Nevertheless, it may be necessary to revisit and revise previous components, or steps within components, before moving forward. Thus, ROAD is also an iterative and adaptive process. The final and fifth component in the ROAD process provides the foundation for subsequent assessments and, thus, it is also a circular decision-making process (Grafton, 2016). The ROAD process is also a system-based approach to risk assessment that allows the integration of different tools and types of knowledge (FE2WNetwork, 2019).

Figure 1. The Risks and Options Assessment for Decision-making Process

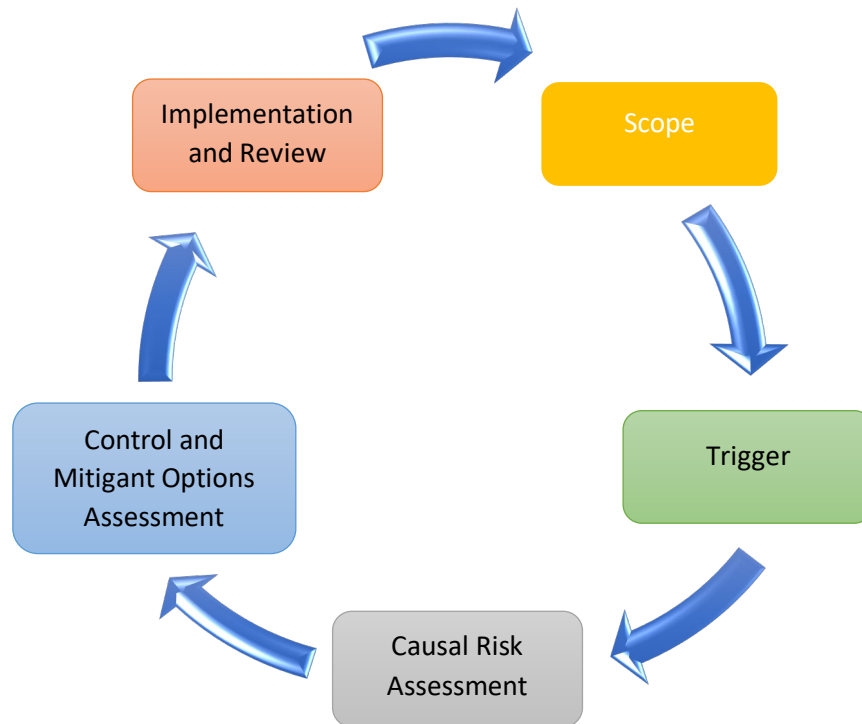


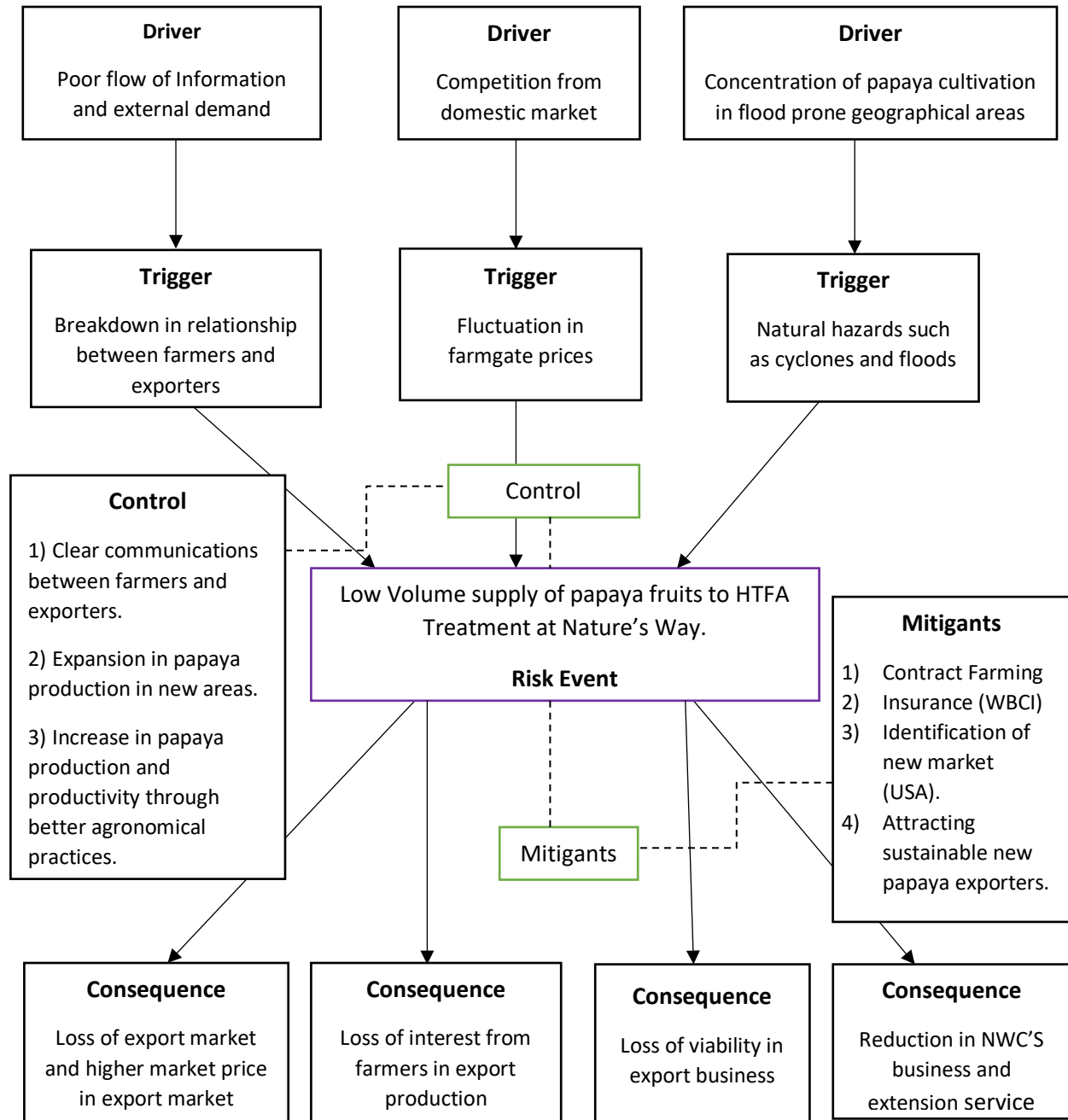
Table 1. Risk system models guide analysis and decisions - terminology

<p>Risk event: an event with uncertain consequences;</p> <p>Trigger: an event that is the immediate cause of a risk;</p> <p>Driver: threat, trend or other source of risk event causing a trigger;</p> <p>Control: action modifying likelihood of driver/trigger causing risk event;</p> <p>Mitigant: an action that ameliorates the after the-event consequences of a risk;</p> <p>Option: an action that affects risk, that is, a control and/or a mitigant;</p> <p>Consequence: an event or outcome from realization of a risk and the application (or lack thereof) of controls and mitigants;</p> <p>Stakeholder: a person, community or organization that can affect, be affected by or perceive themselves to be affected by risks and options;</p> <p>Decision-makers: people/groups managing risk with ROAD.</p>
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Application of ROAD Tool in Pacific Islands Agribusiness context

The ROAD process seems a useful tool to address and to develop the risk and mitigation framework for Pacific Islands agribusinesses. The ROAD tool is applied to the Nature’s Way Co-operative Fiji Limited (NWC) to address the risk of low volume supply of papaya fruit for HTFA treatment. A simplified illustration of the causal pathways involved in the ROAD process is illustrated in Figure 2. The model is a hypothetical representation of the risk associated with low volume supply of papaya fruit to NWC in Fiji.

Figure 2. Potential causal pathways of risks contributing to low volume supply of papaya fruit to NWC



We assume only one decision-maker and stakeholder (NWC), the farmer, with a single objective: to increase the supply of papaya for HTFA treatment at Nature's Way. In this causal pathway, there are three triggers (fluctuation in farmgate prices; natural hazards such as floods and cyclones; and breakdown of trust between farmers and exporters) and three drivers which are causing triggers (competition from local market; concentration of papaya production in flood prone geographical; and poor flow of information between farmers and exporters and external demand).

The NWC in response to the risk is to choose the preferred approaches about how to increase the papaya supply to HTFA treatment. The preferred control may be: (i) improve and enhance communications between farmers and exporters through the extension service in order improve their relationships; (ii) expand papaya production in new geographical areas to overcome natural hazards; and (iii) increase papaya production and productivity through better agronomical practices so that the farmers can meet local demand and supply the export market.

Each of the control actions has a likelihood impact on reducing the risks. While the control decisions determine the potential consequences against objectives, the NWC may also have mitigation actions available.

Our example is highly stylized and, in reality, a much broader range of controls and mitigants would be available to NWC in order to respond to a larger set of triggers and risks. Moreover, the risks and options would be different from the perspective of a different decision-maker, such as government.

The mitigants are as follows.

(i) **Contract farming:** this can be defined as agricultural production carried out according to an agreement between a buyer (Exporter or NWC) and farmers, which establishes conditions for the production and marketing of a farm product or products. Typically, the farmer agrees to provide agreed quantities of a specific agricultural product and, in turn, the buyer commits to purchase the product and, in some cases, to support production through the supply of farm inputs, land preparation and the provision of technical advice, for example (FAO, 2019).

(ii) **Weather-based crop insurance scheme (WBCIS):** this is a unique insurance product designed to provide coverage against financial losses incurred due to natural calamities and extreme weather conditions such as storms, flooding rains, drought, wind, sudden temperature fluctuations. This type of insurance is ideal for those who depend on agriculture for their livelihoods (Vikaspedia, 2018). Its transaction cost is very low compared to traditional crop insurance.

(iii) **Identification of new markets: NWC currently exports papaya to Australia and New Zealand.** Apart from these countries, market opportunities have been identified in the USA, Japan and Hong Kong/China. The last in-depth on-site market studies for Fijian papaya in these markets were conducted in 2009 (Stice, 2019).

(iv) **Attracting sustainable new papaya exporters:** Papaya exports to New Zealand now largely depend on the long-standing exporters from Bilalevu in the lower Sigatoka Valley (Mahren's Exports and Manasa Exports) who supply their traditional Auckland markets. For the Australian market it is Sunrise Produce who supply the Melbourne market (shipping via Auckland). New exporters are required if the

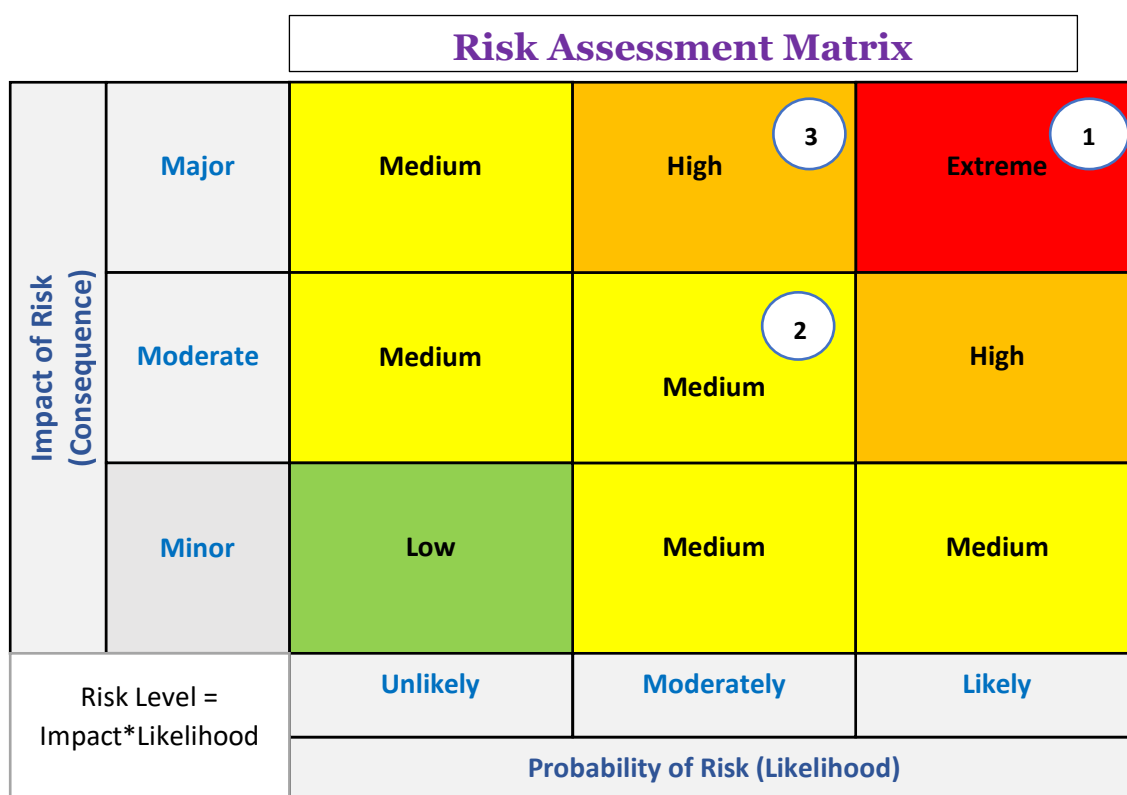
large identified market opportunities are to be realised. The entry of such exporters would be encouraged in order to build trust between farmers and exporters too (Stice, 2019).

Apart from the above mentioned mitigants, the business can also introduce some of the specific risk reduction measures which can assist to lower risks to the business, e.g., using drought-resistant varieties of planting materials, small-scale irrigation and, storage containers to store planting materials in the event of a cyclone.

Table 2: Risk matrix for low volume supply of papaya for HTFA treatment at NWC

Sl. No	Risks/ Triggers	Likelihood	Impacts	Risk Level
1	Breakdown in relationship between farmers and exporters.	Likely	Critical	Extreme
2	Fluctuation in farmgate prices.	Moderately	Moderate	Medium
3	Natural hazards such as cyclones and floods.	Moderately	Catastrophic	High

Figure 3. Risk assessment matrix for low volume supply of papaya



A risk matrix is a matrix that is used during risk assessment to define the level of risk: this is done by considering the category of probability or likelihood against the category of consequence or severity (Wikipedia, 2019). Appendix 1 explains the terminologies of the risk matrix. Risk matrices are a useful instrument for fast, effective, and practical risk assessment processes (Talbot, 2018). Figure 3 illustrates

the risk assessment matrix for low volume supply of papaya at NWC. It helps to prioritise the risk and determine the level of action needed. The NWC risk matrix illustrates that the trust between farmers and the exporter is at an extremely low level and, hence, immediate action is required to better manage and minimise this risk. Table 2 explains the likelihoods, impacts and the risk levels of various triggers to low volume supply of papaya at NWC.

Results and Discussion

The key output of this research is the development of a risk mitigation tool for Nature's Way Co-operative Ltd through application of the ROAD process to deal with serious risk of low volume supply of papaya fruit for HTFA treatment. ROAD is an adaptive process that assesses risks and possible response in agribusiness. It is designed to enable decision-makers (agribusiness companies, farmers and farmer organisations) to make risk-based responses to the threats that may arise in their business. The ROAD process is designed to support businesses, farmers, farmer organisations and governments to assess risks and integrate them into their decision making. The main purpose is to provide a structure for decision-makers to systematically incorporate different risks of their business in order to mitigate them.

The ROAD process can be utilized by both individuals and groups of decision-makers across different scales. The time and effort to apply the ROAD tool will depend on the geographical and temporal scales of the decisions at hand, as well as the resources available. For example, for a farmer, it may be a simple, rapid process with a limited information base, but one that would provide a more systematic way to assess and mitigate risks. By contrast, for a state agriculture department responding to an agricultural risk along the value chain, it would be much more information-intensive, time-intensive and modelling-intensive process (Grafton, 2016).

Contribution

The ROAD process has not yet been widely applied in a policy setting and, thus, it has not been possible to accurately report how ROAD enhances decision making. Nevertheless, because ROAD focuses on causal risks and the delineation of threats and the actions needed before and after the risks are realised, the approach provides a sound basis for risk-based and evidence-based decisions. As with all decision processes, its practical contribution ultimately depends on how it is applied and in what circumstances (Grafton, 2016).

There is evidence that the application of ROAD ought to align with the principles of 'boundary work' (Cash, 2003; Kristjanson, 2009; Clark, 2011) to include the following: (i) knowledge user-driven problem definition; (ii) a project-based and solutions-based approach to research objectives; and (iii) a learning orientation that is experimental and embraces information from successes and failures equally (Kristjanson, 2009).

The key factor in the ROAD process is consideration of causal risk models which highlight the options available to manage risks and meet the objectives of decision-makers and stakeholders. Risks and options assessment for decision making builds on and synthesizes the existing literature and is intended to (i) provide a structured, but flexible process to move from problem diagnosis to better decision-making that can identify, control and mitigate risks, and (ii) be flexible for use at different scales, from farmers with limited information to government departments and agribusiness companies with teams of workers engaged in planning across decades (Grafton, 2016). The success of the ROAD process can be further

determined when it is applied in multiple locations across Pacific Islands and for different decision processes by agribusiness.

Implementation

To get the most out of the application and implementation of the ROAD process for decision-makers, it's important that it be more fully tested and evaluated. Several research questions are pertinent. Under what circumstances and conditions is the ROAD process applicable? For instance, can it be adapted so as to be appropriate for farmers or farmer organisations? Or is it better suited for decision-makers with well-trained staff familiar with risk assessment? Finally, is the ROAD process more amenable to decision-making where the risks are easier to identify and when the trade-offs are clearer? Responses to these questions can only be obtained from testing and applying the ROAD process to assess its weakness, identify its strengths and document its contribution to risk-based decision-making (Grafton, 2016).

The systemic way of applying the ROAD process to Nature's Way Co-operative Fiji Limited has been addressed in this paper and, by using that as a model, may have made it easier to apply the ROAD process to other agribusiness in the Pacific Island countries. The paper explains the systematic application of the ROAD process to address and mitigate the risks in NWC.

Appropriateness of the ROAD tool to Pacific Agribusiness

The application of the tool to the Nature's Way Co-operative case studies indicates that it is appropriate for small and medium enterprises to identify the risks and mitigation options. In the Pacific Islands context, the ROAD process is suitable for the agribusinesses which are addressing multiple risks and this process provides a direct tool to apply to their business risk to mitigate and improve their resilience. The risk matrix provides the required set of information on the impact of risks and the risk level in the agribusiness. The outputs of key figures make the information accessible to a variety of stakeholders without having to read an in-depth report.

The tool is well-suited to be used as part of a value chain analysis, feasibility study, business plan and/or industrial plan. The tool provides a process for examining information for new or existing industries to address the risks faced in their business. The expected users of this tool in the Pacific Islands countries would be agribusiness owners, ministry of Agriculture planners, farmer organisations and development partners.

Conclusion

Pacific Island agribusinesses are the source of food supplies to many livelihoods and impacts on the development of rural livelihoods but are now at a crossroads. For the most part, Pacific Island agribusinesses have failed to flourish. Several factors have contributed to this failure of agribusiness, including lack of appropriate policies and poor decision-making by many Pacific Islands' agribusinesses.

Pacific Islands' agribusinesses need to more carefully assess risks and identify the ways to control and mitigate the risks. The Risk and Options Assessment for Decision-making (ROAD) process can be used to respond to this challenge. ROAD is an adaptive and flexible process intended to generate improved responses to risks, and especially systemic risks (FE2WNetwork, 2019). It is a straightforward process model that can be readily adapted for use in the context of assessing and mitigating risks to agribusiness

in the PIC. The ROAD process is a good option for adaptation and use in the Pacific Islands which could assist agribusiness owners, ministries of agriculture, and farmer organisations to assess and overcome the risks in a more systematic manner.

The ROAD tool can easily combine with other widely used analytical tools such as PIFON's 'Agricultural Value chain guide for the farmers' and many more. It is arguably one of the best ways to approach the risks by farmers, farmer organisations, MOA and small-to-medium agribusinesses.

The application of ROAD tool to one of the successful agribusiness cases in PIC is the key output of this work. It can be used as a model for other agribusiness in order to incorporate in their business and mitigate the risks that they are addressing.

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Appendix 1. Terminology

Likelihood: An estimate of the probability that an event or outcome will occur.

- **Unlikely:** Extremely rare risks, with almost very low or no probability of occurring.
- **Moderately:** Risks that are more typical, with about a 50/50 chance of taking place.
- **Likely:** Risks that are highly likely to occur.

Severity: The impact of a risk and the negative consequences that would result.

- **Insignificant:** Risks that bring no real negative consequences or pose no significant threat to the organization or project.
- **Minor:** Risks that have a small potential for negative consequences but will not significantly impact overall success.
- **Moderate:** Risks that could potentially bring negative consequences, posing a moderate threat to the project or organization.
- **Critical:** Risks with substantial negative consequences that will seriously impact the success of the organization or project.
- **Catastrophic:** Risks with extreme negative consequences that could cause the entire project to fail or severely impact daily operations of the organization.

Risk Level:

- **Low:** The consequences of the risk are minor, and it is unlikely to occur.
- **Medium:** Somewhat likely to occur, these risks come with slightly more serious consequences.
- **High:** These are serious risks that both have significant consequences and are likely to occur. Prioritize and respond to these risks in the near term.
- **Extreme:** Catastrophic risks that have severe consequences and are highly likely to occur. Extreme risks are the highest priority.