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Investment Management meets Agriculture

Evidence-based decision making for small agri-business

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Emily Walker

I wish to thank the Kellogg Programme Investing Partners for their continued support.

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Toitū te whenua, whatungarongaro te tangata

Land is permanent, while people come and go

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Executive Summary

The traditional model of primary production in New Zealand is facing significant challenges from internal and external forces, which are only expected to increase over the coming years. These include water security and quality, climate change, carbon emissions, labour availability, market forces and biodiversity. To continue in business and remain sustainable for future generations, transformational change will be needed requiring sector wide strategic and capital investment programmes.

This research report attempts to provide specific support for agri-business leaders. It focuses on answering the question: Does an evidence-based approach to decision making improve outcomes for small agri-businesses in New Zealand?

Research was undertaken using an inductive approach to thematic analysis, allowing the data to determine the themes, rather than be driven by the researcher's theoretical interest or specific questions (Braun & Clarke, 2006). The data corpus was constructed through a literature review and semi structured interviews. The outcome of the analysis was a thematic map, showing two themes: the decision maker and decision framework.

Key Findings

- There is significant opportunity to support agri-businesses through a decision-making approach that uses evidence to consider the environmental, social, cultural, and economic impacts of their actions.

Decision Maker

- Whilst maintaining an understanding of the current operating environment can be challenging (for decision makers), it allows business leaders to be agile and take advantage of opportunity early. The key is in knowing what topics you must be informed of, then focusing efforts on those domains.
- Decisions must be aligned to an organisation's purpose, else there is potential for mismatched decision making, detracting from the business's momentum, diluting leader and team focus, and ultimately, diminishing the purpose the business is working to achieve.
- Decision makers need to be more ambitious. The interviews found that many organisations were simply *'playing not to lose, rather than to win.'* The case studies revealed that this could lead to the continual investment in tried and tested solutions.

Decision Framework

- Robust analysis of the problem ensures the issue itself is being solved, rather than only managing symptoms. This avoids unintended consequences and rework, increasing the likelihood of developing an enduring solution.
- Decision-making process matters six times more than analysis to producing impactful decisions (Health & Health, 2013). However, process should be flexible, allowing for the idiosyncrasies of individual agri-businesses, and is improved through collaboration.
- In addition, the inclusion of testing into the decision-making process reduces risk through proof of concept, testing assumptions and bias, checking decision makers haven't inadvertently jumped to a solution, and provides awareness of different perspectives to enable continual improvement.
- Analysis of two options rather than just one also improves likelihood of success by a factor of six (Health & Health, 2013). Widening the set of options evaluated improves discussion and debate, increasing the probability of strategic decision making occurring.

Implementation

- Evolutionary implementation, the compounding effects of numerous small changes, has a higher probability of creating successful, enduring change.
- Development of a strategic plan to support implementation of the investment across the business can support accountability for action, prepare for opportunity, understand risk, measure results, and build credibility with stakeholders.

Recommendations

As a result of the findings and discussion presented in this report, the following recommendations are made to the leaders of small agri-businesses:

- Develop and maintain an understanding of the operating environment in which the reader is acting.
- Align all decisions with the business's purpose and principles/values.
- Engage a multi-skilled advisory board to collaborate on and support decision making. This board may include professional advisors, accountant, banker, lawyer, and an independent member.
- Utilise structured processes and evidence to support decision making.
- Prepare a strategic plan to create accountability for action, prepare for opportunity, understand risk, measure results, and build credibility with stakeholders.

1 Introduction

Decision making is a fact of life, and in business good decision making is critical to success. However, there is limited guidance for small agri-business leaders to support their decision making in the congested and constrained operating environment¹ that is today's society.

The traditional model of primary production in New Zealand, which has proved successful for decades, is being challenged by internal and external forces. These include water security and quality, climate change, carbon emissions, market forces and biodiversity, to name a few.

Therefore, it is likely that transformational change will be required as incremental change is unlikely to be sufficient to address the challenges being faced (Renwick, et al., 2018). These transformational changes will require significant sector wide strategic and capital investment programmes that ideally overcome multiple headwinds with one solution.

This research report attempts to provide specific support for small agri-business decision makers and focuses on answering the question: Does an evidence-based approach to decision making improve outcomes for small agri-businesses in New Zealand?

This research is based on the hypothesis that traditionally agri-business has relied on one dimensional, linear decision making. For example, apply more fertiliser, grow more grass, grow bigger lambs, make more profit. However, the current operating environment is significantly more complex and requires multi-factorial analysis that considers the environmental, social, cultural, and economic impacts on the decisions made. For example, the impacts of fertiliser application on nutrient loading, run off into waterways, biodiversity, carbon emissions, stocking rate and financial performance.

2 Purpose, Scope and Objectives

Purpose

The purpose of this research is to understand, analyse and define how an evidence-based approach to decision making would provide value to, and improve the investment outcomes for small agri-businesses in New Zealand. Therefore, testing the hypothesis and laying down a case for change, or otherwise.

Scope

The scope of this research is limited to capital investment decisions of small agri-businesses based in New Zealand.

Whilst the research and findings presented in this report could be applied to a much wider range of decisions; the scope of this report has been limited to capital investments. This distinction was made as significant capital investment will be required in the coming years to implement the transformational change to overcome the challenges to the current model of primary production. Therefore, attempting to provide specific, timely, guidance to the sector.

Objectives

- Develop an understanding of the theory of decision making in relation to key strategic and capital decisions.
- Summarise the researched literature on decision making and understand how it applies to small agri-business in New Zealand.
- Ground truth and test theoretical understanding with the lived experience of industry leaders.
- Analyse and evaluate the findings to offer recommendations to support and improve strategic and capital decision making, adding value to small agri-business.

¹ Operating environment: the conditions, circumstances, and influences that affect the employment of capabilities and bear on the decisions of the commander (Ministry of Defence, 2016). In this report, the operating environment refers to all external and internal conditions, circumstances and influences that impact on a small agri-business e.g., regulations, finance and funding, labour, market, climatic, environmental, social, cultural etc.

Definitions

- A **decision** is a conclusion or resolution after consideration as a result of processing a situation and deciding on a course of action(s); this includes choosing to do nothing (Nicholson, et al., 2015).
- A **small business** is defined as those with fewer than 20 employees and includes those who are self-employed. There are approximately 530,000 small businesses in New Zealand representing 97% of all firms. They account for 28% of employment and contribute over a quarter of New Zealand's gross domestic product (GDP) (MBIE, 2020). There are 62,700 small agricultural businesses in New Zealand, comprising 11% of all small businesses, employing 67,500 people (Stats NZ, 2021).
- For this study, an **agri-business** is defined as any business involved in New Zealand's primary sector providing raw materials like wool, meat or milk. New Zealand's primary industries are dominated by dairy, beef and sheep farming, but also include forestry, fisheries and horticulture (Nana, 2022).

3 Method

An inductive approach to thematic analysis has been followed, allowing the data to determine the themes, rather than be driven by the researcher's theoretical interest or specific questions (Braun & Clarke, 2006).

The data corpus was constructed through a literature review and semi structured interviews, then analysed following the guide outlined by Braun and Clarke (2006).

Data extracts were coded at a latent level, going beyond the surface meaning to identify the underlying ideas, assumptions, and concepts. Patterns and ideas were identified in the data and themes were established. These were defined through an iterative process as more information was coded and the data was repeatedly reviewed.

The outcome of the analysis was a thematic map, showing two themes: the decision maker and decision framework.

Literature Review

In a step aside from a purist view of inductive thematic analysis, the literature review and interviews were conducted in parallel. This was necessary due to the time constraints on this research project; however, it was not anticipated that this would impact the overall analysis or results.

The literature review comprised two parts: firstly available publications on the current decision-making practices in New Zealand agri-business were reviewed, and secondly, the researcher reviewed a large variety of business texts, academic writings, military doctrine, and published books to understand theoretical background, context, and emerging information on the research question.

Semi Structured Interviews

Eight semi-structured interviews were conducted across a range of businesses and individuals including:

- Family farming
- Sheep and beef operations
- Corporate dairy farming
- Horticulture
- Investment specialists
- Consultants
- Independent director
- Agri-social enterprise

Whilst some of the interviewees were not currently working for/in small business, they were currently or previously involved in small business through ownership or a board member/advisory role. In addition, their responses also provided contrast and insight from the perspective of a larger businesses.

The interviews consisted of key questions to provide an outline to the discussion but ensured the flexibility to diverge or pursue an idea in more detail where appropriate (Gill, Stewart, Treasure, & Chadwick, 2008). Interviews were conducted online, and key points and quotes were noted during the discussion. To respect the commercially sensitive nature of some of the information discussed, interviewees have not been identified throughout this report.

Two different question sets were used to inquire about either the organisation which the interviewee represented or the interviewee themselves as a leader. The results have been combined for analysis, and the interview questions are appended.

Case Studies

The findings of the research presented within this report demonstrate the importance of decision-making processes and tools to supporting quality outcomes. Therefore, it is proposed that a specific tool for small agri-business would support and improve their capital decision making.

Whilst there are many tools available to support strategic investment management across a vast array of industries, they do not cater to the specific challenges experienced by small business in New Zealand's primary sector. An early prototype tool was developed based on the critical analysis of the literature review and interviews, presented herein.

The tool was tested with two real world agri-business case studies to test the findings of this research and inform further development of the tool.

4 Literature Review

The information reviewed demonstrated the complex nature of capital investment decision making. It requires discipline, process, and practice and should be undertaken in a collaborative environment whilst maintaining an action-oriented mindset.

Critical analysis of multiple literature sources identified four key themes:

- **Limited existing information** - There is limited information easily accessible to support the holistic transformational decision making required to adapt and excel in today's operating environment.
- **Structure** - Large, complex decisions are improved through a structured process that considers the whole system in which a decision is acting.
- **Understanding the operating environment** - Developing and maintaining an understanding of the operating environment supports the decision maker to be informed, improving their ability to adapt.
- **Collaboration** - Working collaboratively with a multi-skilled team supports improved decision making.

The literature review in this report presents critical analysis and evaluation of these four themes in the context of the research hypothesis.

4.1 Limited Existing Information

There is limited information easily accessible to support the holistic transformational decision making required to adapt and excel in today's operating environment.

Whilst there is an extensive data set and associated commercial products to support farm system decision making, there is limited literature available to support holistic transformational capital investment decisions in small agri-business.

Recently, there has been some inquiry into applying a multi-criteria decision-making framework to land use systems and prioritising innovation in New Zealand agriculture (Renwick, et al., 2018), (Research Findings Brief: Supporting complex decisions on land-use changes), (Renwick, et al., 2017). The research proposed an approach that uses six domains for assessment, as shown in Figure 1. These were defined through literature, scientific opinion, and verification with those involved in land management. A software package weights criteria and evaluates the options against these to provide an overall score that can be compared to the ranking of other land systems.

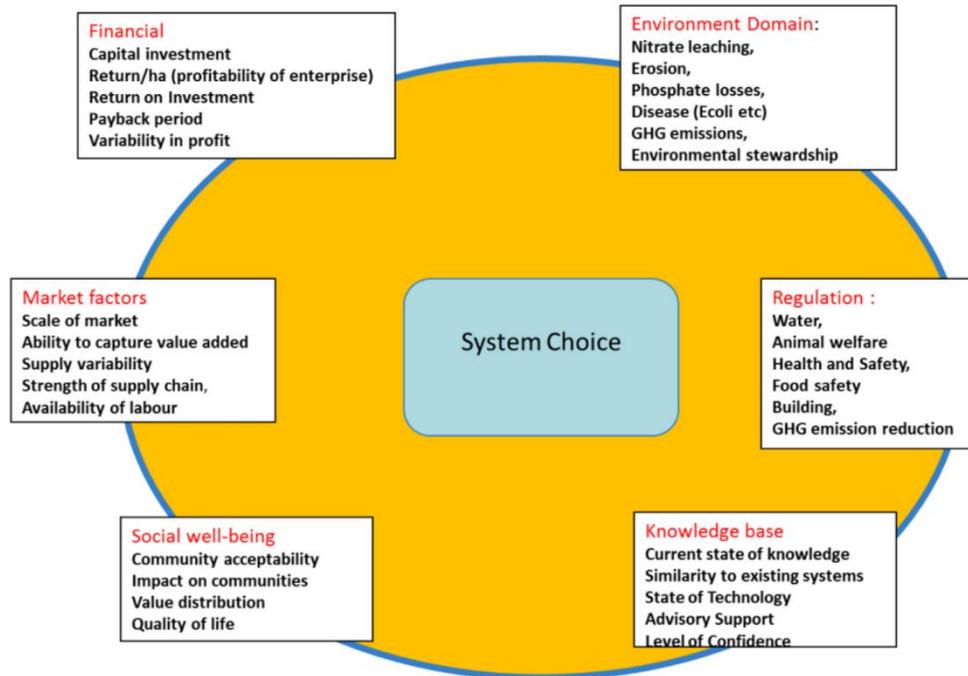


Figure 1. Domains and Examples of Sub-Criteria of the Assessment Framework (Renwick, et al., 2017).

Whilst the developed approach is thorough, it is complex and requires specific software for modelling the options under consideration. This reduces the tool's flexibility to be adapted at a farm/business level and consider the unique and individual conditions. Renwick et al, (2017) noted that this is a challenge of the tool and recommended further work partnering with innovative businesses to create a feed-back loop and modify the framework.

Additionally, the research does not investigate application wider than land use, however, there do appear to be other application opportunities. For example, multi-criteria decision making is globally recognised in many industries and has been adopted by the New Zealand Treasury through the Better Business Case model as the required standard for government business cases to obtain funding. It has also been adopted as the international standard for infrastructure projects (Better Business Cases (BBC), 2022).

The reviewed literature also commented that the required transformational change is dependent and determined ultimately by the land manager/business owner. A paper published by Grains Research and Development Corporation (Australia), *Farm decision making: The interaction of personality, farm business and risk to make more informed decisions* (2015) investigates and provides guidelines to land managers on decision making. These learnings are also applicable to other agri-businesses. The report discusses four categories which influence decision making:

1. **Risk** – the primary reason cited by farmers for making changes to their business. However, the information on which decisions are based does not account for, or calculate, the changing risk profile of the business.
2. **Human nature** – can confound logical, analytical process. An appreciation of how people's values, goals, biases, and personalities influence their decision making is necessary to provide support.
3. **Assumption** – farmers know how to make good decisions, just because they do it often. Decision making is a skill that requires discipline, process, and practice.
4. **Operating principles** – account for the nuanced, unique nature of each business that need to be considered in any framework/process/advice.

These factors should be considered in any recommendations to small agri-businesses on applying decision-making processes.

4.2 Structure

Large, complex decisions are improved through a structured process that considers the whole system in which a decision is acting.

4.2.1 Systems Theory

Systems theory takes a view that a system comprises many components, known as subsystems. These subsystems are interrelated and interconnected, working together to collectively achieve a purpose, as illustrated in Figure 2 using a farm system as an example. The success of a system cannot be explained solely through the characteristics of the individual components alone but how they interact and work together - “the whole is more than the sum of its parts” (Bertalanffy, 1968). Systems theory demonstrates the interconnected nature of the different components which must be considered through capital decision making.

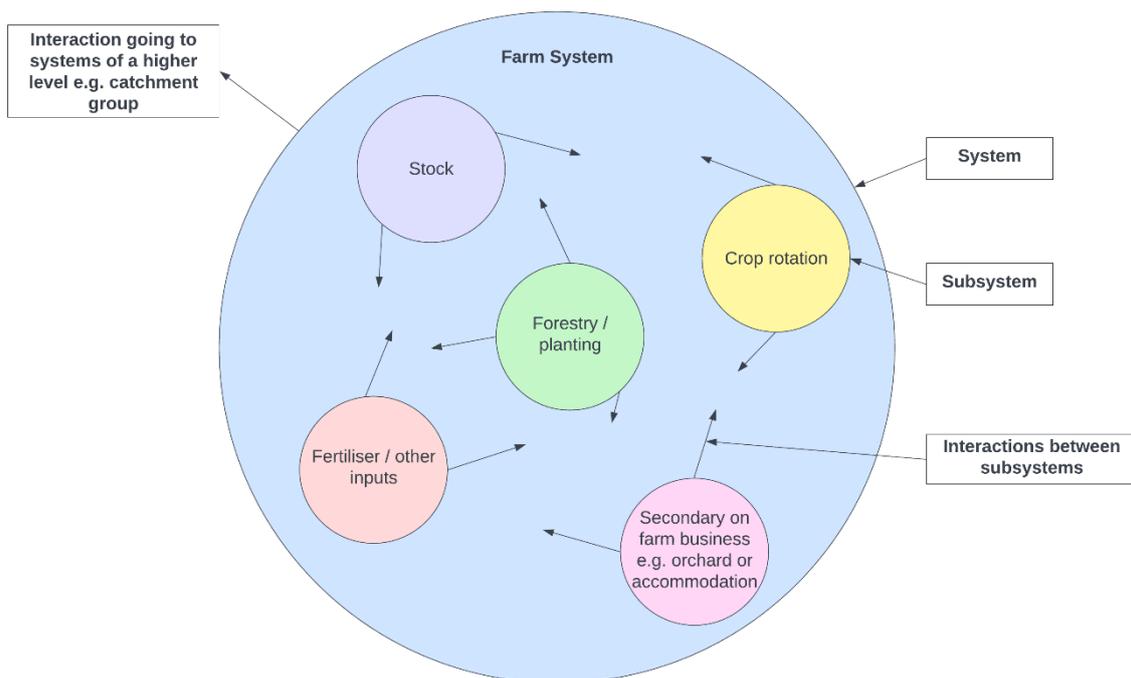


Figure 2. A system comprises many subsystems, with interconnections and interactions, and the system itself connects externally as well (Bertalanffy, 1968) recreated by E. Walker to illustrate a typical New Zealand farm system.

Systems Engineering

Systems engineering takes a systems theory approach, acknowledging the composition of a system, to focus on methods/process to solve problems rather than focusing on a solution. As Health and Health (2013), have proved the process of decision making matters more than the analysis itself – by a factor of six.

Systems engineering focusses on process optimisation and seeking to understand how a system fits together at a level above where the day-to-day challenges arise (What is systems engineering?, 2015). It takes a multi-disciplinary approach to understand multiple metrics, acknowledge that the problems are dynamic and consider the whole life cycle.

Whilst systems engineering uses a feedback loop to obtain continuous improvement, Kleiner (2009) states that most problems leaders face aren't caused by external forces but rather problems tend to be derived from the unintended consequences of a leader's ideas or efforts. In addition, he found that when fundamental change was required to their ideas, leaders lost interest and the suggestions were ignored. This suggests mental models and behaviour theory also influence decision making, perhaps in even in an illogical manner.

4.2.2 Behavioural Theory

Behavioural theory is based on the idea that all behaviours are learnt through conditioning and interaction with the environment, and innate or inherited factors have little influence on behaviour (Cherry, 2022).

Furthermore, behavioural theory of superior performance states that whilst organisations are typically able to identify incremental change opportunities, identifying and taking advantage of disruptive change is significantly more challenging and often only discovered accidentally as an unintended outcome (Gavetti, 2012). This is due to the paradigm where humans focus on what is local and proximate, usually falling back on the familiar and routine actions.

Ultimately, these two ideas combine to emphasise the human disposition towards bias in our behaviour and therefore, decision making.

4.2.3 Bias

Cognitive bias is people's systematic but flawed patterns of responses to judgement and decision making (Wilke & Mata, 2012).

There are many different forms of bias and a plethora of studies that show how they influence decision makers and lead to significant errors in decision making (Hallo, Nguyen, Gorod, & Tran, 2020). There are many different forms of bias that influence rational processing, but the crux of the issue is that humans only have limited time, information and cognitive capacity and so rely on simple strategies or heuristics to make decisions. To counteract this predisposition, decision makers must consciously withhold judgement and allow the process to determine a solution.

4.2.4 Evidence-Based Management

Evidence-based management theory emerged from the medical industry (Pfeffer & Sutton, 2006). It seeks to support professionals to make decisions based on well-founded information that considers the social, ethical, and more recently environmental impacts (Jan de Graaf, 2019).

Jan de Graaf (2019) states decisions are often based on something feeling right, whilst Pfeffer and Sutton (2006) suggest that seasoned practitioners neglect to seek out new information as they trust their own experience more than they trust research (an example of a cognitive bias). Furthermore, decision makers often favour an alternative that utilises their strengths or are driven by dogma and are overly influenced by what they "know" works, rather than asking questions.

Evidence-based management provides a framework to overcome these traits and compels decision makers to consider and connect the following four points:

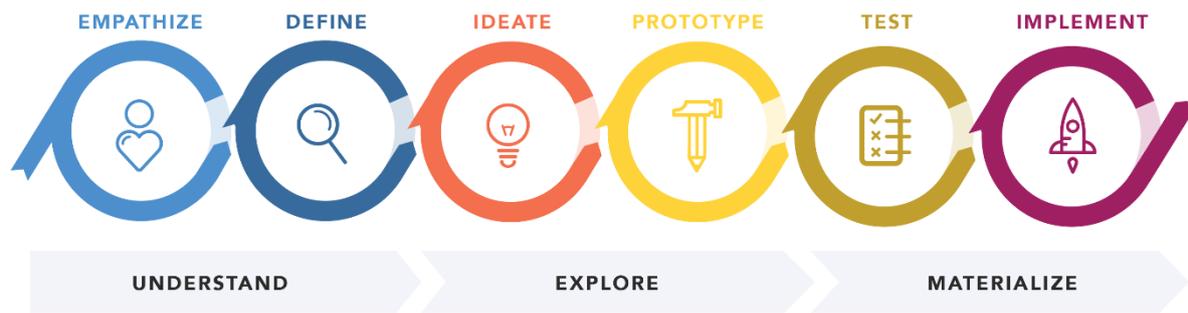
1. Scientific theory
2. Insights offered by professionals
3. Stakeholders' ideas
4. Context

Taking an evidence-based approach is equally important in agri-business to ensure the most recent scientific knowledge is combined with insights and ideas from stakeholders. Thus, avoiding businesses relying on what they have done in years gone by, yet expecting to achieve a different result.

4.2.5 Design Thinking

Design thinking brings the principles of design into business process. The benefits of applying design thinking are well established, particularly when approaching ambitious projects, creating significant strategic advantage for adopters (Hariharan Joshi, Khan, & Rab, 2021).

Whilst they did not invent design thinking, in the 1990's David Kelley and Tim Brown of IDEO coined the term and standardised the process that is commonly used today, shown in Figure 3 (Gibbons, 2016).



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Figure 3. Design thinking process (Gibbons, 2016).

Design thinking provides a structure or process for approaching an ambitious, often novel, problem. It acknowledges there is no single solution for a problem experienced in a complex operating environment. Instead, design thinking encourages teams to collaborate to build understanding of the problem they are trying to solve, explore several options, and experiment how these options work in practice before implementing a solution. The process is iterative and circles back for continuous improvement.

4.3 Understanding the Operating Environment

Developing and maintaining an understanding of the operating environment supports the decision maker to be informed, improving their ability to adapt.

Understanding is the perception and interpretation of a particular situation to provide the context, insight and foresight required for effective decision making (Concise Oxford English Dictionary 12th Edition, 2011).

It is more than knowledge; where knowledge comprises information and skills acquired through experience or education, understanding is applying judgement to make sense of and recognise the significance of facts in a given context (Ministry of Defence, 2016).

Understanding is contextual and perishable. It requires continual development to maintain its validity and a flexible, adaptive mindset to ensure a global perspective is developed from the widest appropriate range of experts and sources. Furthermore, to build understanding one must challenge commonly held views and perceptions. Finally, understanding is not a zero-sum commodity, where if someone understands, someone else does not (Ministry of Defence, 2016).

The principles of understanding are:

- Self-awareness
- Critical analysis
- Creative thinking
- Continuity

Building and maintaining understanding of the operating environment agri-business decision makers act in will better enable them to have insight and foresight. This results in decision makers having awareness of the changes to the system in which their business operates, such as export markets, labour force and environmental regulation, to define how they need to react, or ideally, what they can do to be proactive and create opportunity from the changes.

4.3.1 Influences on Decision Making

Understanding informs decision making and it follows that better understanding results in better informed decisions (Ministry of Defence, 2016). However, decision making is not a wholly rational activity and there are multiple influences that affect judgement, leaving decision makers open to bias. For example, how information is framed can result in different conclusions and emotions colour most aspects of thinking (Health & Health, 2013). Emotion (positive and negative) has been found to be the single cause of most decision-making errors

and 95% of leaders rely on subjective opinions to the point where it impacts their decisions in complex situations (Hallo, Nguyen, Gorod, & Tran, 2020). Working collaboratively and utilising deliberate processes with self-awareness and feedback can reduce these effects.

4.3.2 Confidence

Whilst building an understanding of your operating environment is beneficial, if it leads to over confidence it can impact a decision makers ability to appreciate risk.

As illustrated below, there is a relationship between the decision makers confidence and the level of risk they can comprehend. The study showed that decision makers with either low or high confidence tended to have a lower appreciation of risk (Hallo, Nguyen, Gorod, & Tran, 2020). This resulted in a reduced awareness of the risks involved in their decision and decreased conscious risk taking which can lead to decision-making errors.

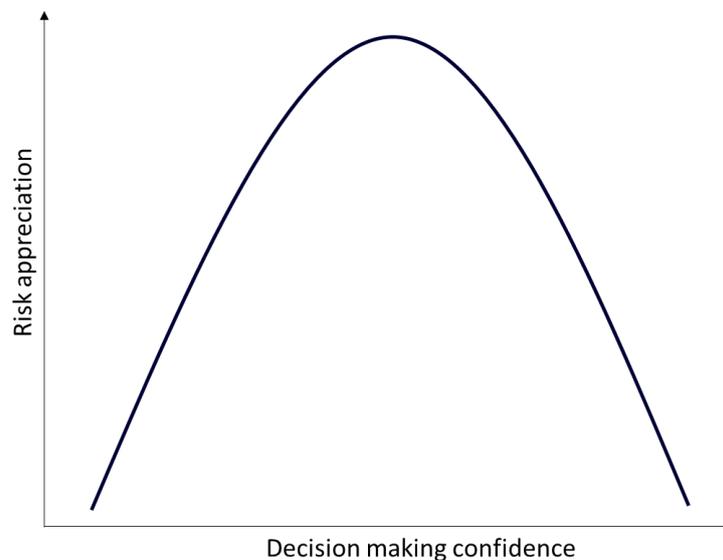


Figure 4. Relationship between risk appreciation and decision-making confidence (Hallo, Nguyen, Gorod, & Tran, 2020) recreated by E. Walker.

Therefore, demonstrating the importance of decision makers having a grounded understanding of their operating environment, to create healthy confidence, so that they are aware of the risks involved in their decisions.

4.4 Collaboration

Working collaboratively with a multi-skilled team supports improved decision making.

All literature reviewed aligned on one thing – collaboration improves decision making. However, to create a productive, collaborative environment that challenges thinking, tests assumptions, and ultimately creates the robust debate that ensures alternatives are rigorously evaluated the literature posed some suggestions (Ministry of Defence, 2016) (Aminov, De Smet, Jost, & Mendelsohn, 2019) (Sibony & Health, 2013):

- Look for people with different backgrounds, experiences, and knowledge,
- Include stakeholders in the analysis of problems,
- Debate ideas and remain open minded to new thinking,
- Meet physically, if possible, and
- Be aware of strong emotions, they can enhance or degrade thinking.

Additionally, there are some risks to be cautious of when working collaboratively. As shown in the above discussions, cognitive factors influence teams, affecting how they develop perceptions, construct meaning, judge, decide and act (Ministry of Defence, 2016). These include:

- **Peer pressure** - Exerted influence for the purpose of shaping opinions, values or behaviours to conform to the group's norms.
- **Groupthink** - Group's tendency to adopt majority decisions. This can be difficult for an individual to overcome when they know the group opinion may be wrong. This can create high risk situations in decision making as it can lead to shortcutting the process.
- **Social prejudice** - A belief that another social group is less capable than one's own.
- **Education and culture** - Groups with better training and education unconsciously adopt analytical methodologies and thinking strategies consistent with their education.

5 Interviews

The interviews conducted yielded a rich data set that provided insight into how decisions are made in a range of small agri-businesses around New Zealand, tested the hypothesis and identified what, if any, improvements would support their decision making.

Critical analysis and evaluation of the interview data set identified three key themes, which have been reviewed in the context of the research question and hypothesis:

- **Growing uncertainty** - The volume and pace of change is continually increasing.
- **Structure** - Small agri-businesses appear to lack structure around capital investment decision making.
- **Risk** - Identification and management of risk.

5.1 Growing Uncertainty

The volume and pace of change is continually increasing.

"People are at overwhelm with everything coming at them."²

There was a consensus among interviewees, mirroring what is heard in many industry forums, that there is significant and swift change occurring in the primary sector, which is leading to growing uncertainty for many business owners.

This is clouding mental clarity and impacting the decision makers' ability to construct an understanding of their operating environment. This can, and is, having ripple effects throughout the industry.

"It is challenging to keep up with all that's happening, I don't tend to read too much as I just don't have time...but you need to be aware of the topics you need to engage with."

The interviewees used pragmatic strategies to support them to create clarity. They all commented on the need to manage your mindset, understand what you can control and put your energy into those things.

"Know what you can and can't control."

² Interview quotes are shown throughout in italics and are not attributed to protect privacy and any commercially sensitive information.

5.2 Structure

Small agri-businesses appear to lack structure around capital investment decision making.

Interviewees were questioned about the decision-making processes they currently employ. Whilst some individuals and companies had structured decision-making processes, many did not, and it was something they acknowledged they struggled with.

Those that had structures recommended establishing good practices at the outset but emphasised that it is never too late to begin.

“Getting good structures in place from the start...hold regular formal meetings, with advisors, accountant, and banker”

One interviewee had recently joined an industry board and learnt a lot about the structures that organisation had in place, which in turn supported their understanding of what was needed in their business – as often, *“you don’t know, what you don’t know.”* This demonstrates the benefit of keeping open-minded and getting involved in other businesses/organisations.

“Corporates have good structure that farm businesses typically don’t have – joining a board has helped me to understand what we should be doing, and the policies and processes that are required.”

Interviewees also laboured the importance of keeping processes simple and agile so they can be tailored by each user. Simple processes make it easier for people to get involved and stay involved, however, they are often more complicated to develop.

“The easier you want the process to be, the more upfront work is required”

“Keep processes simple so people can engage.”

Finally, agri-business at its heart is a practical industry, and so tools need to be practical with clear demonstratable benefits to support adoption.

“Practical solutions with clear benefit.”

5.3 Risk

Identification and management of risk.

Risk and decision making go hand in hand. All businesses are exposed to risk and there are many decisions that need to be made on an operational and strategic level to be proactive towards risk.

“Recognise risk, take a proactive approach – put plan and policies in place”

Sometimes, particularly with the regulatory changes that are occurring, external help is required. Interviewees recommended using experts where you do not have knowledge or capacity. This will expedite the change required and manage the risk exposure.

“Find a good consultant in an identified area of risk, understand what you need to know, how it impacts your business, and get on with it”

Additionally, with the changes to regulations and societal pressures, interviewees felt businesses need to get ahead of these in their decision making, particularly on new projects.

“Integrate environmental, social and governance (ESG) at the outset of a project”

To emphasise importance of understanding and managing risk is to a business’s success, one interviewee stated:

“Understand what the two – three biggest risks that affect profit are – if you don’t know this, you’ll go out of business”

All decision-making processes must consider the risks of the investment and how this alters the risk profile of the whole business.

6 Findings and Discussion

The literature review and interviews constructed a rich data corpus that provided insight into the theory of decision making and how capital investment decision-making is currently approached in small agri-businesses around New Zealand. Critical analysis and evaluation of the data using thematic analysis has identified two themes that influence these decisions:

- The decision maker
- Decision framework

The findings confirmed that there is significant opportunity to support small agri-businesses through an evidence-based approach that considers the environmental, social, cultural, and economic domains, among others.

6.1 The Decision Maker

The decision maker embodies the person(s) responsible and accountable for making a decision. Whilst it might seem obvious that the decision maker plays an important role, there are several components of the decision makers’ skill set and mindset that tip the scales in favour of better decision making.

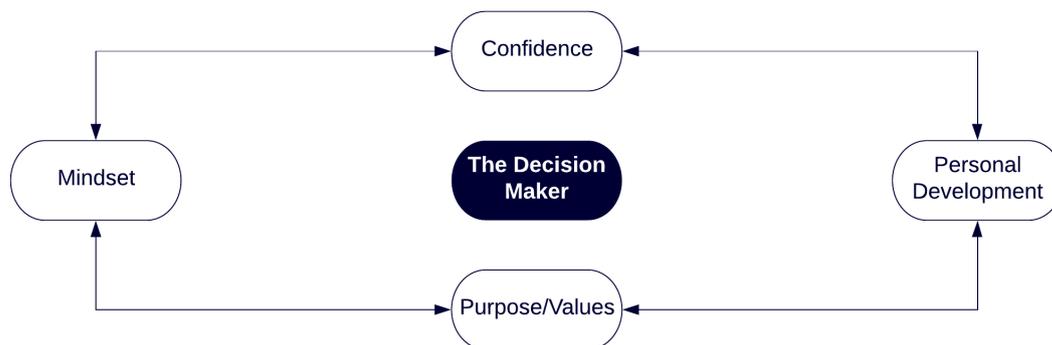


Figure 5. Thematic map of theme 1: The Decision Maker.

6.1.1 Purpose and Values

“(You) have to know why you’re doing it and where you’re going ... (you have) got to have some personal side as running business impacts relationships outside of work. How does it (the business) fit in your personal plan?”

Defining a purpose or vision for your business, often termed your why, is critically important for:

- Alignment of decisions, to ensure movement is in the right direction.
- Articulating to clients, employees, service providers, partners, and stakeholders why you’re in business and what you are working to achieve.
- Continued motivation when business gets tough and requires sacrifices.

When making decisions, checking alignment to your purpose and values avoids mismatched choices that steer the business in unintended directions.

6.1.2 Confidence

Confidence and the closely associated ambition both impact the decision makers’ ability to comprehend risk, bias, and heuristics, and ultimately affects the ability to make a logical decision.

The literature clearly states that the market disproportionately rewards companies that stand out from the crowd, but interviewees commented that many companies are not ambitious enough, particularly around building equity in the business (Sheppard, Sarrazin, Kouyoumjian, & Dore, 2018).

In addition, the research showed that decision makers with either low or high confidence had lower appreciation of risk. These factors result in a “play it safe” mindset which ultimately reduces the agri-business leaders’ ability to make the transformational decisions required to overcome the headwinds the industry is facing today.

“People often play not to lose rather than to win.”

To overcome these hurdles, the literature and interviewees discussed the importance of having a plan. One that aligns to your purpose and values, and states where you want to go over the next five years.

“Have a plan and deliver against it, beat the plan – gives you credit to do anything”

Having a plan and achieving it builds confidence, not only in oneself, but also the confidence of stakeholders, such as banks and regulators. This in turn increases ambition, meaning agri-business leaders have the self-belief to take on challenges and begin to see change as opportunity.

A strategic plan can support agri-businesses to build ambition and confidence. To do this the plan must support business leaders to:

- **Take action** in the right direction each year to realise the compounding effect of success.
- **Prepare for opportunities.** For example, having the foresight (through understanding) that the neighbours’ property may come up for sale then setting out to prepare your business by building equity, increasing cash flows etc., so you are ready to put an offer in when the property does become available.
- **Identify risk.** Identify and mitigate risk to the business.
- **Measure results** year on year against the plan and report it to shareholders/investors.
- **Build credibility** with investors, including the bank, that you deliver against what you say you will. The same can be said about building credibility with regulating bodies.

Finally, development and execution of a strategic plan requires work on the business, not just working in the business. Working on the business looks like strategic planning, investigating new systems, personal development. It is important as this is what drives the business forward, faster.

6.1.3 Mindset

“Self-awareness, reflection, intentional action.”

A decision makers self-awareness is critical in the decision-making process. Self-awareness ensures everyone understands their own biases and tendency to desire one solution over another. The leaders voice can overshadow others around the table, which can undermine the process and diminish the benefits of collaboration. However, their lived experience is also critical evidence to support the solution as well. Self-awareness helps to balance these two competing factors.

Reflection improves the ability to make decisions by:

- Understanding what triggers your bias,
- Remaining open minded to different perspectives and ideas, and
- Building understanding to be open to change and able to pivot quickly.

In addition, undertaking a rigorous objective review of the decision post-mortem captures the good, the bad and looks for improvements. A review can be kept simple and completed within the project team by simply asking:

- What happened? – A simple chronological, factual account of what occurred.
- What was good? – What was successful?

- What was bad? – Without judgement, what was not successful?
- What needs to be improved? – Where can things be done differently, next time.

Finally, self-awareness and reflection are nothing without taking intentional action, to change behaviour or implement learnings.

6.1.4 Personal Development

“Not just harder, work smarter”

Embarking on a growth pathway where one commits to learning about themselves, others and building an understanding of their operating environment develops the key skills and attitudes that have been discussed in this report, including leadership and self-awareness.

It also builds cognitive resilience: the ability to recognise, adapt to and absorb variants, changes, disturbances and surprises (Ministry of Defence, 2016). Cognitive resilience is essential to be able to make decisions in complex environments. It is a fundamental skill not only in today’s society but in agriculture due to the isolation, impact of climatic events and the ongoing challenges of business.

In addition to growing at work, business leaders need to understand how to look after themselves, what else in their life is important and allocate time for these activities as well. For time away from the business is equally important to reduce stress, create distance, and give meaning to life.

6.2 Decision Framework

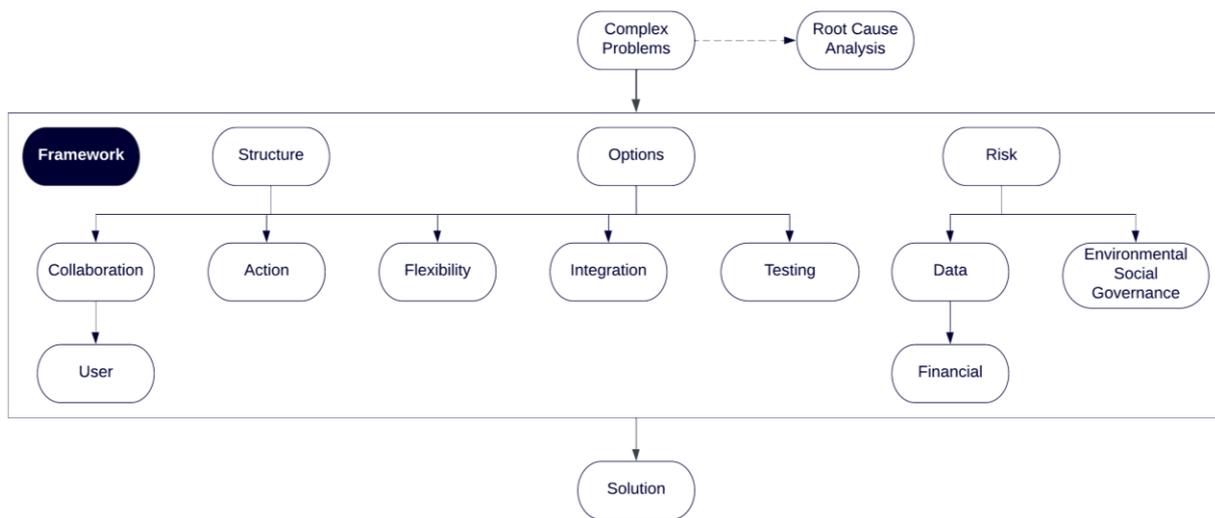


Figure 6. Thematic map of theme 2: Decision Framework.

6.2.1 Root Cause Analysis

Root cause analysis is a process to identify what the problem is, why it is an issue, and, if appropriate, how it is occurring and who is impacted (Root Cause Analysis, 2004). The key benefit of root cause analysis is ensuring that the issue itself is being solved, rather than only managing symptoms. This avoids unintended consequences and rework, increasing the likelihood of developing an enduring solution (Ministry of Defence, 2016) (De Smet, Lackey, & Weiss, 2017).

Issues can almost always be reduced to three to four clear, fundamental problems. Interviewees commented that this was helpful and supported clear decision-making process. Likewise, Sull and Sull (2018) have observed through their research that if decision makers forgo this step, there may appear to be too many priorities, diluting the message.

6.2.2 Structure

Using a structure or process has been shown to improve decision making through providing an outline on how to think, rather than telling decision makers what to think (Sull & Sull, 2018). It has been found that process matters more than analysis, by a factor of six, to producing good decisions that increase revenue, profit and market share (Health & Health, 2013). The findings showed that often process leads to better analysis through isolating faulty logic. However, the reverse is not true; “superb analysis is useless unless the decision process gives it a fair hearing” (Health & Health, 2013).

When considering a structure for decision making, it’s like taking a list to the supermarket (Health & Health, 2013). It should provide guidance and support for the formation of patterns and mental models leading to better thinking and it doesn’t have to be followed 100% to obtain the benefits of using it (Ministry of Defence, 2016) (Health & Health, 2013).

Based on the array of literature reviewed and interviews with industry leaders, the following key ideas are proposed as important elements of a decision-making process:

- **Collaborate** – involve others in the process who think differently to you and bring a different perspective to the conversation.
- **Clarity and simplicity** – develop a small set of priorities that everyone can get behind.
- **Action focused** – once a decision has been made, execute with all available resources.
- **Be flexible** - adapt as circumstances change: first develop a plan including contingences, but don’t get wedded to the plan. Throughout implementation be flexible and adaptive enough to seize opportunities that are aligned with plan and organisation goals/purpose.
- **Suspend judgement** – allow the process to determine the answer; consciously stop the decision maker racing to a solution
- **Disinvest fast on failed initiatives** – failed projects often attract large amounts of time and effort to “fix” them, when it may be better for the business to disinvest and redirect resources elsewhere.

Above all, interviewees stated that whilst adopting a decision-making structure/process was helpful, it needed to be practical, flexible, and kept simple to support engagement with stakeholders.

Implementation

Different types of decisions require different approaches and the effects of best practice are cumulative (Aminov, De Smet, Jost, & Mendelsohn, 2019). As one interviewee said:

“Evolutionary change leads to the biggest success, revolutions don’t often work”

This appears to conflict with the literature on systems engineering and evidence-based management. However, leaders can define the end solution through a transparent decision-making process, then how that is implemented does not have to be revolutionary, all at once, for transformational change to occur. For example, significant capital investment is required to protect coast lines globally from sea level rise. Many of these coastal protection programmes around the world are using the Dynamic Adaptive Pathways Planning approach to plan the required investment. The approach is used to define decision triggers based on socially acceptable risk which enables decision makers to move towards sustainable, climate-resilient solutions, preventing decision paralysis (Haasnoot, Warren, & Kwakkwi, 2019). To apply this to agri-business it might look like defining annual step changes or changes to be implemented when certain targets are achieved. This type of evolutionary change can be very powerful to achieving enduring transformational changes.

6.2.3 Options

Investigating two alternatives rather than just one improves likelihood of success by six times (Health & Health, 2013). Widening the set of options under consideration improves the discussion and debate increasing the probability of strategic decision making occurring. In addition to evaluating alternatives, decision makers need to explore assumptions, recognise uncertainty, prepare to be wrong and ensure a range of outcomes are tested, including the worst-case scenario. This adds to the robustness of the final decision.

Collaboration

Workshopping options provides an opportunity to build a collaborative culture within a project team, as all options are simply recorded as another alternative and judgement is withheld throughout the process. Furthermore, laying out all options can increase creativity and prompt more options.

Collaboration is also important when evaluating alternatives to increase the quality of discussion and debate. There are several ways to support a group to do this, including to appoint a devil's advocate to test the strength of the opposing argument (Aminov, De Smet, Jost, & Mendelsohn, 2019), or to utilise de Bono's six thinking hats (de Bono, n.d.) to ensure all sides of an argument are investigated³.

Integration

The industry experts interviewed were keen to ensure evaluation of alternatives tested the balance between financial return and other increasingly more important factors such as environmental and social impact and kaitiakitanga – will this option be viable (financially, social licence, environmentally) in 50 years' time, if not, should we be doing it now?

Evidence should be gathered and used in the analysis to evaluate how options impact these factors, and ultimately define an integrated solution that creates win-win outcomes.

Testing

Design led thinking promotes the idea of prototype testing. This de-risks the investment through proof of concept, testing assumptions and bias, checking decision makers haven't inadvertently jumped to a solution, and provides awareness of different perspectives all enabling continual improvement.

Whilst not all investments can be tested physically, there are many testing options available including, modelling/simulation and engagement with users, community, and stakeholders.

Finally, through the incorporation a feedback loop into the implemented solution a system can self-regulate and enabling ongoing continual improvement.

6.2.4 Risk

Risk is one of the key factors that impacts a business and was top of mind to interviewees when making decisions. Enabling a pragmatic approach to managing risk through decision making was important to interviewees, as this enabled a proactive, action-oriented way to move forward. Again, tools like de Bono's thinking hats or devil's advocate could be used to identify risk. Additionally, informing risk and assumptions through prototype testing can reduce the overall risk and identify methods for mitigation.

Furthermore, accounting for and incorporating environmental, social and governance risks into the foundation of an investment is no longer optional. These must be integrated into the solution, ensuring positive social and environmental outcomes and that an organisation has the governance, i.e., skills, available technology, diversity of thought, to implement any change.

7 Case Studies

The findings of this research demonstrate the importance of processes and tools to support robust decision making. Whilst there are many tools available to support strategic investment management across a vast array of industries; it is proposed based on the literature review, interviews and analysis presented herein that a specific tool for small agri-business would support and improve their capital decision making.

An early prototype tool was developed to test this theory with real world case studies in the primary sector and inform if further tool development and research is worthwhile. The prototype tool was based on multi

³ de Bono proposed six thinking hats, figuratively worn, to provide a means for groups to plan thinking processes in a detailed and cohesive manner. Essentially ensuring all sides of an issue are looked at. The six hats are: blue-process, white-facts, red-feelings, green-creativity, yellow-benefits, black-cautions (de Bono, n.d.).

criteria analysis and relied on evidence for evaluation of options. The tool framework, as shown in Figure 7, asked decision makers to identify at least three options and evaluate them against the following criteria:

- Business purpose and principles
- Project objectives
- Environmental outcomes
- Social outcomes
- Economic assessment
- Governance
- Compliance

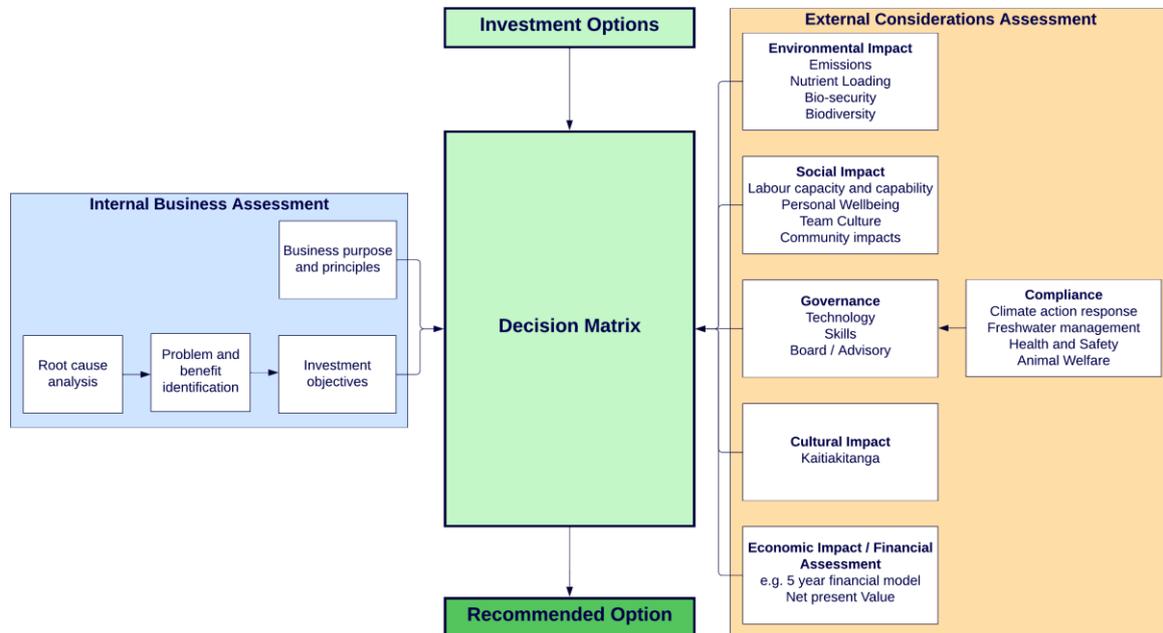


Figure 7. Framework of agri-business decision-making tool prototype.

The tool was tested against two capital investment projects:

- Construction of a new woolshed and covered yard
- Purchase of a seed processing business

Results

Whilst the tool was still in the conceptual stage, testing proved the hypothesis and aligned with the findings presented in this report; a structured tool improved capital decision making in small agri-business.

Participants were facilitated through the decision-making process using the prototype tool. This was undertaken virtually via Zoom which enabled face-to-face conversation and screen sharing.

Both case study participants came to the process with a pre-conceived solution, however, they were open minded through the testing process. Three to five options were developed for both investments which ranged in ambition and were analysed against the assessment criteria.

The root cause analysis improved both participants understanding of the actual problems they were looking to solve which in turn improved understanding of the investment objectives and benefits sought.

The consideration of each evaluation criteria asked decision makers to question how this investment would not only solve the problems being experienced but how it would fit into the wider business model, align to the business’s purpose, and support the business’s response to the industry wide challenges. Through this process risks and benefits were identified that would have been otherwise missed.

Ultimately, even though the tool was only an early prototype, following a structured decision-making process that was evidence-based improved the investment outcomes for the two small agri-businesses involved in the case studies.

Tool Improvements

The additional benefit of the case studies was obtaining feedback on the prototype tool. The early testing provided useful feedback, which is listed below. The feedback has resulted in further improvement and another iteration of the tool.

- The economic assessment needs to be reviewed on a project-by-project basis. Many investments are better analysed over a multiyear period, for example five years, to understand how the capital expense pays off and revenue is generated. This is also useful to evaluate how a capital intensive option weighs against an option that has higher operational expenses.
- The tool needs to support decision makers to be ambitious with their ideas. During testing the preconceived ideas were found to be the safe, tried and tested solutions that solved problems in the here and now rather than future-facing ideas that would serve the organisation over the next 50 years or more.
- Testing also informed how different tool delivery techniques could alter the process. The tests were all completed in a truncated, virtual format. It would be more suitable to conduct the option assessment over a half day workshop in person with a decision-making team to fully flesh out the options and assess the benefits, risks and costs appropriately.

7.1 Tool Implementation

A small agri-business can follow the below steps to implement a structured decision-making process:

What

- Complete a robust root cause analysis to understand the issues being experienced.
- Identify measurable objectives the investment is aiming to achieve. If these are achieved, the issues should be neutralised/solved.
- Develop three-five options that range in ambition. The status quo, or do nothing, should always be considered as a benchmark option.
- Use a decision-making matrix to evaluate the options against evaluation criteria. This will vary from project to project but could broadly include environmental, social, cultural, economic, compliance, and governance risks and business needs.
- Relevant evidence, both qualitative and quantitative, will be required to complete the evaluation. This may include but is not limited to financial models, environmental effects assessment, cultural and social impact assessments, water quality modelling, farm system modelling.
- Complete the evaluation to determine the optimised system. The result may not be the most financially profitable option as the decision matrix optimises across all criteria.

Who

- Bring together an advisory board or project team that is multi-skilled. The group could include business owners, key staff, independent advisors, banker/investors, accountant, lawyer and an independent member. The independent member would be expected to challenge the groups thinking and bring outside the box ideas to the table.

How

- Option development and evaluation is best completed face-to-face aided by an independent facilitator. However, as the process can evolve over time, depending on the available evidence, it may be appropriate for some touch points to be completed virtually.
- Document the decision(s) in a strategic plan that details implementation in an evolutionary manner and creates accountability for action, prepares for opportunities, understands risk, measures results, and builds credibility with stakeholders.

8 Conclusion

The purpose of this research was to provide specific support for agri-business decision makers, given the significant challenges New Zealand's primary sector is facing. The report demonstrates how an evidence-based approach to decision making can provide value to and improve the investment outcomes for small agri-businesses in New Zealand.

Therefore, proving the hypothesis that the current operating environment is increasingly more complex and requires multi-factorial decision making to optimise investment.

8.1 Key Findings

- There is significant opportunity to support agri-businesses through a decision-making approach that uses evidence to consider the environmental, social, cultural, and economic impacts of their actions.

Decision Maker

- Whilst maintaining an understanding of the current operating environment can be challenging (for decision makers), it allows business leaders to be agile and take advantage of opportunity early. The key is in knowing what topics you must be informed of, then focusing efforts on those domains.
- Decisions must be aligned to an organisation's purpose, else there is potential for mismatched decision making, detracting from the business's momentum, diluting leader and team focus, and ultimately, diminishing the purpose the business is working to achieve.
- Decision makers need to be more ambitious. The interviews found that many organisations were simply '*playing not to lose, rather than to win.*' The case studies revealed that this could lead to the continual investment in tried and tested solutions.

Decision Framework

- Robust analysis of the problem ensures the issue itself is being solved, rather than only managing symptoms. This avoids unintended consequences and rework, increasing the likelihood of developing an enduring solution.
- Decision-making process matters six times more than analysis to producing impactful decisions (Health & Health, 2013). However, process should be flexible, allowing for the idiosyncrasies of individual agri-businesses, and is improved through collaboration.
- In addition, the inclusion of testing into the decision-making process reduces risk through proof of concept, testing assumptions and bias, checking decision makers haven't inadvertently jumped to a solution, and provides awareness of different perspectives to enable continual improvement.
- Analysis of two options rather than just one also improves likelihood of success by a factor of six (Health & Health, 2013). Widening the set of options evaluated improves discussion and debate, increasing the probability of strategic decision making occurring.

Implementation

- Evolutionary implementation, the compounding effects of numerous small changes, has a higher probability of creating successful, enduring change.
- Development of a strategic plan to support implementation of the investment across the business can support accountability for action, prepare for opportunity, understand risk, measure results, and build credibility with stakeholders.

9 Recommendations

As a result of the findings and discussion presented in this report, the following recommendations are made to the leaders of small agri-businesses:

- Develop and maintain an understanding of the operating environment in which the reader is acting.
- Align all decisions with the business's purpose and principles/values.
- Engage a multi-skilled advisory board to collaborate on and support decision making. This board may include professional advisors, accountant, banker, lawyer, and an independent member.
- Utilise structured processes and evidence to support decision making.
- Prepare a strategic plan to create accountability for action, prepare for opportunity, understand risk, measure results, and build credibility with stakeholders.

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Appendix A. Interview Questions

Organisations

1. Can you please tell me about your organisation, the work you do and your governance and leadership structure?
2. How are decisions made in your organisation - with a leadership team/group or is it something that you do alone?
3. What defines a problem that is elevated to the decision-making group? i.e., above day-to-day
 - a. Operational
 - b. Strategic
 - c. What defines a challenging decision in your organisation?
4. Do you have a specific methodology or tool you utilise for guiding you through a decision-making process?
 - a. How would you describe this?
 - b. If so, how do you apply this?
5. How do you integrate all relevant components into your decision making? e.g., climate change, carbon zero, freshwater management, inflation, health and safety
 - a. Do you have a tool for this?
 - b. If no, would you use a matrix like this?
6. Can you please talk me through an example of a time when you made a large decision in business, that now in hindsight feels like a fork in the road?

Leaders

1. Can you tell me about your background, your journey to where you are today, and the leadership positions you hold?
2. Are you aware of biases in your decisions?
 - a. And those who sit around the table with you?
 - b. How do you mitigate your own biases?
 - c. How do you ensure they are accounted for when making decisions?
3. Do you have a specific methodology or tool you utilise for guiding you through a decision-making process?
 - a. How would you describe this?
 - b. If so, how do you apply this?
4. How do you integrate all relevant components into your decision making? e.g., climate change, carbon zero, freshwater management, inflation, health and safety
 - a. Do you have a tool for this?
 - b. If no, would you use a matrix like this?
5. What have been your biggest learnings been when it comes to decision making in leadership?