Complexity in the agricultural information exchange interface: implications for strategic farm management and the sustainability of mixed-farming systems

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LIST OF ACRONYMS

The following abbreviations have been used throughout this thesis.

ABARE — Australian Bureau of Agricultural and Resource Economics
ABS — Australian Bureau of Statistics
AKIS — Agricultural Knowledge Innovation Systems
AKS — Agricultural Knowledge Systems
APEN — Australasia-Pacific Extension Network
CMAs — Catchment Management Authorities
CRC — Cooperative Research Centre
CSU — Charles Sturt University
DAFF — Department of Agriculture, Fisheries and Forestry
DAFWA — Department of Agriculture and Food Western Australia
DSS — Decision Support System
FSR — Farming Systems Research
GRDC — Grains Research and Development Corporation
LLS — Local Land Services
NCDEA — National Centre for Dairy Education Australia
NRM — Natural Resource Management
NSW DPI — New South Wales Department of Primary Industries
OECD — Organisation for Economic Cooperation and Development
PAM — Participatory Action Model
PAR — Participatory Action Research
RD&E — Research, Development and Extension
R&D — Research and Development
RDCs — Research and Development Corporations
RFCS — Rural Financial Counselling Service
RIRDC — Rural Industries Research and Development Corporation
RRA — Rapid Rural Appraisal
SME — Small to Medium Sized Enterprise

ToT — Transfer of Technology
CERTIFICATE OF AUTHORSHIP

I, Lauren A Howard

Hereby declare that this submission is my own work and that, to the best of my knowledge and belief, it contains no material previously published or written by another person nor material which to a substantial extent has been accepted for the award of any other degree or diploma at Charles Sturt University or any other educational institution, except where due acknowledgment is made in the thesis. Any contribution made to the research by colleagues with whom I have worked at Charles Sturt University or elsewhere during my candidature is fully acknowledged.

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________________________________________  ______________________________
Signature                                      Date
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ABSTRACT

Decision-making is at the core of managing any mixed-farming system. Strategic decisions are important because they provide the overall, long-term direction for the business and consequently, have a major influence on a mixed-farming system's sustainability.

Australian family-operated, mixed-farming systems are complex. Due to the complexity, farmers seek information, knowledge and advice to assist them with their decision-making. Traditionally, the major providers of information were state departments of agriculture. However, during the 1980s, the public sector began to withdraw from agricultural extension and changed the nature of the services it provided. This change has created a complex information exchange interface with a diversity of service providers and institutional arrangements.

The information exchange interface exists to support farmers in their decision-making. However, there appears to be limited understanding of its influence on farmer decision-making in general, and even less so on strategic decision-making. Accordingly, the focus and contribution of this thesis is to explore and provide insight into this influence. The research questions answered in this thesis are 1. ‘To what extent are strategic decisions made by farmers supported by the information exchange interface?’ 2. ‘To what extent do farmers and advises prioritise strategic decision-making?’ and 3. ‘What are the implications for agricultural sustainability?’ Strategic decision-making in mixed-farming systems, as indicated in the literature, is complex. This thesis reveals that contemporary changes within the information exchange interface have increased the complexity of strategic decision-making, to the extent that support for strategic decision-making is fragmented and limited.

Given the nature of this research, a mixed methods approach was considered most appropriate. A web survey, interactive group exercise and semi-structured interviews were designed to collect data to answer the research questions. The web survey data were analysed statistically whereas the interactive group exercise and semi-structured interview data were qualitative in nature and therefore analysed thematically.

This thesis has taken a broad theoretical perspective and brought together the available theories (innovation diffusion theory, adoption theory, participatory approaches, decision models and innovation systems theory) in the context of the decision-making interface. This thesis highlights
the inadequacies of existing theories to explain the highly personal and highly diverse nature of the information exchange interface. The theoretical implications are discussed, and this thesis reveals that an absence of support for strategic decision-making within the information exchange interface limits the capacity of farmers to strategically manage their mixed-farming systems and consequently, their ability to be adaptable to change. As the literature revealed, strategic management and adaptive capacity are important for the sustainability of mixed-farming systems.

This thesis also reveals there is considerable ambiguity surrounding the definition of strategic management and a strategic decision. Interpretations of strategic vary according to location and the individual, suggesting that strategic views can be somewhat personal. At a practical level, most advisers service the operational-tactical realm, rather than strategic decision-making, for several reasons.

Firstly, most advisers are from technical agricultural production backgrounds and are not skilled in strategic management. They are comfortable with providing operational-tactical advice. Secondly, the nature of private sector business models encourages advisers to service the operational-tactical realm due to the short-term profit opportunities. In addition, the information exchange interface is reactive rather than proactive. Further, there are opportunities for the sectors and service providers to work more collaboratively. Thirdly, there appears to be less demand for strategic management support from farmers, despite awareness of the importance of ‘long-term’ farm planning and management.

Strategic management is multi-disciplinary in that it considers every aspect of the business. Additionally, decision-making is an individualised and personal process. Consequently, the current extension paradigm is limited in its capacity to adequately explain strategic decision-making. It is also limited in its ability to capture the complexity of competing interests within contemporary, mixed-farming systems.

The interface is fragmented, and farmers could benefit from the various service providers working more synergistically. A focus on mutual interaction amongst the service providers, investigating methods they can collaborate and complement each other, could be beneficial.

This thesis has revealed that the private sector has limited opportunities to contribute to R&D
decision-making and changes to current institutional, funding and professional arrangements could improve the effectiveness of the interface.
CHAPTER ONE: INTRODUCTION TO THE STUDY

Live as though you will die tomorrow but farm as though you will live forever! (Farmer)

1.1. INTRODUCTION

Farming systems have always been under pressure to adapt and improve in response to both external and internal change (McGuckian & Rickards, 2011). Australian farmers operate in a complex and constantly changing environment, subject to pressures from weather, markets, social change and environmental conditions (Long & Cooper, 2011). In mixed-farming systems, much decision-making is complex, since there are many considerations which constantly change. Many of the factors involved are unknown or difficult to measure, or their relationship with other factors is not well understood (McGuckian & Rickards, 2011).

Extension was originally conceived as a service to ‘extend’ research-based knowledge to the rural sector to improve the lives of farmers (Rivera, 2011). Transfer of Technology (ToT) is the traditional model of extension and assumes a linear communication process from researchers to farmers via extension (van den Ban & Hawkins, 1996). Failures and criticisms of traditional extension (namely, its inapplicability to developing countries and sustainable agriculture) led to the formulation of alternative models collectively known as participatory ‘bottom-up’ approaches (Marsh, 1996).

In the developed world, at least, industrial agricultural systems have dominated since post-World War II. Known as productivist agriculture, these systems have been strongly associated with the development of environmental, social and economic problems (Robinson, 2008). Certainly, by the early 1980s, critics began to claim that productivist agriculture was unsustainable (Ward, 1993; Wilson, 2001). Also during this time (and since), agricultural extension services in Australia underwent rapid and dramatic change (Hunt, Birch, Coutts, & Vanclay, 2012). The public sector changed the focus of its extension services from agricultural production to environmental conservation, and withdrew from areas perceived to be adequately supplied, or having the potential to be adequately supplied by the private sector (Marsh & Pannell, 1998).
There is an increasingly complex mix of industry, private and public advisory and extension services operating in Australia (Bowyer & Shanks, 2007). There are also various projects and programs operating in the ‘information exchange interface’ which, for the purpose of this thesis, is defined as the collective of all the providers of knowledge, information and advice to farmers, in one form or another, to assist them with their decision-making. There are various funding combinations between the sectors, with formalised partnerships between private and public sector organisations and quasi-public sector organisations becoming more common (Umali-Deininger, 1997). The reforms to the public sector have resulted in the private sector delivering more extension services, including institutional arrangements where the public sector provides the funding (Marsh, 1998). With the private sector continuing to expand the services it provides, and as a result of these developments, there is now a multitude of service providers involved in the information exchange interface (Hunt et. al, 2012).

The information exchange interface exists to support farmers in their decision-making (Klerkx & Jansen, 2010) to improve the management of their businesses (Hofstrand, 2007). There is a myriad of influences on farmer decision-making which make it complex (Long & Copper, 2011), a complexity that is exacerbated in the context of family-operated, mixed-farming systems (McGuckian & Rickards, 2011); hence the capacity of farmers to strategically manage their mixed-farming systems so they are adaptable to change is very important (Hofstrand, 2007).

Strategic decisions are concerned with the overall vision for the business and provide a framework for the future (Lampel, 2015). In a mixed-farming context, they are multi-disciplinary in that a strategic decision often impacts on multiple enterprises at the same time, with various consequences (McGuckian & Rickards, 2011). Strategic decisions are the most fundamental and often the most difficult decisions undertaken by a business (Gilligan, Neale & Murray, 1983). Their significance stems from the fact that they provide the overall, long-term direction for a business and are consequently a major factor in determining a mixed-farming system’s sustainability (Lampel, 2015).

1.2. THESIS CONTRIBUTION: FORMULATION OF THE RESEARCH QUESTION

The literature has established that, for the sustainability of mixed-farming systems, farmers must strategically manage their businesses and be adaptable to change. However, the majority of research to date surrounding farmer decision-making has concentrated on operational and
tactical decisions (see Section 4.5) without due consideration being given to strategic decision-making.

While the information exchange interface exists to support farmers in their decision-making (Klerkx & Jansen, 2010), minimal literature has been written on its complexity. There also appears to be limited understanding of the relationship between the information exchange interface and farmer decision-making generally (see Section Error! Reference source not found.), and even less so on strategic decision-making. There is certainly not any literature on the influence of complexity of the information exchange interface on strategic decision-making within mixed-farming systems.

Accordingly, the focus and contribution of this thesis is to explore the complexity of the information exchange interface and its relationship with strategic decision-making for the sustainability of mixed-farming systems.

In establishing this research aim as a framework for the contribution of this thesis, three research questions were identified and investigated in this research:

1. To what extent are strategic decisions made by farmers supported by the information exchange interface?

2. To what extent do farmers and advisers prioritise strategic decision-making?

3. What are the implications for agricultural sustainability?

1.3. THESIS STRUCTURE

This is a multi-disciplinary thesis in that it combines theoretical and disciplinary interests in agricultural extension, sustainable agriculture and farmer decision-making (Spiller et al., 2015). Each disciplinary interest is a specialisation in its own right; however, typical of the literature surrounding agricultural extension, it is unlikely that sufficient understanding of the research topic can be established without venturing marginally at least into the literature for each.
Whilst it is the purpose of this chapter to introduce the topic as well as the research questions, Chapters Two, Three and Four explore the literature surrounding each research topic. The research context and approach are then presented in Chapter Five and the findings of the research study are presented in Chapters Six and Seven. The findings are then discussed in Chapter Eight. Finally, conclusions are drawn in Chapter Nine.

In particular, Chapter Two explores the research discipline of agricultural extension. Whilst ‘agricultural extension’ is an ambiguous term with no agreed universal definition, nonetheless, the two most dominant models of agricultural extension have been traditional ‘top-down’ extension and participatory ‘bottom-up’ extension. Chapter Two explores and critiques the available agricultural extension and adoption theories. The chapter continues by providing a detailed account of the evolution of agricultural extension in Australia and explores the information exchange interface. This chapter provides detail of the extension approaches currently used by extension practitioners and explores each service provider within the information exchange interface and their relationship with one another. It also considers the implications and challenges of increased private sector and industry participation in the information exchange interface.

Chapter Three provides a history of productivist agriculture, leading into the need for a sustainable agriculture. This chapter discusses the notion that, for mixed-farming systems to be sustainable, farmer decision-making needs to ensure agricultural practices are economically viable, meeting human needs for food and fibre and ensuring quality of life whilst also conserving natural resources. Since these objectives can be achieved in a variety of ways, sustainability is unlikely to be linked to any particular management decision. Rather, agricultural sustainability is thought of in terms of its adaptability and flexibility over time to respond to economic, social and environmental changes both internal and external to the mixed-farming system. Chapter Three discusses the adoption of sustainable agricultural practices compared to production related innovations. It also explores farmer capacity to change to sustainable agricultural practices and relates them to strategic decisions. Chapter Three also considers extension for sustainable agriculture and suggests that sustainable agricultural systems should focus on people rather than technologies, and further suggests that successful extension can only work within the constraints of farmers’ goals. Since farmers are unlikely to be equipped to identify environmental problems and implement appropriate management without seeking
external advice and assistance, therefore, successful extension involves a participatory, capacity building model which facilitates change at the farm as well as at institutional levels, rather than a focus on the adoption of standardised technologies.

Continuing on from Chapter Three, **Chapter Four** explores the complexity of farmer decision-making which is exacerbated in the context of family-operated, mixed-farming systems. Farmer decision-making is influenced by a myriad of factors, many of which are presented in this chapter. While it is not the purpose of this thesis to explore how farmers make decisions, providing this knowledge assists in understanding how the information exchange interface can support farmers in their decision-making. The chapter continues by differentiating between the levels of decisions farmers must make and then it focuses on ‘strategic decisions’. This chapter establishes that the capacity of farmers to strategically manage their farm business is very important for their sustainability. Two case studies are presented to illustrate how two mixed-farming businesses applied strategic business improvements to improve their sustainability.

**Chapter Five** explains the methodology and research approaches used to explore the research questions identified from the review of the relevant literature. The findings are overviewed in **Chapter Six** and further analysed in **Chapter Seven**.

**Chapter Eight**, the discussion section, critically examines the evidence gathered from the study and discusses it with reference to the literature. The literature identified that the capacity of farmers to strategically manage their mixed-farming systems and to be adaptable to change is important for their sustainability. Chapter Eight discusses the relationship between the information exchange interface and strategic decision-making in the context of mixed-farming systems.

The thesis assumes that the findings are applicable nationally. The final chapter, **Chapter Nine**, provides conclusions to the thesis and research questions. The chapter also critiques the available and relevant theories in its capacity to adequately explain the complexity of strategic decision-making in contemporary mixed-farming systems. Implications of the research are also presented in this concluding chapter.
CHAPTER TWO: THE EVOLUTION OF AGRICULTURAL EXTENSION IN AUSTRALIA

2.1. INTRODUCTION

The previous chapter introduced the research questions and detailed the contribution and structure of this thesis. Chapter Two has several objectives. Firstly, it seeks to define agricultural extension and provide a historical context of the discipline. The two main approaches to extension are then considered. The chapter continues by outlining the evolution of agricultural extension in Australia and detailing the nature of the information exchange interface.

The traditional approach to extension, the ‘top-down,’ Transfer of Technology (ToT) approach, implies that new information is created by researchers and passed onto farmers via extension officers. This approach is based on Rogers (1962) theory of innovation diffusion which is also critiqued in this chapter. The second approach to extension is the participatory ‘bottom-up’ approach, which involves greater participation by farmers and is more responsive to their needs. Participatory approaches evolved as a result of the inadequacies of traditional extension when it was applied to developing countries and sustainable agriculture. However, participatory approaches are not without their limitations and consequently this chapter also provides a critique of these approaches. The chapter continues by exploring the origins of agricultural extension specific to Australia.

Agricultural extension in Australia began with agricultural show societies which in turn facilitated the development of the state departments of agriculture. Agricultural faculties within Australian universities were then established and since these early origins, agricultural extension services in Australia have undergone dramatic and rapid change. Traditionally, the major providers of publicly funded agricultural extension were the state departments of agriculture, whose extension programs placed a strong emphasis on agricultural production. However, the 1980s saw a change in government priorities, and public funded extension went from being regarded as a helping profession to becoming enmeshed in policy debates over public and private benefit from public and private goods (Fuglie & Toole, 2014). The result was a review of state departments of agriculture and their restructuring which, in turn, affected the nature of the services they were prepared to provide and how they were provided. Ultimately, the public
sector became more focused on group rather than individual extension, and on environmental (typically public) benefits rather than production (typically private) benefits. Furthermore, it withdrew from areas perceived to be adequately supplied, or having the potential to be adequately supplied by the private sector (Barr & Cary, 2000; Cary, 1998; Cary, Webb, & Barr, 2002; Coutts, Roberts, Frost, & Coutts, 2005; Macadam, 1997; Marsh & Pannell, 1997; 1998; Watson, 1996).

As a result of these developments, there is now a diversity of stakeholders involved in extension in its many forms, and a multitude of alternative service providers and institutional arrangements have appeared. Partnerships between the private and public sectors and quasi public sector organisations are now common. The private sector is sometimes now employed to deliver publicly funded programs (World Bank, 2012). Farmer organisations, cooperatives and groups; input supply companies; retail outlets; marketing boards; Research and Development Corporations; Cooperative Research Centres and university departments are some of the many players in the present information exchange interface in Australia (Paschen, Reichelt, King, Ayre, & Nettle, 2017).

Farmer decision-making is influenced by the relationships farmers have with the providers of extension services (Kilpatrick, 2002) within the information exchange interface. For the purpose of this thesis, the information exchange interface is defined as the collective of all the providers of knowledge, information and advice to farmers, to assist them with their decision-making. The information exchange interface has changed considerably in recent decades (Faure et al., 2017). As the world has progressed into the digital age, the rate of change of this interface has increased, yet the methods used by the various service providers to engage with farmers have not changed at the same pace.

This chapter will outline the approaches to extension used by the various service providers within the information exchange interface. Each service provider will be extensively reviewed, and the challenges associated with the information exchange interface will be discussed before the chapter concludes by exploring the institutional relationships which exist between and amongst the contributing sectors.
2.2. DEFINING AGRICULTURAL EXTENSION

There is no universally agreed definition of ‘extension’ and interpretations of the term have changed considerably, each being a product of its time. An extensively cited definition originally developed by van den Ban and Hawkins (1996: p. 9) articulates extension to involve:

...the conscious use of communication of information to help people form sound opinions and make good decisions.

More recently, the Australasia-Pacific Extension Network [APEN] (2009) and the State Extension Leaders Network [SELN] (2006: p. 2) both interpret extension as:

...the process of enabling change in individuals, communities and industries in the primary industry sector and with natural resource management.

APEN (2009) further remarks that extension:

...involves the use of communication and adult education processes to help people and communities identify potential improvements to their practices, and then provides them with the skills and resources to effect these improvements.

Coutts, Roberts, Frost and Coutts (2005) agree, saying that extension is the process of engaging with individuals, groups and communities so that people are more able to deal with issues affecting them and make the most of opportunities when they are presented. Campbell (2005: p. 25) further adds that:

...extension is a non-coercive policy instrument that aims to foster learning to improve decision making, usually towards a specific objective expressed in terms of a desired change in behaviour among a target group, often the adoption of a particular technology or practice.

Extension was originally conceived as a service to ‘extend’ research-based knowledge to the rural sector in order to improve the lives of farmers. Rivera (2011) suggests that extension was focused on increasing production, improving yields, training farmers and transferring technology, although today, extension is a tool which links multiple players (Rivera, 2011) and according to Hunt et al. (2012), it involves interactions between people, including information sharing, dialogue, learning and action.
Agricultural extension has been continuously evolving (SELN, 2006) and there have been a range of extension models in operation over time. The two most dominant models have been described by Jarrett (1985) as the ‘demand-pull’ model where the direction of problem solving or innovation is determined by farmers; and the ‘science-push’ model in which the direction of problem solving and innovation is determined by research scientists. These models of extension are also commonly known as participatory ‘bottom-up’ and traditional ‘top-down’ extension respectively. For many years, top-down (Transfer of Technology) approaches were the dominant form of extension. However, extension has changed significantly and bottom-up processes used today encourage the co-creation of knowledge and the empowerment of stakeholders (SELN, 2006). Figure 1 below illustrates this evolution of extension in Australia. It is important to note that there is a continuum along the axis and there is no point in time where top-down processes were superseded by bottom-up approaches. How agricultural extension has evolved in Australia into its present form is explored later in this chapter.
Figure 1: The evolution of agricultural extension (SELN, 2006)
The purpose of the following sections is to detail the different approaches to extension that have been applied both in the past and the present, illustrating how extension has evolved, with a particular focus on Australia.

2.3. TRADITIONAL ‘TOP-DOWN’ EXTENSION

So-termed traditional extension methods have been used by some researchers and extension officers since the 1950s. Innovation diffusion theory, developed by Rogers (Rogers, 1962, 1983, 1995, 2003; Rogers & Shoemaker, 1971), is credited for shaping much of the thinking and justification for the popularisation of traditional extension methods. This section critiques traditional extension theory (and its fundamental Transfer of Technology approach), innovation diffusion theory as well as adoption theory, and details their application to developing countries and sustainable agriculture.

2.3.1. Transfer of Technology (ToT)

Transfer of Technology (ToT) is the traditional ‘top-down’ model of extension. It assumes a linear communication process (van den Ban & Hawkins, 1996) and implies that scientists determine research priorities and carry out research in controlled conditions, generating new knowledge and technology. The new technology is then translated for extension purposes into technical recommendations, and extension officers pass the recommendations onto ‘leading’ farmers (Figure 2). The new technology eventually diffuses through to the rest of the farming community (Black, 2000; Campbell, 2005; Pannell et al., 2006). The ToT model underpins many agricultural development strategies (Röling, 1988).

![Research ➡️ Extension ➡️ Farmer](image)

**Figure 2:** Linear (traditional) extension model

According to van den Ban and Hawkins (1996), in some circumstances, such as introducing a new plant variety, ToT is a desirable approach. However, consideration needs to be given to the particular context, as ToT is not suited to all situations. A critique of ToT is given later in this section.
2.3.2. **Innovation diffusion theory**

Innovation diffusion theory is a key theory within extension and was developed in the United States. It was first published as a discrete theory in 1958 (Rogers, 1958) but was practised for some time before then. Ryan and Gross’s 1928 study (Ryan & Gross, 1943) of the diffusion of hybrid corn in Iowa is the most influential diffusion study of all time (Rogers, 2003). The study revealed that the adoption process began with a small number of farmers who adopted hybrid corn soon after it was released. From these farmers, the innovation diffused to other farmers. Furthermore, while commercial channels were the most important original sources of knowledge, it was the neighbouring farmers who were the most important influence leading to adoption (Ryan & Gross, 1943).

The Ryan and Gross investigation became the academic template for diffusion research, firstly in agriculture and then in almost all other diffusion research paradigms (Ruttan, 1996). By the 1950s, extension officers were being trained in the application of innovation diffusion theory (Stephenson, 2003). Agricultural extension officers relied heavily on the diffusion model in their programs, particularly the five stage categorisation of the distribution of adopters over time (Ruttan, 1996).

![Figure 3: The classic adoption curve indicating a small number of individuals adopting the innovation early (left tail), followed by the majority of adopters. Those adopting last form the right tail of the curve (Rogers, 2003: p. 281)](image)

2.3.3. **Adoption theory**

Although closely related to innovation theory, adoption theory was an attempt to understand the personal mental stages an individual adopter progresses through in making a decision about whether or not to adopt an innovation (Figure 4). The theory was constructed so that communication strategies could be aligned to fit farmers’ anticipated patterns of mental
readiness to receive the message. For instance, it is pointless to try and interest a farmer to trial a new product if they are not first made aware of it (Dunn, 1997).

![Diagram showing the adoption process (Rogers & Shoemaker, 1971)](image)

**Figure 4:** The adoption process (Rogers & Shoemaker, 1971)

This model theorises that there are five progressive stages within the adoption process: awareness, information, evaluation, trial and finally adoption (Rogers, 1962). However, there is argument about whether this process actually occurs (Vanclay, 1994a) and whether all five stages actually exist (Rogers, 2003). Further, adoption does not always occur according to the predicted distribution. Additionally, awareness and knowledge do not always filter through to all sectors of the farming community as the theory assumes, nor do awareness and knowledge always lead to adoption. In some cases, awareness and knowledge may be held by farmers, but because of other factors affecting the decision-making process, adoption does not occur. A farmer’s decision to not adopt is often a rational one, for good reason, based on the farmer’s common sense and experience (Eastwood, Klerkx, & Nettle, 2017). In addition, the decision to dis-adopt is also often rational, and not a decision considered by the theory (Marra, Pannell, & Abadi Ghadim, 2003).

Farmers use various sources of information to inform their decision-making, including decisions about innovation adoption. In developed countries, farmers often first hear about an innovation
via the mass media. Farmers then like to discuss the innovation with someone whose competence they trust before they decide to adopt the innovation. This person may be an adviser or a fellow farmer (van den Ban & Hawkins, 1996).

Although they are important, adoption decisions are only one aspect of farmer decision-making. There are also many personal, social, cultural and structural factors that may influence decisions (Whittenbury & Davidson, 2009) (explored further in Section 4.3). Whittenbury and Davidson (2009) and van de van de Fliert (2003) argue that research surrounding farmer decision-making needs to focus more on the perspectives of the farmers themselves because sustainable agricultural systems focus on people rather than on technologies.

### 2.3.4. Criticisms and consequences of innovation diffusion theory

Innovation diffusion theory has both its supporters and its critics (Goss, 1979; Stephenson, 2003). Rogers (1962, 1983, 1995, 2003) popularised the theory and has summarised the results of many adoption and diffusion studies conducted in the 1950s, 60s and 70s (Cary, Barr, Aslin, Webb, & Kelson, 2001). However, Rogers began to acknowledge criticisms of the theory in the 1983 edition of his book, *Diffusion of Innovations* in which he notes that a weakness of the theory was the absence of criticism in its early development.

The focus of extension research has changed over the decades since Rogers’ initial work. Historically, researchers investigated how extension officers and change agents could improve the dissemination of innovations so that as many farmers as possible were made aware of the innovation and subsequently changed their practice. Once adoption theory was understood, extension research focused on the adopter and the unit of adoption, rather than the innovation being adopted. In the early 1900s, distance, social isolation and a limited number of useful technologies were the main challenges faced by extension officers. After WWII, extension officers had a relatively straight-forward task. Innovations such as hybrid corn and the 2,4-D chemical were easily trialled and demonstrated, and affordability and competing messages and products were not a problem. Innovations had clear benefits and farmer networks were easily accessed (Dunn, 1997).

However, as time progressed, some aspects of the theory remained viable but others were problematic. Viable aspects of the theory related to the characteristics of innovations, the stages
of the adoption process, and the effect of the interaction of farmers on adoption (Stephenson, 2003). The flaws in the theory are discussed below.

2.3.4.1. Application in developing countries

The application of innovation diffusion theory in developing countries identified further inadequacies of the theory. Prior to the early 1960s, most diffusion research was conducted within the United States and Western Europe (Ruttan, 1996). In the early 1960s however, the model began to be applied further afield, mainly in Europe and Australia, and the findings of this research generally supported the original US findings (Fliegel & Van Es, 1983). The model was then applied to developing countries in an attempt to prevent famine (Rogers, 2003; van den Ban & Hawkins, 1996), where it was found to be inappropriate and to have undesirable consequences (Fliegel & Van Es, 1983; Goss, 1979; Rogers, 2003; Ruttan, 1996).

The application of the diffusion model in developing countries made it apparent that resource inequality amongst farmers needed to be given more consideration (Fliegel & Van Es, 1983). In developing countries, agricultural producers often had limited access to capital and credit. This notion was taken for granted in earlier studies (Fliegel & Van Es, 1983; Goss, 1979; Stephenson, 2003). In time it became evident that such factors as access to land, markets, and legal protection were the major constraints in the adoption of innovations in developing countries (Fliegel & Van Es, 1983).

Another controversial area of the theory has been its bias towards larger, more ‘successful’ and ‘innovative’ farmers (Campbell, 2005; Chambers & Jiggins, 1987; Stephenson, 2003). Roling, Ashcroft and Chege (1976) and Roling (1988) argue that the application of innovation diffusion theory reinforced existing social inequalities within the farming population. This argument has been reinforced by Vanclay (1994a, 1994b), Black (2000), Rogers (2003) and Stephenson (2003). Rogers (2003) argues that the underpinning notion of the theory is that extension officers need only work with ‘the top’ farmers who are easy to ‘convince’ and the remaining farmer population will follow. More progressive farmers are eager for new ideas, they have the economic means to adopt, and they can also more easily obtain credit if necessary. Further, due to the larger size of their farms, the direct effect of their adoption on total agricultural production is also greater. Consequently, the farmers who need the most support receive little benefit (Goss, 1979).
Tichenor, Donohue, and Olien (1970) found support for the knowledge gap hypothesis in their study of the influence of mass media. Goss (1979) reiterates, stating that as mass media information increases, farmers with a higher socioeconomic status receive the information at a faster rate than the lower status members. Consequently, the knowledge gap between the two groups increases.

Tully (1966) was an early critic, identifying the theory’s insensitivity to local social and cultural factors. The theory assumes communication itself can generate development, regardless of socioeconomic and political conditions (Tully, 1966). Vanclay (1994a, 1994b, 2004) argues that traditional extension ignores the appropriateness of the technology to the farmer’s own situation. It also ignores the social, political, cultural and historical context of agriculture and adoption behaviour. Another assumption of innovation diffusion theory was that increased production and consumption of goods and services constitute the essence of development, and that a fair distribution of income and opportunities will occur. Further, the theory assumes that the key to increased productivity is technological innovation (Beltran, 1976). Fliegel and Van Es (1983) add that incorrect assumptions were also made in regard to individual farmers being able to freely act in their own interests.

### 2.3.4.2. Further criticisms of innovation diffusion theory

The criticisms above are arguments for why innovation diffusion theory cannot be applied to all societies. Other criticisms, however, were more methodological (Ruttan, 1996). Downs and Mohr (1976) criticised the theory, contending that it needs to consider the innovations as well as the individuals adopting them. They opposed the notion of the adopter categories, maintaining that anyone can be considered an innovator if the innovation suits their circumstances. Brown (1981) recommends that rather than focusing on 'innovators', innovations should be targeted at farmers if the innovations are suitable to their situation.

Further criticisms identified general flaws in the theory, regardless of where in the world it was applied. For instance, ‘divisibility’ refers to the fact that it is not always possible to trial a new technology because it cannot always be adopted in part. Vanclay (1994a, 1994b, 2004) suggests that farmers are therefore sometimes cautious about committing to complete adoption. Röling (1988) also claims that the theory ignores distortion of information through the diffusion process and differential rewards between earlier and later adopters of innovations.
‘Pro-innovation bias’ on the other hand refers to the theory assuming that an innovation is good and should be adopted by everyone (Campbell, 2005; Rogers, 2003; Ruttan, 1996; van den Ban & Hawkins, 1996). When adoption is unsuccessful, the individual is blamed for the non-adoption (Dunn, 2008; Ruttan, 1996). However, van den Ban and Hawkins (1996) point out that it is sometimes not sensible for farmers to adopt ideas depending on their situation.

Further, the theory only relates to ‘new’ ideas and does not allow for a package of technologies (Ruttan, 1996). Rather, the theory only applies to single innovations. Also, the theory implies that non-adopters of an innovation are not affected when others in the system adopt, but in fact, non-adopters are affected by the diffusion of innovations process because when other farmers increase production as a result of adopting an innovation, this results in a decrease in prices received by all farmers (Stephenson, 2003). Furthermore, the theory also ignores the diversity among farmers and their farming styles (Goss, 1979) and assumes that farmers are a homogeneous group, apart from their propensity to adopt (Campbell, 2005). The theory also does not acknowledge that decision-making is a highly personalised and individualised process.

2.3.4.3. Consequences of diffusion of innovations

As agriculture in the industrialised nations was transformed, the consequences of technological change were gradually viewed as the social problem, rather than any failure to accept such change (Fliegel & Van Es, 1983). Consequences have been conceptualised as a separate and subsequent process to the diffusion of innovations (Rogers & Shoemaker, 1971). In spite of their importance, Hightower (1972) claimed that initial researchers ignored the consequences of the diffusion of innovations. Reasons for this oversight suggested by Goss (1979) included the following: researchers assumed the consequences of innovation decisions would be positive; the usual survey research methods were inappropriate for the investigation of innovation consequences; and consequences are difficult to measure. Black (2000) further argues that extension strategies based on innovation diffusion theory pay inadequate attention to the issue of sustainability — the long-term economic, environmental and social impacts of the technologies they are promoting.
2.3.5. Criticisms of traditional ‘top-down’ extension

Although there are many documented criticisms of traditional extension methods and approaches, the criticisms did not hinder the growth of diffusion research either in the US or abroad (Ruttan, 1996). Vanclay (1994a), Chambers (1983), Russell et al. (1989) and Kloppenburg (1991) criticise traditional extension by arguing that the model devalues the knowledge and skills of farmers. Traditional extension views scientific research as the exclusive domain of professional researchers, and farmers are on the receiving end of their work. Furthermore, farmers who readily adopt new technologies are perceived as ‘innovators’ and held in high regard, while those not adopting are labelled ‘laggards’ and their knowledge and skills are discredited (Vanclay, 1994a).

Vanclay (1994a, 2004) further criticises the linear model of extension by suggesting it unquestionably accepts the products of agricultural science research as improvements, and accepts that all farming problems can be overcome by the continued application of conventional science. The World Bank (2012) agrees, stating that traditional extension approaches are oriented to production and technology, rather than to markets.

Pretty and Chambers (1993) and the World Bank (2012) argue that while Transfer of Technology has its merits, it also has many limitations. It ignores local complexity and does not take into account local uncertainties, variability and the adaptive capacity of farmers. Technologies successful in one context were applied to other locations irrespective of local context, with widespread failure. For these reasons, Transfer of Technology is not suited to the complexity of sustainable agricultural practices.

2.3.6. The limited applicability of innovation diffusion theory to sustainable agricultural practices

During the 1970s, there was a change in focus in the application of innovation diffusion theory. As a result of growing international concerns regarding environmental problems, the focus changed from production technologies (which typically have individual economic benefits) to the diffusion and adoption of environmental innovations (which typically have public benefits) (Fliegel & Van Es, 1983; Rogers, 2003).
Röling (1992), Russell et al. (1989), Vanclay (1992), Campbell (1994) and Chambers and Jiggins (1987) all agree that the conventional Transfer of Technology model is limited in its applicability to the more complex challenge of developing and promoting more sustainable farming systems and tackling issues that cross farm boundaries. Goss (1979) reiterates, arguing that scaling up from a single farm and a single technology to an entire catchment requires a different mindset. There is considerable doubt as to whether models based on the adoption of single, relatively simple innovations are applicable to the adoption of more complex, integrated practices, such as sustainable agricultural practices. As discussed in the previous section, it is more challenging and complicated to adopt packages of technologies and a new farming system due to such factors as the impossibility of trialling them first. Many writers doubt that models based on technologies whose main merit is that they are more productive, at least in the short-term, are necessarily applicable to the adoption of technologies whose main merit is that they are more environmentally sustainable. Of course, the ideal is to find technologies that meet both criteria; however, a trade-off is sometimes necessary (Battel & Krueger, 2005; Black, 2000; Buttel, Larson, & Gillespie, 1990; Dunn, 2008; Murray, 2000; Nowak, 1987; Pampel Jr & van Es, 1977; Vanclay, 2004).

While the classic diffusion model has a role to play, it is evident from the arguments presented above that traditional, ‘top-down’ extension methods were not sufficient for achieving change in sustainable agriculture. Consequently, new paradigms were required (Dunn, 2008; Fliegel & Van Es, 1983) which led to the development of ‘bottom-up’ strategies, which are discussed in the next section.

### 2.4. PARTICIPATORY ‘BOTTOM-UP’ EXTENSION

Failures and criticisms of traditional, ‘top-down’ Transfer of Technology extension have led to the formulation of alternative models collectively known as participatory ‘bottom-up’ approaches. These models require greater involvement and participation by farmers and are more responsive to their needs and priorities (Marsh, 1998). Participative models stress the importance of local people and farmers’ knowledge and their involvement from the beginning of the research project. Participatory approaches challenge the notion that the only true knowledge is ‘scientific’. They also criticise over reliance on the scientific method for over simplifying complex problems and marginalising local knowledge (Packham, 2011). Chamala’s Participatory Action Model (PAM) is an Australian example of this type of extension (Chamala &
Mortiss, 1990). Tully (1966) is an earlier example and there have been many others since then (Dunn, 1997).

During the 1970s, as a result of the limitations of traditional extension, a new approach known as Farming Systems Research (FSR) was developed. In this method, farmer discussion groups informed research and extension priorities. Research was carried out in either a farming context or in simulations and became increasingly concerned with landholders’ needs and solutions. Its general aim was to describe and analyse farming systems, identify problems and plan research and extension activities. It eventually evolved into several new methods which were characterised by an applied, holistic and iterative approach, conducted by research teams, with a degree of farmer participation usually through on-farm trials (McCracken, Pretty, & Conway, 1988; Packham, 2011).

FSR initially used classic techniques such as farmer survey and field experimentation. However, it stimulated the production of new techniques which collectively fall under the term Rapid Rural Appraisal (RRA). RRA evolved during the 1970s partly from and partly alongside the FSR movement (McCracken et al., 1988).

In the context of agricultural development, the term RRA can be used to describe any of these new methodologies which make use of a multi-disciplinary team that works with farmers. The group assesses the needs of the community and identifies priorities for further research which addresses those needs (McCracken et al., 1988).

Cornwall, Guijt and Welbourn (1994) list some thirty participatory approaches practised in the 1980s and 1990s. This diversity in approach makes it more difficult to specify the nature of participatory approaches (Murray, 2000). In some approaches, such as RRA, community participation tends to be limited to providing information to researchers (Black, 2000). As suggested by Vanclay (1994b), this is not truly bottom-up extension, since the researchers are still firmly in control of the agenda. Other approaches, such as Participatory Action Research (PAR), emphasise community empowerment and are based on the assumption that farmers themselves have the ability to develop sustainable farming systems (Black, 2000). According to Vanclay (1994b), this is true bottom-up extension since the process builds the capacity of farmers to use their own skills to determine the problem and find a solution.
Marsh (1998) argues that farmers should have more control over the information that is delivered to them, and their needs for information should be met. Participatory approaches are seen as more appropriate under this ‘demand-pull’ model of extension.

In 1989, the landmark book *Farmer First* (Chambers, Pacey, & Thrupp, 1989) articulated a critique of the prevailing models of extension and documented the participatory approaches which had been developed and implemented (Glover, 2007). Chambers, Pacey and Thrupp (1989: p. 10) have expounded what they term the ‘farmer first’ approach:

> Instead of starting with the knowledge, problems, analysis and priorities of scientists, it [farmer first] starts with the knowledge, problems, analysis and priorities of farmers and farm families. Instead of the research station as the main focus of action, it is now the farm. Instead of the scientist as the central experimenter, it is now the farmer, whether woman or man, and other members of the farm family.

Advocates claim that participatory, bottom-up methods have many advantages over top-down, Transfer of Technology methods of extension. Firstly, participative approaches recognise the importance of local knowledge. Consequently, they are more likely to generate sustainable processes and practices. They acknowledge the value of stakeholder involvement in research and the value of farmers sharing their knowledge and experience with each other rather than relying on government agencies for direction. They encourage farmer ownership of both problems and solutions. They typically use group processes, which have various advantages such as the pooling of skills, knowledge, experience and other resources; economies of scale; risk sharing, and thus the development of potentially more sustainable solutions (Black, 2000).

Landcare was established in Australia in the mid to late 1980s as a community-based natural resource management (NRM) program by high levels of community involvement in partnership with the federal government. As a change program, Landcare is a successful example of participatory extension. Landcare emphasised group learning, focusing at a local level, attempting to encourage all affected landholders to be involved in improving the situation. Most importantly, farmers and community groups were placed in key planning and implementation roles and were not just passive recipients of information from researchers (Campbell, 1994, 2005).
There are, however, critics of some aspects of participatory approaches. Molnar, Duffy, Cummins and Van Santen (1992), Vanclay (1994a) and Vanclay and Lawrence (1995) argue that the reliance on farmers’ local knowledge to solve problems new to their experience is unlikely to be successful. Farmers may not recognise environmental problems due to their insidious nature, even after extensive damage might have occurred. They may also not have the knowledge to adequately deal with such problems. Surveys of farmers have revealed that although they believe certain environmental problems are serious, they sometimes do not personally believe they have a problem (Marsh & Pannell, 2000a; Marsh & Pannell, 2000b; Vanclay, 1994b). Furthermore, the diversity which exists within communities may cause conflict when there are competing opinions of community needs. Cornwall, Guijt and Welbourn (1993b), Scoones and Thompson (1993) and Gray, Dunn and Phillips (1997) suggest some environmental problems may be best handled with a combination of new and traditional extension.

2.5. THE EVOLUTION OF AGRICULTURAL EXTENSION IN AUSTRALIA

To assist them in their decision-making, farmers seek and receive information from the information exchange interface. As noted previously, the information exchange interface can be defined as the collective of all the providers of knowledge, information and advice to farmers, to assist them in their decision-making.

The origins of agricultural extension in Australia date back to agricultural show societies in the second half of the nineteenth century. Jones and Garforth (1997) suggest that their influence was slight, yet it subsequently facilitated the development of state departments of agriculture. By the late 1880s, researchers and instructors were appointed by state governments and research farms were established (Williams, 1968). In addition, extension officers were appointed to advise farmers on agricultural research findings. It was in these first decades of the twentieth century that agricultural faculties were established in Australian universities and according to Hunt et al. (2012), universities began to develop the intellectual capacity required for research, development and extension (RD&E).

Dunn (2008) suggests that extension as a discipline continued to grow strongly in Australia in the 1950s, further establishing itself within the agricultural faculties of universities, as well as in state and federal government departments. Financial support from the Commonwealth
included grants to state departments of agriculture and universities. The ultimate aim was to improve agriculture and subsequently the nation’s financial position.

Progressing into the 1960s, extension continued to focus on innovation diffusion theory discussed earlier in this chapter. At this time, most extension officers were still employed by the public sector (Hunt et al., 2012). However, in the 1970s, as detailed earlier in this chapter, participatory approaches were developed in response to emerging agricultural sustainability issues (Van Beek & Coutts, 1992). Subsequently, extension officers needed to develop a skill set which involved facilitative styles of engagement as per the nature of participatory approaches (Van Beek & Coutts, 1992).

The early 1990s witnessed the expansion of extension to encompass “a growing literature on theories, methods, tools, providers and processes” (SELN, 2006: p. 6) and the development of pluralism (Figure 1) as extension became extremely diverse. State agencies shifted from being the primary providers of extension services to encouraging other providers (SELN, 2006). The service providers within the information exchange interface and their relationships with one another are discussed later in this chapter.

During the 1990s, a strong Landcare (see Section 2.4) and catchment management ethic also emerged. Over time, Landcare and NRM bodies had greater access to funds, and a range of organisations including Research and Development Corporations (RDCs) (see Section 2.9.3.3), and Cooperative Research Centres (CRCs) (see Section 2.9.3.4) emerged. The establishment of these industry bodies allowed Landcare, NRM bodies and farmer groups to access funds from external sources. According to Stone and Broadbent (2008), agribusiness was not yet accessing these funds at that time. The involvement of agribusiness in providing extension services to farmers is detailed later in this chapter.

Also in the early 1990s, state government departments of agriculture and equivalent were still playing a role in conducting RD&E. Within the public sector, extension officers synthesised research and development (R&D) findings into advice which farmers could apply to their own individual circumstances. In turn, extension officers provided feedback to researchers from farmers, maximising the relevance of R&D (Stone & Broadbent, 2008).
However, the 1980s and 1990s saw a review commissioned by the Australian Government into national agricultural policy. The Balderstone Report (Balderstone, Duthie, Eckersley, Jarrett, & McColl, 1982) reviewed public investment in agriculture and resulted in Australia having one of the least supported agricultural sectors in the world in terms of public sector investment. The report’s impact on the function and structure of agricultural RD&E remains today. Balderstone et al. (1982) investigated issues relating to government assistance programs, markets, agricultural production research and agricultural resource management. Balderstone et al. (1982) triggered movement towards a more competitive agricultural sector and subsequently federal and state agencies underwent considerable change. As a result of the restructure of public extension, industry and the private sector moved to fill the void. RDCs and CRCs became a new organisational platform for agricultural RD&E (Hunt et al., 2012).

By the late 1990s, as a result of the transition of state agencies, there was an emerging gap in the delivery of R&D findings. During the late 1990s the private sector was responding at varied rates to the changes within the public sector. It worked to develop methods to service farmer needs for information whilst generating an income from these activities. Some former government staff relocated to the private sector (Stone & Broadbent, 2008).

Despite the increased involvement of industry and the private sector, there was still an overall decline in RD&E investment (Hunt et al., 2012). Questions were raised about whether the private sector could effectively deliver extension services (Umali-Deininger, 1997). Hunt et al. (2012) suggest that the private sector’s potential to provide extension services to farmers was inhibited by free government extension services still available at that time. Furthermore, the changes coincided with the declining relative, economic importance of agriculture and budget pressures and economic rationalism within the public sector (Hunt et al., 2012).

Nonetheless, state government withdrawal from agricultural extension services continued to gain momentum in the 2000s. The federal government continued to fund extension services through organisations such as regional NRM bodies. During this period, universities also reduced their investment into agricultural extension. According to Hunt et al. (2012), this resulted in a decline in academic capacity and a subsequent return to Transfer of Technology approaches and their application to inappropriate situations due to the time and resource constraints on staff.
Along with the recognition that beneficiaries should pay and not the general public, there have been several other driving forces behind the changes within the information exchange interface. The declining relative importance of agriculture in the economy; budget pressures on governments; increased competition for public capital; the increasing influence of economists’ theories and prescriptions within government; information now having a monetary value; and the declining electoral significance of the rural sector are all valid suggestions (Cary, 1993a; Chamala, 1995; Clark, Fell, Timms, King, & Coutts, 1997; Kidd, Lamers, Ficarelli, & Hoffmann, 2000; Marsh, 1998; Marsh & Pannell, 1998; Marsh & Pannell, 2000a; Prinsley, Dore, Marks, McGuckian, & Thompson, 1994; Rivera, 1992, 1996; Röling, 1988; Solis & Bravo-Ureta, 2005; Umali-Deininger, 1997; Vanclay & Lawrence, 1995; Woods, Moll, Coutts, Clark, & Ivin, 1993). Additionally, the limited outcomes of some public extension programs, as reflected by the slow adoption of extension messages, spurred the search for alternative approaches. Rivera (2011) noted that public sector extension in the 1980s was criticised for not being effective or relevant. This so-called failure was attributed to bureaucratic inefficiencies and the poor formulation and implementation of extension programs. As a result, many extension programs were inadequately funded and lacked a coherent link with both farmers and researchers (Umali-Deininger, 1997).

The information exchange interface has presented additional challenges and further complexity which are discussed later in Chapter Six. As a result of the gradual withdrawal of the public sector from the interface, a multitude of alternative service providers and institutional arrangements have appeared. Contractual collaborations between the sectors are now common (Birner et al., 2009). With reduced public investment, the RD&E system is increasingly industry-driven, and multiple public, private, industry (farmer levy-funded) providers are involved in the interface (Hunt, Birch, Vanclay, & Coutts, 2014). Although the information exchange interface exists to support farmers in their decision-making (Klerkx & Jansen, 2010), the interface has created another layer of complexity to farmer decision-making. A purpose of this thesis is to explore the influence of this complexity on strategic decision-making in mixed-farming systems.

As a result of the transformation of public extension, and in the context of the international literature, the present extension environment in Australia can be considered to be ‘pluralistic’ (Klerkx, Straete, Kvam, Ystad, & Harstad, 2017; World Bank, 2012) and decentralised (Paschen et al., 2017). Following significant institutional change over the course of three decades,
Australia’s RD&E system has changed from a coordinated system to a complex (Hunt et al., 2014), almost haphazard system which involves multiple organisations with minimal national-level coordination as part of a global shift to a market-orientated system (Paschen et al., 2017). Consequently, the system has become fragmented (Coutts & Botha, 2017).

Birner et al. (2009) reports that the term ‘pluralistic’ is used to capture the emerging diversity of institutional options in providing and financing extension. The World Bank (2012) characterises pluralistic extension as having multiple providers and types of services, diverse funding streams and multiple sources of information.

Pluralistic extension recognises local diversity and the need to match it with a diverse suite of extension services, approaches and providers (World Bank, 2012). However, without coordination, a pluralistic RD&E system runs the risk of fragmentation and inefficient use of resources (Paschen et al. 2017).

One of pluralism’s greatest challenges is to coordinate organisations that have vastly different mindsets and worldviews (World Bank, 2012). According to The World Bank (2012), a primary role of the public sector should be to develop a management program which will ensure that the multitude of providers work cooperatively to achieve joint objectives. The program should emphasise coordination and should also reflect stakeholders’ agreement on the roles for the different service providers and on who is best suited to perform each function under the program.

The World Bank (2012) suggests pluralism will prevail and become more common in respect to extension methods and institutional structures. Therefore, it is important to ensure a pluralistic system is successful.

The remainder of this chapter is devoted to exploring each of the service providers in the information exchange interface. It also reviews the available literature surrounding the interface, including the challenges presented by the increased involvement of industry and the private sector, as well as the relationships between the various sectors.
2.6. NEW APPROACHES TO AGRICULTURAL EXTENSION IN AUSTRALIA

Capacity building and community engagement are the present focus of agricultural extension services in Australia (Figure 1). Capacity building involves the improvement of business and industry profitability and sustainability; the ecological health of catchments; and the wellbeing of people and their communities. A main aim of many extension projects is to build the capacity of the people involved so they need less ongoing support (Beilin, Paine, & Pry, 2007; Coutts et al., 2005; Macadam, Drinan, Inall, & McKenzie, 2004; Maguire & Cartwright, 2008; McKenzie, 2007).

Coutts (1997) developed a typology of extension models as a function of capacity and suggests extension projects fall under one of the following models: Group facilitation / empowerment; Programmed learning; Technology development; Information access; and the Individual consultant / mentor model (Figure 5).

Firstly, the Group facilitation / empowerment model focuses on assisting people to identify their own problems and solutions. The emphasis is on people learning from each other in groups in order to feel a sense of project ownership and responsibility, resulting in more sustainable outcomes. The project will often provide or fund a facilitator, and Landcare is a prominent example of this model. Group extension models are more cost-effective than one-to-one advice, and this has contributed to their popularity with the public sector (Coutts et al., 2005).

Meanwhile, the Programmed learning model involves delivering specifically designed training programs and workshops to landholder and community groups in order to increase knowledge and skills. The programs and workshops are delivered via a variety of methods and incorporate an ‘adult learning’ philosophy which acknowledges the existing knowledge held by participants (Coutts et al., 2005).

On the other hand, the Technology development model involves working with individuals and groups to develop specific technologies and practices which will then be available to the rest of the community. It often involves local trials, demonstrations and field days. A key, underlying philosophy of this model is that successful technology development must involve all stakeholders. The model acknowledges that most technologies need some form of adaptation, and social influences need to be addressed to facilitate technological changes (Coutts et al., 2005).
Further, the Information access model recognises that people require different information at different stages of the decision-making process. Additionally, the method of information delivery needs to suit individual learning styles. Projects of this type seek to make information available and accessible in a variety of ways, but not usually through direct contact with an extension officer. Individuals and groups can then access the information whenever they like. For instance, the information can be based in a central location such as a website (Coutts et al., 2005).

Finally, the Individual consultant / mentor model is about individualised one-to-one support, such as that provided by private consultants (see Section 2.8.2.2). This model rests largely on the relationship between the consultant and the client, where trust and mutual respect influence the farmer’s decision to try new approaches (Coutts et al., 2005).

![Figure 5: The capacity building ladder (Coutts et al., 2005)](image)

It is important to note that there is considerable overlap or at least mutual reinforcement between the extension models detailed above. The five models can be collectively termed ‘capacity building’ (Figure 5) and Coutts et al. (2005) suggest that each model is necessary for the capacity building process.


2.7. A CLASSIFICATION OF INSTITUTIONAL ARRANGEMENTS

Since capacity building and community empowerment became the focus of extension in the past decade or so, collaboration between service providers and respective delivery modes have become the cornerstone of contemporary extension methods. A classification of the institutional arrangements for such collaboration highlights how complex the information exchange interface has become.

Table 1 below displays a classification scheme of institutional arrangements for agricultural extension systems. The scheme distinguishes between the financing of extension services and the provision of those services (Feder et al., 2011).

For instance, Cell 1 of the table displays the typical public sector model, where state agencies finance and provide extension services. Meanwhile, a ‘pure’ model of private sector extension provision is displayed in Cell 5 where the private sector provides extension services on a market basis, and farmers pay for those services. Another pure model is shown in Cell 8 where the private sector provides extension services to farmers as part of a product sale. On the other hand, Cell 2 illustrates how the public sector may contract the private sector to provide the extension service. The public and the private sector may also jointly finance the provision of extension services, although a joint venture arrangement is not displayed in Table 1. Furthermore, industry may also contract extension services from private sector providers (Cell 11), however, they may also employ their own extension staff (Cell 12) (Feder, Birner, & Anderson, 2011).

Table 1: A classification scheme of institutional arrangements (derived from Feder et al. (2011))

<table>
<thead>
<tr>
<th>Provision of the service</th>
<th>Public sector</th>
<th>Farmers</th>
<th>Private sector</th>
<th>Farmer Groups</th>
</tr>
</thead>
<tbody>
<tr>
<td>Public sector</td>
<td>1. Public sector extension services provided for free to farmers</td>
<td>4. Fee-based public sector extension services</td>
<td>7. Private sector contract extension officers from the public sector</td>
<td>10. Farmer Groups contract staff from the public sector</td>
</tr>
<tr>
<td>Private sector</td>
<td>2. Public sector contracts to the private sector</td>
<td>5. Private sector provides fee-based services</td>
<td>8. Embedded services: private sector provides information with products</td>
<td>11. Farmer Groups contract extension officers from the private sector</td>
</tr>
</tbody>
</table>
Feder et al. (2011) suggests that enabling industry groups (including farmer groups) to hire extension services from both the public and private sectors creates a more demand-driven model, since it gives farmers a voice in publicly financed contracts. Industry groups may also receive funds from the public sector for extension services. In cases where industry groups are not involved in the contracting arrangements, they may still participate in the annual and long-term planning of agricultural extension activities. They can also assist with financing agricultural extension by collecting fees from their members. Further, they can keep a seat on boards that manage extension funds and hire extension providers, and can contribute to performance evaluation in contract renewal decisions (Feder et al., 2011).

Birner et al. (2009) explores the most appropriate methods of providing and financing extension and concludes that a ‘best fit’ approach to the local situation is necessary. Further, the policy environment, the capacity of service providers, characteristics of the local community, the production system and market access should also be considered (Birner et al., 2009).

From a service provider’s perspective, collaboration is logical and efficient. However, the myriad of relationships that exist across the sectors in the information exchange interface can create confusion and complexity for the recipients of the service. The characteristics of the individual service providers is discussed later in this chapter, whereas the concept of Agricultural Knowledge Innovation Systems is discussed below.

### 2.8. AGRICULTURAL KNOWLEDGE INNOVATION SYSTEMS

Agricultural Knowledge Innovation Systems (AKIS) is a useful concept (EU SCAR, 2013) which has developed within the agricultural domain to identify, analyse and assess the various actors within an agricultural system as well as their communication and interactions with one another (Knierim et al., 2015). The World Bank (2012) (World Bank, 2012) suggests that the AKIS approach has developed from a concept into an entire subdiscipline.
AKIS has been extensively debated in the literature (Klerkx et al., 2012) and definitions of the term have evolved, each being a product of ideas surrounding agriculture at that point in time (EU SCAR, 2012). According to (EU SCAR, 2012), AKIS is derived from the Agricultural Knowledge Systems (AKS) concept that originated in the 1960s. AKS was a government driven initiative to teach farmers new skills in order to increase agricultural productivity. AKS was not intended to promote breakthrough innovations or rural development. The policy reforms of the 1990s and the privatisation of extension in many countries saw a drift from government driven AKS and towards multi-actor systems, in which private actors came to play a larger role (EU SCAR, 2012).

Also, to accommodate the increased awareness that was given to the importance of ‘information’ in the agricultural system, an ‘I’ was added to AKS in the 1970s, creating the term ‘Agricultural Knowledge Information Systems’. Later on, according to EU SCAR (2012), ‘Information’ was changed to ‘Innovation’, to reflect a new emphasis on technical and social innovations in the model (EU SCAR, 2012).

EU SCAR (2012 p. 23) defines AKIS as:

> a set of agricultural organisations and / or persons, and the links and interactions between them, engaged in the generation, transformation, transmission, storage, retrieval, integration, diffusion and utilisation of knowledge and information, with the purpose of working synergistically to support decision-making, problem solving and innovation in agriculture.

In AKIS, research, extension and education are part of a broader network of organisations, enterprises and individuals within agriculture (Knierim et al., 2015) that includes for example farmers, farmer groups, processors, rural resellers, consultants, researchers, policy makers and consumers, who are focused on bringing new products, methods and forms of organisation into economic use (Knierim et al., 2015). All of the stakeholders are able to contribute to innovation and change (Murphy, Nettle, & Paine, 2013a).

Agricultural innovation occurs through interaction amongst this diverse group of stakeholders (World Bank, 2012). These stakeholders may have quite disparate perspectives and skills (World Bank, 2012). The critical element of an agricultural innovation system is the bringing together of stakeholders to work together to stimulate, support and develop appropriate innovation in a given context (Coutts & Botha, 2017). There is a focus on mutual interaction, and finding ways
that the stakeholders can complement one another (Coutts & Botha, 2017). The stakeholders interact, cooperate and coordinate their activities to generate new knowledge, technologies and practices for desired change (Klerkx & Nettle, 2013).

The AKIS approach considers the institutions and policies that influence the stakeholders as well as the conditions and relationships that promote innovation (World Bank, 2012). It is a flexible, dynamic and interactive process which focuses on sustainable development rather than on productivism (see Chapter Three) (EU SCAR, 2012).

AKIS are now very diverse and some have mainly privatised extension systems, while others have multi-actor systems where the government is the driving force (EU SCAR, 2012). The structure of the AKIS differs greatly between countries and diversity can also be found within different states and regions within the same country (EU SCAR, 2012). Due to the diversity, Klerkx and Nettle (2013) argue a ‘one-size fits all’ approach is inadequate to ensure innovation occurs and address the challenges posed by the need to increase productivity and sustainability in agriculture and food production (EU SCAR, 2013).

In reality, existing AKIS are often fragmented (EU SCAR, 2012) such as the information exchange interface which exists in Australia. Although, there are examples where innovation networks have been applied with success such as in the New Zealand dairy industry (Rijswijk & Brazendale, 2017). Rijswijk and Brazendale (2017) argue that the use of innovation networks can identify the roles and strengths of the different stakeholders involved. It is the purpose of the next section to explore the various stakeholders involved in agricultural extension in Australia and how they each influence farmer decision-making.

### 2.9. SERVICE PROVIDERS WITHIN THE INFORMATION EXCHANGE INTERFACE

There is a multitude of stakeholders involved in agricultural extension in Australia. It is important to understand that these stakeholders are not homogenous. They all have their own unique characteristics in terms of how, and in which areas, they may influence farmer decision-making, and in how they prefer to engage with other service providers (Bowyer & Shanks, 2007). While Eastwood et al. (2017) report that in practice, public and private roles are less dichotomous and clear cut as assumed in the literature, Umali-Deininger (1997) notes a distinction is important because of the different range of services each, and particularly the private sector, has the
choice to deliver (Umali-Deininger, 1997). The World Bank (2012) categorises the service providers into three groups: public sector, private sector and non-government organisations. For the purpose of this research study, the service providers have been separated broadly into one of three groups: public sector, private sector and industry (Figure 5). More specifically, they have been categorised as:

- the production focused public sector (such as state departments of agriculture);
- the conservation focused public sector (such as Catchment Management Authorities);
- the private sector providers that sell advice;
- the private sector providers that sell advice linked to products;
- industry groups at a local or regional scale (for example, farmer groups); and,
- industry groups at an industry scale (such as RDCs and CRCs).

Each intermediary is discussed in more detail below.

**Figure 6:** The information exchange interface in Australia

### 2.9.1. Public sector extension

For the purpose of this research study, public sector agencies have been categorised on the basis of whether they are production or conservation focused. Using New South Wales as an example, the Department of Primary Industries is considered to have a production focus and, presently at
least, the Catchment Management Authorities (which replaced the likes of Land and Water Conservation and have since been replaced by Local Land Services (LLS)) are considered to have a conservation focus. By definition, the Department of Primary Industries is focussed on production; however, the nature of federal funding in the last decade or so has seen them take on conservation-based portfolios. Hence, it is important to note that some overlap exists.

Stone and Broadbent (2008) report increased farmer caution in the use of government RD&E services due to a perceived ‘loss of touch’. However, while the use and credibility of government services had declined, individual staff still retained a high level of credibility and remained a strong communication conduit.

Glyde, Gray, Ovenden, and Dunn (2014) found farmers and consultants valued the neutrality of the information provided by the public sector. The public sector was considered to have no pecuniary interest due to the absence of a need to sell a product. Glyde et al. (2014) found consultants valued NSW DPI researchers for their technical skills, particularly concerning diagnostic services.

While many farmers acknowledged there were limited opportunities to engage with NSW DPI agronomists, Glyde et al. (2014) found farmers still appreciated the role of district agronomists. There was also a strong recognition of the effectiveness of NSW DPI staff to access information from a variety of sources and present it independent from external influences.

Despite the restructure and gradual withdrawal from extension services, the public sector is still responsible for a great deal of information generation through its research programs. It is also responsible for ensuring the dissemination of this information, even if it is delivered by others. The federal government is a major funder of extension activities across Australia, although in some cases it is moving towards becoming a coordinator rather than a provider. Marsh (1998) reported all state departments have explicitly stated that being responsive to the expressed needs of their clients is one of their key objectives, and some departments are setting up formal links with industry to achieve this. This finding is supported by Coutts et al. (2005). Marsh and Pannell (2000a) reported that most public agencies envisage the private sector playing a greater role in the delivery of many services which were previously the responsibility of the public sector. A general vision for the future of extension services in Australia is for much greater
involvement of the private sector, and for the public and private sectors to work more closely together (Cocklin, Mautner, & Dibden, 2007; Coutts et al., 2005; Feder et al., 2011; Marsh & Pannell, 1998; Prinsley et al., 1994).

2.9.2. Private sector extension

Meanwhile, Umali-Deininger (1997) defines the private sector as all the ‘economic agents’ whose objective is to generate profits directly or indirectly for their owners or shareholders. This sector covers commercial enterprises operated by a farmer or group of farmers, including cooperatives, commercial production and marketing firms. It also includes input manufacturers and distributors, processing firms, commodity boards, as well as private consulting businesses.

For the purpose of this research study, the private sector is broadly defined as those enterprises which receive no government financial assistance. Private sector enterprises which provide extension services include input supply companies; retail outlets; marketing boards; and consultants, trainers, accountants, banks and advisers on insurance and superannuation. These businesses within the private sector work to support farmer decision-making in exchange for money, either directly as a fee for the service or indirectly through the costs of this service being incorporated into the cost of the supply of a product. This definition is collectively derived from Maalouf, Contado and Adhikarya (1991), Prinsley et al. (1994), Umali-Deininger (1997) and Stone (2005).

As discussed previously in this chapter (see Section 2.5), the changes to agricultural extension provided by the public sector in Australia are an important reason behind the increase in private sector participation in the delivery of agricultural extension services, particularly one-to-one and on-farm advice (Stone & Broadbent, 2008). However, private sector involvement in extension is not limited to taking over the functions of the public sector, with commercial opportunities for product sales and distribution also validating private sector involvement. For instance, the simplest form of involvement is when private input supply companies such as fertiliser and seed companies provide information with their products in the interests of marketing their own products (Carney, 1998). Nettle, Klerkx, Faure, and Koutsouris (2017) state that the involvement of the private sector will depend on the agricultural industry as well as the different levels of government involvement in each state. In addition, Umali-Deininger (1997) notes that agriculture’s dependence on more specialised knowledge and technologies has made it
economically feasible for the private sector to provide extension services, either directly or indirectly related to its products. Moreover, the growing commercialisation of agriculture and increased market competition have further strengthened the economic incentives for farmers to treat extension as another purchased input (Paschen et al., 2017; Umali-Deininger, 1997). This notion is explored in more depth later in this chapter.

During the 1990s, as a result of the gradual withdrawal of the public sector from extension service provision, farmers increasingly saw the private sector in general as an emerging form of technical competence. This was particularly due to the private sector’s one-to-one advisory services and increased participation in R&D. Many private consultants and agribusiness advisers (see Section 2.8.2.1) were already accessing information from both private and government researchers and delivering it to farmer clients. The technical expertise of the private sector was grounded in the need to ensure its products worked effectively for farmers. Many private sector businesses also conducted field trials and input supply companies undertook their own product R&D (Stone & Broadbent, 2008).

For the purpose of this research study, the private sector is broadly categorised into agribusiness and consultants, the difference being that consultants solely sell advice whereas agribusiness may also sell advice linked to products. This classification within the private sector is appropriate when discussing the topic as it helps to identify the interests of each group when providing advisory and technical services to farmers. Each sub-group is discussed below.

2.9.2.1. **Agribusiness**

Prinsley et al. (1994) report that the term ‘agribusiness’ was first coined by Davis and Goldberg (1957). They defined agribusiness as the sum total of all the operations involved in the manufacture and distribution of farm inputs; production operations on the farm; and the storage, processing and distribution of farm commodities.

Agribusiness is comprised of two major components. The first is the input sector which is mainly comprised of those businesses which produce and retail agricultural inputs such as fertilisers, chemicals, seed and machinery. The second is the output sector which handles the farm produce once it leaves the farm, establishing markets, adding value and marketing the product to the consumer (Prinsley et al., 1994).
Agribusiness is playing an increasing role in the provision of extension services to farmers. Agribusiness has a primary role to market its own products and services first and foremost. The major advantage to agribusiness in providing extension services is to use information to add value to a product in order to increase sales. The second opportunity is a result of structural changes which have occurred within state departments (discussed in Section 2.5), giving agribusiness the opportunity to increase its role in these areas, provided there is a benefit for it in doing so (Stone, 2005).

Agribusiness is also playing an increasing role in assisting farmers with their decision-making (Stone, 2009). In addition to having a sales merchandising team, agribusiness also employs agronomists who provide advice to individual farmers, as either fee-for-service or linked to product sales (Bowyer & Shanks, 2007; Coutts et al., 2005; Marsh & Pannell, 1998, 2000a, 2000b).

Agribusiness’ increasing importance as an information provider should not be underestimated (Stone, 2009). However, extension provision by agribusiness entails its own challenges (Feder et al., 2011). According to Bardsley (1982), agribusiness is sometimes regarded as a suspect source by a significant proportion of the farming community. More recently, Long and Cooper (2011) reported that farmers are wary of resellers and believe their advice has ‘strings attached’. Stone (2005) and Feder et al. (2011) support this argument, reporting that some farmers expressed concern about relying on the quality of advice from agribusiness because of its close association with product suppliers and the associated issue of pecuniary interest. Farmers surveyed by Stone (2005) and Feder et al. (2011) expressed concerns about the honesty of the advice from agribusiness and whether products were being supplied to meet the needs of farmers or because of financial rebates from suppliers, product availability, or alliances between agribusiness and its suppliers.

The challenges for agribusiness in providing extension services are essentially the cost incurred in providing extension staff and the difficulty in measuring the dollar benefit. While the performance of sales staff can be measured by the amount of product they sell, the benefits of extension staff cannot be as easily measured because the benefits are often indirect. This imposes significant constraints on agribusiness to invest in such people (Stone, 2009).
The future role of agribusiness in providing extension services will be driven by its perception of the value of doing so. The rate of new input products entering the marketplace is slowing down and therefore agribusiness must find alternative methods to generate income. Agribusiness has upskilled in other ways, including communication technologies. To address the issues presented above, agribusiness is now moving towards fee-for-service programs (see Section 2.8.2.2) to address these issues and provide clear market based payment systems (Stone & Broadbent, 2008).

However, fee-for-service programs are not universally utilised by all farmers. For instance, so-called bottom-end farmers (described later in Section 2.10.2.1) who might have traditionally accessed advice from the public sector (detailed in Section 2.5), no longer have as much access to such services as the availability of public sector advice has reduced significantly and these farmers might not be willing or able to pay for advice. The role of agribusiness is important to this group of farmers as they either do not recognise they are paying for the advice in the cost of products or simply choose to ignore the fact that the costs are built in. Other farmers will often use resellers as a second opinion to help confirm decisions (Long & Cooper, 2011). Stone (2005) concluded that agribusiness has largely replaced the role in extension previously occupied by the public sector. Increasingly, agribusiness is undertaking R&D, however Glyde et al. (2014) note, that there is an issue with agribusiness being involved in RD&E due to the commercial-in-confidence nature of their work. Agribusiness acts as an important information conduit between farmers and R&D organisations but as Glyde et al. (2014) point out, the agribusiness pathway to adoption had either been undervalued or not fully understood. Glyde et al. (2014) also found that agribusiness aims to ensure farmers remained dependent on them for advice. The relationships between industry and agribusiness are explored further in Section 2.11.

2.9.2.2. Private consultants

Asking someone for advice is a decision in itself. A significant amount of trust is involved in accepting another person’s advice, particularly when it can have a significant influence on a business (Nicholson et al., 2015). In contrast to agribusiness, and for the purpose of this research study, consultants are considered to be those individuals who only sell information, knowledge or advice which is not linked to products; that is, fee-for-service.
Consultants act as information consolidators and are advisers to farmers. A survey conducted by Stone (2009) discovered that farmers view their consultant as a specialist who is a direct source of information. Stone (2009) also found that, due to an information overload, farmers viewed their consultant as a skilled information consolidator. Farmers expect their consultant to possess a vast array of current information with a corresponding depth of knowledge. They also expect their consultant to provide a snapshot of that information on request. The information provided by consultants is generally holistic and considers the economic, environmental and social implications of the recommendations (Bowyer & Shanks, 2007; Stone, 2005). Consultants also act as a ‘sounding board’ as they bring a range of experience gained from other properties (Nicholson et al., 2015).

Private consultants work closely with individual farm businesses and provide information specific to that farm (Bowyer & Shanks, 2007; Long & Cooper, 2011). Coutts, Roberts, and Samson (2007) found that farmers use private consultants because they can provide a professional, ‘independent’ opinion. Their advice is considered to be value-free and they play the role of the ‘honest broker’ with no pecuniary interest in the information and advice provided. This finding is supported by Bowyer and Shanks (2007), Stone and Broadbent (2008) and Long and Cooper (2011). King and Nettle (2013) discovered that many farmers prefer advice that is not conditional on generating sales.

As a result of the restructure and withdrawal of the public sector from the information exchange interface, many former government staff became private consultants. Private consultants provide advice on all aspects of farm and business management. Accounting, financial, marketing and management advice has almost always been the exclusive province of the private sector and historically has not been provided by the public sector (Black, 2000; Cary et al., 2002; Marsh & Pannell, 1998). Other roles include but are not limited to technical production; risk management; marketing and processing; enterprise mix; and human resources including succession planning (Black, 2000; Bowyer & Shanks, 2007; Coutts et al., 2007; Long & Cooper, 2011; Stone, 2005; Umali-Deininger, 1997). Consultants also act as trainers, mentors and change facilitators and assist in the formation of farmer groups as well as undertaking R&D. Consultants can provide a necessary link between researchers and farmers (Long & Cooper, 2011). Some
private consultants are also employed by farmer groups to conduct research which is highly specific to their needs (Stone, 2005).

Consultants can also assist clients with decision support systems which are discussed later in Section 4.8. The uptake of decision support systems has been slow and support by consultants is seen as critical to their success (Long & Parton, 2012). Llewellyn (2007) reported that farmers who used a consultant were two to three times more likely to adopt and continue to use a new technology.

Meanwhile, King and Nettle (2013) found that younger advisers placed more emphasis on assisting farmers to manage business risk whereas older advisers placed more emphasis on assisting farmers to understand and manage their farm business as a system.

Subsequently, the role the private consultant can play in the farmer decision-making process can vary. After the consultant provides the farmer with the information, the consultant may assist the farmer in making a decision as well as assist with the evaluation of the results (Long & Cooper, 2011). However, some farmer-consultant relationships can be more dependency-based, with the consultant making the majority of the operational and tactical decisions (see Sections 4.4.1 and 4.4.2) on behalf of the farmer. Long and Cooper (2011) report such dependency is not always a negative and does allow the farmer to focus on other aspects of the business.

Sometimes, a farmer may not follow through with the recommendation made by the consultant. Lane (1992) suggests several possible reasons behind this. Firstly, it could be due to limited farmer understanding of the recommendation. Secondly, the recommendation may not align with the farmer’s values, goals and motivations. Further, the consultant may not have considered the emotional and financial risk the farmer considers when making the decision. The influences on farmer decision-making are explored later in Section 4.3.

Long and Cooper (2011) discovered that the farmers who benefited most from their consultants were those who were clear about their goals. Some farmers and their consultants have a strong relationship, and in some instances, this relationship is closer than with any other service provider. If the consultant is involved in many of the operational decisions (see Section 4.4.1), communication between the farmer and consultant is quite regular (Long & Cooper, 2011).
and Cooper (2011) found the age and experience of advisers was important to farmers, with many farmers expecting their adviser to have at least ten ‘years’ experience. King and Nettle (2013) found relational connections were a significant source of influence on older farmers. However, younger farmers do not place as much importance on building a relationship with the consultant.

The decline in the availability of one-to-one advice from the public sector accompanied by an increase in farmer awareness of the advantages of using a consultant has seen an expansion in the number of practising consultants (Black, 2000). In a review of national extension and education, Coutts et al. (2005) estimated there were more than 1,300 private agricultural consultants operating in rural Australia. This finding is supported by Bowyer and Shanks (2007). Coutts et al. (2005) and Stone (2005) estimate that more than fifty per cent of Australian farmers use private consultants. This finding is supported more recently by Long and Parton (2012).

Similar to agribusiness, consultants will only remain in the information exchange interface if there is profit in their activities. This profit can be derived from funding agencies, client payment or a combination of the two. However, Prinsley et al. (1994) warns that if consultants are paid to deliver information to farmers, there is the possibility that this may contribute to a sales slant to advice, less objective product analysis and possible conflicts of interest.

Private consultants often focus on the ‘top-end’ (see Section 2.9.2.1), more ‘business-like’ farmers who can afford and are willing to pay for their services (Rivera, 2011). Those farmers who see a benefit in the advice are prepared to pay compared to those who do not. This reflects free market forces in operation (Stone & Broadbent, 2008).

It is important to also note that not all farmers use consultants. There has been minimal research into the motivation behind farmers’ use of consultants. (Mayberry, Crase, & Gullifer, 2005) found farmers who are striving for improved financial returns are more likely to employ a consultant to lift production and profitability than those who farm as a lifestyle choice or are focussed on natural resource management.

Agribusiness and private consultants are in close and frequent contact with farmers. Subsequently, Stone and Broadbent (2008) suggest that the public sector should consider the
role of the private sector in capacity building. Reflecting international trends, Paschen et al. (2017) predicts that the private sector in Australia will continue to play an increasing role in funding, managing and delivering RD&E. Although, this change is likely to occur unevenly across industries and localities. Private sector advisers are a primary source of technical information for farmers (Stone & Broadbent, 2008). Increasingly, farmers are seeking more competent advisers as their businesses become more complex and demanding (Paschen et al., 2017). Stone and Broadbent (2008) suggest there is also scope for the private sector to act as a feedback mechanism between farmers and R&D organisations so that farmers can provide input into R&D funding and priority decisions.

### 2.9.3. Industry involvement in extension

For the purpose of this research study, ‘industry’ is defined as those groups and organisations involved in agricultural extension which receive funding from both the private and public sectors. It is considered that there are two categories of agricultural extension service provider within this sector: those at the regional scale such as farmer organisations, cooperatives and groups; and those at the industry scale such as RDCs, CRCs and universities. Each service provider is discussed separately below.

#### 2.9.3.1. Farmers

Ryan and Gross (1943) established that farmers are an important information source for other farmers (see Section 2.3.2). Farmers exchange information at various events such as field days, paddock walks and workshops as well as through everyday communication. Farmers are generally willing to share information and it is likely to be locally relevant. This information is highly valued by other farmers and considered to be from a credible source (Bowyer & Shanks, 2007).

#### 2.9.3.2. Farmer groups

Many farmer organisations, cooperatives and groups co-exist throughout Australia. Farmer groups as they exist now have largely developed and evolved since the mid 1990s (Long & Cooper, 2011). Groups range from large national groups with thousands of members to smaller, local groups. Many farmer groups provide extension services to their members (Umali-
Deininger, 1997). Broadly, each group aims to improve productivity and sustainability for its members (Long & Cooper, 2011). Some groups appear to form because of a perceived need to attract more R&D to their local region due to specific, localised problems. Other groups form as a result of a perceived isolation from services (Gianatti & Carmody, 2007), to facilitate the flow of information or from a desire to find other farmers who are also committed to a particular practice (Marsh & Pannell, 2000b).

The withdrawal of the public sector discussed earlier in Section 2.5 has seen an increase in farmer participation in group activities and the emergence of new groups. Gianatti and Carmody (2007) report that farmers want information more specific to their needs. Since the ‘Decade of Landcare’ in the 1990s, there has been a rapid increase in the number of farmer groups with a natural resource focus (Taylor, 2013). Farmer groups collaborate with a range of other stakeholders from all sectors. They also attract sizeable funds from various sources (Bowyer & Shanks, 2007; Long & Cooper, 2011). Some farmer groups employ staff (Umali-Deininger, 1997) and some groups contract for RD&E to address their specific needs (Gianatti & Carmody, 2007). Gianatti and Carmody (2007) suggest that farmer group involvement in the research process can be classified into three levels which are outlined in Table 2 below.

Table 2: Three current levels of farmer group involvement in the research process (adapted from Gianatti and Carmody (2007))

<table>
<thead>
<tr>
<th>Process</th>
<th>Identification and supply of field sites</th>
<th>Roles within a larger project</th>
<th>Co-development and leadership of research initiatives</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researcher describes field site needs. Group members provide sites. Researcher liaises directly with host farmer.</td>
<td>Farmer groups complete one part of a larger project.</td>
<td>Farmer groups and researchers develop and implement a new project together. Project idea initiated by either party. Idea developed in partnership before funding application is submitted.</td>
</tr>
<tr>
<td>Example</td>
<td>Selection of trial sites for testing of a new crop variety.</td>
<td>Survey the group members, organise focus groups, coordinate extension events e.g. paddock walks.</td>
<td>WA No-till Farming Association Conservation Farming Project.</td>
</tr>
<tr>
<td>Farmer Benefits</td>
<td>Research results are more applicable as trials are conducted under local conditions. Develop relationships with researchers.</td>
<td>Farmer group formally written into the project and its budget. Recognition at state / national scale. Improved negotiation and project management skills.</td>
<td>Increased relevance of research completed in local area. Greater benefits to members. Farmer ownership of project outcomes. Improved project management and leadership capacity.</td>
</tr>
<tr>
<td>Researcher Benefits</td>
<td>Reduced time for site selection. Increased opportunities to communicate with farmers.</td>
<td>Wider extension of research outcomes.</td>
<td>Defined roles to build on each partner’s strengths. Farmer involvement often provides credibility for research.</td>
</tr>
</tbody>
</table>

Farmer groups are not only effective research partners but are also a very effective means of delivering research outcomes (Taylor, 2013). Conducting research with farmer groups and
utilising bottom-up extension approaches (see Section 2.4) ensures research outcomes are applicable to farmers. When designed properly, this approach can overcome the major criticism of traditional top-down public extension which is, namely, research which is inapplicable to farmers and does not satisfy their needs or interests (Gianatti & Carmody, 2007).

In most cases, the success of the farmer group is the result of the efforts of a few local ‘champions’ who have the motivation to make changes in their community (Long & Cooper, 2011). The greater the input farmers have into the planning phase of a project, the greater the impact of the outputs on the farmers (Kearns, 2006). Research in this area suggests learning in groups is an effective mechanism for most farmers and assists them to support each other to adapt to change. These groups provide a common focus for farmers to network with each other as well as with industry partners, allowing for the ownership of information extended and knowledge created (Taylor, 2013). Kilpatrick, Bond, Bell, Knee, and Pinkard (2003) suggest there is also evidence a multi-stakeholder approach allows for greater adoption of the technology or practice being tested.

Working with farmer groups also assists in reducing the transaction costs associated with one-to-one extension. Groups can source, generate and disseminate information to members using a wide range of methods (Stone & Broadbent, 2008). Many farmer groups undertake significant extension activities such as paddock walks and field days. Networks of farmer groups can provide researchers with opportunities for greater impact well beyond partnerships with one or two farmer groups (Gianatti & Carmody, 2007; Long & Cooper, 2011).

In some circumstances, belonging to several farmer groups contributes to an information overload (see Sections 2.8.2.1 and 2.8.2.2). Feder et al. (2011) report that the effectiveness of extension approaches which involve farmer groups depends on the amount of social capital which exists at the local level. Another challenge of farmer groups is avoiding social exclusion and elite capture. Poor farmers and socially marginalised groups typically play a limited role in the leadership of farmer groups. In particular, the representation of women is often low. Feder et al. (2011) suggest one strategy to deal with the elite capture and the social exclusion problems is the formation of specialised organisations or the allocation of reserved seats on boards and committees.
2.9.3.3. **Rural Research and Development Corporations**

The rural RDCs which co-exist in Australia are a unique partnership between the public sector and industry. RDCs recognise the benefits of participatory approaches and collaboration amongst the sectors (Australian Government, 2009).

Most of the RDCs are commodity-based, encompassing the cotton, dairy, fisheries and aquaculture, forest and wood products, grains, grape and wine, horticulture, meat and livestock, pork, sugar and wool industries (Australian Government, 2009). The Australian Meat Processor Corporation supports the Red Meat Processing Industry (Australian Meat Processor Corporation Ltd., 2014), while the Rural Industries Research and Development Corporation (RIRDC) invests in R&D on behalf of smaller, new and emerging industries. It also covers generic, cross-cutting issues such as farm safety, trade and quarantine (Australian Government, 2009).

The RDCs are funded by levies on production within their industry matched by dollar for dollar contributions from the federal government. Hence, RDC programs and priorities are identified by both industry and the government, creating dual accountability and outcomes that are in the best interests of both farmers and the public (Australian Government, 2009).

The role of RDCs is to facilitate, disseminate, adopt and commercialise the results of R&D. Industry is involved throughout the R&D process from issue identification through to adoption of R&D outputs (Australian Government, 2009). All the RDCs take a collaborative approach and develop partnerships with other stakeholders to ensure the sustainable management of natural resources within their respective sectors (Australian Government, 2009). Due to the changing role of the public sector explored in Section 2.5, RDCs can no longer rely solely on government extension services to extend their research. Therefore, Paschen et al. (2017) argues that the expected further privatisation of agricultural extension is at odds with the RDC co-funding model. Hunt et al. (2014) reports that in some cases, RDCs continue to depend on public sector expertise, capacity and infrastructure to deliver some RD&E services. This is partly explained by a ‘market-failure’ of the system in filling particular gaps. However, (Coutts et al., 2005; Marsh & Pannell, 1998, 2000b; Mullen, Vernon, & Fishpool, 2000; Prinsley et al., 1994) argue that RDCs have taken a more proactive role in extension and act as coordinators and wholesalers of information marketing activities. Subsequently, relationships have developed with other
industry groups, government agencies and the private sector (Coutts et al., 2005; Marsh & Pannell, 1998, 2000b; Mullen et al., 2000; Prinsley et al., 1994).

The RDCs contract the private and public sectors to provide RD&E services (Hunt et al., 2012). Long and Cooper (2011) report agribusiness is of the opinion that RDCs should also be funding agribusiness-driven research programs, because agribusiness is more familiar with farmer needs. However, Long and Cooper (2011) also report that there is reluctance on the behalf of RDCs to fund ‘private’ research due to the possibility that the only beneficiaries of the research would be the farmer clients of the private business.

2.9.3.4. Cooperative Research Centres

The CRC program was launched by the federal government in 1990. CRCs are collaborative research ventures utilising participatory approaches to bring together researchers from universities, industry and the public and private sectors. The CRC program aims to develop formal links and build effective networks. The close interaction between researchers and the users of research is a key feature of the CRC program. Another feature is the strong education component which produces graduates with skills relevant to industry needs (Department of Innovation Industry Science and Research, 2009).

Initially, many CRCs relied on state departments of agriculture for delivering their extension activities. However, as a result of the restructure within state departments, CRCs found alternate methods of disseminating the results of their research, and now utilise their close relationships with industry and the private sector (Marsh & Pannell, 2000a). An example was the partnership between the CRC for Plant-Based Management of Dryland Salinity (Salinity CRC) and AWB Landmark, a large agribusiness company. The project, Promoting Salinity Solutions through Agribusiness, aimed to increase the area sown to lucerne and other perennials in southern Australia to manage and ameliorate dryland salinity by providing Landmark agronomists with the latest information. Landmark agronomists would then disseminate the information to their local networks of farmers, the ultimate target of the project (Bowyer & Shanks, 2007).
2.9.4. **Tertiary institutions**

While not necessarily providers of extension services, universities provide training in agriculture and natural resource management through undergraduate and postgraduate courses. They also carry out research in conjunction with the public sector, farmers, other research institutions and industry (Murphy et al., 2013a). TAFE institutions play a similar role and provide training in agriculture and natural resource management through certificate, diploma and advanced diploma courses. However, they differ from universities in that the courses are very practical and tailored to job requirements whereas university courses tend to be more focused on theory. Further, TAFE institutions do not generally have research programs (Bowyer & Shanks, 2007).

2.10. **THE IMPLICATIONS OF INCREASED INDUSTRY AND PRIVATE SECTOR INVOLVEMENT IN THE INFORMATION EXCHANGE INTERFACE**

As a consequence of the restructure and withdrawal of the public sector from the information exchange interface, an opportunity was presented for industry and the private sector to undertake some of the extension functions which were traditionally the responsibility of the public sector (Feder et al., 2011). Various authors have raised concerns and identified challenges which may arise due to the increasing input from industry and the private sector into agricultural RD&E (Klerkx et al., 2017). Some of these concerns and challenges have been explored previously in Sections 2.9.1 and 2.9.2. The purpose of this section is to detail other challenges and discuss the consequences.

2.10.1. **The challenges of increased industry and private sector involvement**

Many authors have explored the potential challenges arising from increased industry and private sector involvement in the information exchange interface. Stone (2005) acknowledged that research results conducted for private clients may be either unavailable for more general use or alternatively, may have a charge attached to their wider dissemination. Eastwood et al. (2017) echo these concerns. Other authors have expressed concerns that private research will lead to a greater duplication of research (Black, 2000; Lindner, 1993; Marsh & Pannell, 1998, 2000b; Prinsley et al., 1994). Coutts and Botha (2017) add that conflicting data may become available. Hunt et al. (2012) propose private research has contributed to a disconnection in the RD&E feedback loop.
Furthermore, Prinsley et al. (1994) and more recently Hunt et al. (2012) point out conflicting information could become available to farmers. Moreover, these authors suggest there is a risk in relation to the reliability and independence of advice being provided by agribusiness. Prinsley et al. (1994) argue there is a need to ensure private sector advice is of a quality standard. Consequently, as explored in Section 2.8.1, Cocklin et al. (2007) report many farmers have expressed a preference for government funded research and extension, which is regarded as more independent. Furthermore, Marsh and Pannell (1998) argue research conducted by the private sector is not subject to the same level of critical review as public sector research, thus not adequately ensuring the validity of the research. However, Marsh and Pannell (1998) also point out, that in their defence, the private sector has its professional integrity and reputation to maintain and is unlikely to make unwarranted recommendations. Furthermore, Feder et al. (2011) propose those stakeholders who perform unsatisfactorily will be eliminated by market forces. However, while poor performance will be revealed over time, farmers in the meantime may incur a financial loss by acting on poor advice. For this reason, Coutts et al. (2005) propose having in place a public extension service which can authenticate the reliability and validity of recommendations. Feder et al. (2011) and Rivera (2011) argue there is a need for regulatory oversight and certification of extension providers to reduce financial losses potentially experienced by farmers as a result of following poor advice.

The onus is increasingly on farmers to be able to determine the value and relevance of information to their situation and they increasingly need to rely on their own problem-solving skills (Marsh & Pannell, 2000b). There are also concerns for the capacity of advisers to critically evaluate information (Stone, 2005). The sheer number of alternative sources of information and products provides a challenge to farmers and advisers (Marsh & Pannell, 2000b). Stone and Broadbent (2008) propose the development of an information repository and a collaborative knowledge management and feedback system. In addition, Macadam et al. (2004) also identified a risk of an information drought in areas of the agricultural sector, resulting in disadvantage where extension services are limited.

Many writers have commented on the increased costs of accessing information in the information exchange interface. As a result of the increased costs, Rivera (1993) and Stone (2005) report some farmers are more reluctant to share information they have paid for. Further, as previously mentioned, some farmers cannot afford to purchase advice (EU SCAR, 2012) and
Anderson and Feder (2004) suggest this group may undervalue information because they are less able to prejudge its value. What’s more, this group will not be targeted by the private sector. According to Rivera (1993) and EU SCAR (2012), the bias of a ‘privatised’ extension system is toward larger, wealthier farm businesses. Furthermore, research conducted by Stoyles (1992) found some private consultants only dealt with more ‘innovative’ farmers (see Section 2.9.2.1). Research by Feder (2011) found input supply companies will only provide advice on matters for which they have a product to address the issue; and they concentrate their business activities in areas of higher potential, or on higher-value crops, or on better performing farmers. Marsh and Pannell (2000) also cite similar experience in New Zealand, finding input supply companies provided extension services to their ‘best customers’ only. According to several authors, this bias is predictable. The study carried out by Feder (2011) also concluded private sector extension was biased toward more educated farmers, although not necessarily those with large landholdings. Prinsley et al. (1994) state that the private sector could effectively extend to smaller, resource-poor farmers, if they were wholly or partly funded to do so. The topic of farmer segmentation is discussed later in this section.

Research conducted by Hall and Kuiper (1998) on the privatisation of extension in New Zealand found that farmers were initially unwilling to pay for consultancy services. However, the adoption of advice by farmers receiving advisory services was much higher after privatisation than before. This improvement was attributed to two reasons. Firstly, farmers who pay an adviser receive very specific advice that is immediately applicable to their situation. Secondly, farmers place more value on advice they have paid for. However, this apparent increased adoption of advice may be attributed to fewer farmers being advised. It is possible the farmers who pay for advice are also those who tend to adopt advice. Consequently, the total number of farmers who adopt advice may not be greater than before privatisation but the percentage of farmers receiving advice and adopting it may be much greater.

As well as increased costs for accessing information, Hunt et al. (2012) report an escalation of transaction costs in the information exchange interface. For instance, public sector researchers incur costs if they need to rely on the private sector for practical feedback on their research. Outsourcing also creates large transaction costs (Hunt et al., 2012).

Hunt (2012) reported that the restructuring and withdrawal of the public sector has also resulted in short-term funding and thus employment tenures rather than continuing employment. This
impacts on the building of professional capacity (Stone, 2005) by inhibiting professional succession, retention of expertise and maintenance of relationships between and within the sectors (Hunt et al., 2012). Paschen et al. (2017) reported similar findings.

Coutts et al. (2005), Stone (2005), Prinsley et al. (1994) and Marsh and Pannell (1997) have pointed out that the public sector provides many more training opportunities than the private sector (as well as industry – discussed later) and staff within the private sector may not receive adequate training. Stone (2005), Murphy, Nettle, and Paine (2013b) and Paschen et al. (2017) raise the issue that there are now difficulties in accessing suitable experienced advisers due to the public sector no longer supplying enough appropriately trained staff which the private sector can then source. This means that the private sector must or should train and mentor staff, however there are questions as to whether they are able to do so.

Another potential shortcoming is the loss of economies of scale in staff training (J. R. Anderson & Feder, 2004). Further, agribusiness often nominates quite defined numbers of days allocated to professional development and is unable to allocate more (Stone, 2005). In addition, (Paschen et al., 2017) reported that only a few employees in the private sector offer career paths. As a possible solution to these problems, Coutts et al. (2005) and Feder (2011) suggest the public sector could have a primary role in providing ongoing training to private sector advisers. Feder (2011) acknowledges that in developed countries such as the United Kingdom and New Zealand, the privatisation and restructuring of the public extension system released large numbers of competent potential advisers into the market. However, Feder (2011) suggests this is a short-term solution.

A further challenge experienced by the private sector is that it tends not to have the administrative resources to compete for projects. It also lacks the range (though not depth) of intellectual capacity and experience to match publicly funded agencies (Stone, 2005). Despite the increased private sector involvement in agricultural extension, there is evidence of poor private sector input into public sector policy and research (Marsh & Pannell, 1998; Stone, 2005). Subsequently, there is a potential gap in providing practical feedback into research. According to Stone and Broadbent (2008), the private sector can now be considered as the major extension provider in Australia. However, Stone and Broadbent (2008) suggest more consideration needs to be given at the policy level of the private sector’s role in capacity building and as a catalyst
for change. Many public sector agencies and RDCs are conducting extension activities that specifically target private sector advisers such as adviser updates and agronomist workshops. However, this appears to be more orientated to getting information out rather than gaining input into policy and research directions. Many public sector agencies would like to develop formal links with the private sector, but according to Stone and Broadbent (2008), they have not got much beyond running technical workshops. These findings are supported by more recent findings by Paschen et al. (2017). However, Marsh and Pannell (1998) along with Stone (2005) believe that as these contacts become more frequent, and as more partnerships between the public sector and industry develop, the value of information provided by the private sector will become clearer to the public sector, and the opinions of those working in the private sector will inevitably influence public sector policy direction. Although, more recently, Paschen et al. (2017) discovered that public sector and RDC collaborations with private sector advisers and farmers was dominated by top-down, linear, technology transfer models, where the knowledge of agricultural researchers was prioritised over the practice-based knowledge of advisers and farmers. Therefore, the private sector is limited in its ability to contribute to R&D decisions.

There are also inconsistencies in the market place in regard to fee-for-service and Stone (2005) claims that the private sector cannot function efficiently until the public sector clearly defines its role. Where the private sector identifies a gap which promises profitable opportunities, it may develop a service to fill that gap. However, according to Stone (2005), public sector agencies and RDCs who provide free or subsidised advice are sending mixed messages on the value of advice. There is little clarity concerning which public sector services will have a charge attached (Stone & Broadbent, 2008). Prinsley et al. (1994) suggests that, while the public sector continues to alter its policies, the private sector cannot easily establish its services.

### 2.10.2. Fee-for-service extension

Private consultants have traditionally always provided fee-for-service (see Section 2.9.2.2). Agribusiness on the other hand has traditionally provided advice linked to product sales. Agribusiness responded to the restructure of the public sector and its gradual withdrawal from extension services by providing fee-for-service and this service is commonly used by farmers today (Hunt et al., 2012).
Further, farmer requirements for information and advice have expanded in recent decades, and Rivera (2011) suggests that ‘traditional’ public sector extension cannot be expected to meet all farmer requirements. As agriculture becomes more specialised, the private sector is better situated than the public sector to provide technical assistance and Rivera (2011) suggests some farmers are increasingly bypassing public sector extension (if it is available) and seeking advice from the private sector.

The demand for agricultural extension services, and therefore the willingness to pay for them, depends on the expected benefits from the new information. The type and level of demand will be determined by the financial situation of the farm business, the cost of the extension service, and the additional income generated as a result of adopting the advice. Given that a farmer cannot buy only part of the service and that a fixed or negotiated fee is usually paid, medium and large-scale businesses can spread the cost, resulting in lower per unit costs and higher rates of return. Fee-based services have received negative reactions from small farmers who cannot afford the services. The focus of the private sector is therefore on clients whose profits can be maximised and on geographical areas with fertile soils and satisfactory infrastructure. Rivera (2011) propounds this tendency reinforces existing patterns of inequality. On the other hand, the larger the farm business, the greater the potential demand for fee-for-service and the private sector will target these farmers (Umali-Deininger, 1997). Consequently, fee-for-service tends to be biased toward larger, wealthier farm businesses (Rivera, 2011).

2.10.2.1. Farmer segmentation

Profitability is the main criterion for private sector advisers. Subsequently, the private sector tends to choose clients who will be more profitable to them. Stone (2005) reports the private sector now segments its client base and provides different levels and types of service to each segment or alternatively, only provides services to a particular segment. There is a tendency for businesses to focus largely on those clients that generate the greatest return on investment. Generally, extension agencies have categorised their clients into either so called ‘top-end’ or ‘bottom-end’ farmers (Stone, 2005; Vanclay, 1994b). In order to explain the influence of the information exchange interface on farmer decision-making, there is a need to differentiate between, and define, a ‘top-end and a ‘bottom-end’ farmer.
‘Top-end’ farmers

Top-end farmers are those who operate in a globally focussed business environment and concentrate on ‘doing business’. They mostly rely on fee-for-service advisers who have no pecuniary interest in the advice they provide and they are prepared to pay accordingly (Bowyer & Shanks, 2007). Top-end farmers are wary of resellers and believe their advice often has ‘strings attached’ (Stone, 2005). They will use resellers, however, for a second opinion and confirmation (Bowyer & Shanks, 2007).

The age and experience of advisers is an issue for top-end farmers, who are wary of advice given by advisers they see as being young and inexperienced and without practical life experience. They perceive approximately ten years of experience is necessary before they will trust an adviser enough to allow them to inform their decision-making (Stone, 2005). Stone (2005) suggests that this may result in a human capital crisis in the future, with not enough advisers available to service demand (Stone, 2005).

Stone (2005) found the top twenty per cent of farmers are almost completely reliant on the private sector to inform their decision-making. Most of these farmers concentrate on managing the business, whilst leaving much of the agronomic and production work to their farm manager or contractors. This is commonly the case in the grain, dairy and horticulture industries in particular.

‘Bottom-end’ farmers

Bottom-end farmers, who make up approximately twenty per cent of the farming sector, are experiencing difficulty accessing information and advice, particularly because they are not willing to pay, and access to free advice is increasingly limited. Public sector services have largely disappeared, with the exception of conservation-related services (Stone, 2005).

The role of agribusiness’ retail agronomy services (see Section 6.3.2.1) is important for this group (Prinsley et al., 1994). Bottom-end farmers do not recognise that they are paying for the advice through the cost of the product or simply choose to ignore the fact that the costs are built in (Stone, 2005).
Bottom-end farmers are resisting the change to private sector advice. Stone (2005) reported that this group of farmers are of the opinion that free government extension services will continue, despite the obvious withdrawal of the public sector from the information exchange interface in recent decades. Stone (2005) reported that those farmers who do not pay for advice are expected to exit the industry.

The level of service farmers receive from the private sector is determined by their profitability to the private sector and many providers are looking to let go of their unprofitable clients. Some industries are more prepared to pay for information and advice than others. These include the grains, dairy, horticultural and intensive industries. This means some industries have low level advisory services, as the profitability is not there to sustain the services (Stone & Broadbent, 2008).

The private sector’s segmentation of their client base is similar to the categorisation proposed by Rogers (2003) on innovativeness mentioned in Section 2.3.2. Rogers (2003) defines innovativeness as the degree to which an individual or other unit of adoption is relatively earlier in adopting new ideas than the other members of a system. Rogers (2003) proposes members of each adopter category have much in common. For example, the literature describes farmers who adopt an innovation early (innovators) as information seekers, they have a high degree of mass media exposure, are younger (Lionberger, 1960), more cosmopolitan (Coleman, 1957) and their interpersonal networks extend over a wide area reaching outside their local system. Innovators have higher incomes than later adopters (Lionberger, 1960), and have the largest operations of all adopter categories (Coleman, 1957).

On the other hand, members of the late majority category are generally of a lower socioeconomic status, make little use of mass media channels, and learn about most new ideas from their peers (Rogers, 1962). The various adopter categories differ in their sources of information, with innovators relying on primary sources and later adopters relying on word of mouth (Ryan & Gross, 1943).

Van den Ban & Hawkins (1996) stress that care must be taken when interpreting this information, because it does not distinguish between cause and effect. Many studies show clearly that people who have adopted many innovations have frequent contact with change.
agents. However, it is unknown if this contact results in the adoption of innovations, because people interested in innovation seek contact with change agents, or because change agents seek contact with these people. All three factors most likely play some role. Also, some relationships, while being positive, are very low (van den Ban & Hawkins, 1996).

### 2.10.3. The implications for sustainability

Although Klerkx et al. (2017) acknowledge that fee-for-service has reportedly lead to greater client satisfaction, there are concerns regarding whether and to what extent the private sector will give priority to sustainability. Rivera (1993) argues that fostering a profit-first-and-foremost orientation toward agricultural development is likely to be unsustainable. Klerkx (2010) suggests that private sector advisory services pertaining to environmental sustainability and food safety issues is sub-optimal. According to Stone (2005), there are few incentives for the private sector to focus on sustainability.

As the private sector is motivated by generating profit, this often means public good issues which clients are not prepared to pay for are not yet areas that can sustain fee-for-service (Bruges & Smith, 2008). Consequently, Klerx and Jansen (2010) propose policy measures to stimulate farmer demand for sustainable farm management advice (pull measures) and to build capacity among advisers (push measures).

Klerkx and Jansen (2010) suggest a balance between push and pull measures is necessary. Findings from Klerkx and Jansen (2010) suggest creating awareness of sustainable farm management advice is an important prerequisite to creating demand and appears more important than economic incentives. For example, following complete privatisation of agricultural extension in The Netherlands, farmers were given a voucher to purchase advice. However, the voucher was only used by one third of farmers. Klerkx and Jansen (2010) found that rather than stimulating farmer demand, the voucher stimulated advisers to provide the advice.

Valeeva, Lam, and Hogeveen (2007) found that fining farmers for environmental and food safety breaches had a greater influence on their behaviour than incentives. This finding is supported by following work by Klerkx and Jansen (2010).
Klerkx and Jansen (2010) also found that farmer perceptions of the cost of the damage caused by the problem compared to the cost of the advice also influenced them to change (Klerkx & Jansen, 2010). That is, if farmers were shown that the problem was costing more than the advice, they would be motivated to change their practices.

Notwithstanding the above, Klerkx and Jansen (2010) suggest it is most important of all to have a broader institutional support network which is conducive to a proactive approach to addressing sustainable farm management.

As a result, of the area of providing sustainable farm management advice being generally unprofitable and therefore failing to attract private sector advisers, Rivera and Alex (2004) suggest that the government should remain responsible for ‘public good’ extension to encourage sustainable farm management. There have been examples where industry and the private sector have been funded by the government to undertake sustainability work so that the farmers did not have to pay via fee-for-service. Stone (2009) reports the private sector has utilised Natural Heritage Trust funds for natural resource management work. However, Stone (2009) also reports government distrust of private sector profit motives has adversely affected this type of natural resource management advice by the private sector.

2.11. INSTITUTIONAL ARRANGEMENTS: RELATIONSHIPS BETWEEN SERVICE PROVIDERS WITHIN THE INFORMATION EXCHANGE INTERFACE

The notion of institutional arrangements was previously introduced in Section 2.7. With the gradual withdrawal and restructure of public sector extension services, effective, modern extension delivery relies on collaboration, and institutional relationships have become more dominant (Birner et al., 2009). Consequently, the nature of the information exchange interface means all extension services are influenced to some degree by institutional arrangements (Feder, 2011). As Section 6.3.1 reveals later on in this thesis, the private sector still relies on the public sector for support.

Rivera (2011) emphasises the importance of positive relationships between the public and private sectors. As this chapter has established, there has been a shift in Australia from state agencies being the primary provider of agricultural extension services, to their withdrawal, change in focus and subsequent encouragement of other providers. This has led to increased
industry and private sector provision of agricultural extension services and the formation of partnerships between industry and the public and private sectors (SELN, 2006). These relationships are discussed in this section.

The increasing involvement of industry and the private sector in the information exchange interface raises questions about the relationship of these agencies to one another and to the public sector (Black, 2000). Marsh and Pannell (1998) and Prinsley et al. (1994) suggest there is anecdotal evidence that the sectors work well together, particularly at the farm level. However more recently, Stone and Broadbent (2008) argue that the relationship between industry and the private sector is quite weak and there is an absence of communication between advisers at the ‘grass roots’ level and research funding bodies.

### 2.11.1. Competition between the service providers

While an information-rich environment is clearly preferable to one that is information-poor, and while one might argue that the market itself will take care of competing sources of information and advice, there is concern regarding the coordination between service providers within the information exchange interface. Black (2000), Coutts et al. (2005), Prinsley et al. (1994), Ridley (2004), Rivera (1993) and Thomas and Smith (1993) all emphasise the importance of a cooperative rather than a competitive relationship between the various sectors in the information exchange interface. Stone and Broadbent (2008) suggest a competitive relationship has developed between some service providers due to cultural differences and some suspicion from the public sector regarding the profit-based motives of the private sector. Stone and Broadbent (2008) suggest that R&D organisations perceive the private sector use R&D outputs to generate profits for itself, which appears at variance to the notion that farmers (that is, levy payers) are encouraged to make money from implementing R&D outputs. Stone (2005) suggests the private sector is well situated to provide targeted, relevant information to its clients and is driven by making a profit from the advice, yet also has its reputation to uphold and therefore needs to ensure the integrity of its advice.

On the other hand, Stone and Broadbent (2008) suggest the private sector also perceives the public sector to have different ideas and motivations that are inconsistent with its own approaches. The communication strategies that work the most effectively relate to previous (now private sector) government employees who maintain relationships with those in
government. King and Nettle (2013) discovered informal networks between highly connected and respected individuals underpin knowledge that sharing across the various sectors. Stone and Broadbent (2008) found there was little communication amongst the major agribusiness companies at a corporate level due to strong market competition. King and Nettle (2013) also found indications of disconnects within the private sector. The limited collaboration was due to a perceived conflict of business interests and preference for different business models (relational driven or margin driven). Further, Stone and Broadbent (2008) found there was limited communication within the private sector between private consultants and agribusiness due to competition.

King and Nettle (2013) suggested professional relationships need to be improved within the private sector to ensure farmers received consistent and appropriate advice. This may involve developing strategies to align private business goals. Nonetheless, there is common ground between industry and the private sector. The ultimate goal for each sector is to deliver information to farmers synthesised into messages farmers can understand and apply to their own businesses to increase productivity and profitability (Stone, 2008).

Stone (2005) reported that the private sector is driven by farmer profitability. Stone (2005) identified a cultural barrier between the private sector and farmers which exists due to differences in perceptions of profitability and accountability. Stone and Broadbent (2008) suggest these barriers need to be further understood in order to improve engagement.

2.11.2. Relationships between industry and the private sector

Stone (2009) identified limited strategic engagement between RDCs and agribusiness and their understanding of one another. Stone (2009) found some RDCs were beginning to engage with agribusiness at several levels and there was evidence that a greater understanding of the key business drivers for farmers and agribusiness was necessary. However, more recently, Paschen et al. (2017) reported that RDCs were perceived as knowledge gatekeepers and their efforts at collaboration with the private sector were not perceived as genuine. Stone (2009) also reported that there were also differing terms of trade used by agribusiness and RDCs that were restricting engagement and needed to be understood and recognised.
RDCs and CRCs have begun to realise the private sector is an integral capacity building mechanism that has yet to be fully canvassed (Stone & Broadbent, 2008). According to Stone and Broadbent (2008), the private sector would like to develop stronger collaborations with RDCs and values personal interaction with researchers. The private sector is seeking ways to access all the available information from the various providers within the information exchange interface. Further, the private sector would like to provide feedback and input into R&D priorities.

Agribusiness, farmers and RDCs are not homogenous groups and acknowledgement of the diversity is necessary to achieve effective RD&E. Agribusiness has a strong desire to engage with R&D providers and could act as a feedback mechanism. Research has found some industry organisations and some agribusiness companies have established effective working relationships. This approach has been to the benefit of some farmers and some agribusiness companies, but not necessarily to the whole industry (Stone, 2009). Stone (2009) concluded that it is important to engage all RD&E providers to facilitate the role of the private sector in capacity building. Hunt (2012) suggests it would be beneficial to enhance the relationships between all of the various sectors within the information exchange interface (Hunt et al., 2012).

2.12. CONCLUSION

Agricultural extension is an ambiguous concept with no universal definition of the term. The purpose of agricultural extension is to build the capacity of farmers to improve their decision-making so that they can improve the management of their farm businesses in order to improve their quality of life (Omar, Bakar, Jais, & Ibraik, 2011). The two main extension models are commonly referred to as participatory ‘bottom-up’ and traditional ‘top-down’ extension. Bottom-up approaches evolved in response to the failures of top-down approaches, particularly when they were applied to non-industrialised countries and sustainable agricultural practices. New terms and theories developed such as ‘farmer-first’ (Farrington and Martin, 1988; Chambers et al, 1989; Chambers, 1997) and ‘farmer participatory research’ (Okali et al 1994). Participatory approaches have been particularly successful in natural resource management (Dunn, 2008).

Transfer of Technology methods will continue to be effective in certain situations. RD&E programs based on the Transfer of Technology model have been remarkably successful in
increasing agricultural production. Participatory approaches on the other hand remain appropriate for raising awareness, improving stakeholder involvement and combining resources to solve problems that cross farm boundaries (Campbell, 2005).

The Transfer of Technology model does not easily allow for upward communication from farmers to influence the information flowing down from researchers. The bottom-up model on the other hand tends to over-emphasise participation, local knowledge and local problem-solving capacity. Neither approach is superior in all respects with each having its limitations (Röling, 1988). Effective extension therefore requires the full repertoire of extension approaches, carefully chosen according to context (Campbell, 2005). Effective extension also requires a client-orientation. That is, a sound knowledge and understanding of the client’s needs and opportunities. Extension cannot solve any problems unless it is aware of the problems (Röling, 1988). The lack of farmer feedback regarding their needs and priorities hinders effective extension programs (Feder et al., 2011). The most effective extension approaches have strong bottom-up flows of information from farmers to researchers (Röling, 1988). Effective extension must also consider the capacity of R&D organisations in terms of tangible opportunities, research-based information, technologies and sound ideas.

Agricultural extension services in Australia have undergone dramatic and rapid change. As a result of the restructure and gradual withdrawal of the public sector from the information exchange interface, there is now a multitude of service providers (King & Nettle, 2013). There has undoubtedly been a shift in public extension from one-to-one to group-based approaches and from a focus on production and economics to environmental and social concerns. There are various projects and programs taking place, funded by different combinations of public, private and industry investment (Campbell, 2005). Reforms have resulted in the private sector delivering more extension services, including institutional arrangements where the government continues to provide the funding. The private sector continues to expand the services it provides.

Extension is no longer viewed as the traditional, top-down public sector approach, but rather as a multi-institutional, ‘pluralistic’ system which comprises players from the public, private and industry sectors that use various extensions methods and models, notably bottom-up approaches (Hunt et al., 2012). Nonetheless, misunderstanding of extension theories persists.
For instance, many stakeholders now recognise the flaws of innovation diffusion theory, yet it remains influential in extension programs (Dunn, 1997).

Public and private extension providers should not compete with one another, nor should the private sector repeat the public sector’s efforts. Efforts should be made to seek and refine the arrangements that induce the best use of all service providers (Feder et al., 2011) to best assist farmers in their decision-making. The private sector has become a popular advisory service and this is unlikely to abate (Rivera, 2011). However, in spite of its benefits, private sector extension is no panacea and is not without its own challenges (Feder et al., 2011). The comparative advantage of each sector should be capitalised on (Umali-Deininger, 1997). It is imperative the public sector cooperate with and establish a working relationship with the private sector (Omar et al., 2011) in the information exchange interface. The sectors need to collaborate effectively to improve the environmental, economic and social sustainability of farm businesses by assisting farmers with their decision-making.

The purpose of the next chapter is to explore the notion of sustainable agriculture and how it has evolved. The chapter also considers the factors which influence a farmer’s capacity to change to sustainable agricultural practices and the role of extension in promoting sustainable agriculture.
CHAPTER THREE: EXTENSION FOR SUSTAINABLE MIXED-FARMING SYSTEMS

3.1. INTRODUCTION

The previous chapter defined agricultural extension and introduced the two main approaches in use. The chapter also provided a historical context of the discipline and expounded the evolution of agricultural extension in Australia. The nature of the information exchange interface was explored, including the contemporary emphasis on collaboration across and within the sectors. The chapter also identified the main providers of agricultural extension: the public sector, agribusiness, private consultants and industry, each with their own roles in the information exchange interface, supporting farmers in their decision-making.

Agricultural extension encompasses a diverse range of methods and activities which seek to improve the economic, environmental and social sustainability of any farm business (Omar et al., 2011). ‘Sustainability’ is an ambiguous and contested concept (Dibden & Cocklin, 2005; Lockie, 2001; Marsh, 1998). The guiding definition proposed in 1987 by the World Commission on Environment and Development (Brundtland Commission) emphasised that ‘sustainable development is that development that meets the needs of the present generation without compromising the ability of future generations to meet their own needs’ (World Commission on Environment and Development, 1987). This definition of sustainable development introduced three interconnected, mutually inclusive themes: the environment, society and economics that constitute the concept of sustainability (Omar et al., 2011).

The purpose of this chapter is to review the evolution of sustainable agriculture and demonstrate that in order to be sustainable, mixed-farming systems must be economically viable, meet human needs for food and fibre, provide quality of life for the farming family and conserve natural resources (Dibden & Cocklin, 2005).

3.2. PRODUCTIVIST AGRICULTURE

With respect to the developed world, industrial agricultural systems have dominated since post-World War II. Known as ‘productivist agriculture’, the sole concern of these agricultural systems
was maximum production of food and fibre (Ward, 1993). According to Robinson (2008), key elements were intensification, concentration and specialisation. Productivist agriculture aimed to maximise food production through the application of ever more intensive farming techniques and biochemical inputs. It was characterised by the modernisation of farming practices, mass consumption of agricultural inputs and the expansion of world food trade (Ward, 1993). Robinson (2008) adds that it also included government subsidies, price guarantees, and protectionist and interventionist policies that kept prices for agricultural products artificially inflated, giving farmers a strong sense of financial security, further encouraging more agricultural intensification and increased productivity and output (Robinson, 2008).

Along with this industrial production of food and fibre, productivist agriculture has also been strongly associated with the development of environmental, social and economic problems. In the early 1980s, critics of productivist agriculture began to claim it was unsustainable (Ward, 1993; Wilson, 2001). Productivist agriculture has been blamed for a range of environmental problems, including diminished biodiversity, removal of natural habitats, soil erosion, salinity, water pollution and a growing reliance on an excessively narrow range of crops and livestock. The threats posed to the environment vary in magnitude and type between productivist farming systems (Robinson, 2008). Similarly, there has been great variability in the extent to which productivist agriculture has delivered economic and social sustainability. According to Ward (1993), this has been most apparent in small to medium-sized family businesses, where the movement of people off the land has been significant for decades. The flight from the land has accompanied other trends fostering rural depopulation and subsequently reducing the social sustainability of both farming and rural communities (Robinson, 2008).

In seeking to explain the situation, commentators (Buttel, 2004; K. A. Gould, Pellow, & Schnaiberg, 2004; Obach, 2007; Schnaiberg, 1980; Ward, 1993; Wilson, 2001) have often used the term ‘the agricultural treadmill’. The treadmill of production was a theory introduced by Schnaiberg (1980) to investigate rapidly increasing environmental degradation. Farmers were increasingly embedded in the ‘treadmill’ of production and profit maximisation. The treadmill of production had environmental and social implications. In essence, the ‘treadmill’ notion points toward a problem of perpetual capital intensification with consequently intensified production and exploitation of natural resources. Once farmers ‘get on’ the treadmill, it is difficult for them to ‘get off’ (Schnaiberg, 1980).
3.3. WHAT IS SUSTAINABLE AGRICULTURE?

Throughout the world, despite recognition of the treadmill, agriculture is under increasing pressure to develop as a more sustainable activity. A consensus of informed opinion (Bowler, 2002; Martens, 2006; McIuskey, 2001; Omar et al., 2011; Stoneham, Eigenraam, Ridley, & Barr, 2003; Vanclay, 2004; World Commission on Environment and Development, 1987) recognises three dimensions of sustainable agriculture: environment, economy and society (Figure 7).

![Figure 7: The three spheres of sustainability (Omar et al., 2011)](image)

Stoneham et al. (2003) define environmental sustainability as the maintenance of biological assets for the future. Sydorovych and Wossink (2008) add that environmental sustainability includes attributes relevant to the impacts of production on the ecosystem. Agriculture has had a direct impact on biological assets because crop and livestock production requires the mass clearing of native vegetation. Consequently, habitat is fragmented or lost, and the remnants are further degraded through practices such as overgrazing, weed invasion and timber harvesting. The effect of these practices has been well documented elsewhere. However, they ultimately lead to a loss of biodiversity and even extinction (Bowler, 2002; Kemp & Martens, 2007; Ridley, 2005; Stoneham et al., 2003).
The indirect effects of agriculture occur largely as a result of altered hydrology associated with land clearing and chemical use. Land clearing has altered river flow patterns and water tables. Nutrient leakage from agricultural land has degraded water quality. In addition, increased nutrient transfer to habitat areas has changed natural ecosystems in favour of fertility-loving weeds (Bowler, 2002; Ridley, 2005; Stoneham et al., 2003).

According to Meul et al. (2008), an environmentally sustainable agricultural system must function within a stable agro-ecosystem, which can be ensured by optimising the quality of the natural resources including air, soil and water; and preserving biodiversity. An environmentally sustainable agricultural system is highly eco-efficient and conforms to the principle ‘produce more from less’. The emphasis is on sustainable farming systems that are capable of renewing themselves indefinitely. Sydorovych and Wossink (2008) suggest that in order to achieve this, it is necessary to select production practices that contribute to the ecological health of the soil, surrounding water resources, air, atmosphere, plants and animals.

Economic sustainability on the other hand refers to the maintenance of agricultural raw materials and services (Kemp & Martens, 2007). It also refers to the attainment of satisfactory levels of economic returns to farm land, labour and capital, and the costs of government subsidies to farming. However, the definition of ‘satisfactory’ is contested between farm and non-farm interests and is largely determined through policy (Bowler, 2002; Kemp & Martens, 2007).

Firstly, to be economically sustainable, Kemp and Martens (2007) point out that a farm must be profitable over time. It should also be able to maintain its productivity indefinitely by relying more on its own inputs and capital which would make it less vulnerable to external market fluctuations. A farmer must comply with various governmental regulations which may result in additional costs associated with time spent to gain an understanding of the new regulations, production adjustments in response to the regulation requirements, purchase of new inputs and equipment, and employee training (Sydorovych & Wossink, 2008). Further, Meul et al. (2008) state that an economically sustainable agricultural system minimises the risk of farming activities. That is, the production of value-added products is minimally impacted by external events such as a change in interest rates or a fall in price of agricultural commodities. Furthermore, the value added to products should be at least sufficient to remunerate the farm’s
production factors such as farm labour, capital and land, at a level that is comparable with other economic sectors (Meul et al., 2008).

Social sustainability views farmers in three distinct roles: as producers, consumers, and members of the community (Kemp & Martens, 2007). It also has two components: internal social sustainability and external social sustainability. The external social component relates to societal concerns regarding the impact of agricultural production. The responsibility of agriculture to consumers is to provide adequate quantities of safe food at a reasonable cost. Due to people not only consuming agricultural products but also being involved in their production, sustainable agriculture should provide sufficient employment opportunities in local communities and offer safe and comfortable work environments (Meul et al., 2008). Agriculture also impacts on the local economy by creating permanent seasonal jobs on farm and a share of farm income that will be spent locally contributing to the local economy and creating additional jobs. Additionally, standards of animal care describe how farm animals can adapt without suffering to the environment designed by humans. Recently, increasing attention has also been given to farmland aesthetics. Farms that are visually attractive positively affect local property values and attract tourists. Finally, on-farm public recreational opportunities, such as hunting, fishing, hiking, food and wine tasting, may have a positive impact on local communities and also provide opportunities for farm income diversification (Sydorovych & Wossink, 2008).

To satisfy the requirements of internal social sustainability, farmers and their families should have sufficient access to housing, income, health, labour, good and safe working conditions, services, facilities, education and financial security (Kemp & Martens, 2007). Farmers must also be able to live according to their own values and norms, within the limits perceived by the wider community. Social capital is also vital. Farmers should have diverse and trusting relationships with others. Social capital strengthens social cohesion and stability within communities. Hence, it eventually creates a broad social support base for agriculture (Meul et al., 2008). In addition, a farm that will discontinue current sustainable practices in the future is not considered to be sustainable. Therefore, the continuity of the farm within the family is also considered (Sydorovych & Wossink, 2008).

Sustainable agricultural development is one that produces abundant food without depleting natural resources or polluting the environment. It is agriculture that follows the principles of
nature to grow crops and raise livestock and develop farming systems that are, like nature, self-sustaining. Sustainable agricultural development includes vibrant rural communities, rich lives for farming families, and wholesome food for the larger population. No matter how accomplished the farmer is, no agriculture is sustainable if it is not profitable, able to provide a satisfactory income and quality of life. Sustainable practices lend themselves to family-owned and operated farms (Omar et al., 2011). Additionally, off-farm inputs should not be subsidised (Robinson, 2008) and local markets and food systems should be established, providing farmers with the opportunity to sell directly to consumers. As alternatives to industrial agriculture evolve, so must their markets and the farmers who serve them. Creating and serving new markets remains one of the key challenges for sustainable agricultural development. Sustainable agricultural development demands practice and technologies, which are technically appropriate, economically viable, environmentally non-degradable and socially acceptable (Omar et al., 2011).

Additionally, in order to maximise the sustainability of their mixed-farming systems, the capacity of farmers to think and act strategically and be adaptable to change is also extremely important (Kuruppu, Murta, Mukheibir, Chong, & Brennan, 2013). To reiterate from Section 2.6, capacity building is the present focus of agricultural extension. The strategic management and adaptive capacity of mixed-farming systems is detailed later in Section 4.9. The influence of the information exchange interface (detailed in Chapter Two) on the strategic management and adaptive capacity of mixed-farming systems is revealed later on and is a contribution of this thesis.

According to Stoneham et al. (2003), there have been significant changes to the size and structure of the rural sector in Australia. Some regions have experienced declines in population and economic wellbeing over the past decades. A number of factors have led to this outcome including productivist agriculture and demographic trends such as ageing populations, changing aspirations of rural youth and competition for labour in cities. Continued dependence on broadacre agriculture has generally led to declining rural populations and lower availability of services relative to urban communities. The emergence of major provincial centres has been another social change that has grown out of the inability of smaller towns to meet community expectations of education, health, cultural and business services (Stoneham et al., 2003).
As a result of the developing criticism of productivist agriculture, the mid-1980s saw a shift towards a 'post-productivist' ethos. Post-productivism implies that modern agricultural regimes and policies have moved beyond a principle emphasis on increasing food and fibre production, and are now comprised of a multitude of functions with an emphasis on food quality, environmental conservation as well as social and economic sustainability (Evans, Morris, & Winter, 2002; Walford, 2003; Wilson, 2004).

3.4. CRITERIA FOR A SUSTAINABLE AGRICULTURE

A search for sustainable agriculture has emerged from the recognition that productivist agriculture and industrialised food production are unsustainable (Bowler, 2002). Agricultural production is highly dependent on the specific natural conditions and socio-economic factors of its setting. For these reasons, agricultural sustainability should always be assessed within its specific context (Sedorovych & Wossink, 2008). Therefore, when developing criteria to assess the sustainability of an agricultural system, the criteria will be spatially and temporally variable. Nonetheless, various authors have expressed their ideas of a sustainable agriculture. For a system to be defined as sustainable at the scale of the farm and its immediate boundaries, Ridley (2005) suggests it should include the fundamental requirements of: acceptable leakage of water (some systems should have minimal leakage, while for others this is not required), minimal leakage of solutes, negligible erosion (wind or water), no persistent toxicity, sub-threshold pest, disease and weed incursions, no preventable loss of biodiversity in surrounding areas, sufficient profitability for people (including on and off-farm income), and sufficient quality of life for people living on the farm and within the community.

Agreeing with the above, Robinson (2008) further suggests sustainable farming systems should be less specialised and consist of a mixture of cropping and livestock enterprises to reduce dependence upon purchased inputs. Also, farmer decision-making should consider negative off-farm impacts such as groundwater contamination and removal of valued landscape features. Robinson (2008) also suggests that a mixture of management structures including family-owned and operated farms is more sustainable than all farms being corporately owned.

In the opinion of Norman, Janke, Freyenberger, Schurle and Kok (1997), a farm that places the most emphasis on short-term profit at the sacrifice of environmental quality is not sustainable long-term. However, pursuing environmental quality without ensuring the viability of short-
term returns is also not sustainable. A farm that is very productive but uses large quantities of a non-renewable resource, such as fossil fuel or a non-rechargeable aquifer, to achieve and maintain that productivity is also not sustainable long-term. Figure 8 below illustrates the attributes Sydorovych and Wossink (2008) associate with sustainable agriculture.

**Figure 8: Attributes of agricultural sustainability (Sydorovych & Wossink, 2008)**

Drawing from Ridley (2005), Robinson (2008), Norman et al. (1997) and Sydorovych and Wossink (2008), definitions of sustainable agriculture are generally concerned with the need for agricultural practices to be economically viable, to meet human needs for food, to be
environmentally benign or positive, and to be concerned with quality of life. Since these objectives can be achieved in a variety of ways, sustainable agriculture is unlikely to be linked to any particular management practice. Rather, sustainable agriculture is thought of in terms of its adaptability and flexibility over time to respond to the demands for food and fibre, its demands on natural resources for production, and its ability to protect the soil, water and other natural resources (Kuruppu et al., 2013). This goal requires an efficient use of technology in a manner conducive to sustainability. Because agriculture is affected by changes in markets and resource decisions in other sectors and regions, such changes often provide additional pressures leading to the depletion of local agricultural resource bases (Robinson, 2008).

An assessment of the sustainability of a production system involves looking forward, to a future that is often not universally agreed. It is often easier to look backward, and assess the progress of production systems as they evolve from unsustainable states. The process is further complicated because a sustainable state of resource management is not a fixed or ideal steady state, but rather an evolutionary process of attempting to improve the management of systems, through improved understanding and knowledge. The process is not deterministic as the end point is not known in advance (Cary, Webb, & Barr, 2001).

3.5. SUSTAINABLE AGRICULTURE INDICATORS

The Brundtland Commission’s definition of sustainable development is known worldwide, and has rightfully gained its place in the vision, mission and strategy of businesses and governments. However, putting the theoretical concept into practice often proves to be challenging. A useful tool to effectively bridge the gap between theory and practice is a framework that considers sustainable development as a long-term and complex process of change (Meul et al., 2008).

As previously stated, the common theme in the agricultural sustainability literature is that it embodies environmental, economic, and social dimensions. However, analysis that integrates them effectively remains rather elusive (Fernandes & Woodhouse, 2008). A great number of studies have attempted to develop the methodological base for the assessment of sustainability of agricultural production systems. Many studies propose to assess sustainability by identifying one or more attributes within each dimension of sustainability, and then measuring them by means of indicators, giving a holistic sustainability assessment (Sydorovych & Wossink, 2008).
To prove effective, an indicator must be scientifically sound, have stakeholder acceptance (Sydorovych & Wossink, 2008), be relevant to the issue being studied, sensitive, easily accessible and comprehensible. In addition, indicators should be temporal, spatial and systemic, covering the economic, environmental and social aspects of agriculture. Furthermore, they should be ethical and recognise values such as the need to conserve natural and human heritage (Zahm, Viaux, Vilain, Girardin, & Mouchet, 2008).

One of the most comprehensive proposals developed for sustainability indicators is that of the Organisation for Economic Cooperation and Development (OECD). However, whilst informative, the list of potential indicators offered by the OECD is very large. Such indicators are informative, but a large number of indicators make it difficult to compare or rank different production systems with respect to their overall performance. A more effective approach would be to work with a more limited set of indicators selected for their relevance to a given set of goals in a given context (Fernandes & Woodhouse, 2008).

Fernandes and Woodhouse (2008), Meul et al. (2008), and Zahm et al. (2008) are just three examples of the many tools which have been developed to assess the sustainability of an agricultural system. It is not the purpose of this thesis to discuss at length the intricacies of sustainability assessment tools although it should be noted that they are all context specific and each method is not necessarily suitable to all agricultural production systems. Since sustainability is not a static concept, but characterises a constant evolution, a monitoring tool to evaluate sustainability will never be complete. The model needs to be flexible to enable constant adaptation to changing conditions both internal and external to the agricultural system (Meul et al., 2008).

The purpose of acknowledging these three models is to illustrate the complexity of agricultural systems, particularly Australian mixed-farming systems. There is an infinite number of factors which influence the sustainability of Australian mixed-farming systems. In addition, the information exchange interface (see Chapter Two) which exists to support farmers in the management of their mixed-farming systems is characterised by a diverse range of service providers. These service providers with competing interests (see Section 2.11), are all seeking to gain a foothold in the information exchange environment. The point is, that while the sustainability indicators suggested by Fernandes and Woodhouse (2008), Meul et al. (2008), and
Zahm et al. (2008) are all useful in terms of measuring the sustainability of a system temporally and spatially, they may be limited in their capacity to measure the sustainability of Australian mixed-farming systems in terms of extension delivery in the information exchange interface.

3.6. ADOPTION OF SUSTAINABLE AGRICULTURAL PRACTICES COMPARED TO PRODUCTION RELATED INNOVATIONS

As Chapter Two explored, there is a long history of investigating how to encourage farmers to adopt what are perceived to be desirable new practices and technologies (McGuckian & Rickards, 2011). As discussed in the previous chapter, the classical model of adoption is predicated on production related innovations that apply equally to all farmers for whom the technology is designed. A production related innovation refers to those innovations that are developed primarily for commercial reasons. With a production related innovation, non-adoption only affected the non-adopting farmer, and since adoption was in the farmer’s self-interest, it was assumed adoption would eventually occur. Governments were keen to promote new practices because of the national benefits to be gained from enhanced production (Vanclay, 1994b).

On the other hand, sustainable agricultural practices are mostly process innovations and include those techniques, methods and approaches which improve land management rather than increase farm productivity. There are many social and environmental reasons why farmers’ adoption of sustainable agricultural practices is desirable. While non-adoption of production related innovations only affects the non-adopting farmer, failure to adopt beneficial sustainable agricultural practices threatens the livelihoods of others. Non-adoption causes ‘off-site’ damage, a term referring to all the impacts that are of concern to people other than the production concerns of the individual farmer, including loss of the productive potential of the farm for future generations, impacts on downstream water users, impacts on neighbours, loss of wildlife habitat, loss of ecological diversity, water and air pollution and exhaustion of non-renewable farm inputs such as phosphates, and the destruction caused by their use (Vanclay, 1994a).

Since agricultural land is a non-replenishable resource that is continually diminishing due to urban expansion, the whole nation suffers as the resource base declines through environmental degradation and loss of agricultural land (Vanclay, 1994b). Consequently, while extension agencies could be somewhat ambivalent about farmers who did not adopt production related
innovations, environmental issues posed a new problem. Thus, the entire community has an obligation and responsibility to ensure natural resources are managed in a sustainable manner. However, extension agencies need to exercise some caution. It is also important to recognise that it was the adoption of practices promoted by public (and private) extension in the past which initially caused many environmental problems (Kilpatrick, 2002; Vanclay, 1994b).

A large body of research indicates that the adoption of sustainable agricultural practices is increasing but not as quickly as is necessary to guarantee a sustainable agriculture. While some sustainable agricultural practices such as lime application to treat acid soils have been readily adopted by farmers, other sustainable agricultural practices have not been so widely adopted (Pannell et al., 2006). The literature provides many reasons for the reluctance of farmers to adopt sustainable agricultural practices. Research by Rogers (2003) indicates that innovations which promise to be profitable, universally applicable, low risk, easily trialable, compatible, not so complex and have observable benefits, are readily adopted by farmers. However, most sustainable agricultural practices have technical and financial characteristics that are the opposite of those associated with ease of adoption. Practices for sustainable agriculture tend not to have an immediate or obvious advantage, but rather are found to be complex; not always compatible with existing practices; not easily trialled on a small scale; and have results which are not immediately observable and / or are difficult to measure (Kilpatrick, 2002). They also tend not to be profitable in the short-term and are often high risk. These factors reduce the adoption of sustainable agricultural practices and their popularity with farmers. Cary, Barr, et al. (2001) suggest that extension and education programs which promote sustainable agricultural practices to overcome or ameliorate the factors which restrict their adoption will be beneficial.

In addition, there are also many other fundamental differences between sustainable agricultural practices and production related innovations that make the adoption process of sustainable agricultural practices much more complex, and their adoption much less likely (Vanclay, 1994a). Personal beliefs, values, opinions, attitudes, individual capacity and skills to assess options and make appropriate decisions also influence the adoption of sustainable agricultural practices. The factors which influence the capacity of farmers to change to sustainable agricultural practices are discussed below.
3.7. FARMER CAPACITY TO CHANGE TO SUSTAINABLE AGRICULTURAL PRACTICES

There are many factors influencing a farmer’s capacity to change to sustainable agricultural practices. An individual’s capacity to change differs according to the changes being considered (which have already been discussed), their individual and situational circumstances, along with many other factors. Furthermore, because these factors are context specific, capacity to change needs to be considered on a local basis (Cary, Barr, et al., 2001).

It is difficult to predict which farmers are more or less likely to change. However, Cary, Barr, et al. (2001) found several factors or characteristics which most commonly influence the adoption of sustainable agricultural practices. These characteristics can be useful indicators of capacity to change to sustainable agricultural practices: farm income and business characteristics; farm size; farmer age; participation in occupation-related education or training; participation in social groups and movements; and personal assessment and motivation.

Interactions between these characteristics and the relationship they have with adoption behaviour can be complex and complicated. While some relationships have been found in empirical studies (Cary & Wilkinson, 1997; CIE, 2001; Curtis et al., 2000; Mues, Chapman, & Van Hilst, 1998), there is no widely accepted theoretical model of human adoption behaviour that can guide and direct empirical studies. Consequently, research tends to be atheoretical and exploratory in nature (Cary, Barr, et al., 2001). It is not the purpose of this thesis to explore to any depth the characteristics which influence a farmer’s capacity to change to sustainable agricultural practices. This has been completed exhaustively elsewhere (Anosike & Coughenour, 1990; Bamberry, Dunn, & Lamont, 1997; Barr & Cary, 1992; Beal, 1997; Carboni & Napier, 1993; Cary, 1992; Cary, Barr, et al., 2001; Cary, Webb, et al., 2001; Cary et al., 2002; CIE, 2001; Curtis et al., 2000; Fenton, MacGregor, & Cary, 2000; B. Gould, Saupe, & Kleme, 1989; Guerin & Guerin, 1994; Haberkorn, Hugo, Fisher, & Aylward, 1999; Kilpatrick, 1996; Mues et al., 1998; Nelson, Alexander, Elliston, & Blias, 2004; Reeve & Black, 1993; Saltiel, Bauder, & Palakovich, 1994; Shrapnel, Davie, Freed, & Frank, 2000; Witter, Robotham, & Carrasco, 1996). Rather, it is a purpose of this thesis to explore the influences on the strategic decision-making (as will be discussed in Section 4.3) and adaptive capacity of farmers in mixed-farming systems because as this thesis will demonstrate, these are the two major factors which ultimately influence the sustainability of mixed-farming systems. The point demonstrated here is that the decision to adopt sustainable agricultural practices is more often than not a strategic decision. For instance,
fencing to land class (see Section 4.9) is a strategic decision which is also a sustainable agricultural practice. Similar to strategic decisions, there are an infinite number of factors influencing the decision to adopt a sustainable agricultural practice. The influences on farmer decision-making (and not just the influences on adoption decisions) are discussed in the next chapter.

As Sections 2.3 and 2.4 explored, both Transfer of Technology and participatory approaches have their limitations in addressing environmental problems where the outcomes are long-term and unknown. Therefore, it can be similarly suggested that the available extension approaches may also be limited in their capacity to address other strategic decisions. Strategic decisions are discussed later in Chapter Four.

3.8. EXTENSION FOR SUSTAINABLE AGRICULTURE

The concept of sustainable agriculture was a response to the serious environmental degradation caused by intensive and high external input agriculture. Initially, efforts to promote sustainable agriculture concentrated on the biophysical context and the development of sustainable technologies that would preserve natural resources or even assist affected agro-ecosystems to regenerate, although now, there is increased awareness that biophysical components as well as economic and social factors all need equal attention (van de Fliert, 2003).

Land degradation is a prominent issue in Australia and there are several reasons why it continues to occur. In their review, Pannell et al. (2006) concluded that farmer adoption of sustainable agricultural practices depends on their expectation that it will allow them to better achieve their goals. If the farmer perceives those goals are not likely to be met, then adoption will certainly not follow. Goals vary widely between individual farmers (see Section 4.3.8) depending on their circumstances and personal preferences and may include economic, social and environmental outcomes. Further, adoption is based on subjective perceptions of expectations rather than on objective truth. According to Pannell et al. (2006), these perceptions depend on three elements: the process of learning and experience; the characteristics and circumstances of the farmer within their social context; and, the characteristics of the practice.

Therefore, Barr (1994), Coutts (1997), Cary, Webb, et al. (2001) and Pannell et al. (2006) all stress that successful extension for sustainable agriculture can only work within the constraints of
farmers’ goals. Family, personal and financial securities are generally the highest priorities for Australian farm families. It is inevitable that, at times, a conflict of interest will arise between a sustainable agricultural practice and the family’s goals. Even with the most persuasive extension, farmers are not likely to change their management unless they can be convinced that the proposed changes are consistent with their goals.

Kilpatrick (2002) notes it is important to also be aware that farmers tend to underestimate environmental problems. Further, the processes generating the problems are often invisible and subsequently farmers are not always aware of them. Kilpatrick (2002) claims that this suggests farmers are unlikely to be equipped to identify problems and implement appropriate management without seeking external advice and assistance.

McGuckian and Rickards (2011) further add that a farmer’s perception of the messenger of a desired change, such as an extension officer, influences the farmer’s level of interest in the proposed change. The perceived trustworthiness of a messenger is often influenced by how long the farmer has worked with that person.

Sustainable agriculture places emphasis on the human element of the system, as opposed to conventional agriculture which centres on production technologies. Therefore, sustainable agriculture is characterised by the behaviours that farmers display, and their knowledge and skills as well as their decision-making. This has implications for extension, in that the approaches applied should be orientated towards building farmer capacities favourable to sustainable agriculture, rather than towards achieving adoption of standardised technologies. Extension approaches favouring this type of learning are participatory, experience-based and adaptable. van de van de Fliert (2003) suggests that an assessment of farmer needs, their participation in technology development, assessment of the implementation of the innovation, and the development of learning opportunities are among the sequential phases for successful extension for sustainable agriculture. A participatory, capacity building model provides a generic framework for successful extension under diverse environmental and social situations (van de Fliert, 2003).

Effective implementation of sustainable agricultural practices can be better achieved by facilitation using approaches that align with the nature of sustainable agricultural systems. This
type of facilitation contrasts with the Transfer of Technology paradigm discussed in Section 2.3.1. Whereas Transfer of Technology served the promotion of standardised, single-component technologies and aimed at their straightforward adoption, extension for sustainable agriculture should facilitate holistic change at both the farm and institutional levels (van de Fliert, 2003).

3.9. CONCLUSION

For mixed-farming systems to be sustainable, farmer decision-making needs to ensure agricultural practices are economically viable, meet human needs for food and fibre, ensure quality of life and conserve natural resources. Since these objectives can be achieved in a variety of different ways, sustainability is unlikely to be linked to any particular management decision. Rather, agricultural sustainability is thought of in terms of its adaptability and flexibility over time to respond to economic, social and environmental changes both internal and external to the mixed-farming system. This goal requires an efficient use of knowledge and technology in a manner conducive to sustainability. Further, it requires a strategic mindset which is discussed in the following chapter.

As stated earlier in this chapter, the Brundtland Commission’s definition of sustainable development is known worldwide, and has rightfully gained its place in the strategic planning of many businesses and governments. However, putting the theoretical concept into practice often proves very challenging. A useful tool to effectively bridge the gap between theory and practice is a framework that considers sustainable development as a long-term and complex process of change.

Assessments of the sustainability of mixed-farming systems involve looking forward, to a future that is often not universally agreed. It is often easier to look backward, and assess the progress of farming systems as they evolve from unsustainable states. The process is further complicated because a sustainable state is not a fixed but rather an evolutionary process of attempting to improve management through improved understanding and knowledge. The process is not deterministic as the end point is not known in advance. Since sustainability is context specific and not a static concept, a monitoring tool to evaluate sustainability will never be complete and will continuously be subject to change.
The following chapter explores the complexity of strategic decision-making in mixed-farming systems. The chapter also explores the infinite number of influences on decision-making processes and presents case studies of two different farming families who have successfully implemented strategic approaches to improve their farm businesses. The chapter concludes by reviewing the relevant literature surrounding the adaptive capacity of small business.
CHAPTER FOUR: FARMER DECISION-MAKING

4.1. INTRODUCTION

The previous chapter explored the concept of sustainable agriculture and the factors which influence a farmer’s capacity to change to sustainable agricultural practices. The chapter also explored the role of extension in sustainable agriculture.

The process of farmer decision-making has been studied extensively (Cooper, 2011; Long & Cooper, 2011; Long & Parton, 2012; McGuckian & Rickards, 2011; Whittenbury & Davidson, 2009, 2010). Nicholson, Wooldridge and Muller (2008) suggest that although decision-making is at the core of managing a farm business, farmers do not always make informed decisions. Since the 1980s, an unprecedented increase in input choice, advances in technology along with market deregulation and volatility, have increased the complexity of farm decisions (Long & Cooper, 2011). Australian farmers are now highly sophisticated business managers who must take a myriad of factors, including international markets and local climatic conditions, into consideration (Whittenbury & Davidson, 2009). In addition, approximately ninety-nine per cent of Australian farms are family-owned and operated (National Farmers Federation, 2014). Consequently, personal and professional relationships are intertwined, which causes further complexity. Family values interconnect with those of the wider community. Farm production decisions are made in the context of many non-production and even non-farm influences that farmers either explicitly or implicitly consider (McGuckian & Rickards, 2011).

The reasoning behind farmers adopting or not adopting innovations was presented in Chapter Two. While the adoption of innovations is important, it is only one aspect of farmer decision-making. Whittenbury and Davidson (2009) suggest that to fully understand the reasoning behind farmer decision-making, all aspects surrounding farmer decision-making should be explored rather than taking a narrow focus on the adoption of innovations. The purpose of this chapter is to explain the types of decisions faced by farmers amidst the complexity of managing mixed-farming systems. This chapter will explore the limitations of available decision models in capturing the complexity of competing interests in mixed-farming systems and also consider the intuitive and subjective knowledge, or heuristics, farmers draw on to guide their farming
practices, against a backdrop of understanding of the personal, socio-cultural and structural factors that also influence farmers’ decisions.

The chapter continues by exploring the literature surrounding the farmer perspective on information delivery, decision support systems and strategic approaches to business improvement. The chapter concludes by presenting two farming case studies in which the farm businesses have made strategic business improvements to improve the sustainability of their mixed-farming systems.

4.2. UNDERSTANDING THE COMPLEX ENVIRONMENT SURROUNDING FARMER DECISION-MAKING

Decision-making is at the core of managing a business. Managers must contend with high levels of risk, uncertainty and changing competitive landscapes (Wharton University of Pennsylvania, 2013). In particular, mixed-farming systems have always been under pressure to adapt and improve in response to both external and internal change. As McGuckian and Rickards (2011) discovered, a discussion with a farmer covers a vast range of topics. Matters requiring consideration include but are not limited to: fertilisers, reproductive management, crop choice, sowing method, leasing or owning machinery, labour hire, grazing crops, planting trees, markets, animal health, climate change, weather, cash flow and capital purchases. All of these considerations are related and interact continuously, as farmers respond to changes in their environment. In doing so, they create other circumstances requiring response (McGuckian & Rickards, 2011).

Mixed-farming systems add further complexity to decision-making. There are many considerations which are constantly changing and many of the factors involved are unknown and their relationship with other factors is poorly understood. According to McGuckian and Rickards (2011), deciding how heavily to graze a pasture on light soil can be a complex decision. McGuckian and Rickards (2011) elaborate, suggesting the decision will depend on how much pasture is available for the sheep and what quality is required at a particular stage in pregnancy. It will also depend on how much damage grazing does to the soil (which again differs between wet and dry soil), and the farmer’s attitude to soil management as well as their environmental values. Increasing the stocking rate may improve profitability in the short-term, yet may also influence the family’s capacity to manage the other enterprises and their lifestyle. Questions
concerning the sustainability of the situation and ultimately whether the family can or should stay on the farm may then come into play. As this example from McGuckian and Rickards (2011) illustrates, a myriad of interconnected influences and complex questions flow from a seemingly simple grazing decision, thus illustrating the complexity of many seemingly simple farming decisions.

As discussed in Chapter Three, farming has become highly mechanised. Long and Cooper (2011) discovered that, in their quest to increase productivity, some farmers recognise the benefit of seeking specialised advice. Seeking advice has been discussed earlier in this thesis and will be explored in more detail later in this section.

Further, McGuckian and Rickards (2011) propound it is also vital to understand the social influences on farmer decision-making. The complexity of mixed-farming systems is increased if they are family-operated. As mentioned earlier in this chapter, most farms in Australia are managed by farming families and are often multi-generational, the farm having been owned by the family for many years, often with a strong emotional tie to the land. As a consequence, there are multiple decision-makers often involved in intricate relationships with each other, creating a blurred personal-professional operational environment somewhat typical of living in one’s workplace. Business and personal decisions are often made interchangeably, with reactive management of familial relationships and work demands frequently the subject of dinner table conversation. McGuckian and Rickards (2011) suggest that the enterprises and farming system adopted by a family are often strongly linked to personal preference and family traditions. Farming families must also consider factors such as availability of family labour, family goals, local community services and opportunities, off-farm income, large family expenses, if and when to have a holiday and farm succession.

McGuckian and Rickards (2011) found that the social influences on farmer decision-making are often not acknowledged by farmers, nor taken into account by extension officers and researchers. Yet, McGuckian and Rickards (2011) also discovered that the fundamental reasons for the farming family choosing their occupation are social and include flexibility of the lifestyle, the opportunity to work alongside their children, an attachment to the land and, simply, they enjoy farming.
Social factors also predominantly determine decisions regarding land use. McGuckian and Rickards (2011) suggest the overall mixed-farming system designed by farmers is driven by four main factors: hassle reduction; labour availability; recreation; and, personal preference.

Nicholson et al. (2015: p. 3) suggest farmer decision-making involves

...choosing a path that provides a farming business with acceptable reward for acceptable effort at an acceptable amount of risk.

Nicholson et al. (2015) stress that the word ‘acceptable’ is important because it requires individuals to define what is acceptable from their perspective. Lower profits may be acceptable to one farming business but not to another, as long as the farm business allows them to maintain a particular lifestyle, achieve personal goals and it aligns with their values. On the contrary, another business may rather aim to maximise returns whilst knowing they are operating at a higher level of risk and may be foregoing other opportunities. According to Nicholson et al. (2015), both positions are equally valid.

Nicholson et al. (2015) further emphasise that investing in the capacity of farmers to make decisions is just as important as investing in machinery. Less than ideal decision-making is as damaging to a farm business as unreliable equipment.

The following section explores the myriad of influences on farmer decision-making. It is not the purpose of this thesis to study how farmers make decisions. Rather, it is the purpose of this thesis to explore the relations between the information exchange interface and farmer decision-making. However, in order to achieve this, some background must be given on the literature surrounding how farmers make decisions and the factors which influence these decisions. As this section and the following section illustrate, farmer decision-making is complex and an understanding of this complexity will assist in uncovering how the information exchange interface can improve its support of farmers.

4.3. INFLUENCES ON DECISION-MAKING PROCESSES

Influences on farmer decision-making may be either internal or external to the farm business. Farmers may have some control over internal influences whereas they generally have little
control over external influences (Cooper, 2011). As previously discussed, research has shown that people use heuristics and intuition when making decisions which are influenced by past experience and knowledge. These experiences are combined with an individual's values, beliefs, perceptions, emotions, stress levels and age to influence a decision (Edwards-Jones, 2006). A range of other factors such as financial position, stage of life and family succession plans may also influence decision-making (Mayberry et al., 2005). Healy, Roberts, and England (2013) found significant variation in the influences on farmer decision-making. They found the most common sources of influence were family, intuition, experience and fee-for-service advisers (see Section 2.8.2). Whittenbury and Davidson (2010) argue that an exploration of influences on farmer decision-making, not merely in the context of adoption, is necessary to gain a greater understanding of how farmers make decisions. Whittenbury and Davidson (2010) classify the influences on farmer decision-making as being (mostly) objective, (mostly) subjective or having both objective and subjective characteristics (socio-cultural influences). Subjective influences such as rules of thumb, knowledge and experience are extremely important to farmers when making decisions (Whittenbury & Davidson, 2010). Intuition and heuristics are discussed later in Section 4.6. whereas objective and socio-cultural influences on farmer decision-making are discussed below.

4.3.1. Objective influences

Objective influences, or what sociologists refer to as structural factors (Giddens, 1984; Ortner, 1994), exist external to the farm business and frame the context in which the business operates. In sociological terms, structural factors are those that arise from the social relationships, organisations and institutions surrounding people (Germov & Poole, 2007). Examples of structural factors include financial and regulatory systems, politics, markets and weather conditions, as well as soil and plant characteristics. Other structural influences that affect farmers include fluctuations in commodity prices and the costs of inputs such as fuel. Farmers have little control over these factors yet they exercise significant influence on their decisions. Some such structural factors have previously been identified as ‘barriers’ to adoption. For instance, Mendham, Millar, and Curtis (2007) found that the availability of one-to-one extension services influenced a landholders’ decision to adopt a sustainable agricultural practice.

Stakeholders within the information exchange interface are also structural influences on farming activities. Such organisations include Catchment Management Authorities or equivalent,
government departments, and the industry bodies mentioned in Chapter Two. Whittenbury and Davidson (2009) suggest that the personal relationships that develop between local employees of institutional organisations and local farmers may also influence farmer decision-making. Further, this influence may be beyond the content of what is being communicated.

4.3.2. **Emotions, stress and mental health**

In their review of the literature, Robbins, Judge, Millett, and Boyle (2013) found that studies of decision-making processes place emphasis on rationality. Often, the effects of anxiety, fear, frustration, doubt and happiness are either downplayed or ignored. However Robbins et al. (2013) argue that decisions are strongly influenced by these emotions at any given moment and given the same information, individuals will make different decisions based on their emotions at that point in time.

Whereas positive stress sharpens alertness and performance, Robbins et al. (2013) claim that stress and emotions can reduce problem-solving abilities. Stress is commonly encountered in farming and can be experienced during busy times such as harvest, and by adverse conditions such as prolonged drought (Nicholson et al., 2015).

Long periods of chronic stress can impair decision-making. When people are affected by chronic stress, their ability to reason, anticipate, plan and organise is reduced (Nicholson et al., 2015). Stressed persons tend to do things the way they have always done them. They are unlikely to be persuaded to change regardless of any rational or economic justification. They take a more conservative approach and do not want to absorb new information or think in depth about a problem. Stressed persons avoid attending learning opportunities such as paddock walks and field days and change under these circumstances is unlikely (Long, 2012).

It is important to acknowledge stress as an influence on decision-making because it can alter a farmer’s attitude to risk, the health of the farmer, the stability of the farm family and subsequently, the health and stability of the business (Cooper, 2011). Hounsime (2006) found that the better a farmer’s mental health, the more likely that farmer was to adopt sustainable agricultural practices.
4.3.3. Personality types

Long (2012) suggests that an understanding of personality types can assist in understanding farmer behaviour, the likelihood of a farmer seeking advice and support, and a farmer’s ability to perform tasks. Advisers can then tailor their approach to suit different personality types (Klerkx et al., 2017; Long, 2012).

Allen Consulting Group (2008) identified four categories of small business owner based on psychological characteristics which influenced the owner’s willingness to seek support and advice. These four categories were:

- ‘Just do it’: the owner’s main focus was to attract resources. They act as independently as possible.
- ‘Flying solo’: the owner has usually been successful in business and is too proud to seek support.
- ‘Support seekers’: the owner has a strategic mindset and seeks advice accordingly.
- ‘Active network’: the owner considers support and advice to be essential for business success.

In another study, Strachan (2011) identified four different ‘temperaments’ which described a farmer’s ability and preference to perform tasks. Firstly, the ‘SJ’ (Sensing Judging – ‘Traditionalists’) temperament is less likely to adopt new ideas and will resist change until there is a desperate need to change. Secondly, the ‘SP’ (Sensing Perceiving – ‘Trouble-Shooters’) temperament is impatient with abstract ideas and will take risks and has a ‘do it now and fix the details later’ approach. In contrast, the ‘NT’ (Intuitive Thinkers – ‘Visionaries’) temperament is a trailblazer, is good at problem solving and values logic and knowledge. Finally, the ‘NF’ (Intuitive Feelers – ‘Catalysts’) temperament is good at participatory decision-making and works well in groups, focusing on the people in the organisation. It tends to ignore problems in the hope they will go away.

Recognising that not everyone thinks in the same manner is the first important step in the delivery of information. Not everyone prefers information to be delivered in a particular way. Strachan (2011) suggests that extension officers can modify their information delivery methods to suit the personality types explained above, enabling their messages to be conveyed more quickly and effectively.
4.3.4. **Attitudes, risk management and decisional bias**

The study of farmer attitudes has received considerable attention in recent years with a growing realisation that attitudes can play an important role in farmer behaviour. Edwards-Jones (2006) reports that attitudes are formed by what an individual believes to be true about an object.


While some authors acknowledge that an understanding of attitudes can provide useful insights into farmer decision-making, such a perspective is not without its critics (Burton, 2004). Individuals perceive risk differently and have different tolerances for risk (Knight, 1921). Cooper (2011) adds that farmer decision-making is influenced by farmer attitudes towards risk, whilst Adams (2011) refers to the ‘euphoric’ feeling of power and success that results from positive outcomes in risk taking. These feelings are described as ‘The Winner Effect’. This effect occurs when testosterone levels rise and enhance the appetite for risk. There are many sources of risk in farming and therefore Healy et al. (2013) strongly advise that risk and uncertainty are fundamental considerations that need to be understood.

Nuthall (2011) lists a range of decisional bias and claims that such bias is a common fault in decision-making. For instance, accessing easily obtainable information from the internet rather than researching peer reviewed journal articles is an example of decisional bias. Analytical approaches assist in limiting decisional bias however they are commonly overlooked in many decision-making approaches.

4.3.5. **Education levels**

Over the three decades to 2011, the Australian Bureau of Statistics reports that the proportion of Australian farmers with non-school qualifications more than doubled, while the proportion with a bachelor degree or above increased six-fold (Palmer, 2012). Palmer (2012) claims these increases are partly due to the entry of younger generations of farmers. Nonetheless, farmers
were still less likely to hold non-school qualifications compared to people in other occupations (Figure 9) (Palmer, 2012).

![Bar chart showing non-school qualifications by occupation](image)

**Figure 9:** Non-school qualifications by occupation (Palmer, 2012)

Regarding the relatively low number of farmers holding non-school qualifications, a concern raised by Long (2012) was that most farmers have not been taught the process of science-based analytical thinking at the university level. Therefore, farmers’ analytical thinking is constrained to experiential learning. Nonetheless, such processes still remain challenging to those who have received formal training in the process (Long, 2012).

### 4.3.6. Stage in farming lifecycle

People have different requirements at different stages of their lives. Howard (2009) in Long (2012) reports farm business goals are driven by the farmers’ own personal goals and requirements. From a series of interviews with Victorian farmers, Howard (2009) identified the following phases in the lifecycle of a farm business: starting out / gearing up; expanding income / young family; expanding income / succession of next generation; cruising along; and, winding down.

These phases reflect the different desires of farmers and their subsequent demands on the farm business. Farmers at each stage have particular motivations that make them more or less inclined to focus on business management. Therefore Long (2012) suggests that an understanding of these life stages is critical in understanding how farmers manage their businesses.
4.3.7. Socio-cultural influences

The social-cultural influences on decisions are often not acknowledged or understood by farmers nor taken into account by extension officers and researchers. However, they are fundamental to the family’s decision to be farmers; and the social benefits derived from specific decisions can sometimes override economic or environmental benefits. Farmers are strongly motivated by social drivers (Long & Cooper, 2011).

Farmer heritage also influences their values and world views, which, in turn, influence their farming decisions. Some farming families have a patriarchal management style, where the oldest male has overriding authority in the business and the women play a subordinated role (Whittenbury & Davidson, 2010). However, Whittenbury and Davidson (2010) stress it is important to note this is not the case for all farming families.

In a study by Whittenbury and Davidson (2010), all farm family respondents reported the importance of family values, which they perceived were enhanced by a farming lifestyle. They reported a farm provided a good basis for raising a family and creating a decent, respectable lifestyle. Milne, Stenekes, and Russell (2008) also highlighted the strong influence of lifestyle on farmer decision-making. These findings are also supported by I. Gray and Lawrence (2001) and Poiner (1990), whilst Whittenbury and Davidson (2010) found that farmers perceived self-reliance and independence as important.

Whittenbury and Davidson (2010) also reported that, while farmers acknowledged the importance of economic influences on decision-making, a number of respondents also noted farming was a lifestyle choice and if the decision to farm was based purely on financial factors, they would be financially better off not farming. Maximising profit is clearly not the only motivation for farmers. Farmers choose their occupation because they enjoy farming and the lifestyle it provides and often the property has been in the family for generations. Personal goals, ambitions, values and beliefs often surpass rational economic decision-making.

These findings are reinforced by Burton’s (2004) ethnographic study of farmers which uncovered the strong influence of social identity and status in farming practice. He found that while farmers positioned economic goals as important in their decision-making, they did so using an approach that demonstrated good farming practice to others. For instance, the farmers would put more
effort into the fields adjacent to public roads to portray they were ‘good’ farmers. Consequently, farmers sometimes made decisions which did not have the best economic outcome. According to Burton (2004), economic outcomes are not the only or main driver for some farming decisions. East, Wright, and Vanhuele (2008) suggest these findings reinforce that, while it is possible to predict an individual’s decision based on rationale and logic, the outcome rarely matches what individuals actually do.

4.3.8. Goals of the farm family

As stated earlier, a farm managed by a family adds extra complexity to decision-making. Decisions are made not only to satisfy the business but also to satisfy the goals of the farm family (Cooper, 2011). Regardless of factors such as land quality, knowledge, experience and capital, a successful farm business can only operate effectively if the managers communicate well and have clearly defined business and personal goals (Long, 2012).

All farm families have their own set of goals that affect how they manage their business. A sustainable farm will have an interacting set of aims that include natural resource management goals, economic objectives, production goals, lifestyle goals, and the needs of the wider community. Farm families must reassess these goals continually as conditions change (Whittenbury & Davidson, 2010). Cooper (2011) suggests most farmers would like to improve their financial position over the course of their career as long as they do not have to sacrifice other values such as health, family, lifestyle and outside interests.

Passing the farm onto the next generation is a goal of many farm families, and all decisions must consider the effect on future generations. Succession planning is extremely complicated and early planning is necessary in order to prevent any undue future stress on the business. Planning is needed to not only provide for children not returning to the farm, but also to plan for the next generation if they would like to join the farm business. This may lead to changes in the structure of the farm business. A child returning to the farm after furthering their education may have different ideas which may either present opportunities or cause family conflict. Disagreements on how the farm should be managed are unlikely to be beneficial (Cooper, 2011).

Within the farm, there are institutional matters which will affect decisions. Families may consist of a number of generations, with each member often having a partner. This can lead to
relationship difficulties and issues. As family relationships influence the sustainability of a farm business, the legal structure of the farm must be carefully planned. A relationship break-down could undermine the sustainability of the farm business and could lead to the break-up of the farm itself (Cooper, 2011).

McGuckian and Rickards (2011) found that advising farmers on particular areas of their farm business is more effective when the influences on farmer decision-making are taken into consideration. Goals are highly personal and quite often strategic, even if subconsciously so. Decision-making is more complex than just day-to-day (operational) decisions (see Section 4.5). An understanding of the influences on farmer decision-making will allow advisers to appreciate all the factors a farmer must consider and provide some reasoning behind their decisions.

4.4. TYPES OF DECISIONS

Every single person must make up their mind in a great variety of circumstances and it is confusing that the word ‘decision’ is used for all of them. When a supermarket customer encounters an aisle of breakfast cereals, they have a decision to make. When a Year 12 student considers which university to attend, they too, are facing a decision. Further, when a farm business considers purchasing an additional farm, entering a new market or succession planning, they are also required to make a decision. The same term is applied to routine as well as complex deliberations, to both small and high-risk situations, to exploratory steps as well as irreversible moves (Rosenzweig, 2013).

Before farmers can be advised on how to make better decisions, they need to be aware of how decisions differ. Decisions can be categorised based on numerous characteristics including the level of complexity involved and the frequency of the decision. The value in knowing which decision is being dealt with allows the most appropriate action to be taken (Nicholson et al., 2015).

4.4.1. Programmed and non-programmed

Most authors who have written about decision theory have proposed a method of classifying decisions (Gilligan, Neale, & Murray, 1983). Amongst the earliest and best known of these is the distinction between programmed and non-programmed decisions that was put forward in 1960
by Herbert Simon (1960). The distinction that Simon (1960) proposed was based on the idea that most business decisions are straightforward, repetitive and routine, resulting in the business being able to develop a defined and formalised procedure for handling them. These types of decisions, which include day-to-day activities such as ordering stock, are labelled programmed decisions. Non-programmed decisions on the other hand are those which Simon (1960) suggests are:

...novel, unstructured and consequential. There is no cut-and-dried method for handling the problem because it hasn’t arisen before, or because its precise nature and structure are elusive or complex, or because it is so important that it deserves a custom-tailored treatment.

Strategic decisions, the focus of this thesis, tend to be non-programmed decisions. Examples of this type of decision include deciding on whether to develop a new product or whether to outlay expenditure on a new factory. However, having identified these two types of decision, Simon (1960) comments that they should be seen in terms of a continuum, with highly programmable decisions at one end and highly non-programmable decisions at the other. Between the two extremes are:

...decisions of all shades of grey...the terms programmed and non-programmed are simply labels for the black and white of the range (Simon, 1960).

4.5. LEVELS OF DECISION-MAKING

Managing a farm business requires decisions to be made of various levels of complexity (Glyde et al., 2014). Following Simon’s (1960) classification of business decisions, Gilligan et al. (1983), Markham et al. (2006), Cooper (2011), Le Gal, Dugue, Faure, and Novak (2011), BBC (2014) and Glyde et al. (2014) propose that managers encounter three types of decisions: operational, tactical and strategic (Figure 10). The differences between each surround the level of complexity of the decision, the degree of certainty or uncertainty that is associated with the outcome, together with the time-frame involved (Leeuwis, 2004), the frequency with which the decision needs to be made, the extent to which it is routine or non-routine, and the implications of the decision on the sustainability of the business.
4.5.1. Operational decisions

Operational decisions are simple, recurring (Gilligan et al., 1983) and made frequently on a day-to-day or week-by-week basis (Whittenbury & Davidson, 2010). In a mixed-farming context, these include sowing, fertilising or harvesting a crop, as well as animal husbandry. Operational decisions require technical expertise and tend to be well-structured and programmed as discussed in Section 4.3.1. That is, the desired outcome is known and the necessary information is available from within the business. The required information may be detailed and is usually known with some certainty, as in applying a particular herbicide at the recommended rate to kill a weed. However, interactions with other parts of the system and the need to prioritise activities should also be considered (Cooper, 2011).

4.5.2. Tactical decisions

Decisions at a tactical level on the other hand include those tasks which need to be completed in the short to medium term to achieve the strategic goals of the business (Janczak, 2005). Tactical decisions include, for instance, detailed planning to produce a product for a particular market (Cooper, 2011). They involve efficient acquisition and allocation of resources. Tactical decisions are made less frequently than operational decisions (Gilligan et al., 1983) and the time-frames in farming tend to be associated with the biological cycles of crops and livestock. They
may range from weeks in the case of vegetables and chickens, to years for beef production or fruit trees. Annual cycles are also common. Problems and their solutions are relatively well defined although there is a greater degree of uncertainty than in operational decisions. Uncertainty can arise from such elements as the nature of biological processes, market unpredictability and climate uncertainty (Cooper, 2011).

4.5.3. **Strategic decisions**

Strategic decisions are quite different from operational and tactical decisions. The literature defines strategic decisions as those which concern the overall vision for the business and have long-term implications. Each strategic decision is unique in character. They are made infrequently and involve major organisational change, large resource commitments and are difficult to reverse once they are implemented (Chandler, 1962; Drucker, 1954; Eisenhardt & Zbaracki, 1992; Hofstrand, 2007; Janczak, 2005; Jennings & Wattam, 1998; Lampel, 2016; Mintzberg, Raisinghani, & Theoret, 1976). Strategic decisions are multi-dimensional (Drucker, 1954; Janczak, 2005) and have consequences for other decisions within the business. They include decisions on the size and scale of the business and whether to diversify or intensify (Cooper, 2011). Within a farming context, examples of strategic decisions include farm expansion plans, succession considerations (Whittenbury & Davidson, 2010) and fencing to land class (see Section 4.9.1).

As a result of their unique and complex nature as well as their long time-frame (Eisenhardt & Zbaracki, 1992; Janczak, 2005), the information available on which to base strategic decisions is less precise than for operational and tactical decisions (Cooper, 2011). Due to this absence of information, as well as the resource commitments and their significance for the sustainability of the business, strategic decisions require highly detailed analysis, and, in many cases, the use of a substantial element of judgement by the farmer (Gilligan et al., 1983).

One of the most fundamental aspects of managing a business is creating a vision and a set of business goals and objectives (Jennings & Wattam, 1998) (Figure 11). The purpose of strategic management is to design a farm business that allows the farm family to achieve their professional and personal goals (Hofstrand, 2007; Jennings & Wattam, 1998). Strategic decisions provide the long-term strategy whereas operational and tactical decisions ensure the implementation and monitoring of the strategy (King & Nettle, 2013). Strategic management
provides a framework for the future (Mintzberg et al., 1976) and aims to improve the sustainability of the farm business within its physical, social, economic and political environments.
Figure 11: A model of strategic management (derived from L. Thomas, Wheelen, and Hunger (2006))
Strategic management is an ongoing process (Figure 12) that involves creating strategies to achieve goals and then evaluating and altering the strategies based on the observed outcomes. A clear business strategy reduces uncertainty and promotes efficiency in decision-making (Jennings & Wattam, 1998).

**Figure 12:** Strategic thinking involves three main activities (Wootton & Horne, 2001)

Due to the long-term nature of strategic decisions, they will be implemented in a business environment which cannot be fully anticipated. Strategic decisions take place in a context of future uncertainty. Consequently, contingency plans are necessary in case of unforeseen events. In this context it may be argued that strategic management does not aim to solve problems but rather create an environment in which emerging problems are solvable (Jennings & Wattam, 1998).

### 4.5.3.1. The roles and skills involved in strategic management

The skill set required for strategic management is vastly different to the skills required for operational and tactical decisions (Gilligan et al., 1983). Often farmers must be proficient in both areas (Nicholson et al., 2015).

The differences between operational, tactical and strategic decisions have implications for how the decision process should be approached (Gilligan et al., 1983). Operational decisions are
generally made by the farmer in owner-operated farms, or by the manager in corporate farms. If there are several properties in a family partnership, usually the family member who lives on that property makes the operational decisions. Operational decisions are made in a context that has been established by the tactical and strategic decisions. Tactical and strategic decisions are likely to be jointly made in family farm partnerships, although the ‘head’ of the family may have overriding authority, and likewise, senior managers in corporate farms (Whittenbury & Davidson, 2010).

The complexity, the uncertainty, the long-term implications and the expertise required mean strategic management is more than a planning, implementation and control process. It is also a state of mind and an attitude (Table 3). Strategic management requires managers to be forward-thinking, proactive, and focused on the future (Hofstrand, 2007).

Table 3: A strategic compared to a non-strategic mindset (Keelin & Arnold, 2002)

<table>
<thead>
<tr>
<th>A Strategic Mindset</th>
<th>A Non-strategic Mindset</th>
</tr>
</thead>
<tbody>
<tr>
<td>Broad-view with zoom in</td>
<td>Narrow-view</td>
</tr>
<tr>
<td>Abstract with powerful engagement of the imagination</td>
<td>Concrete with no engagement of the imagination</td>
</tr>
<tr>
<td>Abstraction illustrated with concrete examples</td>
<td>Concrete illustration only</td>
</tr>
<tr>
<td>Important, non-intuitive, framework breaking ideas</td>
<td>Generally understood ideas that fit within a consensus framework</td>
</tr>
<tr>
<td>Embraces alternatives and uncertainties</td>
<td>Embraces neither alternatives nor uncertainties</td>
</tr>
<tr>
<td>Aims to achieve an over-arching goal</td>
<td>Focuses on supporting goals</td>
</tr>
</tbody>
</table>

Strategic decisions are the most significant, yet often the most difficult and, paradoxically, the most frequently underestimated decisions encountered by businesses. They are significant because they provide the overall, long-term direction for a business and therefore contribute to the sustainability of a business (Gilligan et al., 1983).

4.5.3.2. **Understanding trade-offs and consequences**

For every decision there is a road not taken (Rhodes, 2016). As Section 4.3 explored, decisions are a part of everyday life and range from inconsequential to life-changing. The difficulty of a decision is associated with how frequently it must be made and the risks associated with the decision. There tends to be a negative correlation between these factors and frequent decisions are often associated with lower risk. According to Creelman, Long, and England (2015), less
common decisions are made more difficult by limited experience in making them and the limited opportunity to alter the decision once it has been made.

The word ‘decide’ derives from the Latin term *decidere*, from de- (‘off’) + caedere (‘to cut’). That is, in making a decision, decision-makers ‘cut-off’ the alternatives. Whilst it is not ideal to ‘burn bridges’, truly strategic decisions metaphorically do just that. Individuals commit a major asset to a choice that will be difficult or impossible to change (Rhodes, 2016). For instance, the opportunity to buy the property next door is a decision that may only arise once over the course of a farmer’s career. However, they may live with the consequences forever (Creelman et al., 2015).

The consequences of strategic decisions are difficult to quantify and tend to involve great uncertainty. Strategic decisions always involve trade-offs, since no business has unlimited resources. In strategic circumstances, taking one option often results in other opportunities diminishing or becoming completely unavailable (Gilligan et al., 1983).

A side-effect is a consequence of a decision that happens in parallel, or in addition to, an intended effect. A decision-maker is faced with a trade-off when the beneficial effects of a proposed intervention must be weighed against the side-effects of that action (Rhodes, 2016). Trade-offs are difficult to quantify or compare (Nicholson et al., 2015). For instance, the side-effect of chemotherapy is nausea and hair loss. A cancer patient must understand the trade-off between the intended impact of chemotherapy and its numerous side-effects (Rhodes, 2016).

4.5.3.3. The reasons surrounding the difficulty involved in strategic management

The literature surrounding strategic decision-making is mostly from the business management discipline, of which farming is a part. According to Rosenzweig (2013), advances in the understanding of decision-making have not been matched by improvements in practice. Whilst Gilligan et al. (1983) suggest the importance of strategic management to the sustainability of a business is self-evident, it receives relatively little attention from most business managers. The literature suggests several reasons for this.

According to Gilligan et al. (1983), strategic management is a difficult and unnatural process for the majority of businesses. Despite its importance, strategic management frequently becomes
subordinated to other management activities regardless of whether the business is successful or experiencing difficulties. Gilligan et al. (1983) suggest that the reason for this is if the business is enjoying success, there is a temptation to leave current practices untouched, whereas, if the business is facing difficulties, solutions to current, short-term problems become the priority.

Further, as discussed in Section 4.4.3.1, Wharton University of Pennsylvania (2013) stresses that the skill set necessary for making strategic decisions is significantly different from those required for operational and tactical decisions. Gilligan et al. (1983) elaborate, stating strategic decision-making requires conceptual skills and the ability to envisage not only what changes might occur in the business environment in the long-term, but also to identify the opportunities and threats that are likely to stem from this change. After all, the long-term nature of strategic decisions means their consequences will materialise over a number of years. As Section 4.4.3 explored, strategic decisions are based on broad parameters rather than detailed forecasts of future events, therefore a manager’s ability to form accurate predictions is severely restricted (Gilligan et al., 1983).

A focus of this thesis is to explore the notion of farmers seeking advice from the information exchange interface to assist with their strategic decision-making. Strategic decision-making is essential to maximise the sustainability of mixed-farming businesses. It is assumed that good decision-making skills contribute to sustainability and resilience (Healy et al., 2013). To ensure their farm businesses are resilient and sustainable, farmers must think strategically and be adaptive to change. The majority of farmers do not necessarily have the required skills and knowledge to make sound, strategic decisions and often need to seek advice. Seeking advice presents several challenges, and it is the purpose of this thesis to explore those complexities. For that reason, the remaining sections of this chapter are devoted to the processes and influences surrounding farmer strategic decision-making to ensure the sustainability of their mixed-farming systems, and the role of advisers in providing them with assistance.

4.6. DECISION-MAKING MODELS AND PROCESSES

There are many explanations of how people make decisions and various approaches have been developed to analyse farmer decision-making. Decision-makers often do not consciously consider the process they undertake when making a decision (Whittenbury & Davidson, 2010). It is not the purpose of this thesis to discuss in any detail the intricacies of decision models as
this has previously been done elsewhere. The purpose of this section is to provide an overview of decision models. Section 9.3 will explain how decision models are limited in their capacity to explain strategic decision-making in contemporary mixed-farming systems.

According to J.R. Anderson, Dillon, and Hardaker (1977), the common approach in Australian agriculture has been the use of decision analysis. Decision analysis is a quantitative, logical choice model with a focus on risk probability and subjective expected utility values. Decision analysis employs a formal decision-tree process to select the right decision (J.R. Anderson et al., 1977).

Jennings and Wattam (1998) and Noorderhaven (1995) explain that the rational economic model of decision-making consists of a structured, four step sequence: identifying the problem, generating alternative solutions, selecting a solution, and implementing and evaluating the solution. In this model, the decision-maker makes decisions based on economic factors, although, as Whittenbury and Davidson (2010) point out, decision-making is influenced by many factors which are not economic — many of which have been discussed earlier in this chapter.

On the other hand, Hardaker, Huirne, Anderson, and Lien (2004) detail the process of decision-making and risk management as a series of sequential steps (Figure 13). This model is based on several assumptions, some of which are unrealistic. Firstly, farmers should be willing to and capable of employing a formal, quantitative decision-making process. Secondly, the subjective expected utility values and risk probabilities for all factors and perceptions affecting decision-making can be measured and calculated. Further, these truly reflect a farmer’s worldview and they are meaningfully used by the farmer in adoption decisions. Thompson (2009) suggests that the validity of these assumptions is questionable.
Figure 13: Steps in risk management (Hardaker et al., 2004)

Marsh and Pannell (2000b) have proposed a decision-making approach that differs from J.R. Anderson et al. (1977), Hardaker et al. (2004), Jennings and Wattam (1998) and Noorderhaven (1995) by incorporating personal, social, cultural and economic aspects of decision-making into the decision analysis model. Pannell et al. (2006) attempted to draw together the many disciplinary approaches to extension and adoption, and to summarise the major findings of adoption research in recent decades. Pannell et al. (2006) discovered that landholder adoption of a sustainable agricultural practice depends on their perception of whether or not it will assist them to achieve their goals. In other words, adoption is based on subjective perceptions or expectations rather than objective truth. Pannell et al. (2006) expounded the four main goals of landholders and their families as: wealth and financial security; environmental protection and enhancement; social approval and acceptance; and personal integrity and high ethical standards.
Previously, Simon (1955) simplified the decision-making process into three stages: identifying all the possible alternatives; determining all the possible consequences of these alternatives; and evaluating all the possible consequences. Pomerol and Adam (2006) claimed that the common weaknesses of decision-making are not exploring the alternatives fully and not understanding the underlying assumptions.

Simon (1955) proposed that decision-makers search for alternatives which in their opinion are satisfactory. In doing so, they can make decisions without determining all the possible alternatives. Simon (1955) also proposed that decision-makers recognise the world they perceive is a very simplified model of the real world. Subsequently, they are able to make a decision using a simple rule of thumb.

There are many considerations involved in making decisions (Figure 14), many of which are not based on rational economic theory or decision analysis. The methods used by farmers to make decisions can range from simple to extremely complex processes. While many of the decisions are made in order to improve the financial position of the business, many are also influenced by a range of social and psychological factors (Long & Cooper, 2011) such as affect, emotion and the use of heuristics (Whittenbury & Davidson, 2010).

Figure 14: A model illustrating how people make decisions (Long, 2012)

Although, according to Loewenstein and Lerner (2003), people may make decisions based on their anticipated feelings. A farming example is a decision to revegetate a water course, which
will be made partly by considering the anticipated feelings once revegetation is complete, and not just considering the benefits for the environment.

The influence of feelings is also referred to as the ‘affect heuristic’, where people’s affect will influence their decision-making (Whittenbury & Davidson, 2010). Finucane, Alhakami, Slovic, and Johnson (2000) explain that people rely on affect when judging the risk and benefit of particular actions. Objects and events are assigned with positive and negative feelings in people’s minds and these are consulted when making a decision.

Farmers constantly use heuristics to simplify the decision-making process. Heuristics are also known as ‘rules of thumb’. As discussed earlier, Simon (1955) proposed the theory of bounded rationality, which explains that people cannot always obtain all necessary information to make the best decision. Farmers are often limited in the amount of time they can designate to the gathering of information. Farmers also differ in their ability to gather information. Consequently, farmers must often make a ‘best-bet’ decision with the information they have (Long & Parton, 2012). Nicholson et al. (2015) suggest there must be a trade-off between the accuracy of a decision and the time spent gathering information. Subsequently, farmers use heuristics in their decision-making (Long & Parton, 2012). However, Long and Cooper (2011) warn that rules of thumb are not always correct and can sometimes cause less than ideal outcomes, particularly when the rule of thumb is no longer relevant (Long & Parton, 2012).

Farmers also frequently use intuitive decision-making processes. Intuition is a contested concept and an agreed definition is difficult to find. Yet, according to McCown (2002), almost everyone uses intuition in decision-making. Intuition has been variously defined as representing irrational decision-making, gut feeling, tacit knowledge, and has been discussed as a conscious, unconscious, pre-conscious and sub-conscious process (Whittenbury & Davidson, 2010). McCown (2002) refers to intuition as ‘automatic knowing’ whereas Rickards (2009) describes intuitive thinking as a process involving an individual’s subconscious, the current situation and their past experience and knowledge. Easen and Wilcockson (1996) agree, describing intuition as a non-conscious process that makes sense of a situation. Intuition allows people to make decisions more quickly because it bypasses rational processes (Kahneman, 2012). However, good intuition relies on past experience and knowledge (Pomerol & Adam, 2006). McCown (2002) further adds that intuition considers an individual’s personal values, beliefs, goals,
aspirations, stage of life and a myriad of other factors which influence the decision-making process. Nonetheless, whilst having its limitations, intuition enables a decision to be made (Long & Parton, 2012).

Social conditioning and formal education place emphasis on the importance of rationality in decision-making, and in doing so, they challenge the value of intuition. Intuition is often treated with scepticism because it is the opposite of the scientific approach to problem-solving (Long, 2012). Yet, while intuition is considered as unprofessional judgement, Whittenbury and Davidson (2010) report that it is often used within professions such as nursing, policing and emergency services as well as by high level managers. Further, McCown, Carberry, Hochman, Dalgliesh, and Foale (2009) and Long (2012) both propose that intuition is the most common decision-making process used by farmers. McCown et al. (2009) suggest that while intuition is preferred by many farmers, exposure to analytical thinking assists in improving intuition because it improves knowledge.

Nicholson et al. (2015) propose that the only significant difference between the top twenty per cent of successful farmers and the remainder of the industry is their ability to make the right decision at the right time. In agreeance, Gibb (2009) defines good management skill as the ability to make ‘good decisions’ in a timely manner. However, due to uncertainty in the environment, and without the wisdom of hindsight, farmers cannot make good decisions all the time. Therefore, they can be termed ‘best bet’ decisions with hindsight. Good farm managers recognise that luck and timing can also play a role and these factors are usually outside of their control.

Gibb (2009) found that farmers with good management skill follow a set of rules to achieve their success, and they are able to identify the critical variables when making decisions. Experience, observation and a comprehensive world view contribute to identifying the critical variables quickly. Good farm managers are not distracted by non-critical variables. They also listen to advisers but do not follow them blindly. Passion also provides resilience in adverse conditions. Further, good farm managers act quickly and decisively. More often than not, the good options disappear quickly. Good farm managers are able to make near ideal decisions, rather than
analyse a situation ‘to death’ and as a result, miss an opportunity. However, Nicholson et al. (2015) suggest that to not act is also a decision and is sometimes the correct choice.

Lehrer (2009) concludes that there is no correct method of decision-making. Mixed-farming systems are complex and there is a vast range of influences on farmer decision-making. Decisions models are limited in their capacity to capture the complexity of competing interests within family-operated, mixed-farming systems because decision-making is such a personalised and individualised process.

4.7. THE FARMER PERSPECTIVE ON INFORMATION DELIVERY

Farmers need to accumulate an extensive amount of information from a range of sources in order to make informed decisions. The conditions in which a farm business operates change so rapidly that it is difficult for farmers to know what questions to ask and what advice to act on (McGuckian & Rickards, 2011). The service providers described in Chapter Two can assist farmers to varying degrees with their increasingly complex decision-making. Increasing access to information can cause information overload and some farmers have difficulty establishing what information is relevant to them (Cooper, 2011). One of the most valuable services an adviser can offer is sorting through and finding information relevant to their farmer client (McGuckian & Rickards, 2011). Advisers can also assist farmers by not only providing advice but also providing strategies, tools and models. Advisers can also organise group forums where farmers can learn from each other through sharing their experiences (McGuckian & Rickards, 2011).

4.7.1. Decision-making: in what areas would farmers like assistance?

Stone (2005) found that the majority of farmers indicated their agronomist was their most important adviser, closely followed by their accountant and financial adviser. Looking towards the future, respondents indicated that their business adviser would be their most important source of information, followed by their marketing adviser and agronomist. Paschen et al. (2017) reported that as the financial and business environment in which farm businesses operate becomes increasingly complex, some farmers are increasingly interested in improving their business management skills and knowledge.
McGuckian and Rickards (2011) and Stone (2005) found that financial management and decision-making were the two most common areas in which farmers would like assistance. Farmers felt they were not adequately skilled in this area. Many older farmers, for instance, are less skilled in financial and business management than in agricultural production because of past emphasis in agricultural education and extension on science and production issues. Similarly, Paschen et al. (2017) reported that as the complexity of the business environment has increased, profitability is generally now seen as more important than production and some farmers are seeking assistance with making business decisions to improve the profitability of the farm business as an entirety.

McGuckian and Rickards (2011) also discovered that, as a consequence of the extended drought, the rules of thumb used by farmers came into question. There is therefore a need to advise farmers on how best to operate in current conditions. McGuckian and Rickards (2011) argue that farmers are advised to ‘drought-proof’ their farms without being provided the necessary knowledge. The drought also highlighted the need to manage risk through diversification. Many farmers need assistance with superannuation and succession planning, and locally specific climate projections will also assist farmers to plan for the future.

### 4.7.2. Information preferences

With regard to the level of information farmers require for decision-making, Stone (2005) found that farmers prefer concise information at the level of a simple paragraph or one page overview rather than a complete research article. They prefer to access information on a variety of topics in accurate snapshots from which they can obtain more detail if required. The overwhelming consensus was that farmers required their adviser to have an in-depth level of knowledge on a range of subjects, although several farmers would also like a short summary so they have a basic level of information. Farmers perceive present information delivery was difficult for the average person to understand (Stone, 2005).

Stone (2005) also found that farmers prefer to receive information via a range of methods, including field days, fact sheets, brochures, industry magazines, email and phone advice. On-farm advice was the preferred method of information delivery for the majority of respondents. Respondents suggested it was the role of advisers to attend workshops and then synthesise the information for their clients. One-to-one advice was highly valued by nearly almost all
respondents. Trials at a local level were also valued where the adviser could interpret the results relevant to the farmer’s own business.

Farmers surveyed by Hill, Kaine, and Ashburner (2013) also sought experiential information. Extension efforts which provided opportunities for farmers to view and experience the technology or practices, such as demonstrations and trials, were valued. King and Nettle (2013) discovered that the internet was also a growing influence, particularly for younger farmers. However, Cooper (2011) reported that many farmers use the internet as a source of information which can exacerbate the problem of information overload. In addition, Easdown and Starasts (2004) point out that internet content can lack the appropriate context required by farmers to make decisions. Research by Stone (2005) indicated that farmers would like information stored in a central location. They would also like this information to be specific to their own farm businesses.

4.8. DECISION SUPPORT SYSTEMS

In order to support farmers in their decision-making, researchers have invested in the development of decision support systems (DSSs), which can assist farmers in their tactical and strategic decision-making (Long & Cooper, 2011). Developers searched for a method to provide research outcomes directly to farmers. With the gradual change in nature and provision of public sector extension services, researchers saw an avenue to fill the void by providing farmers with tools to assist with the on-farm application of research outcomes. Researchers expected farmers to use them for many years to come to assist in their decision-making (Long & Parton, 2012).

However, the use of DSSs by farmers has been extremely low. Many authors have reviewed the reasons behind the poor farmer uptake of DSSs. According to Nguyen (2007), for a DSS to be successful, it needs to be simple to use, relevant, effective, low cost and have farmers involved in its development. Farmer confidence in the ability of the DSS to provide accurate information is also critical. Other reasons suggested by Nguyen (2007) for low farmer use of DSSs include farmer age, computer literacy, fear of using computers, time constraints as well as poor marketing. Long and Parton (2012) suggest that advisers and farmers who have developed knowledge, skills and rules of thumb surrounding a topic are less likely to use a DSS for that topic. Consequently, the more likely potential users are those who would like to learn more about a particular topic.
Long and Parton (2012) also suggest that DSS developers should not be disheartened by their discontinued use. DSSs are primarily a learning tool and they may only be used once or twice until the information has been learned. For more complex issues, the DSS may be used for longer. It will then be ‘discarded’ as the user develops rules of thumb. According to Long and Parton (2012), expecting farmers to use DSSs which provide an analytical approach to decision-making is unrealistic because the systems do not align with the intuitive thought processes most farmers prefer to use.

Long and Parton (2012) also found that DSSs were more likely to be used by advisers rather than farmers because the information required for the model is usually collected by the adviser. Gibb (2009) reported that many farmers would prefer their adviser used the DSS for them and then provided a recommendation, rather than learning to use the DSS themselves.

Once the ‘key finding’ is understood, the adviser will establish a rule of thumb and will no longer use the DSS. The adviser will transfer the knowledge learnt from the DSS to the farmer. The farmer will then be faced with a decision influenced by the range of personal factors plus other variables discussed earlier in this chapter. Subsequently, McCown (2002) and Long (2012) suggest that developers of DSSs should target advisers as users, and accept discontinued use of the DSS by farmers as a success.

As a result of their low and short-term use, some question the investment in DSSs. However, Long and Cooper (2011) disagree and suggest that advisers use a range of tools to assist farmers with their decision-making and there is no doubting the value of DSSs. Long and Cooper (2011) add that DSSs are used by people with all their biases and cognitive limitations; DSSs assume that farmers make decisions mostly based on economic drivers, but as this chapter has demonstrated, this is a major oversimplification.

4.9. STRATEGIC MANAGEMENT OF MIXED-FARMING SYSTEMS

Australian farmers operate in a complex and constantly changing environment, subject to pressures from weather, markets, social change and environmental conditions (Healy et al., 2013). The literature indicates that in order to maximise the sustainability of their mixed-farming businesses, it is important that farmers think strategically (Kuruppu et al., 2013). An individual
with a strategic mindset understands the fundamental drivers of their business (Wootton & Horne, 2001). A strategic mindset develops and evaluates every decision and action in light of current and future circumstances (Keelin & Arnold, 2002). A strategic mindset considers all variables, internal and external to the business (Hambrick & Fredrickson, 2001). It ensures the goals of the individuals involved are achieved whilst enabling flexibility to ensure the business is able to change quickly and easily in response to changes in the business environment (Keelin & Arnold, 2002).

Therefore, in order to maximise the sustainability of their mixed-farming systems, the ability of farmers to think and act strategically and be adaptive to change is very important (Farquharson et al., 2013). Adaptive capacity is the capacity of individuals to adapt to changing circumstances (Jacobs, Nelson, Kuruppu, & Leith, 2015). The term ‘adaptive capacity’ is derived from biology and defines the ability of a system to live and reproduce in a range of environmental contingencies (Gallopin, 2006). Brooks and Adger (2004: p. 168) define adaptive capacity as:

...the set of resources (natural, financial, institutional or human, and including access to ecosystems, information, expertise, and social networks) available for adaptation, as well as the ability or capacity of that system to use these resources effectively in the pursuit of adaptation.

Kuruppu et al. (2013) meanwhile, define adaptive capacity as the conditions that enable or prevent anticipatory adaptation from occurring and claim that it varies across regions and sectors. Rickards, McKellar, and George (2012) also suggest that adaptive capacity is context dependent, locally specific, dynamic and subjective, and necessitates a multi-disciplinary approach as described by Spiller et al. (2015).

In their review of the literature addressing sustainable farming systems, Darnhofer, Bellon, Dedieu, and Milestad (2010) identified three strategies that strengthen the adaptive capacity of a farm. Firstly, farms are learning systems that generate new knowledge and allow farmers to learn through experimentation and evaluation. Secondly, a farm business must be flexible both in the short-term as well as the long-term to increase the opportunities for new activities. Operational flexibility improves adaptive capacity when ‘surprises’ present themselves, whereas strategic flexibility is directed at long-term choices and the capacity to change. Thirdly, diversity within the farm business spreads risk and creates buffers, offering the business a variety of alternatives if necessary.
Successful Australian farmers have always adapted to changed circumstances which is generally regarded as being fundamental to maximising the sustainability of the farm business. A purpose of this thesis is to explore the capacity of farmers to continue to adapt under the pressure of a changing information exchange interface. While the interface exists to support farmers in their decision-making (Klerkx & Jansen, 2010), traditionally, most of the support was provided by the public sector. However, with the restructure and gradual withdrawal of the public sector from the interface, the question remains as to whether the other service providers have the capacity to assist farmers to strategically manage their mixed-farming systems and adapt to change.

Adaptive capacity is not a uniform skill held equally by farmers. For instance, as elucidated by Nitkin, Foster, and Medalye (2009), in the context of climate change, many small to medium sized enterprises (SMEs) have short-term plans and a ‘wait and see’ approach, rather than proactively preparing adaptation strategies. Kuruppu et al. (2013) suggest that it would be beneficial for SMEs to undertake strategic planning. Further, there is opportunity for the public sector to engage with other stakeholders that can in turn provide businesses with educational opportunities which promote the benefits of strategic planning to build adaptive capacity and business resilience.

Kingwell (2006) reviewed the adaptive capacity of the Australian agricultural sector to climate change and found that the option with the most potential involved strategic approaches surrounding the extension or enhancement of existing activities for managing increasing climate variability.

Kingwell’s (2006) review also highlighted that in order to adjust and adapt to climate change, farmers need to make strategic business changes, such as modifying enterprise mix; altering rotations across soil classes; and changing stocking rates, feeding regimes and flock structures.

Strategies undertaken to build adaptive capacity will simultaneously support the resilience of the business. Holling and Walker (2003: p. 1) describe ‘resilience’ as:

...the potential of a particular system to maintain its function [which may not be the most efficient way] in the face of disturbance and the ability of the system to re-organise following disturbance-driven change.
Additionally, Walker and Salt (2006) define resilience as the capacity of a system to undergo change and still retain the same function and structure. Healy et al. (2013) further add that, a resilience mindset is a framework for considering the ability of a business to prepare for and respond to shocks. It involves understanding the risk, likelihood and consequence of shocks, and the business’ preparedness or flexibility in terms of responding to a new state after that shock.

Resilience can be considered as a subset of adaptive capacity (Gallopin, 2006). There is an increasing focus on farmers’ resilience and adaptive capacity to improve decision-making and management in response to uncertain and changing conditions (Healy et al., 2013). Healy et al. (2013) claimed that good decision-making skills contribute to resilience. If farmers are better equipped to make complex decisions in relation to changing climatic, market and natural resource management challenges, the resilience of their farming systems will be improved (Healy et al., 2013).

Considering the findings of Walker and Salt (2006), Nitkin et al. (2009), Darnhofer et al. (2010), Rickards et al. (2012), Healy et al. (2013) and Kuruppu et al. (2013) in the context of mixed-farming systems, decisions such as selecting the most suitable enterprise mix, fencing to land class (see Section 4.9.1), changing to a rotational grazing system, and grazing crops are all strategic decisions which will improve the adaptive capacity and sustainability of mixed-farming systems.

However, as Rickards et al. (2012) elucidated, adaptive capacity is context dependent and locally specific, therefore the most suitable strategic decisions will differ between mixed-farming systems.

To highlight the relevance and importance of adaptation strategies in mixed-farming systems to improve their sustainability, it is useful to consider two brief case studies. The following section explores two mixed-farming systems which made strategic business changes to improve the adaptive capacity and subsequent sustainability of the mixed-farming business. These two businesses altered their enterprise mix and modified their grazing systems in order to reduce risk and improve the resilience and adaptive capacity of their businesses to improve their position to respond to uncertain and changing conditions.
4.9.1. Strategic approaches to business improvement

In the first case-study, Mike Roberts Communications (2013) reported on a family-operated, mixed-farming system which made strategic business changes to improve the sustainability of the business. The farm was progressively zoned and subdivided into land classes, based on the capability of the land to support a range of crops on a long-term sustainable basis. The somewhat interpretative and subjective evaluation is based on the degree of limitation imposed on the land by a variety of physical factors which include erosion, soils, wetness and climate. Land is evaluated on the basis of the range of potential crops, productivity, ease of management and risk of degradation. Before the strategic changes, the business was predominantly cropping with a complementary Merino enterprise using set stocking methods. However, the land capability assessment and the strategic changes reduced the hectares cropped and increased stock numbers to provide the family with a more stable income.

The catalyst for change was photos of “terribly” bare hills. The business wanted to ensure the farm could be passed on to the children. Crop yield variability was increasing and risk was exacerbated by the rising costs of inputs. The ability of the land to turn out good stock was much more reliable so the business made strategic business improvements to increase livestock productivity. The business invested in infrastructure on the farm, sowed fewer hectares to crops and increased stocking rates. Creeks were fenced off to encourage the regeneration of native plants. The business also changed from a set stocking regime to rotational grazing, including fencing off ridge tops. Rotational grazing encouraged the regeneration of native grasses and subsequently improved pasture productivity and carrying capacity. The grazed areas recovered more quickly and the business also experimented with pasture cropping (Mike Roberts Communications, 2013).

The major benefit of the new system was increased ground cover. The improved ground cover supported more stock and livestock health also improved as a result of a varied and improved diet. Increased ground cover improved the water holding capacity of the soil which in turn led to better recovery from grazing. After responding to summer rainfall, the native pastures flourished and enhanced soil fertility which in turn benefited the winter crops. The family business also experienced a “warm fuzzy feeling” viewing formerly bare paddocks now covered in a variety of plants. The business takes great pride in the good condition of its country and its calm, well-conditioned stock (Mike Roberts Communications, 2013).
When considering the time taken and expense incurred in setting up the new system, the long-term costs of supplementary feeding far outweighed the costs of the strategic business improvements which improved the sustainability of the system (Mike Roberts Communications, 2013).

In a further case study, Mike Roberts Communications (2014) reported of another family-operated, mixed-farming business which also made strategic improvements. The autumn feed gap presented an issue because stubbles had lost their value. In drier years there would be little rain to kick-start pastures and constant hand-feeding was expensive and time consuming.

To address the issue, the business began grazing crops which increased profits and flexibility. As the business became more experienced with grazing crops, the grazed and non-grazed paddocks yielded nearly the same. Grazing a crop provided fodder during the autumn feed gap and allowed for improved pasture establishment. Grazing crops early dramatically increased the carrying capacity of the pastures by reducing grazing pressure. In some years, the business discovered that grazing the crops was often the difference between having a good spring pasture or no pasture at all (Mike Roberts Communications, 2014).

Additional benefits included ryegrass control, worm control, and more fertile ewes with better milk supply which subsequently produced better lambs. Further, grazing delayed flowering which minimised the risk of frost damage (Mike Roberts Communications, 2014).

The business identified several critical factors which ensured success. Firstly, stocking rate was important to ensure the whole paddock was grazed off consistently. Paddocks also needed to be sown early. Putting the sheep onto the crop and then taking them off again at the right times was also critical (Mike Roberts Communications, 2014). These elements are all strategic processes which maximised the success of the farm business.

For the system to be successful, the business stressed that flexibility was important. The season often dictated whether or not the grazed crop would be harvested. In a season starting off with no soil moisture and a late break, cereals would still be sown with the aim of grazing them. If the season was going well, the sheep would be taken out of those paddocks and put onto
pasture. If there was not enough rainfall, the crop may have been grazed off and not harvested. The business also kept reserves of stored fodder in case climate conditions demanded supplementary feeding (Mike Roberts Communications, 2014).

4.9.1.1. *Illustrating the complexity*

Figure 15 below is a model which illustrates the factors the business in the first case study may have considered when deciding to fence to land class and implement a rotational grazing system. The changes required significant investment, however, they also had major potential to improve productivity and profitability and to minimise risk. There were also potential social and environmental benefits. Subsequently, the strategic business changes could potentially improve the sustainability of the mixed-farming system and farm succession was a viable possibility which was the original stimulus for the change.
**Figure 15:** A model illustrating a strategic business decision: Fencing to land class

- **Fence-off native vegetation**: Increase biodiversity, reduce hectares cropped, increase groundcover, increase soil fertility, increase soil water holding capacity, improve winter, carry recovery from grazing, pasture production, higher yields, sheep numbers, labour, happy farmers, productivity, profitability, reduce risk, preserve natural resources, sustainability of the family farm.

- **Rotational grazing**: Rotational grazing, lower runoff, lower salt, higher carrying capacity, recovery from grazing, pasture production, sheep numbers, productivity, profitability, lower risk, lower $& labour, water infrastructure, fence infrastructure, time out from grazing.

- **Reduce hectares cropped**: Reducing hectares cropped, lower inputs, lower risk, higher money and lower labour, water infrastructure, fence infrastructure, time out from grazing.
Prior to implementing the strategic decision to fence to land class and implement a rotational grazing system, there were many factors to consider and many influences on the decision. Figure 16 below illustrates the process the family may have gone through before deciding to fence to land class.

**Figure 16:** The decision-making process a family-operated, mixed-farming business may go through before deciding to fence to land class

Firstly, the business began to explore its options and discussed rotational grazing with their consultant and other farmers who had successfully implemented a rotational grazing system. The business then considered the implications of the decision to fence to land class. It would need to invest in water and
fencing infrastructure on the farm. The pastures could not be grazed while they were established. The business decided to erect the fencing themselves rather than hire contractors to save on labour costs. This meant there was less time for other activities and the project had to be completed gradually. However the business perceived that this method involved less risk.

Reducing the hectares sown to crops and expanding the livestock enterprise meant their farming system would be more labour intensive. This meant there would be less time for other activities and leaving the farm for a holiday was more challenging. Setting up the new system was also stressful because it entailed exploring unfamiliar territory and there was no guarantee the changes would be successful. The decision required a substantial, long-term investment which was difficult to reverse. The information on which to base the decision was not well established or precise, and it was also more difficult to acquire than for other operational and tactical decisions the business had made in the past. Further, the long-term nature of the decision meant the consequences of the decision would materialise over a number of years. Subsequently, the decision was made based on a substantial element of judgement on the business’s behalf. It planned for a future it could not fully anticipate.

It is important to note the model presented in Figure 16 is not comprehensive. Mixed-farming systems are complex and no two mixed-farming systems are identical. Together with the infinite number of social, cultural, personal, economic and environmental influences on a farmer’s decision-making, the process illustrated in Figure 16 is unique for every strategic decision in any family-operated, mixed-farming system. Strategic decision-making is a highly personalised and individualised process. As Figure 16 illustrates, it is also a constantly evolving process involving re-assessment and re-evaluation based on observed outcomes to ensure the overarching goals are met.

4.9.2. The importance of strategic management

In both of the case studies, the businesses were mixed-farming systems which historically placed more emphasis on cropping than livestock. However, both businesses discovered the livestock enterprise of the business was more profitable and sustainable. Subsequently, they made strategic changes to improve the productivity and profitability of the business by expanding the livestock enterprise. Both of the businesses had a strategic mindset. They both understood the fundamental drivers of their business as per Wooton and Horne (2001). They considered future and current circumstances in their decision-making as per Keeling and Arnold (2002). They considered the critical variables, internal and external to the business, as per Gibb (2009) (see Section 4.6). Additionally, their decision-making
aligned with their strategic goal (see Section 4.5.3) which was to pass the farm on to the children. In line with the strategies identified by Darnhofer et al. (2010), they diversified the business to spread risk. Furthermore, these strategic decisions maximised the businesses’ potential to remain flexible and adaptable to change, improving the sustainability of the mixed-farming system. Biggs, Edwards, Rickards, and Wiseman (2011) stress that adaptation is a continuous, ever-changing process involving cycles of decision-making, planning, action, observation and learning. Subsequently, the businesses will have to continuously evaluate their mixed-farming systems and make adjustments as necessary as the business experiences changes from both within and external to the farming system.

The case studies highlight the importance of a supportive information exchange interface. Both of the businesses learned through on-farm experimentation and evaluation, as outlined in Darnhofer et al. (2010), with the support of service providers within the information exchange interface. These businesses received strategic business assistance to modify their mixed-farming systems. They were involved in Grain and Graze 2 which was a collaborative program building on existing networks involving a range of service providers from various sectors within the information exchange interface. This program aimed to address issues of resilience, complexity and adaptive management which are necessary to improve the profitability of mixed-farming businesses (Farmlink, 2016). The program improved the knowledge and capacity (see Section 2.6) of the managers to strategically manage their businesses and improve their adaptive capacity and sustainability.

4.9.3. Improving the adaptive capacity of mixed-farming systems

Kingwell (2006), Biggs et al. (2011), Mukheibir et al. (2012) and Kuruppu et al. (2013) strongly recommend that in order to be adaptive to change, businesses need to shift from traditional responsive approaches to proactive approaches. A proactive mindset will build resilience and adaptive capacity, enabling the business to respond to changing information and trends, and have an ability to withstand sudden shocks such as droughts, floods, bushfires and heat waves (Mukheibir et al., 2012).

If service providers within the information exchange interface are reactive in their approach and lack a sense of urgency on particular issues, then this is likely to hinder the opportunities available to small business to utilise support and implement proactive adaptation strategies. It is difficult for small business to be proactive, particularly when the external context is not conducive or supportive of making such plans (Kuruppu et al., 2013).
Kuruppu et al. (2013) claimed that government programs tend to be reactive and focus on business recovery during and after a shock rather than on altering the vulnerability of small business through anticipatory prevention, preparedness and adaptation planning. Further, the short-term nature of government-led programs and the limited support available to small business also contribute to vulnerability. In addition, the selection and eligibility criteria for government funded programs can be too rigid and inflexible. Kuruppu et al. (2013) suggest that the success of efforts to build the adaptive capacity of small business will depend on how support organisations address these issues. Many of these processes are largely outside the control of individual small businesses and reside within the broader landscape in which governments and other stakeholders operate. Kuruppu et al. (2013) concluded that if these factors are not addressed, the adaptive capacity of small business will continue to be undermined.

Adaptive capacity is a product of a multi-disciplinary intellectual and experiential space. Kuruppu et al. (2013) also concluded that effective, collaborative relationships between small business and support organisations are critical to enhance the adaptive capacity of small business. Farquharson et al. (2013) add that, collaborative relationships between and within the support organisations are also critical. Poor coordination between government, industry and private sector stakeholders leads to limited information sharing, duplication of services and missed opportunities for joint learning and reflection amongst stakeholders. Kuruppu et al. (2013) discovered that the importance of collaborative relationships has been largely overlooked in formal programs which aim to build small business resilience and adaptive capacity. Poor relationships also constrain the abilities of small business to direct their resources towards implementing adaptive strategies. Underpinning these failures are struggles over power due to the desire of organisations to protect their niches in the wider landscape supporting small business. Ineffective relationships between small business and support organisations, and within and between support organisations themselves have the potential to limit the adaptive capacity of small business and undermine their ability to adopt strategic planning initiatives. Farquharson et al. (2013) propose that one-to-one support will assist small business to improve their adaptive capacity.

4.10. CONCLUSION

For the sustainability of mixed-farming systems, farmer decision-making needs to ensure that agricultural practices are economically viable, meet human needs for food and fibre, ensure quality of life for the farm family while conserving natural resources. Since these objectives can be achieved in
a variety of ways, sustainability is unlikely to be linked to any particular management decision. Rather, agricultural sustainability is thought of in terms of its adaptability and flexibility over time to respond to economic, social and environmental changes both internal and external to the mixed-farming system. This goal requires an efficient use of knowledge and technology in a manner conducive to sustainability. Further, it requires strategic management which entails long-term planning for a future which is not entirely known. Consequently, strategic decisions typically require the use of a substantial element of personal and professional judgement by the farmer making the decision. Additionally, since sustainability is context specific and not a static concept, a monitoring tool to evaluate sustainability will never be complete and will continuously be subjected to change.

The purpose of agricultural extension is to build the capacity of farmers to improve their decision-making so they can better manage their farm businesses. Bottom-up approaches evolved in response to the failures of top-down approaches, particularly when they were applied to non-industrialised countries and sustainable agricultural practices. Although, RD&E programs based on the Transfer of Technology model have been successful in increasing agricultural production, the Transfer of Technology model does not easily allow for upward communication to influence what comes down. The bottom-up model on the other hand tends to over-emphasise participation, local knowledge and local problem-solving capacity. Neither approach is superior in all respects, with each having its limitations (Röling, 1988).

Effective extension therefore requires a sound knowledge of clients’ needs and the use of a full repertoire of extension approaches, carefully chosen according to context (Campbell, 2005). Effective extension has strong bottom-up flows of information from farmers to RD&E organisations whilst also taking into consideration the capacity of RD&E organisations.

Agricultural extension services in Australia have undergone dramatic and rapid change. As a result of the restructure and gradual withdrawal of the public sector from the provision of agricultural extension services, there is now a multitude of service providers (King & Nettle, 2013) in the information exchange interface.

For the purpose of this thesis, the information exchange interface is defined as the collective of all the providers of knowledge, information and advice to farmers, in one form or another, to assist them with their decision-making.
There are various projects and programs taking place in the information exchange interface, funded by different combinations of public, private and industry investment (Campbell, 2005). Reforms have resulted in the private sector delivering more extension services, including institutional arrangements where the public sector provides the funding. The private sector continues to expand the services it provides.

Extension is no longer viewed as the traditional, top-down public sector approach, but rather as a multi-institutional, ‘pluralistic’ information exchange interface which comprises many stakeholders from the public, private and industry sectors that employ various extensions methods and models, notably bottom-up approaches (Hunt et al., 2012). The information exchange interface has changed considerably in recent decades. As the world has progressed into the digital age, the rate of change of this interface has increased, yet the methods used by the various service providers to engage with farmers have not changed at the same pace.

For a sustainable agriculture, it is not only the knowledge, skills and goals of farmers that must be considered, but also the actions taken by service providers within the information exchange interface (Omar et al., 2011). Within this multi-institutional, pluralistic interface, efforts should be made to seek and refine the arrangements that induce the best use of all service providers (Feder et al., 2011) to best assist farmers in their decision-making, and the comparative advantage of each sector should be capitalised on (Umali-Deininger, 1997). The private sector has become a popular advisory service and this is unlikely to abate (Rivera, 2011). However, in spite of its benefits, private sector extension is no panacea and is not without its own challenges (Feder et al., 2011).

Farmer decision-making is influenced by a myriad of factors both internal and external to the business. It is also influenced by the relationships farmers have with the providers of extension services (Kilpatrick, 2002) within the information exchange interface. As this chapter has established, farmer decision-making is complex, and this complexity is exacerbated in the context of family-operated, mixed-farming systems. For the sustainability of mixed-farming systems, the capacity of farmers to strategically manage their farm business is extremely important. However, it is not the purpose of this thesis to study how farmers make decisions. Rather, it is the purpose of this thesis to explore the relations between the information exchange interface and farmer decision-making. Nonetheless, an
understanding of how farmers make decisions is important for uncovering how the information exchange interface can best support farmers in strategically managing their businesses.

Chapters Two, Three and Four have identified several important gaps in the literature. Namely, the majority of research to date surrounding farmer decision-making has concentrated on operational and tactical decisions. Also, minimal literature has been written on the complexity of the information exchange interface which exists to support Australian farmers. Additionally, there appears to be no literature on the influence of the complexity of the information interface on farmer decision-making nor on strategic decision-making within mixed-farming systems.

As outlined in the research objectives in Section 1.2, farmers must be adequately supported in the strategic management of their businesses in order to improve their adaptive capacity. However, there appears to be limited understanding of the relationship between the information exchange interface and farmer decision-making generally (see Section Error! Reference source not found.), and even less so on specifically strategic decisions. Accordingly, the focus and contribution of this thesis is to explore and provide insight into this relationship.

The following chapter explains the methodology and research approaches employed to explore the research questions identified from the review of the relevant literature.
CHAPTER FIVE: RESEARCH CONTEXT AND APPROACH

5.1. INTRODUCTION

The majority of research to date surrounding farmer decision-making has been on the adoption of tools, technology and practices. This thesis aims to explore and understand the complexity surrounding farmer decision-making in the information exchange interface in order to improve the sustainability of mixed-farming systems.

The previous chapters introduced the research questions and explored the relevant agricultural extension, sustainable agriculture and farmer decision-making literature. Chapter Two gave an historical overview of the agricultural extension discipline and described the information exchange interface. Meanwhile, Chapter Three reviewed the evolution of sustainable agriculture and demonstrated that in order to be sustainable, mixed-farming systems must be economically viable, meet human needs for food and fibre, provide quality of life to the farming family and conserve natural resources. Sustainable agricultural systems must also be flexible and adaptable to change. In order to improve their adaptive capacity, a strategic mindset is very important. The purpose of the information exchange interface is to support farmers in their decision-making. Chapter Four explored the literature surrounding the complexity of strategic decision-making in mixed-farming systems.

This chapter outlines the methods and approaches used in this research study to address the research questions identified from a review of the relevant literature. A mixed methods approach was implemented for this research study.

This chapter commences with a discussion of the theoretical framework adopted and the reasoning behind the selection of a mixed methods approach. The chapter continues by explaining the methods of data collection and analysis utilised. This is followed by ethical considerations and issues of reliability and validity. The limitations and potential challenges associated with the methodology and research design are also discussed.

5.2. CHOOSING A RESEARCH APPROACH: MIXED METHODS

Selecting a particular methodology depends on the nature and purpose of the research (Minichiello, Aroni, Timewell, & Alexander, 1995). The purpose of this thesis is to explore and understand the
relationships between farmer decision-making and the information exchange interface for the sustainability of mixed-farming systems. Given the nature of this particular research topic and the research questions, a mixed methods approach was considered most appropriate.

Mixed methods refers to research that integrates quantitative and qualitative research within a single project (Bryman, 2004). Mixed methods research encourages researchers to use multiple paradigms or a single paradigm that encompasses the use of both qualitative and quantitative research methods (Creswell & Plano Clark, 2007). While qualitative and quantitative methods might be portrayed as being quite separate, mixed methods research rejects this dichotomy (Tashakkori & Teddlie, 1998) and suggests that combining quantitative and qualitative approaches provides a better understanding of research problems than either approach alone (Creswell & Plano Clark, 2007).

Mixed methods approaches are recommended where there are complex research questions that are not sufficiently answered by qualitative or quantitative approaches alone (Tashakkori & Teddlie, 1998). Mixed methods allow for a broader understanding of social issues and the main rationales for selecting this approach are said to be for participant enrichment (optimising the sample); instrument fidelity (maximising the appropriateness of the instruments used in the study); and significance enhancement (mixing techniques to maximise the interpretation of the data) (Onwuegbuzie, Bustamante, & Nelson, 2010). A mixed methods approach heavily focuses on the research question and places emphasis on diversity at all levels of the research (Tashakkori & Teddlie, 1998).

If chosen carefully, mixed methods research can offset the apparent weaknesses of qualitative and quantitative methods when either is used in isolation (May, 2001). Mixed methods can answer questions other methods cannot. In this research study, the quantitative data provided understanding of farmer attitudes across a population of farmers (Teddlie & Tashakkori, 2003).

As well as many positive attributes, there are also several challenges associated with mixed methods research. Firstly, it is important that the diversity of approaches be assessed in a reflective way to prevent duplication. Secondly, the researcher needs to be careful to not mix research approaches together in an ad hoc way as this can threaten validity. Thirdly, methodological congruence must be maintained and there should be consistency in data collection and analytical strategies (Morse, 2003).
There are different opinions on the use of mixed methods. Guba and Lincoln (1989) state that some authors believe the use of mixed methods is untenable and take a purist stance, stating that different methods are incompatible, posited on the link between epistemology and method. On the contrary, Patton (2002) is of the opinion that too much research is based on habit rather than situational appropriateness. Rather, the researcher should make sensible method decisions given the purpose of the inquiry, the research question under investigation, as well as the resources and the time available.

Others advocate the use of a single paradigm that accepts mixed methods, such as pragmatism (Datta, 1997; Patton, 2002; Rallis & Rossman, 2003; Tashakkori & Teddlie, 1998). Pragmatism is not defined by any particular philosophy or reality, but rather the research problem is given central emphasis. Pragmatic approaches place high importance on the research questions, with the methods matched according to the specific purpose of the research (MacKenzie & Knipe, 2006). Pragmatism is considered to be the most relevant philosophical framework for mixed methods research (Tashakkori & Teddlie, 1998) and was consequently deemed as most appropriate for this research study.

5.3. RESEARCH DESIGN

A combination of qualitative and quantitative methods was utilised to collect data pertaining to this research study. According to Tashakkori and Teddlie (1998), the use of multiple data sources informs a more holistic understanding of a complex topic. In this research study, depth and detail of understanding of the research study was gained through semi-structured interviews and the interactive group exercise. The quantitative survey data also provided a valuable role in answering aspects of the research questions which the qualitative data could not. The use of the two forms of data provided vital information in comprehensively answering the research questions.

5.3.1. Research rationale

At the beginning of this journey, the purpose of this research study was to explore the relationship between the information exchange interface and strategic decision-making in mixed-farming systems. As Chapter Two discussed, the information exchange interface has undergone significant change. There is now a multitude of service providers providing advisory services to farmers. Many different institutional arrangements and formalised collaborations have appeared (see Section 2.8). For the purpose of this thesis, the information exchange interface is defined as the collective of all the providers of knowledge, information and advice to farmers to assist them with their decision-making.
Minimal literature has been written on the complexity of the information exchange interface which supports farmers in their decision-making. There appears to be no literature on the influence of the complexity of the information exchange interface on decision-making and certainly not within mixed-farming systems.

In the decade prior to the beginning of this research study, agribusiness had increased its advisory services and was playing a more prominent role in the interface and offering fee-for-service. Again, there was minimal literature surrounding agribusiness and fee-for-service, and most of the available literature was anecdotal. Further, the literature did not address the influences of the information exchange interface on the sustainability of mixed-farming systems.

As the literature has revealed, to improve the sustainability of mixed-farming systems, the capacity of farmers to think and act strategically and be adaptable to change is very important. There has been minimal literature written on strategic decision-making in mixed-farming systems in Australia. The majority of research has concentrated on operational and tactical decisions. As the following chapters will reveal, the information exchange interface, the limitations of the available extension and adoption theory and decision models, and the complexity of strategic management, all influence the capacity of farmers to operate their business with a strategic and adaptive approach.

5.3.2. Timeline of research

The mixed methods methodology employed in this research study evolved through an exploratory phase, data collection phase and synthesis phase. Research began in March 2008 with a review of the relevant literature to critique the body of knowledge and methodologies, identify research gaps, generate ideas and link prior and current research. Journal databases were explored as a starting point. Bibliographies of journal articles, books and theses were also useful. Meetings, seminars and conferences were also attended and relationships with key informants were developed.

This initial exploratory study was followed by a quantitative, web-based survey conducted in 2009. An interactive group exercise was also undertaken in late 2009 and semi-structured interviews were conducted in 2013. These methods of data collection are detailed in the following section.
5.4. METHODS OF DATA COLLECTION

Three methods of data collection were used in this study: a web survey, an interactive group exercise and semi-structured interviews. The data collected from the web survey was quantitative in nature whereas the data from the interactive group exercise and the semi-structured interviews was qualitative. Data from each method of data collection were used to gain a greater understanding of the research problem and enlighten further analysis and collection of data. The semi-structured interviews collected data to answer the following research questions:

1. To what extent are strategic farm management decisions of farmers supported by the current agricultural information exchange interface?

2. To what extent do farmers and advisers prioritise strategic decision-making in their practices?

On the other hand, the interactive group exercise collected data pertaining to research question three:

3. What are the implications for agricultural sustainability?

The interactive group exercise also assisted in answering research question one. The interactive group exercise allowed the notion of collaboration to be explored, which was a significant issue which emerged from a review of the literature. The web survey collected background information pertaining to all three research questions (Table 4).

Table 4: Three methods of data collection were used to answer the three research questions.

<table>
<thead>
<tr>
<th>Date Collection Method</th>
<th>Research Question Answered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Web Survey</td>
<td>Provides background only to questions 1, 2 &amp; 3</td>
</tr>
<tr>
<td>Group Exercise</td>
<td>3</td>
</tr>
<tr>
<td>Interviews</td>
<td>1 &amp; 2</td>
</tr>
</tbody>
</table>

Care was taken to ensure that a balance was maintained between using insights to inform further stages, whilst maintaining an open and unbiased opinion to remain receptive to the new and unexpected.
5.4.1. **Web survey**

Surveys are the most commonly used method of data collection in the social sciences. In general, surveys are methods of data collection in which information is gathered through oral or written questioning. Oral questioning is known as interviewing, whereas written questioning is accomplished through questionnaires (Sarantakos, 2005).

There has been considerable growth in recent years in the number of surveys being administered online. There is a crucial distinction between surveys administered by email and surveys administered via the internet. In the case of the former, the survey is sent via email to the respondent, whereas with a web survey, the respondent is directed to a website to answer the questionnaire (Bryman, 2004). This research study employed a web survey.

Web surveys operate by inviting prospective respondents to visit a website at which the questionnaire can be found and completed online. The web survey has an important advantage over the email survey in that it can use a much wider variety of embellishments in terms of appearance (Bryman, 2004).

However, the advantages of web surveys are not just in relation to appearance. Web surveys have several advantages over traditional, postal surveys. Firstly, some respondents may feel more comfortable completing the questionnaire online because of the long periods of time they already spend online. Additionally, completing the questionnaire online removes the need to return it via post which some respondents may find inconvenient. Further, online surveys are more cost effective to administer, have faster response rates and there are no constraints in terms of geographic coverage. There are also fewer unanswered questions, resulting in less missing data, and better response rates are received for open questions with more detailed replies (Bryman, 2004).

Another advantage of web surveys is they can be designed so that when there is a filter question, it skips automatically to the next appropriate question. The survey can also be programmed so that only one question ever appears on the screen or so that the respondent can scroll down and look at all the questions in advance. Further, respondents’ answers can be automatically programmed to download into a database, thus reducing or eliminating coding which can be very time consuming. There are a growing number of software packages available to construct surveys. There is generally an associated cost with accessing these online software packages although some are free. With websites such as
these, the questionnaire can be designed online and a web address created to which respondents can be directed in order to complete the questionnaire (Bryman, 2004).

However, despite all the advantages, surveys are not without their disadvantages. The major disadvantage of surveys, regardless of whether they are postal or online, is that the researcher can never be certain the person answering questions is who the researcher believes them to be (Bryman, 2004).

A disadvantage of online surveys compared to postal surveys is they are restricted to online populations and lower response rates are generally obtained. Further, there are also confidentiality and anonymity issues. It is normal for researchers to indicate that responses will be confidential and anonymous. However, with email surveys, since the recipient must return the questionnaire either embedded within the message or as an attachment, respondents may find it difficult to believe their replies really are confidential and will be treated anonymously. In this respect, web surveys may have an advantage over email surveys (Bryman, 2004).

The web survey designed for this research study (see Appendix I for the complete list of survey questions) was conducted in collaboration with the Australian Government Department of Agriculture, Fisheries and Forestry (DAFF). DAFF contracted staff at Charles Sturt University (CSU) to develop and conduct an online survey to gain a client evaluation of the Rural Financial Counselling Service (RFCS).

The RFCS program provides grants to state and regional organisations to provide free and impartial financial counselling to primary producers, fishers and small rural businesses who are suffering financial hardship and who have no alternative sources of impartial support. Objectives of the RFCS program include providing clients with access to financial information, options, decision support and referrals to other service providers. The program also aims to empower clients to make their own decisions on how to most effectively manage change. An outcome of the program is to improve awareness among clients and service providers within the RFCS referral network of the need for a proactive approach to managing change (Glyde, Gray, Howard, & Dunn, 2009).

The RFCS evaluation questions were initially provided by DAFF and were refined and adapted for internet application by the research team at CSU. The evaluation of the RFCS had nothing to do with
the objectives of this research study. However, it was an excellent and affordable opportunity to gain access to the nationwide database of the RFCS to gain an understanding of their use of information sources, which was relevant to this research. The survey questions which are relevant to this research are those pertaining to demographics, sources of information and ideas about farming. Questions surrounding long-term planning were asked to gain insight into the respondent’s thoughts on strategic planning. Previous surveys developed and utilised by I. Gray, Lawrence, and Dunn (1993) and A. M. Anderson (1981) were taken into consideration when designing the questions for this web survey.

The purpose of the web survey was to gain an understanding of specific background only. The survey was prompted by theory but not as hypothesis testing. Questions pertaining to age, gender, education and time spent farming were asked in order to gain an understanding of the sample’s demographic. Questions which explored the use of a range of agricultural extension services by land managers and how their use of these services has changed were added to the survey to address this study’s research questions.

For a suite of information sources, the web survey respondents were asked if those information sources were available to them (yes / no). Those respondents who indicated that the information source in question was available to them were then asked if they used that information source (yes / no). Of those respondents who said they did not use the information source in question, they were asked if they had used it in the past (yes / no). Of those respondents who said they did use the information source in question, they were then asked how useful it was on a scale of one to five — one being extremely useful and five being not useful at all. Of those respondents who said they used the information source in question, they were asked if their level of use has changed in the past five years. A scale of one to three was used; one being ‘I use this source less than I did five years ago’; two was ‘I use this source as often as I did five years ago’ and three was ‘I use this source more than I did five years ago’.

Of those respondents who said they use the information source in question, they were also asked how important they think it will be to them in the future. A scale of one to five was used, one being very important and five being not important at all. The findings from these questions are presented in the next chapter. Questions were also asked to gain an understanding of the respondents and their current situation. The findings from these demographic questions are presented below. The method of data analysis is explained in Section 5.5.2.
Questions pertaining to the use of information sources were asked to gain insight into which information sources were being used by respondents and how their use had changed, considering the changes in the information exchange interface that have been identified in the literature (see Sections 2.5 and 2.8).

Questions were asked pertaining to the future importance of the information sources in order to gain an understanding from the farmers’ perspective of the future importance of particular service providers, considering the information exchange interface was likely to continue to change into the future.

The web survey participants were also asked a range of attitudinal questions to gauge an understanding of their perceptions of the importance of planning ahead in farming. Participants were asked, on a scale of one to five, whether they agreed or disagreed with a range of statements, ranging from strongly agree to strongly disagree. These questions were asked to gain an understanding from the farmers’ perspective of the importance of long-term strategic planning in managing farm businesses.

While the survey consisted of 378 individual questions, due to extensive question branching in the survey, none of the participants would have been asked to complete all 378 questions. Pre-coded questions were mostly used because the data produced from this type of question require less time to code and evaluate. However, where appropriate, open-ended questions were incorporated to allow respondents to state their answers in a way they saw as appropriate and in their own words.

There were no questions in the survey which were made compulsory. In conjunction with the Office of Rural Financial Counselling, CSU decided not to have compulsory fields because much of the data sought was potentially sensitive for respondents, even among the early questions in the survey. As far as possible, the more sensitive questions were located towards the end of the survey, but this was not always practical. No negative or derogatory correspondence regarding any aspect of the survey was received by the investigative team. A subscription to QuestionPro, an online software program designed to create web surveys, was purchased and utilised to host the survey.
Before the survey was administered, it was pilot tested with people who had similar backgrounds and experiences to the potential participants. Their feedback was evaluated and where perceived relevant, incorporated into the survey. Input regarding the survey was also sought and received from state agriculture departments, RFCS service providers, ABARE and CSU. One hundred and thirty-six pre-release tests (pilot tests) were carried out on the survey website before sampling commenced.

The sample was arranged by DAFF. As advised by DAFF, the sampling was carried out by Executive Officers of Rural Financial Counselling Services in each state. Under the confidentiality provisions of the Deeds of Grant between RFCS providers and the Australian Government, client records are confidential to the Rural Financial Counsellor and the Executive Officer of each service. Consequently, each Executive Officer was asked to generate a report which selected client names and addresses randomly to send either a letter or an email inviting these clients to participate in the survey by logging on to a website. A total of 4,771 invitations were sent to clients nationally during August 2009. The breakdown by state was: New South Wales (1565), Queensland (571), Tasmania (200), Victoria (1689), South Australia (629), Western Australia (117). An information sheet (see Appendix I) was emailed to the web survey participants and their informed consent was interpreted as their log on to the survey website and completion of the survey.

Respondents were people who had used the RFCS within the past five years. A question was added to the survey to ascertain whether the respondents had used the RFCS within the past five years or not. Those who had not been clients within the past five years were thanked for their participation and they finished the survey.

As the survey was internet based, emails were sent to those clients who had provided email addresses to service providers. However, it was assumed a large number of clients had internet access but may have not provided an email address. To enable their participation, letters providing the survey web address were sent to the randomly selected clients inviting them to participate.

For those clients who indicated to service providers that they wished to complete the survey and who did not have internet access, the Office of Rural Financial Counselling advised RFCS service providers they could make a computer available to clients, providing no input from the service provider was made available to the client while they participated in the survey.
The presentation and structure of the cover email and survey was designed to be as simple as possible for participants to complete, making them feel at ease and appreciated, rather than the subject of a strict interrogation. The chosen format ensured a smooth completion of the survey, allowing each respondent to feel part of the research process, and helped to avoid fatigue and boredom, which can cause loss of interest and cooperation. The survey took an average of twenty minutes for participants to complete and the questions were arranged according to the logic of the respondent, adequately linked together, minimising the intellectual effort required and the conceived period of time taken to answer the questions. Resultantly, it was hoped participants would maintain a positive attitude toward the study and were more likely to complete it.

5.4.1.1. The sample demography - web survey

In total, the survey attracted 429 responses. The sample clustered in the 40 to 64 years age range (n = 424). This is representative of data from the Australian Bureau of Statistics (ABS), indicating the median age of farmers in 2011 was 53 years (Palmer, 2012). Seventy-one per cent of the sample were male and 29.1 per cent female (n = 423). These figures are also indicative of ABS data (Table 5) which found 72 per cent of farmers in Australia in 2011 were men and 28 per cent were women (Palmer, 2012). A secondary level of education was the highest level of education completed by the largest proportion of respondents (50.5 per cent). Forty-seven per cent of respondents indicated they had a non-school qualification. This is slightly higher than ABS data which indicates 38 per cent of farmers had a non-school qualification in 2011 (Palmer, 2012).

The mean period of time operating a farm was 27 years (see Appendix X). Farms of respondents were distributed around all States, but none were located in either of the Territories. The largest proportion of respondents was in Victoria (40.2 per cent), with a similar number in New South Wales (35 per cent). Sixty-five per cent of respondents identified their farms as ‘sheep, beef or grain’. The remainder were distributed across categories with the largest being dairy (10.5 per cent). This is similar to ABS data which identified 62.6 per cent of farms as sheep, beef or grain enterprises (Palmer, 2012).
Table 5: The web survey data compared to ABS data

<table>
<thead>
<tr>
<th></th>
<th>Web Survey</th>
<th>ABS</th>
</tr>
</thead>
<tbody>
<tr>
<td>Farmer Age (years)</td>
<td>40-64</td>
<td>53</td>
</tr>
<tr>
<td>Female Farmers (%)</td>
<td>29.1</td>
<td>28</td>
</tr>
<tr>
<td>Male Farmers (%)</td>
<td>70.9</td>
<td>72</td>
</tr>
<tr>
<td>Non-school qualifications (%)</td>
<td>47.2</td>
<td>38</td>
</tr>
<tr>
<td>‘Sheep, beef or grain’ enterprises (%)</td>
<td>64.8</td>
<td>62.6</td>
</tr>
</tbody>
</table>

Respondents were asked, ‘Including yourself, how many people did your farming enterprise employ during the 2008 calendar year?’ The majority of respondents had employees during the calendar year of 2008, with most reporting between one and five (70.9 per cent).

In addition, respondents were also asked to describe the size of their farming enterprise compared to similar businesses in their region. ‘About average’ was the most common response (57.1 per cent).

Respondents were also asked approximately what percentage of their total household income was generated off-farm in the last financial year. Almost one third (32.1 per cent) of respondents relied entirely on their farm enterprise for income (n = 421). That is, they generated no off-farm income. The next largest proportion of respondents (30.9 per cent) indicated they generated less than one quarter of their income off-farm. Further, respondents were asked how they saw their current financial status in farming. 51.3 per cent of the respondents described their businesses as ‘barely viable.’

Minimal reference is made to the findings of the survey data throughout the thesis. The survey data were clients of the RFCS. That is, either current farmers or farmers who had left the farm who were experiencing financial difficulty. The respondents were also from a variety of industries and not just mixed-farmers. Therefore, the sample was not representative of the mixed-farming population and consequently, the thesis does not rely heavily on the data.

5.4.2. Interactive group exercise

The second phase of data collection for this research study was an interactive group exercise held during a plenary session at an international conference. The purpose of this was to gain an understanding of the complexities of the information exchange interface from the perspectives of the people who work in the interface. The data from the interactive group exercise are not linked to the
findings of the web survey because they are not sequential. The purpose of the interactive group exercise was not to further explore the web survey data, but to gather additional data. They are two complete, entirely different data sets.

The Australasia-Pacific Extension Network (APEN) 5th International Conference was held from 9-12 November 2009 at Abbey Beach Resort in Bussellton, Western Australia. An interactive group exercise was organised and delivered at the conference. The session entailed conference delegates participating in group discussions. Conference delegates were mostly extension professionals from the agricultural and natural resource management sectors, as well as several representatives from the health sector. The discussion topic revolved around private sector involvement in extension.

The interactive session began with an introduction of the Future Farm Industries Cooperative Research Centre (FFI CRC) as it was the sponsor of the session and this research study. Delegates were then told of the purpose, objectives and expected outcomes of the session. They were informed of how the data was going to be used and were given instructions on what to do. Delegates were given an instruction sheet, an information sheet and a feedback sheet (see Appendices II, III and IV). Delegates were advised that the session was completely voluntary and they could leave at any time. Their informed consent was interpreted as their continued participation in the exercise. Participants were then separated into eighteen groups based on their area of employment. Groups ‘represented’ NSW State Government; Victorian State Government; Western Australian State Government; Queensland State Government; private consultants; the university sector; local natural resource management groups; local farmer groups and Research and Development Corporations and their international equivalents. One group consisted of a mixture of Northern Territory, South Australian and Tasmanian State Government employees as well as Federal and International Government employees. This diverse group was formed because there were not enough delegates from each agency to form their own group representing their state, territory or country. Groups consisted of between seven and twelve delegates. Each group was asked to consider several questions and capture their thoughts on butcher’s paper (Plate 1). The theme of the conference was ‘Shaping Change in Communities — Dimensions of Excellence’. The questions were designed to align with this theme as well as to meet the objectives of the research study.
The questions asked were:

1. What are your three main drivers for sustainability when shaping change?
2. What do you think the drivers are for the private and public sector (whichever one you are not)?
   a. List the main drivers for each organisation represented in your group. Find any commonalities between your organisations and then list those that represent the main drivers for your group.
3. Which drivers from question one do you feel would be most successful in shaping change for sustainability, and why? We are interested in the differences between public and private sectors.

These questions were asked to gain an understanding from the perspective of a range of informed professionals who work in extension:

- the factors which influence the sustainability of agricultural businesses (see Section 3.4);
- the perceptions of the sectors of one another (see Section 0);
- the influences on their presence and their actions in the information exchange interface (see Section 2.9); and,
- how can the information exchange interface assist farmers to adapt to changing conditions (see Section 4.9)?

For the purpose of this research study and data collection method, ‘shaping change’ was defined as changing farmer and community behaviour for the better. Respondents were asked for their thoughts on the most successful methods of ‘shaping change’. This question was asked to gain insight into the issues and challenges presented by the current extension environment as perceived by the respondents — that is, well informed people involved in extension.
**Plate 1:** Each group captured their thoughts on butchers paper and then four of the groups presented their findings to the larger group.

For the purposes of the group exercise and the entire research study, sustainability, drivers, shaping change, public sector and private sector were defined as:

- **Sustainability:** Comprised of three dimensions: environment, economy and society. Sustainability entails using resources to meet the needs of the present generation without compromising the ability of future generations to meet their own needs.
- **Drivers:** The factors which drive a business / organisation and influence its agenda and activities.
- **Shaping change:** The most effective strategy to improve farmer and community behaviour.
- **Public sector:** Consists of those organisations that are solely publicly funded. Its contact with farmers is not usually on a fee-for-service basis, and the desired outcomes are for the benefit of the wider community and not private individuals. Contact with farmers is at a group level and rarely on a one-to-one basis.
- **Private sector:** Consists of those organisations and businesses that are solely privately funded, usually on a fee-for-service or product sales basis. Its focus is to extend information in order to generate profits and assist clients to meet their own environmental, social and economic goals and objectives.

Participants were informed of these definitions at the beginning of the session. Delegates were instructed to spend ten minutes on each question. They were asked to appoint a scribe and a reporter. The reporter’s role was to report their group’s findings to the larger group. The topic they had to report back on (see Appendix V) was, ‘How could the public and private sector collaborate to shape change?’.
Session organisers roamed amongst the groups to give any assistance if it was needed and ensure the
groups kept on time. After thirty minutes, the smaller groups amalgamated into the larger group and
reporters from four of the groups were asked to present their group’s findings. The selected reporters
represented the NSW State Government group, the local farmer group, the Research and
Development Corporation Group and the private consultant group. The floor was then open for
discussion. The final ten minutes of the session were used by the chairperson to summarise the main
outcomes from the session. Approximately two hundred conference delegates participated in the
session which took seventy-five minutes to complete. The methods of data recording and analysis are
detailed in Section 5.5.1.

5.4.3. **Semi-structured interviews**

Professionals who provide advisory services to farmers were interviewed during this research study
to gain a greater understanding of the perceptions of those who directly advise farmers and assist
them with their decision-making. The semi-structured interviews were qualitative in nature and their
purpose was to seek the perceptions of the advisers on a range of topics pertaining to this research
study including strategic decision-making, the complexity of the information exchange interface and
the factors which influence the sustainability of mixed-farming systems. It is the purpose of this
section to detail the sampling procedure utilised to recruit the respondents as well as the nature and
method of semi-structured interviewing.

5.4.3.1. **The nature of semi-structured interviews**

Semi-structured interviews consist of open-ended questions surrounding the researcher’s topic of
interest. According to Patton (2002), the open-ended nature of the questions defines the topic under
investigation while also providing opportunities for both the interviewer and interviewee to discuss
some topics in more detail. The interviewer can decide in advance what topics to cover whilst
remaining open and receptive to unexpected information from the interviewee.

Rallis and Rossman (2003) explain that the purpose of interviewing is to allow one to enter another’s
perspective (at least to the degree the respondent allows) and see the world from their point of view.
Minichiello et al. (1995) add that the underlying assumption of qualitative research and in-depth
interviewing is an understanding of what people think is necessary in order to understand why they
behave the way they do. Creswell and Plano Clark (2007) further explain that the qualitative study is
an exploratory inquiry process with the aim of understanding a social or human problem, based on building a complex and holistic picture of the respondent’s view formed with their own words.

In this study, semi-structured interviews provided a useful method to obtain the information required for the research that could not be gained from any other data collection method. The issue under investigation was complex, subjective and context dependent, and interviewing assisted interpretation of varying perspectives from the various service providers within the information exchange interface who assist farmers directly with their decision-making. The principal investigator in this study attended the semi-structured interviews with the intention of exploring an under-researched topic (the relationship between the information exchange interface and strategic decision-making in mixed-farming systems), not knowing exactly what the problem or issue was. The semi-structured interviews allowed the principal investigator to research the topic in question and identify the research questions which required further investigation. The semi-structured interviews were focused yet flexible enough to allow additional data to arise by permitting interviewees to freely put forward information. This method also allowed the principal investigator the opportunity to gauge the appropriateness of each question during the interview process (Minichiello et al., 1995). The semi-structured interviews afforded a greater understanding of the under-researched topic. As the interviews progressed, the principal investigator adapted the interview protocol to suit, which allowed the research questions to be answered.

5.4.3.2. Strengths and limitations of interviews

Patton (2002) advises that data gathering is always a selective process. For instance, the researcher selects interviewees and questions, the audio data leaves out visual interactions and the transcript leaves out tone-of-voice nuances. In all cases, an interview is a snapshot of dialogue at a particular place and time. Months or years later, an interviewee may see and say things differently. Patton (2002) claims that, even so, interviews are a good method to explore under-researched topics and capture experiences and perspectives. An interview guide assures focused questions and responses across interviews, while open-ended questions and probes provide opportunities to explore and reflect on unanticipated topics and nuances. With appropriate questioning, an interviewer can provide a much less frustrating experience than a pre-set survey (Patton, 2002).

According to Bryman (2004), an interview’s greatest strength and weakness is that data are based on perception, memory, accuracy of reporting, point of view and the ability to articulate issues.
Minichiello et al. (1995) add that the presence of an interviewer may also bias responses. Further, semi-structured interviews can yield large quantities of descriptive, qualitative data. They are typically conducted within a one or two hour timeframe and are subsequently time consuming, costly and usually involve a smaller sample size. Further, they lack anonymity and standardisation (Bryman, 2004; Minichiello et al., 1995; Neuman, 2003; Patton, 2002; Sarantakos, 2005).

Nonetheless, interviews are useful when observation is not possible, they can provide historical information, they allow flexibility regarding the topics covered, afford a conversational style, allow the individual’s perspective and experiences to emerge and generally evoke a better response rate (Miller & Crabtree, 2004; Minichiello et al., 1995; I. Neuman, 2003; Patton, 1990; Rossman & Rallis, 2003; Sarantakos, 2005). Miller and Crabtree (2004) describe the interview as interactive and intimate, allowing depth, detail and nuance with verbal and non-verbal forms of expression made available to the interviewer.

5.4.3.3. Developing and initiating a sampling procedure

According to Miller and Crabtree (2004), respondents should be selected with the purpose of maximising the richness of information obtained pertinent to the research questions. As such, selection should be purposeful and not random. This view is echoed by Minichiello et al. (1995). The method of identifying informants depends on what is feasible in terms of resources, time and research aims (Minichiello et al., 1995). Sarantakos (2005) describes several different strategies that are available to the researcher for purposefully selecting information-rich cases. This research study employed a purposive, snowball sampling technique.

Sarantakos (2005) describes purposive sampling as a non-probability sampling technique in which the researcher purposely chooses subjects who, in their opinion, are thought to be relevant to the research topic. Patton (2002) describes the snowball technique as an approach for locating information-rich, key informants by asking ‘well-situated’ people. In this research study, key informants were identified during the exploratory research phase. Key informants were met at various meetings, seminars and conferences. They were also identified through the literature. Sarantakos (2005) defines snowball sampling as a sampling procedure in which the interviewees are asked to recommend other persons who meet the criteria of the research and who might be willing to participate. If and when such people are recommended, they are approached and relevant information is collected from them. These interviewees are also asked to recommend other persons
who might fit the research design and who would be willing to be studied. In this research study, the original key informants were asked if they could recommend other people who would be willing to be interviewed. When further potential interviewees were identified, they were contacted and asked if they would like to participate in the research study.

Patton (2002) explains that there are no rules for sample size in qualitative research. Rather, the sample size depends on the purpose of the research and practical considerations. In this research study, the principal investigator was very selective and purposeful when choosing who to interview, allowing for sufficient data to be gathered using a small sample. A lot of thought and research went into choosing who to interview so that a large sample size was not required and those that were chosen would complement the participants contributing to phase two of the research. In effect, particular effort was made to ensure that there was a good representation of the information exchange interface within this final, data rich, phase of the research.

The semi-structured interviews were intensive and qualitative in nature. The purpose of the semi-structured interviews was to follow-up and confirm notions which emerged from the other two data sets, as well as build further notions and interpretations. In this research study, interviews continued until the topic became saturated and no new themes emerged from the interviews (Sarantakos, 2005).

5.4.3.4. Preparing

Initially, once they were identified, potential interviewees were sent an introductory email (see Appendix VIII) with an information sheet (as required by the Charles Sturt University Ethics in Human Research Committee – see Appendix IX) attached. The email explained the purpose of the research, the interview process, the time commitment involved and asked if they would like to participate. If the potential interviewees confirmed they would like to be involved in the research study, a time and place for an interview was then organised.

Due to either the geographical location or the work schedule of some of the interviewees, two informants were interviewed by phone. Of the face-to-face interviews, one interview was conducted at Charles Sturt University and another in a quiet café suggested by the interviewee. The other face-to-face interviews were conducted in the participants’ workplaces for the convenience of the interviewee. Nine interviews were conducted in total and each interview was conducted by the
principal investigator and data collected from the phone interviews appeared to be of the same quality as data collected from face-to-face interviews.

5.4.3.5. **Interview process**

The interview protocol for the semi-structured interviews was developed (see Appendix VI) to ensure the relevant information was pursued to best answer research questions one and two. Questions were designed to understand, from the interviewee’s perspective, influences on farmer decision-making, particularly strategic decision-making, within the information exchange interface. The objective was to understand the respondent’s point of view rather than make generalisations about their behaviour as guided by Patton (2002). To begin each interview and establish rapport, the interviewer introduced themselves and explained the nature and purpose of the study. In the case of the face-to-face interviews, the interviewee was given another copy of the information sheet. This form explained the purpose of the study and provided contact details for the Ethics in Human Research Committee should the interviewee have any concerns. As a requirement of the Charles Sturt University Ethics in Human Research Committee, the interviewees were also given a consent form (see Appendix VII) to sign. The interview commenced once their informed consent had been obtained.

Questioning began broadly, in order to gain an understanding of the interviewee’s business and career, and to also develop a rapport with the interviewee. This approach follows the outline provided by Miller and Crabtree (2004), who suggest the interview should begin with rapport-building biographical questions to establish the interview style and provide a context, followed by the introduction of the research themes. Subsequently, the interviewees were then asked questions to explore the research topic. From here, each interview self-directed, according to the interviewee’s initial response, consistent with the methodology of semi-structured interviewing. Despite the importance of a set order of questions to ensure reliability and validity (D. E. Gray, 2006), an interviewee’s spontaneous responses determined the final order, number of questions asked and their nature as guided by Sarantakos (2005).

During the semi-structured interviews, questions were asked when the interviewer felt it was appropriate to ask them. Additional questions were either prepared or thought of by the interviewer during the interview and, consistent with the flexibility of this approach, the wording of questions was not necessarily the same for all respondents. Cues or prompts were used to encourage the interviewee
to consider the question further. Probing was employed when required to obtain the perspectives of
the interviewee that were not provided in the initial response, as advised by Hancock (2002).

Interviews were conducted during May and June 2013 and took between twenty minutes and two
hours, depending on the interviewee’s responses to the questions. Participation was completely
voluntary and interviewees were informed they could withdraw from the interview at any time. None
of the interviewees chose to withdraw from any of the interviews.

5.4.3.6. Audio recording and note taking during interviews
The use of semi-structured interviews allowed interviewees to formulate responses in a manner they
regarded as appropriate (Sarantakos, 2005). According to Wood and Kroger (2000), audio-recording
provides an accurate copy of the spoken interview, and five interviews were audio-recorded with
permission from the participants. The other interviews were not audio-recorded because the
interviewees spoke quite slowly and it was easy for the principal investigator to take notes. Written
notes were also taken throughout the interviews which were audio-recorded. If the interviewee
offered insights after the audio recorder had been packed away, they were written down verbatim.
Notes of unrecorded interviewee responses were added to the interview transcript. After each
interview, debrief notes were written down and the interview data was compared to other data
collected and vice versa. This information was typed, added to the interview transcript and used as
data.

5.4.3.7. Transcription of interview data
A transcript is the written version of the interview with as many annotations and commentaries as the
researcher sees fit. Although the interview recording is the data, a transcript makes analysis possible.
Depending on the purpose of the research, it can be important to keep the first transcript verbatim as
one cannot tell what features might turn out to be important in the analysis. In a sense, transcription
is the first stage of analysis: deciding how to transcribe the interview, and what to include or exclude
(Patton, 2002; Wood & Kroger, 2000).

The purpose of the research will determine the level and type of detail to include in the transcript
(Miller & Crabtree, 2004). In this research study, the principal investigator transcribed the interviews
and this process was extremely valuable. Re-listening to the interview during transcription enabled
reinforcement, remembering of important points and reflection on interviewing style for refinement. For some purposes the researcher may find it important to record the paralinguistic features of the interview, to give a sense of the way the words were said. Noting intonation and pauses can be helpful in the transcript, as they are important in the delivery of meaning. However, using a formal system of ‘going beyond the spoken word’ can double or triple the transcription time and was not necessary in this research study. Interviews were transcribed using the conventional orthographic form. This method is generally used by analysts, as a phonetic transcription is very hard for most people to read. In this research study, the phonetic form would have distracted from the content and was not necessary (Wengraf, 2001).

5.5. DATA ANALYSIS AND INTERPRETATION

5.5.1. Qualitative data analysis

The data collected from the semi-structured interviews and the group exercise was qualitative and consequently could not be analysed statistically due to their descriptive nature (Patton, 2002). Therefore, the principles and methods used were qualitative analysis and interpretation.

The qualitative style often uses thematic analysis. In order to build theory and potentially draw conclusions from their data, researchers engage in a process called categorisation, usually through coding. Qualitative coding is an integral part of data analysis and is guided by the research question. It involves extracting meaning from documents, notes and transcripts. Qualitative coding is undertaken by the researcher to locate key themes, patterns, ideas, and concepts within their data (Denzin & Lincoln, 2005).

The data from the group exercise consisted of the principal investigator’s notes taken during and after the discussion phase of the exercise and during the debrief, as well as the butcher’s paper the groups wrote on during the brainstorming phase of the exercise. This data was typed and entered into NVivo for analysis. The semi-structured interview transcriptions and typed notes were analysed separately also using NVivo.

NVivo is a computer software program designed to analyse rich, text-based data. NVivo is an organisational tool, and lessens the labour-intensive aspects associated with qualitative analysis. Automating the time-consuming aspects allows for more time to explore trends, build and test
theories and ultimately answer the research questions (QSR International Pty. Ltd., 2007). The data from the interactive group exercise and the semi-structured interviews were thematically analysed. NVivo allowed the qualitative data from this research study to be assembled under a series of headings reflecting the key themes that emerged from the interviews. In some cases, these could be expressed as a list, or direct quote, while in other cases it was better expressed as a narrative. The original research questions were considered while the data was themed. This revealed a range of themes pertaining to farmer-decision making in the information exchange interface to improve the sustainability of mixed-farming systems. The main themes which emerged were the organisations which were involved in the information exchange interface, sustainability and multi-institutional relationships. The validity of this analysis is based on an iterative process of discussion and cross-checking with the raw data (Patton, 2002).

5.5.2. Quantitative data analysis
The data collected from the web survey was quantitative and subsequently analysed statistically using the software program SPSS (Statistical Package for the Social Sciences, version 17). In the case of web surveys, Sarantakos (2008) advises that data analysis begins where data collection ends. In this research study, the data was able to be directly downloaded into SPSS from the QuestionPro website, removing any need for manual data entry. To prepare the data for statistical analysis, it was cleaned by removing incomplete responses which were not useful. The variables were also re-named for the ease of the principal investigator. Tests were conducted for statistical differences between all of the sources of information (in terms of their usefulness, importance as well as change in use) and the demographics responses. No statistical differences were found. Therefore, the data are presented in this thesis as frequencies only.

5.6. RELIABILITY AND VALIDITY
Sarantakos (2005) advises that validity covers a number of aspects that indicate whether an instrument measures what it is expected to measure, and how accurately. Reliability, on the other hand, refers to the ability of the instrument to produce consistent results. Validity and reliability apply to both qualitative and quantitative methods. Creswell and Plano Clark (2007) add that, in a mixed methods context, validity is defined as the ability of the researcher to draw meaningful and accurate conclusions from all of the data in the study.
In quantitative research, internal validity refers to the extent to which there is confidence in a research design to work, while external validity is the extent to which findings are generalisable. Methods of addressing validity in quantitative research include ensuring items intended to measure the same construct are correlated, and those that are intended to measure different constructs are not correlated. Measurement items can be judged by experts, and the use of pre-testing workshops can also be enlisted (Bryman, 2004). Statistical controls, pre-testing of the survey instrument and judgment by peers were used in this research study to measure the validity of the quantitative survey data.

In contrast, qualitative researchers use a different nomenclature and have different definitions for these concepts. For instance, Lincoln and Guba (1985) talk of credibility (instead of internal validity), transferability (external validity), dependability (in place of reliability) and conformability (rather than objectivity). Methods of addressing these concerns in qualitative research include prolonged engagement, triangulation, referential adequacy (re-analysis), thick description, keeping a reflexive journal, and conducting a dependability and confirmability audit. Tests of reliability and validity which were used in this research study were demonstrated results (the results were as expected), credible results (the results were related to previous findings in the literature), and an inferential consistency audit (the degree to which the interpretations are consistent with the analysis of data and not contradictory).

5.7. ETHICAL CONSIDERATIONS

Ethics is the study and practice of standards of conduct and moral judgment and is the term used to denote the code of morals applied to the research process (Minichiello et al., 1995). Every decision made by researchers involves an ethical and political component. Each research process will present its own ethical and political dilemmas (Patton, 2002). The Charles Sturt University Ethics in Human Research Committee’s code of ethical conduct guided the ethical components of this research. The Charles Sturt University Ethics in Human Research Committee approved this research study (approval numbers 415/2009/3 and 415/2009/4). The major risks for participants were the invasion of privacy and the need to preserve confidentiality.

The interviewer needs to have an ethical framework for dealing with issues that may arise during the research process, such as confidentiality and achieving a balance between neutrality and empathy. Interviewing is powerful, and Patton (2002) advises, under the promise of confidentiality, it may
become a confession. This illustrates the importance of anticipating and dealing with the ethical dimensions of qualitative inquiry. Qualitative methods are naturalistic, highly personal and interpersonal, and thus may be more intrusive than quantitative methods. There are also important ethical decisions to be made during a survey process and the anonymity of respondents needs to be assured (Patton, 2002).

5.8. CONCLUSION

The purpose of this chapter was to provide sufficient detail regarding the research design, data collection, analysis and interpretation in order for the reader to be able to make informed judgements regarding the quality of this research. Based on the research problem, which was to understand the complexity surrounding farmer decision-making in the information exchange interface, a web survey of land managers, a group exercise with extension professionals, and semi-structured interviews with advisers who directly assist farmers in their decision-making, were developed and executed.

The main purpose of the web survey was to gain an understanding of the sources of information used by farmers. The intent was to gauge if and how their use had changed in recent years and how important they thought those information sources would be in the future. It was then the purpose of the interactive group exercise to gauge an understanding of the perceptions of the sectors of sustainability and of one another. This allowed the issue of collaboration to be explored, which was a significant issue which emerged from a review of the literature. It was then the purpose of the semi-structured interviews to explore what levels of advice the sources of information were providing, as well as to gain a further understanding of collaboration and other issues pertaining to having a multitude of players in the information exchange interface.

The interview process and techniques used in this study have not generated findings that can be claimed to reflect the views of most members of each sector. Rather, the intention was to gather the views and perceptions of a range of informed people. These views and perceptions are presented in the following three chapters as themes which emerged from the interviews and the group exercise. The quantitative results from the web survey are also presented.
CHAPTER SIX: SETTING THE SCENE FOR THE FINDINGS

6.1. INTRODUCTION TO THE FINDINGS

The purpose of this research study is to explore and understand the complexity surrounding farmer decision-making in the information exchange interface and to identify implications of this for the sustainability of mixed-farming systems. To reiterate from Section 1.2, the research questions are:

1. To what extent are strategic decisions made by farmers supported by the information exchange interface?

2. To what extent do farmers and advisers prioritise strategic decision-making?

3. What are the implications for agricultural sustainability?

To recapitulate from Section 5.4, a web survey of land managers; an interactive group exercise with professionals who work in extension; and semi-structured interviews with advisers who directly assist farmers in their decision-making were undertaken to collect data pertaining to this research study. The findings are overviewed in Chapter Six and further analysed in Chapter Seven. The data from the web survey are quantitative in nature and presented as frequencies. The findings from the group exercise and the semi-structured interviews are qualitative in nature and presented as themes which emerged across the two data sets.

6.2. SETTING THE SCENE: WEB SURVEY FINDINGS

As Section 0 detailed, a specific component of a broader web survey was designed for this research study (see Appendix I for the complete list of survey questions and Appendix X for all of the findings). Questions pertaining to age, gender, education and time spent farming were asked to gain an understanding of the sample’s demographic (see Section 5.4.1.1). For a suite of information sources, the web survey respondents were asked if they used them, how their use had changed and if they perceived that information source as being important in the future. The web survey participants were also asked a range of attitudinal questions to gauge an understanding of their broader views about farming, including their perceptions of the importance of planning ahead and where farm management stood in the context of the environment in which it is based. The web survey was almost exploratory in nature, providing foundational key data that helped to define the investigative context.
of the research study and establish the research questions. Two data sets captured from this survey revealed important detail about farmer information sources, which was a first step in defining the nature of the information exchange interface.

6.2.1. Farmer use of information sources

For a suite of information sources, the online survey respondents were asked if they were available and if they used them (Table 5). If the respondents indicated that they used a particular information source, they were asked if their usage had changed in the past five years (Table 6) and how important they perceived that information source would be in the future (Table 7). The purpose of asking these questions was to gain an understanding of ‘what’ information sources in the information exchange interface were being used by farmers to confirm the importance of the interface in farmer decision-making.

Table 6: Perceived usefulness of information sources

<table>
<thead>
<tr>
<th>INFORMATION SOURCE</th>
<th>YES, I USE IT (%)</th>
<th>EXTREMELY USEFUL</th>
<th>VERY USEFUL</th>
<th>USEFUL</th>
<th>NOT VERY USEFUL</th>
<th>NOT USEFUL AT ALL</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMILY MEMBERS</td>
<td>90.3</td>
<td>23.9</td>
<td>36.3</td>
<td>39.0</td>
<td>0.8</td>
<td>0</td>
</tr>
<tr>
<td>CMAs</td>
<td>56.9</td>
<td>9.8</td>
<td>24.8</td>
<td>56.2</td>
<td>6.5</td>
<td>2.6</td>
</tr>
<tr>
<td>OTHER FARMERS</td>
<td>95.7</td>
<td>25.0</td>
<td>35.4</td>
<td>38.4</td>
<td>1.2</td>
<td>0</td>
</tr>
<tr>
<td>PRIVATE CONSULTANTS</td>
<td>55.0</td>
<td>21.6</td>
<td>43.8</td>
<td>29.0</td>
<td>3.7</td>
<td>1.9</td>
</tr>
<tr>
<td>RURAL MERCHANDISE STORE</td>
<td>88.6</td>
<td>18.6</td>
<td>40.8</td>
<td>37.9</td>
<td>2.3</td>
<td>0.3</td>
</tr>
<tr>
<td>STATE DEPTS</td>
<td>80.3</td>
<td>10.9</td>
<td>24.7</td>
<td>54.9</td>
<td>8.4</td>
<td>1.1</td>
</tr>
<tr>
<td>LANDCARE</td>
<td>45.8</td>
<td>13.6</td>
<td>30.3</td>
<td>51.5</td>
<td>3.8</td>
<td>0.8</td>
</tr>
</tbody>
</table>

There are a wide variety of information sources being used in the information exchange interface (Table 5). Some information sources are much more commonly used than others. Some are used by almost all farmers while the other sources seem to have similar levels of use. For instance, 88.6 per cent of respondents indicated they used rural merchandise stores, whereas 45.8 per cent used Landcare as an information source.
Table 5 also illustrates that 55 per cent of respondents indicated they used private consultants. This finding is supported by Healy et al. (2013) who found that 48 per cent of farmers used private consultants.

Table 5 also illustrates that 95.7 per cent of respondents indicated they use other farmers as an information source. This finding supports the initial findings seven decades ago of Ryan and Gross (1943) who found that other farmers were an influential information source among farmers (see Section 2.3.2).

There was a wide variety of sources being used in the information exchange interface, and 90.3 per cent of respondents indicated they use family members as an information source. This finding is supported by Healy et al. (2013) who also found that family members were a common information source for farmers.

Eighty-nine per cent of the respondents indicated they use rural merchandise stores as an information source. 37.9 per cent indicated they were useful and 40.8 per cent indicated they were very useful whereas 18.6 per cent indicated they were extremely useful. The role of agribusiness in the information exchange interface is discussed later in Section 6.3.2.1.

Table 5 also illustrates the perceived usefulness of the various information sources used by farmers. These questions indicate the extent to which the respondents find these information sources useful in terms of finding the information they need to manage their farms generally.
Table 7: Changes in the use of information sources

<table>
<thead>
<tr>
<th>INFORMATION SOURCE</th>
<th>LESS (%)</th>
<th>AS OFTEN (%)</th>
<th>MORE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMILY MEMBERS</td>
<td>13.1</td>
<td>50.6</td>
<td>36.3</td>
</tr>
<tr>
<td>CMAs</td>
<td>10.4</td>
<td>44.2</td>
<td>45.5</td>
</tr>
<tr>
<td>OTHER FARMERS</td>
<td>10.1</td>
<td>68.2</td>
<td>21.7</td>
</tr>
<tr>
<td>PRIVATE CONSULTANTS</td>
<td>13</td>
<td>44.4</td>
<td>42.6</td>
</tr>
<tr>
<td>RURAL MERCHANDISE STORE</td>
<td>7.4</td>
<td>73.3</td>
<td>19.3</td>
</tr>
<tr>
<td>STATE DEPTS</td>
<td>23.6</td>
<td>59.3</td>
<td>17.1</td>
</tr>
<tr>
<td>LANDCARE</td>
<td>20.5</td>
<td>55.3</td>
<td>24.2</td>
</tr>
</tbody>
</table>

Farmer use of information sources (Table 6) has changed in the past five years (prior to 2009 when the web survey was conducted). 23.6 per cent of respondents were using state departments less than they did five years previously. Similarly, 20.5 per cent of respondents were using Landcare less than they did five years previously. The percentages for the other sources were quite small. For instance, only 7.4 per cent of respondents indicated they use rural merchandise stores less than they did five years previously.

Table 6 also shows 73.3 per cent of respondents indicated they use rural merchandise stores as often as they did five years previously, whereas 19.3 per cent indicated they use them more than they did five years previously. These findings suggest a trend of more respondents using rural merchandise stores as an information source.

Meanwhile, 42.6 per cent of farmers are using private consultants more than they did five years previously (Table 6), indicating an overall increase in the use of private consultants.
Table 8: Perceived future importance of information sources

<table>
<thead>
<tr>
<th>INFORMATION SOURCE</th>
<th>VERY IMPORTANT (%)</th>
<th>IMPORTANT (%)</th>
<th>NOT VERY IMPORTANT (%)</th>
<th>NOT IMPORTANT AT ALL (%)</th>
<th>NOT SURE (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>FAMILY MEMBERS</td>
<td>37.1</td>
<td>48.9</td>
<td>9.4</td>
<td>1.8</td>
<td>2.9</td>
</tr>
<tr>
<td>CMAas</td>
<td>17.8</td>
<td>51.3</td>
<td>17.8</td>
<td>3.6</td>
<td>9.6</td>
</tr>
<tr>
<td>OTHER FARMERS</td>
<td>31.7</td>
<td>55.1</td>
<td>9.4</td>
<td>0.8</td>
<td>3</td>
</tr>
<tr>
<td>PRIVATE CONSULTANTS</td>
<td>25.6</td>
<td>49.3</td>
<td>14.1</td>
<td>5.3</td>
<td>5.7</td>
</tr>
<tr>
<td>RURAL MERCHANDISE STORE</td>
<td>23.3</td>
<td>59.1</td>
<td>13</td>
<td>1.5</td>
<td>3</td>
</tr>
<tr>
<td>STATE DEPTS</td>
<td>15.7</td>
<td>56.9</td>
<td>17.8</td>
<td>2.8</td>
<td>6.8</td>
</tr>
<tr>
<td>LANDCARE</td>
<td>13.9</td>
<td>54.4</td>
<td>22.2</td>
<td>4.4</td>
<td>5</td>
</tr>
</tbody>
</table>

Table 7 shows the future importance of the information sources as perceived by respondents. Overall, respondents perceived all of the information sources would be important in the future. In particular, 49.3 per cent of respondents perceived private consultants would be important and 25.6 per cent perceived they would be very important. Similarly, 59.1 per cent of respondents indicated rural merchandise stores would be important and 23.3 per cent indicated they would be very important. This suggests that among respondents, private consultants, state departments and rural merchandise stores were all going to continue to play an important role in the information exchange interface in the future. It also suggests that the information exchange interface was going to continue to be complex, with so many important service providers involved in farmer decision-making.

6.2.2. Farmer attitudes towards long-term planning

The web survey respondents were also asked a suite of attitudinal questions to gain an understanding from the farmers’ perspective of the importance of long-term planning in managing a farm business (Table 9). Long-term planning can be contextualised as strategic management, given strategic decisions involve a long time-frame (see Section 4.5.3). Participants were asked, on a scale of one to five, whether they agreed or disagreed with a range of statements, ranging from strongly agree (score 1) to strongly disagree (score 5). The findings from some of these questions are presented in Table 9 below. The survey instrument can be found in Appendix I and the findings from the entire survey can be found in Appendix X.
Table 9: Farmer attitudes towards long-term planning

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Not Sure (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
<th>N</th>
<th>Mean</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Knowing that the farm will still be productive and in good condition in the future is more important than short-term profits.</td>
<td>30.4</td>
<td>56.4</td>
<td>8.6</td>
<td>3.7</td>
<td>0.9</td>
<td>349</td>
<td>1.88</td>
</tr>
<tr>
<td>2. Profit and capital gain are only a small part of the satisfaction to be gained from being a farmer.</td>
<td>23.7</td>
<td>45.1</td>
<td>11</td>
<td>17.5</td>
<td>2.8</td>
<td>355</td>
<td>2.31</td>
</tr>
<tr>
<td>3. It is in the best interests of farmers to invest in environmentally sound land management practices on their farms to ensure the long term success of their farms.</td>
<td>35.4</td>
<td>60.8</td>
<td>3.2</td>
<td>0.3</td>
<td>0.3</td>
<td>342</td>
<td>1.69</td>
</tr>
<tr>
<td>4. Farmers in general do not give enough consideration to undertaking environmentally sound land management practices.</td>
<td>1.2</td>
<td>17.2</td>
<td>21</td>
<td>44.3</td>
<td>16.3</td>
<td>343</td>
<td>3.34</td>
</tr>
<tr>
<td>5. I would have never tried a new chemical until it was well proven in the district.</td>
<td>16.1</td>
<td>35.5</td>
<td>20.5</td>
<td>24.9</td>
<td>2.9</td>
<td>341</td>
<td>2.63</td>
</tr>
<tr>
<td>6. There is not much point in planning more than a few months ahead.</td>
<td>2.6</td>
<td>9.6</td>
<td>5.6</td>
<td>49.4</td>
<td>32.7</td>
<td>342</td>
<td>4</td>
</tr>
<tr>
<td>7. I regard myself as a fairly conservative and traditional farmer.</td>
<td>8.5</td>
<td>36.5</td>
<td>13.2</td>
<td>31.9</td>
<td>9.9</td>
<td>342</td>
<td>2.98</td>
</tr>
<tr>
<td>8. It does not pay to be too scientific with farming - it all depends on the weather anyway.</td>
<td>6.4</td>
<td>22.8</td>
<td>15.8</td>
<td>41.2</td>
<td>13.7</td>
<td>342</td>
<td>3.33</td>
</tr>
</tbody>
</table>

It must also be borne in mind that the questions lean towards conservation and environmental sustainability. Nonetheless, the first question presented in Table 9, ‘Knowing that the farm will still be productive and in good condition in the future is more important than short term profits’, had a mean response of 1.88, indicating that respondents strongly agreed with this statement, perceiving the sustainability of the farm was more important than short-term profits. The findings to this question also indicate an element of stewardship which is also a strategic attitude.
The third question presented in Table 9, ‘It is in the best interests of farmers to invest in environmentally sound land management practices on their farms to ensure the long-term success of their farms’, had a mean score of 1.69, indicating again that respondents strongly agreed with this question. This finding again indicates the importance of environmental stewardship and strategic management. Respondents perceived that the preservation of natural resources and strategic management were important for the sustainability of their businesses.

The sixth question in Table 9, ‘There is not much point in planning more than a few months ahead’, had a mean score of 4, indicating that respondents disagreed with this statement. In other words, respondents agreed that strategic management was important.

The questions pertaining to farmer attitudes presented in Table 9 indicate some farmer awareness of strategic values. That is, these findings suggest that farmers knew strategic management is important, however the findings do not explain whether they have the capacity to implement strategic management. Whether the information exchange interface supports them in strategic management is also an important consideration explored in the next section.

6.3. SETTING THE SCENE: THE INFORMATION EXCHANGE INTERFACE

The purpose of the previous section was to provide insight into ‘who’ was a part of the information exchange interface and providing information to farmers. The purpose of this and the following sections is to provide insight into ‘what’ information each source is providing and any issues associated with them providing that information.

The findings indicate there were very few agribusiness companies during the 1980s selling advice linked to their products. There were approximately four private agricultural consultancy firms in New South Wales, employing one or two people each, selling advice to farmers. This finding is supported by Prinsley et al. (1994) (see Chapter Three). The NSW Department of Agriculture was the major provider of agricultural extension services and “there was an office in every town”.

The DPI [Department of Primary Industries] was the entire force through the 1980s. And probably the early ’90s.

However, the past twenty-five years have seen dramatic change.
...They [DPI] had a major restructure. They lost a proportion of their good guys who went private. But they also changed their role.

As Chapter Two revealed, traditionally the major providers of publicly funded agricultural extension were the state departments of agriculture, whose extension programs placed a strong emphasis on agricultural production. However, the 1980s saw a change in attitude, and government funded extension as a helping profession became enmeshed in policy debates over public and private benefit from public and private goods. The result was a review of state departments of agriculture and subsequent restructuring, which in turn affected the nature of the services it was prepared to provide, and how those services were provided.

_They were one-on-one in the '80s and then in the '90s they went to more group stuff, and then through the 2000s, they shifted again._

As Chapter Two explored, the public sector became more focused on group rather than individual extension, and on environmental (typically public) benefits rather than production (typically private) benefits. Furthermore, it withdrew from areas perceived to be adequately supplied, or having the potential to be adequately supplied by the private sector.

_...movement of responsibility from public to private._

The gradual withdrawal of the public sector caused many concerns. The change in nature of public sector extension programs not only affected farmers, but advisers as well.

_The change in DPI affects both advisers and farmers._

Agribusiness was concerned because state departments of agriculture were not only a valuable source of information for farmers, but also for agribusiness advisers and private consultants.

_...One of their [DPI’s] roles was to service our [agribusiness] sector. And private agros [agronomists] would also have contact from DA’s [District Agronomists] and be getting info [sic] from them._

The private sector was also concerned, deliberating how it would effectively service farmers’ needs with the change in provision and nature of public sector extension services.
Our perception was that most District Agronomists were doing bugger-all, really, with individuals...Even though they weren’t doing much we were worried about losing them and what it meant for us, because we were the next level.

As a result of the gradual shift of the state department of agriculture’s extension programs, the private sector has moved to fill the gap and increase the extension services it provides to farmers.

...The reason the private industry has grown so dramatically, is because of that shift in the DPI [Department of Primary Industries].

The public and private sectors now differ considerably in their relationships and interactions with farmers. The advice given by the public sector is influenced by government policy, is more generic in nature and is provided on a group basis. On the other hand, the private sector is now working directly with farmers, one-on-one at the farm level. Advisers give specific advice and make daily decisions with farmers. Their advice is conduit in nature and farmers place a lot of trust in their adviser. Advisers understand the social fabric that farmers work and live in.

The public sector does not work as closely with farmers and is subsequently missing the social link. The findings from the group exercise and the semi-structured interviews suggest that the best approach to assist farmers with change is for the public sector to use the private sector as a conduit to engage with farmers.

Public sector → Private service providers → End users.

The public sector conducts research and the private sector synthesises the research and delivers the findings to farmers. However, this pathway presents potential issues. Firstly, farmers are potentially paying levies to fund the research and then paying again for the private sector to synthesise those results and deliver them in a context the farmer can understand and apply to their own situation.

Due to its close and frequent contact with farmers, agribusiness is considered to be “in touch” with famers whilst the public sector is considered to be “out of touch”. The public sector is not necessarily ineffective or performing poorly, its role has simply changed.

...[We] are...a lot more proactive and quick to act than the public sector...We are on farms every day. We spend ninety per cent of our time in paddocks.
Because of its close and frequent contact with farmers, agribusiness is considered to be the most influential 'change agent' and the biggest influence on farmer decision-making.

*Agribusiness are [sic] the biggest change agents. They have the biggest influence over farmers because we are in the paddock on the day. ‘The best fertiliser in the world is a footprint in the paddock’. It’s about being there. These guys [points to the other sectors drawn on the whiteboard] don’t have time to do all that.*

*I think of our clients... we [agribusiness] are the dominant advisory group...*

Several interviewees suggested agribusiness has been successful in selling advice to farmers because it gives specific, one-to-one advice unique to individual farm businesses. The public sector no longer gives this specialist level of advice.

*Also, the type of advice was important. They [public sector] give a different level of advice.*

As a result, state departments of agriculture no longer have as much influence on farmer decision-making.

*The steer [sic] of influence of the DPI advisers has already been and gone...*

The effect on individual farmers of the changes in the type and level of advice provided by the public sector depends on how heavily those farmers were relying on the advice prior to the change.

*The influence of reduced DPI depends on how much people were using them to start with.*

A further challenge presented by the withdrawal of the public sector is that there are still many farmers who cannot justify paying for advice, yet need it regardless.

*...There is a whole section of growers who are not big enough to pay for our [agribusiness] services, and are not going to buy a product from us, but still need an answer. So where do they go?*

According to several interviewees, in the past ten years, the majority of farmers would not have relied heavily on state departments of agriculture. This finding is supported by the web survey data.
The steer [sic] of influence, their contact with growers, had already waned ten years ago when their roles changed.

The major transition within state departments of agriculture occurred twenty years ago and this is when the changes had the most impact on farmer decision-making.

...Going back twenty years ago, it would have been ninety per cent domination by DA’s [District Agronomists].

During the past ten years, for locations which were still serviced by a state department of agriculture district agronomist, the district agronomists did not have the capacity to service individual farmers, and relied heavily on group-based extension methods.

In the last ten years in New South Wales, half of those places that had a DA [district agronomist], they weren’t dealing with a lot of farmers anyway. And in these areas, the private sector dominated.

In particular, the leading, more progressive farmers were not relying on state departments of agriculture, and sought specialist advice from the private sector.

Top farmers don’t use DPI.

It was suggested during the semi-structured interviews that nowadays, leading farmers seek information from all sources and “nut it out themselves”. Other farmers, on the other hand, look to their adviser as an information consolidator.

They want the whole package and the agronomist is meant to understand the whole package for them. They do put a lot of trust in us. So I see our role as getting the best information from everywhere, filter it, and try to merge the result to the grower.

It is therefore important that agribusiness advisers and private consultants are well informed and their knowledge is current.

It’s about making sure you are across information in the industry completely...our farmers employ us because they assume that you are across everything...
There is an enormous amount of information available and it is impossible for farmers to be knowledgeable on all aspects of managing a farm business.

*They are trying to get their head around their cash flow...tax, marketing...commodity pricing, and then to get their head around two hundred herbicides... and all the rest of it, it's too much.*

Further, there are variations in the information exchange interface between states as well as between regions. The extension services provided by the public sector vary between states and this in turn influences the services provided by industry and the private sector. The information exchange interface varies at the local level depending on whether or not there is a “good agribusiness in town”, a DPI branch (or equivalent) or a private consultant servicing the area. Universities and active farmer groups also influence the local information exchange interface.

*In Tasmania, the University of Tasmania has a strong influence.*

To a certain degree, the extension services available in a particular location are also influenced by the advice and services farmers are seeking. This reflects free market forces in action as businesses cannot profit from activities which farmers are not willing or able to purchase.

The advice farmers seek varies depending on the enterprise and the geographical location of the farm.

*It’s [livestock industry] different from cropping.*

There is more demand for advice in broad acre cropping than there is for livestock.

*The [livestock] industry doesn’t demand anywhere near the same level of advice on livestock management as broad acre cropping does. Consultants would spend a tenth of their time on livestock advice than they do broad acre cropping / pasture advice.*

There are several reasons behind the limited demand for livestock advice compared to broad acre cropping. Firstly, the majority of farmers are comfortable with their own level of livestock knowledge and they do not need to seek advice when making decisions concerning their livestock enterprises.

*A lot of farmers are comfortable with their own level of knowledge regarding livestock, so they don’t seek it.*
What’s more, cropping requires more specialist one-to-one advice than livestock. Recent years have witnessed an increase in hectares used for cropping and a reduction in livestock numbers. This change coincided with the change in nature of the services provided by state departments of agriculture, generating a market for specialist cropping advice for the private sector.

Also, the increase in cropping coincided with DPI reducing their one-on-one advice — this influenced the increased role of the private sector.

Additionally, there is an added degree of difficulty in providing livestock advice compared to broad acre cropping advice.

Crops are easy because they start in one paddock at the start of the year, it runs on the calendar year, and you can measure their traits and attributes easily. Livestock are more tricky [sic] because they move about and it relies heavily on the farmers’ records.

Due to the difficult nature of providing livestock advice, the service is too expensive for the majority of farmers to justify the expense.

We can’t provide enough time to track where they have been and how they are performing. It would cost the farmer too much for what he is going to make out of it.

Furthermore, the profits received by agribusiness for selling broad acre cropping products are more than the profits generated from selling livestock products.

And as a business...our main income comes out of broad acre cropping. Animal health products...We don’t make any money out of them. There is no profit margin.

However, a few specialists have been profitable selling livestock advice.

There are many people who have started off giving livestock advice and haven’t gotten very far. It comes back to demand, more than anything else.

Some agribusinesses employ a veterinarian on a contract basis to give animal health and nutrition advice.

Our business employs, under contract, a specialist vet, because it takes that level to give advice on animal health and nutrition.
The veterinarian generally speaks to groups of farmers rather than to clients on a one-to-one basis.

You can cover that sort of info [sic] in a group, but you can’t do it on broad acre farming. So that satisfies clients’ needs for advice regarding livestock nutrition, most of the time. We may get that bloke in for one-on-one with our very big clients, because they are at the size where they need it.

Another issue with providing advice in the livestock industry is that there are very limited career path opportunities in which to gain knowledge and experience.

[There is]...no training ground in the department any more. If we [agribusiness] put someone on as a pasture agronomist, we need to support them for three to four years before they’ll be any good...much easier to get people into cropping... We can’t grab people from DPI any more.

The limited farmer demand for assistance with livestock decision-making presents a problem for animal health graduates.

We [agribusiness] may have three people assigned specifically to animals. There is a whole strain of animal health graduates who have no job ahead of them. We end up picking a lot of them up as agronomists and sending them into pasture areas and harness their animal skills that way.

It was also suggested there is even less collaboration amongst the various sectors in the livestock industry than the broad acre cropping industry.

Another thing we see in animal health...it is...very secretive.

Resultantly, fee-for-service does not work as well for the livestock industry as it does for the broad acre cropping industry.

Fee-for-service won’t work for the livestock industry.

However, the findings suggest that the public sector continues to be a leader in animal management advice.

I have seen the public sector take a lead way in animals...There is a real need there for animal health advice. Animal health is a specialised area that we don’t get.
The capacity in which the various extension providers exist today in this complex information exchange interface is discussed in further detail in the following section.

6.3.1. Public sector

The interviewees who were employed in agribusiness were surprised at the percentage of respondents who indicated in the web survey that they use state departments of agriculture as an information source. The interviewees thought the percentage was high compared to what they had experienced.

*Most of our guys would not have used a DPI guy for seven to eight years, at any level.*

*Now, only fifty per cent of people would be using them.*

Another interviewee offered further insight:

*My farmers that I know that would say they use DPI as an information source, they would only use them once or twice a year. Very few would say they are a primary source. And that doesn’t say that the DPI guys are no good at their job, it’s just saying that their roles are different.*

Several interviewees suggested the public sector had ‘lost touch’ and expertise, and was not familiar with the issues influencing farmer decision-making.

*The public sector has lost touch.*

The public sector is also not up to date with issues affecting farmers.

*I find that when I talk to GRDC reps [sic] or public advisers about extension, they are always way behind the eight ball. They are always way behind what is happening in the field...It’s not just a little bit. It’s by a lot. And in any surveys I have seen, it’s always done by a GRDC representative or a public service provider. And what happens then though...their thinking is behind, [which influences] the way they project their questions...We also found the lag time with the public sector was too slow. They would come out and say something and we were talking about it three years ago. They just didn’t move fast enough with what was happening in the field.*

However, it was suggested the situation was different in Western Australia.
Ag WA [Department of Agriculture and Food Western Australia] are still in touch with farmers because the majority of their research is done out in the sticks. There are still some really good people out there.

Comments were also offered regarding the future role of the public sector. Several interviewees suggested the future role of the public sector varied between states. Most interviewees suggested the public sector will continue to be responsible for regulation including bio-security.

Yes, they’ll be regulators, but that doesn’t mean that they won’t have an important role to play.

The overall view was that research will be the responsibility of the public sector and extension will be the responsibility of the private sector.

From a research perspective, they’ll be important. They’ve cut the extension arm and kept the research arm and they are leaving extension to agribusiness... We... deliver it to the farmers and the farmers pay us for it.

The public sector will play an important role in ‘blue-sky’, novel research. Further, public sector researchers will become specialists and will work within RDCs.

The specialists, entomologists, pathologists etc. — agribusiness is never going to have a handle on that. We need to be able to call on someone about these issues... I need to be able to ring him and say... ‘this is what I’m seeing, this is what I’m thinking, am I right, am I wrong?’... I can then take that message to my growers and my fourteen agros and their growers. And that’s the pathway. That’s how it moves fastest. So I hope the public sector keep those researchers. Without them, we can’t offer anywhere near the level of service we do now.

In July 2013 (several months after the semi-structured interviews were conducted), the NSW Department of Primary Industries (NSW DPI) was to undergo another restructure. The perceived potential impact of this restructure on farmers was discussed during the interviews.

From a farmer point of view, I think it depends on what level of contact they have had... I think for half the industry, there will be no effect because the change has already occurred. It’s only the farmers who are currently using them fairly heavily that are going to notice a change.

It was suggested that to a certain degree, the level of impact was also dependent on how active the local DPI adviser had been. Either way, the interviewees suggested that the level of impact would have
been low because a DPI adviser engages with a low percentage of farmers regardless of how ‘active’ they are.

A location that would of had a very active DPI adviser, he would still only be dealing with twenty farmers in a location which may have one hundred and fifty farmers.

The impact of the most recent restructure would be low on farmers because the shift had already occurred.

The...advice and contact...has already shifted dramatically before this most recent reshuffle. If this massive reshuffle hadn’t happened, there had already been a massive shift anyway.

The impact is more concerning for agribusiness, which uses DPI as an information source.

...The recent changes are concerning, because our sector definitely needs a DPI, and we need each other. They are an important information source.

Some agribusiness advisers have a close relationship with DPI advisers.

And the few DPI advisers that I have close contact with, we certainly have a lot of contact...we keep in touch with each other...they’ll feed...information through, and we’ll feed information through to them...That’s important.

Regardless of the changes, the interviewee’s perceived DPI would continue to play an important role.

As an information source, and as an overseer of issues, they have an important role to play.

6.3.2. Private sector

To reiterate, the private sector can be separated into two groups: agribusiness and private consultants. Whilst private consultants only offer fee-for-service programs, agribusiness offers fee-for-service as well as advice linked to product sales. Agribusiness adds value to its products by providing information with the product. Both private consultants and agribusiness advisers participated in the semi-structured interviews.
As a result of the gradual shift of the state department of agriculture’s extension programs, the private sector has moved to fill the void and increase the extension services it provides to farmers.

...The reason the private industry has grown so dramatically, is because of that shift in the DPI.

Along with the gradual withdrawal of the public sector from extension, cropping and drought were also identified as major catalysts for more farmers using private sector advisers than ever before.

The drought has changed things.

From the early nineties, there was a big shift and cropping increased dramatically. Subsequently, there was a very large uptake of advisers by farmers but also the droughts of the last decade spurred another wave because farmers were looking for more input through difficult times, and that spurred another wave of people more reliant on particular advisers. They also coincided with the change in direction of the DPI.

It was also suggested that herbicide resistance strongly influenced more farmers to consult with an adviser. As a result of herbicide resistance, agricultural chemical sales have changed from seventy per cent in-crop spraying and thirty per cent pre-emergent to the opposite.

If you haven’t got it sorted before the plant comes out of the ground, you’re in trouble. Resistance is probably driving our game more than anything else.

An agribusiness adviser claimed that private consultants have shifted away from providing operational advice mainly due to herbicide resistance and their inability to keep up-to-date with product development.

Further, as farming became more input driven, the public sector could not keep up with product development. Subsequently, a market developed for agribusiness to advise farmers on new technological innovations and products.

Farming became very input driven and they [public sector] couldn’t keep up with the inputs.

Agribusiness could not only make a profit from selling the product, but could also increase sales and generate more profits by providing advice pertaining to that product. Many advisers in the industry
gained entry into private sector extension by virtue of their capacity to sell, not necessarily their ability to conduct effective extension. The findings surrounding the role of agribusiness in the information exchange interface and its relationship with farmers are presented below.

6.3.2.1. **Agribusiness**

Historically, agribusiness only sold products and these sales generally had advice attached. Some agribusinesses refer to this service as ‘responsive agronomy’.

_Historically, agribusiness always did responsive-type agronomy. The farmer would identify a problem and give us a ring. We would go out there and make a recommendation and fix it._

However, as a result of reduced profit margins on products, many agribusinesses began providing fee-for-service programs.

_Over a decade ago, we realised that [responsive agronomy] had a knob in it, and we started our fee-for-service program._

Responsive agronomy is no longer profitable for agribusiness. As a result, agribusiness is phasing out this program and encouraging clients to adopt its fee-for-service program.

_...Phasing out ringing the agro [agronomist] to come and look at the paddock to tell you what weed to spray...No money in it...The mark-up on chemical isn’t enough...Going to more ‘whole farm plans’._

Further, as a result of the changes to public sector extension services, there was new, increased farmer demand for fee-for-service and agribusiness was in a position to meet that demand. Offering a fee-for-service program has allowed agribusiness to provide an improved service to farmers, assisting them to make timely decisions. There is an opportunity for agribusiness to profit from assisting farmers to increase their own production and profitability.

_What we realised was that responsive agronomy was no good. All we were doing is plugging people’s problems, and we were never there in time. For example, if we had been there two weeks earlier, we could have saved the farmer a heap of money, or made him a heap of money...And our skill set was a lot better than just being able to make responsive decisions...We offered a structured program where we said righto, we will contract to you and offer you someone to be in this paddock every couple of_
weeks at certain times of the year, and we’ll record things like plant numbers and the rest of it, but we’ll do strategic plans across the whole program and try to influence you that way.

Our fee-for-service is strategic and proactive. Once we have the contract signed, it is our job to identify the problems before they become problems.

In addition, agribusiness also had to offer more to attract and retain credible staff.

And to keep staff, we had to offer something better.

Agribusiness further discovered it had to prioritise its time. Some customers were spending a small amount of money on products but utilising a significant amount of the advisers’ time and this was not profitable for agribusiness.

...We had trouble...justifying our time. We would get customers spending bugger-all money but taking up a lot of our time...not fair...

Offering a fee-for-service program has made the system more equal and agribusiness can now prioritise its time more effectively. In other words, farmers are charged according to the level of advice they receive and fee-for-service clients receive priority over responsive agronomy clients.

...Having these service programs has allowed us to prioritise our time. If you are only a service program you get priority time, our guys are instructed to service those growers first, and everyone else with the time they have left, in order of importance of the client.

The new system has taken some getting used to, for both clients and agribusiness.

It’s something we have had to grapple with too.

There is a fee structure for the fee-for-service program: the more clients’ pay, the greater the level of service they receive. Advisers provide advice on a range of topics including production agronomy, farm planning and management. Fee-for-service clients generally still purchase merchandise although they are not obliged to.

...If you want to pay $10,000 a year, you’ll get bank balances, the whole lot, gross margins, profit and loss, plus production.
The clients who select the fee-for-service program generally have different characteristics compared to those who prefer responsive agronomy.

Our fee-for-service clients tend to be the above average farmers in the district with bigger cropping areas. They are probably ‘top-end’ growers. And that’s certainly where we want to be. It means that if the grower is paying us for our time, then we can free them up to shop where they want, because the product is separated from the agronomy. Of course we want to get the sale, but the onus goes back onto the store manager to win the sale on its merit, and not so much us having to charge a margin on the chemical to stay in the paddock. Because inevitably what happens is, the bloke who takes up a lot of time, then goes to the bloke down the road who has spent no time on it and gets a quote, and we’ve got to match it, and we do our arse because we have spent so much time in the paddock that we can’t charge out. It happens all the time. And there are guys out there who know how to play the system perfectly.

However, it is still sometimes difficult to guess which clients will choose fee-for-service over responsive agronomy.

...I struggle to pick it. You look at some guys and you think, yeah, you’ll go buy fee-for-service because you’re on your own and you’re struggling, you can’t keep up. But then they won’t want it. And then you look at other guys and you think, you’ve got a good handle on it, and they want it, because they want to go the next level. It’s about the grower’s perception in his own mind I think.

Individual agribusiness advisers may have a range of both responsive and fee-for-service clients, depending on their experience, skill level and personal preference.

For example, one of our guys would operationally have fifty clients, responsive. [However] they are more than likely going to have ten fee-for-service clients (they’ll be on their farm at least once a fortnight / month depending on the time of year) and twenty general (responsive) clients. You weed out the responsive clients that take up a lot of your time. And you’ll have ‘self-starters’ — blokes who ring you three times a year, they’re quite confident, they understand it all. They’ll take a message from you and model it over the paddocks, they just need a bit of advice every now and again, either over the phone, or a visit every now and again.

The range of advice an individual agribusiness adviser will give also varies depending on experience, skill level and personal preference.

...not all...of our consultants do farm consultancy. They don’t all have the expertise or they just don’t want to do it. Some of them just do production agronomy. To do farm
consultancy, you have to also be comfortable with livestock consultancy...You don’t have to be a livestock specialist, but you need a sound understanding. You need to be able to manage the jigsaw puzzle that is the farm, and livestock is an integral part of that jigsaw.

The level of service each fee-for-service client receives may be different, depending on their requirements.

...We don’t have a set package for every client. We believe this is fraught with danger. And you’re not really aligning yourself with what the client requires. So our approach for the twenty years we’ve been in business is, you’re the client, (and we have a perspective of what they need), but you’re the client, and what do you want out of us, where do you want to get to, and do they want a five year plan in the first place, for instance. So you work within those guises. A lot of farm consultancy guys say, ‘this is what I do, this is my package, this is what it costs. Take it or leave it’.

The level of advice provided in the fee-for-service program also “…depends on the agro [agronomist]” as well as the agribusiness. Some advisers only give operational or tactical production agronomy advice whereas others assist farmers to develop five year business plans (the ambiguity surrounding whether a five year plan is a strategic decision is discussed further in Chapter Eight). Further, there are aspects of the farm business which agribusiness in general is not equipped to advise on, such as taxation and succession planning.

[We] will say, hey, you need to talk to...about your family structure. This is not what we operate in. We’ll see more law firms, accounting firms, handling the other stuff. Brokers. Specialists. Agribusiness don’t want to do that. Segments of their business might do it. For example, RuralCo have ‘Ag Concepts’ and do high level brokerage advice on how you manage your market risk.

Every farm business has different finance requirements. Most agribusinesses are not in a position to provide advice on finance. They can provide the product, but not the advice because, among other things, they might not have the capacity to do it well. Agribusiness also makes substantial profits from selling insurance.

The fee-for-service program is very convenient for farmers. Unless they want to, farmers do not have to be present when the advisers are present on the farm inspecting their paddocks.

We do everything in four wheelers on the farm...Most farmers don’t even need to stop and get off the spray rig to talk to us. We whip through, send them the report and they
act on it. We can prioritise where they are spending their time and what they are doing and where they are spending their money. Whereas you can’t do that when you are just getting a snap shot in time when you are out there once or twice a year.

Agribusiness has had a “…tremendous response” to its fee-for-service programs. Many agribusinesses continue to offer both services.

You can always have that responsive-type agronomy if you want it, and that can be in conjunction with a private consultant or it can be guys who just want to do their own thing.

However a few agribusinesses now only offer fee-for-service programs.

...[Another agribusiness] started the same way we did, about ten years ago, going down the road of fee-for-service. And then they went the full hog and stopped doing responsive agronomy. They only offered fee-for-service. They had a really good response to it.

Some agribusinesses also subcontract private consultants to service clients rather than employing agribusiness advisers on salaries. The fee-for-service program is working better for some agribusinesses compared to others.

The fee-for-service works well for...The corporates are struggling with their business model. They are trying to charge for what they are already doing. It doesn’t work. If you are going to sell a service program, we find, there has to be a product on the shelf. If you are going to grow the business, then fee-for-service is the way to do it...some of the corporates still can’t get it right. They can’t figure out how to charge for their service. Because they don’t offer anything else that they don’t already provide with their responsive service.

Another issue regarding fee-for-service is some farmers are not prepared to pay for the advice and in their opinion the advice should be provided free of charge. However agribusiness disagrees.

It’s a skilled labour unit...Why can’t a tertiary bloke with ten years experience charge for his time? That’s what they’ve [farmers] got to get their head around. They pay for an accountant, a diesel mechanic, everything else, but an agronomist comes with the chemical. It’s a terrible thing.

On the other hand, whilst some farmers are prepared to pay, they cannot afford to.
...There is a whole section of growers who are not big enough to pay for our services, and are not going to buy a product from us, but still need an answer. So where do they go?

As discussed earlier in this chapter, there is concern regarding which sector is going to service this group of farmers now that public sector extension services have changed. Whilst there are still limited public sector advisory services available for environmental concerns, this group of farmers may have to rely on responsive agronomy for production advice, which is limited to operational advice. These farmers may also have to purchase the product to access this advice.

In addition, a further issue concerning the information exchange interface is agribusiness and private consultants have not historically had input into public sector investment in R&D. This finding collaborates with findings from the group exercise.

Once upon a time, agribusiness was seen as just selling product and making dollars.

Traditionally agribusiness advisers were not invited to public sector RD&E meetings. They have however been invited to RD&E meetings organised by Research and Development Corporations such as the Grains Research and Development Corporation (GRDC), although according to agribusiness advisers, they were only invited to listen and not to provide input. However, this has begun to change.

This is being righted now...agribusiness has started to have a say in R&D&E.

Agribusiness advisers and private consultants now hold positions on GRDC panels, including the GRDC Agribusiness Reference Groups which is explored later in this chapter. Considering its daily contact with farmers, agribusiness argues that it should have a place on GRDC panels and have the opportunity to provide input into RD&E investment.

I’ve seen GRDC surveys where they ranked where they [farmers] get their advice from. And distribution agronomists are up in the top three nearly every time. That’s why we want us on their steering committees. Because they know if they influence just one agronomist, they influence fifty growers. As opposed to having to tackle each of those fifty growers direct.

Agribusiness conducts its own research and also attracts tenders and funding to conduct research for other sectors. Researchers are also contacting agribusiness advisers to gain access to farmers who might be interested in participating in research.
More and more we are seeing researchers coming straight to us.

Participants of the group exercise who represented sectors other than agribusiness suggested that agribusiness advice, whether it is responsive agronomy or fee-for-service, is not ‘value free’ and agribusiness has a pecuniary interest in providing advice.

The agribusiness advisers who participated in both the group exercise and the semi-structured interviews argue otherwise.

That’s a really naive, bias opinion.

It was suggested that the notion of a pecuniary interest is outdated and the industry has since moved forward.

I think we are past that now...Saying that we just wanted to rip blokes off.

It was argued that agribusiness has its integrity to uphold and if it gave poor advice, it would not remain in business.

The idea that they are ripping farmers off is questionable...If they were ripping farmers off, farmers would have walked away from them years ago.

Another interviewee reiterated:

...farmers vote with their fee. If you worked out how many advisers there are in southern NSW, and worked out how many private consultants there were and how many agribusiness advisers there were, the simple fact is, a business would not employ a private agronomist unless he was pulling his weight. If they don’t have farmer support, they won’t have a job. It’s a very simple calculation.

Agribusiness argues it would not continue to be in business if it was giving farmers poor advice or encouraging farmers to purchase products they did not need.

If we gave out shonky advice, we would be broke in two years. If we were loading up farmers with stuff they didn’t need, we’d be broke and they’d be broke. We see ourselves as driving production.
Agribusiness further argued it was not “ripping farmers off” but on the contrary, it was trying to save farmers money.

_The commercial agro [agronomist] is the biggest handbrake on farm expenditure because they are always trying to do something cheaper._

This interviewee referred to an interaction he had with a ‘leading’ farmer:

...[NSW Farmer of the Year] spoke at our agronomy conference. Someone asked him ‘where did he see his business going in the future with raising productivity’. And he said we have to spend more. We all stopped and thought ‘wow’. But he saw that to increase production, he had to increase inputs, and get those inputs right and manage their farm to a maximum.

Several interviewees were asked during the semi-structured interviews if farmers were sceptical about receiving advice linked to products. The general consensus was ‘no, they are not’. However, it was suggested that in the past, there had been advisers who would try and sell products to farmers which they did not need and there may possibly still be a few advisers continuing to do so today.

...I know blokes from the past who would just get in and get out and make as much as they could. And the old style commercial agronomist. And they still play around. And corporate tended to do that, because of the way their businesses were structured.

Individual agribusiness advisers have their own reputation and integrity to uphold.

...it’s our own integrity that we fight very hard to keep...We let our ranks think whatever they want, make whatever recommendations they want. At the end of the day, it is their integrity that they need to look after...

Advisers form their own opinions based on the knowledge they have gathered and the experience they have gained.

...we jump up and down and scream blue murder if we are ever forced to have an opinion on anything.

Business culture plays an important role in the integrity and quality of the advice and varies between companies and individual stores.
But it comes down to business culture. The independents...we have a different business culture, and we even question each other if we think the other is spinning... Recommending stuff that probably doesn’t fit. You can’t pigeonhole all of the corporates because there are branches of the corporates who act very well. It changes from location to location...It comes down to the culture of the business, and the integrity of the individual delivering the service. They are the two biggest things that are going to drive the quality of the advice.

The participants of the group exercise who represented the public sector expressed the view that agribusinesses are trying to make farmers reliant on them to ensure future business for the agribusiness. This idea is supported by the literature presented in Chapter Three.

If we were doing a shithouse job we wouldn’t be in business. It’s too hard to remain in business these days. We make stuff—all out of agchem [sic] sales, our salaries are going up, our in-house costs are going up, we need to ensure the advice we sell is good. The public sector are out of touch. Whereas we are very much justified. For every agro [sic] on the books, we need him to be turning over a million to over a million and a half to keep that store functional. That’s the reality of us doing our business. And then we have to do it with integrity and honesty and make sure our growers are making money because if you stitch them up you don’t get paid... that’s our challenge. And it’s a challenge of every private industry business. And I think you’ll see the private sector move more to charging for their service, because they have no alternative.

Whether they are university graduates or have several years’ experience, sourcing qualified, competent staff is another challenge for agribusiness.

To get good quality graduates is really hard. We signed a bloke up earlier in the year and he had four offers on the table. You have to offer them something more.

Sourcing staff is one challenge and keeping them is another. Staff turnover inhibits the formation of relationships with clients which impacts negatively on both the business and the client.

Our real skills shortage is keeping graduates...It is difficult to employ an agronomist with five years’ experience. They just don’t exist. I don’t know where they go. Commercial agronomy — there is a big hole about age thirty. It’s that change over in life. People start to settle down, have kids, maybe look for something better. It’s probably the age where you have your skill set and you can go back to the farm, if the farm can have you, lease your own country etc. It’s hard to find someone with five years’ experience. It’s also where they are worth a fair bit of money. We’ve invested a lot of money to get them to that stage — it’s frustrating when they leave.
Some businesses find it beneficial to employ staff with a good work ethic first, and offer performance based incentives later.

$45,000 is about the starting salary for a trainee. We believe you can’t buy loyalty. If you start paying big money from the start, you’ll lose them. It is inevitable. Because you won’t always be able to pay the most. I prefer to offer less money, get blokes for the right reasons and then progress them quickly. Once they start kicking goals, we might move them up $10,000 a year. So they are in front, but after they do the...work, not before it. That is an internal culture we have, we’ve been down that road. We took on ten graduates from CSU [Charles Sturt University] one year, trained them all. Kept two of them. You get wounded. It costs us $15,000 a head just to get them through their courses. We train them and then they go to competitors, play one against the other, go back to the family farm or go into banking.

Some agribusinesses support their graduates by providing them with a mentor. The mentor is generally a fellow, experienced adviser.

We give the graduates a local mentor as well.

A further challenge presented by employing graduates is that some clients are hesitant to receive advice from a university graduate with very limited practical experience.

Clients want experience but they don’t want to pay for it...Or there is a perception there that they [advisers with ten years’ experience] are not any more valued than the young bloke fresh out of uni.

Different agribusinesses have different ways of dealing with this situation. However, it depends on the history of the location.

When [we buy a new store, we go there and say] righto, we have this [fee-for-service] program..., if you want the senior agro [sic], he offers this service and it costs this much. If you want, you can have the young bloke, he is still good, and he does this...In some areas, that works ok. In other areas, it doesn’t. For example, in areas where they’ve always had an old bloke who probably started the store, the clients can’t comprehend a graduate. Whereas [another store], they’ve had a graduate for every two years for a long time, and the clients are used to it. It’s store and business orientated.

Keeping staff in small, rural towns presents a further challenge, particularly when that person does not have family ties to the local community.
Keeping guys in the shops in the small towns for a long time is really hard, particularly when they don’t have a family link to the area...And it’s fair enough. They put the hard yards in out in the scrub, and we need to look after them. It is hard work and it is mentally draining. You are on call all the time. You are answering the phone all the time. You work Saturday mornings...People learn they can earn better money elsewhere.

However, it is less challenging to retain staff once they reach about thirty years in age.

We find that once you get past...thirty five and you have those kids and you are settled down, you’ve got a bucket load of debt, you’ve got to stay and you enjoy being at that stage, and you stop trying to put the world on fire, and worrying about where you are going, and you just settle in to what you’ve got to do.

Also at this age, the mentality of the adviser shifts.

...You start to get the big picture stuff. And then it becomes, right, we did this last year with this grower, let’s do this and this and this, and you start to push the envelope a bit. Or this didn’t work so well, so let’s try this. And that’s why we get our senior agronomists doing as much fee-for-service as they can handle. It’s not about flogging stuff to those blokes, the sales just happen. The product is a secondary thing.

In addition, the mentality of the present generation presents a further challenge.

This generation is hard work. There are individuals that are fantastic, but otherwise...We found that two words came up all the time. The words ‘me’ and ‘now’. When we started, we were extremely grateful to have the opportunity...You never took time off during the growing season, as much for your own reputation with growers than anything else. We were never told that we couldn’t. We just never did. These guys will take a month’s holidays during the spraying season. It’s all about ‘what I want’...They are in such a bustling hurry to get where they want to be, but they don’t want to do the hard yards to get there...In our job, one mistake is the end of your career. If you smoke a paddock, that’s it. No one else in the district is going to use you...Some of them are very talented, but there is an air of arrogance or cockiness, they are a lot more confident in what they are doing, but sometimes that confidence is not warranted. We find ourselves pulling the brakes on them all the time. And you can’t tell them much...You’re miles better off to sit there quietly, and shut up and they seem to listen to that.
6.3.2.2. Private consultants

The range of advice provided by private consultants varies from tactical to strategic. Some private consultants solely give production-focused agronomic advice whereas other consultants focus more on the financial management of the entire business.

The production-focused agronomic advice given by consultants is mostly tactical. Whilst these consultants take into consideration the whole farm system, their advice focuses on agronomy. They may assist farmers with gross margins but may not necessarily assist with whole farm budgets or whole farm management.

A typical agronomic consultant will review what happened on the farm last year and plan for the next year. They work on a paddock-to-paddock basis, in either a twelve month cycle or on the calendar year. With their long-standing clients, they may look at more long-term goals rather than just trying to ‘get through’ the next year. This advice may include some financial advice such as budgeting and reviewing bank interest costs.

I try and take the emphasis off the products and put the focus on the system. The system has to drive itself. It’s not just about product input.

The type of advice given depends heavily on the needs and demands of the client. A consultant will tailor their service to suit the individual clients’ skills, interests and location.

They employ me to challenge them.

One private consultant who participated in the semi-structured interviews said he disliked giving operational advice as he found it extremely annoying and disinteresting. “That’s what sales agronomists are for”. This particular interviewee began charging his clients twenty dollars for phone calls to eliminate the phone conversations regarding operational advice. This method proved effective and has reduced the calls. Charging for the call causes clients to pause and consider whether the phone call is really necessary.

This particular interviewee said he has removed himself from assisting farmers with day-to-day (operational) decision-making. His older clients found this transition difficult to accept because “that’s how it was in the old days”.
This comment is supported by another interviewee who said a client of his employed a consultant who would drive through the paddock and say “you need to control that ryegrass” and the farmer would say “...but how, when, what with?” The client was not receiving the operational answers he needed from the consultant and so would then visit the agribusiness store and ask what chemical he needed to use and purchase it.

Other topics on which consultants may advise farmers include labour management, and selling equipment that is used infrequently and replacing it with contractors. Increasingly private consultants are involving themselves in research. They may not always profit from it but find it interesting and challenging. It was suggested that on-farm research is limited and farmers value it immensely. Other consultants are funded by government to act as facilitators in farmer groups, delivering government funded research outcomes.

Some private consultancy firms provide advice on all aspects of farm management, including pasture and crop agronomy, livestock management, financial analysis, modelling, valuations and succession planning. Some firms also act as employment agencies and conduct contract research work.

...we basically cover everything.

Of the 77.0 per cent of respondents who indicated in the web survey that private consultants were available to them as an information source, 55.0 per cent of respondents indicated that they used them (Table 5). Of those respondents who indicated they used them, 29.0 per cent indicated they were useful, 43.8 per cent indicated they were very useful and 21.6 per cent indicated they were extremely useful. Respondents who found private consultants useful did not find any other source useful. In response to this finding, one respondent who participated in the semi-structured interviews suggested “If I’m paying for something, I place more value on it”.

The private sector advisers who participated in the semi-structured interviews suggested 55.0 per cent was a high percentage compared to their own experiences. However, Healy et al. (2013) found that 48 per cent of farmers use fee-for-service advisers and they were one of the most common sources of information for farmers.
The number of farmers engaging a consultant varies between locations. For instance, farmers in northern Victoria, where farm sizes are generally smaller and family incomes are less than $60,000 per annum, tend not to use a private consultant. The number of farmers employing a private consultant in central New South Wales is also low because farm sizes are larger and therefore there are not as many farmers in the area and consequently there is not enough business to support a consultant. It was suggested that in southern New South Wales, fifteen per cent of farmers use a private consultant. Meanwhile, twenty to thirty per cent of farmers in the Parkes, New South Wales district would pay for some sort of operational or tactical advice.

Fifty-five per cent of the online survey respondents indicated they use a private consultant. Several interviewees suggested this number seemed high. One interviewee said this figure might include agribusiness fee-for-service clients. GRDC report that seventy-four per cent of farmers use an ‘adviser’ but this could be agribusiness advisers (including ‘over-the-counter’ advice) as well as private consultants. One interviewee claimed that the top twenty per cent of growers use a private consultant and this number has been consistent for the past fifteen years. The next thirty per cent of farmers are now searching for a consultant. In the past fifteen years, the number of farmers has decreased by thirty-five per cent due to retirement, selling out and farm size increasing. Nonetheless, the demand for services has steadily increased since 1989. It was suggested that the majority of farmers in southern New South Wales would pay for some sort of advice, either linked to products or not.

It was further suggested that in southern New South Wales, the majority of farmers who use fee-for-service (from either private consultants or agribusiness) farm at least 2,500 acres. The majority of clients are either family farms or corporate businesses. Since the drought, the leading farmers have been increasing their land size. One private consultant said he had fewer clients nowadays but his business was busier than ever before with sixty clients. Most businesses are mixed farms with sheep, wheat and barley the dominant enterprises. Twenty per cent of clients are continuous croppers. The corporate farms are the biggest, most profitable clients. They are the easiest clients to do business with although, their businesses entail more work since there is a lot more reporting to the owners, with every action needing justification. The farm manager does not make any of the decisions.

Similar to the agribusiness fee-for-service programs, farmers need to be able to afford and justify the cost of using a private consultant. For instance, some private consultants charge $165 per hour which can equate to $2 per hectare for their clients. This cost can be quite inexpensive compared to bank interest for instance which, for some clients, may cost $400 per hectare.
Agribusiness fee-for-service clients do not also seek advice from a private consultant.

*This would be doubling-up. If farmers are employing us, they are not employing anyone else... We are delivering the same services.*

Farmers would only be employing a private consultant as well as paying for an agribusiness fee-for-service program if the private consultant provides detailed financial management services which agribusiness does not provide. Some agribusinesses assist with the development of whole-farm budgets and this is the most ‘strategic’ advice they provide; however, they only develop whole-farm budgets for their long-standing clients with whom they have formed a strong relationship because they are the only clients who request this service. Further, a sound understanding of the farm business is necessary in order to develop a whole-farm budget and this takes considerable time.

There are still farmers who ring their sales agronomist and ask them to come and inspect a paddock, but then ring their private consultant to check the information first before acting on it. Some private consultants encourage their clients to use other sources of information and to speak to their agribusiness adviser. Some sales agronomists email information they have given the farmer to the farmer’s private consultant, to keep all parties informed. Some consultants and sales agronomists work in partnership rather than competitively. Collaborative relationships such as this may be rare as other interviewees suggested a lot of competitiveness exists within the private sector and there was animosity between private consultants and agribusiness advisers.

In some areas there is huge farmer demand for fee-for-service and demand is outstripping supply. Agribusiness predicts it will provide more fee-for-service in the future and responsive agronomy will be phased out. Agribusiness will revise its business model and begin charging for the service. Both agribusiness and private consultants need to ensure their advice is credible otherwise farmers will not continue to pay for the service.

### 6.3.2.3. Supply companies

The influence of supply companies on the information exchange interface was discussed during the semi-structured interviews. Some interviewees suggested supply companies have significant influence on the information exchange interface because they conduct significant research. However, the
influence of this research on farming is often overlooked. Supply companies conduct a significant amount of extension however the method varies depending on the company. Sales would not eventuate without the extension process.

Other interviewees disagreed, and suggested supply companies were not of high importance and did not have a significant influence on the information exchange interface because they do not interact directly with farmers. Although they may not have the almost daily, one-to-one contact with farmers like agribusiness does, it was suggested their influence on farmer decision-making should not be overlooked as their influence may be latent and subtle.

6.3.3. Industry extension

To reiterate, for the purpose of this research study, ‘industry’ is defined as those groups and organisations involved in agricultural extension who receive funding from both the public and private sectors. Two categories of agricultural extension service providers are considered within this sector: those at the regional scale consisting of individual farmers as well as farmer organisations, cooperatives and groups; and those at the industry scale consisting of RDCs, CRCs and universities.

RDCs (see Section 2.8.3.3) invest significantly in research, development and extension.

*I can’t think of one grower group in NSW that does not exist without GRDC or MLA funding or similar.*

Several interviewees suggested RDCs are not ‘in touch’ with farmers and are not familiar with the issues and complexity surrounding farmer decision-making.

*...they are always way behind the eight ball... their thinking is behind...*

This in turn affects their investments and research. Whilst GRDC publications are a good source of information for farmers, in the past there has not been a lot of opportunity for farmers to provide feedback to GRDC.

*RDCs are driving the funding but they are out of reach for growers.*
As discussed previously in this chapter, agribusiness advisers are in daily contact with farmers and are familiar with the issues farmers face. However, this close contact with farmers has not in the past been recognised by GRDC.

Some advisers have formed ‘grower groups’ due to the limited recognition RDCs give to the private sector.

...in essence, whilst it’s a ‘grower group’, two thirds of the people who ran it were non-growers. Because GRDC wouldn’t recognise our sector in the business. It’s termed a grower group, but for all these years, particularly the first 6-7 years, it’s been driven by advisers.

However, GRDC is gradually changing and recognising the value of the private sector.

GRDC are changing. They still have more change to occur...

The changes have been recent and more change still needs to occur.

GRDC have only just shifted in the past three years, to recognising any private part of the advisory industry. They have very much been a laggard in this.

It was also suggested GRDC are investing more in one-to-one advice rather than group extension methods although, according to several interviewees, GRDC still place more value on private consultants than on agribusiness.

...they still distinguish far too much between a private consultant and an agribusiness.

Therefore, GRDC are devaluing the importance of agribusiness and the service it provides to farmers.

...they’re...making too much of a distinction...they’re saying...your level of advice is more peripheral than what a private consultant does, and it’s not.

In the past agribusiness has not been invited to have any input into RD&E investment. However, GRDC is now recognising the value of agribusiness as a change agent and is working towards involving agribusiness more in its decision-making. GRDC has established ‘Agribusiness Reference Groups’ which consist of agribusiness advisers, suppliers and private consultants. GRDC Agribusiness Reference Groups are invited to provide feedback into RD&E decisions. This is recognition by GRDC
that agribusiness is important. Interviewees suggested the research is still approximately three years behind; however, GRDC is working to accelerate the research.

Often when GRDC funds a project, a public sector department or a university is awarded the contract, and agribusiness is asked to be involved after the funding and outcomes have been set. Agribusiness is asked to be involved in order to gain access to farmers who may be interested in participating in the research and adopting the research outcomes.

A further concern is that GRDC expect the private sector to provide in-kind contributions which presents a problem for the private sector.

So whenever there is a project going on, GRDC have always expected the private advisory sector would give it in-kind, just 'cause you should...There was a subconscious thinking that you should do it anyway for the sake of the industry.

This situation works fine for public sector employees. However, it presents a problem for a self-employed private consultant.

...you've got to ask yourself, how much time you can put into those things...someone has to pay the bills.

Along with RDCs, farmer groups also play an important role in the information exchange interface. To reiterate from Section 2.9, farmer groups provide agricultural extension services to their members and often attract sizeable funds from various sources to conduct projects.

Farmer groups attract research funds from larger industry groups.

Farmer groups and their networks are not only effective research partners but they are also a very effective means of delivering research outcomes. Conducting research with farmer groups and utilising bottom-up extension approaches ensures research outcomes are applicable to farmers.

Whole system driven by grower because he is the common link.

Some farmer groups are established as a result of a perceived need to attract more research and development to their local region due to specific, localised problems.
The whole catalyst for...started because of the lack of practical research coming out of DPI, bottom line. That doesn’t get stated publicly but that’s how it started.

Farmers also receive a vast amount of information from other sources which include written information, information available on the internet, radio and television, as well as field days, seminars and meetings. This is often given or organised by public sector officers, agribusiness advisers, private consultants as well as farmer groups. The nature and effectiveness of these sources of information is discussed below.

6.3.4. Information sources

Farmers receive a massive amount of information from a variety of sources. This information is often generic and the onus is on the individual farmer to decide how to apply the information to their own situation. Farmers are constantly bombarded with information from television, the internet, emails, newsletters, magazines and radio. Farmers receive handouts at field days, seminars and meetings. The sheer amount of information available often causes information overload for farmers. Farmers nowadays mostly discard written information because they do not have time to read it. Farmers will generally only keep really helpful references such as the Winter Variety Sowing Guide published annually by the NSW Government.

Public extension officers, private consultants, agribusiness advisers, farmer groups and RDCs often organise field days, seminars and meetings to engage with farmers. The findings surrounding these various extension methods are discussed below.

6.3.4.1. Field days, seminars and meetings

Field days, seminars and meetings take a variety of forms and include paddock walks and pre-season meetings. Field days range in size considerably and are an important information source exposing farmers to new techniques and products.

Paddocks walks have decreased in popularity in recent years and advisers and extension officers tend only to organise them when there is a topic of particular importance and relevance such as a disease
causing significant problems in a particular season. One interviewee suggested paddock walks had decreased in popularity because there is nothing dramatically different happening in the industry. 

If you look back to the 1990s, they [paddock walks] were the rage, because canola was new, there was a lot happening, there was a lot of new information coming out...That information has slowed dramatically...there is not as much to see.

On the other hand, pre-season meetings are still popular.

...There is always this notion of ‘make sure I’m geared up for the year ahead and I am across everything’. So they are still quite well attended, but that all depends on your content.

One private consultant who participated in the semi-structured interviews organises a pre-season meeting each year. Each meeting is held on a different client’s farm. The meetings consist of two or three guest speakers plus the consultant. One speaker is generally from a non-agricultural background, “someone left of field”. Product sellers are specifically avoided because farmers are not interested in listening to them. The pre-season meetings are very popular and ninety per cent of clients attend.

Smaller field days have decreased in popularity in recent years and the general consensus from interviewees is they will be eventually phased out.

We’ve seen a massive shift in the past five years; growers don’t want to go to field days any more. They use to swamp field days, and now they don’t want to go.

The major catalyst behind their decrease in popularity has been an increase in farm size. As farms become larger, farmers become busier and are more discerning with their time.

It’s almost got too busy for them.

Part of the challenge with any information day or evening...is that farm size has increased, and also there has been a reduction in labour units per farm. So the time factor has definitely gotten worse for most farmers. So they are much more discerning about what they attend these days...whereas fifteen years ago they would have gone anyway...for the social side...

Nonetheless, the popularity of any field day, seminar or meeting is driven by content.
If you don’t have interesting topics, you won’t get the numbers.

The content needs to be valuable and relevant otherwise farmers will not attend.

If you look like you don’t have the right content, they’ll vote with their feet very quickly.

The content must also be interesting to farmers.

...you need to choose things you think are going to trigger their interest.

In order to know what content to include in a field day, seminar or meeting, organisers must be ‘in touch’ with their clients. In other words, organisers must be familiar with the issues affecting farmers and be aware of any topics which farmers may need to improve their knowledge of.

In order to know what content to deliver at a field day, you’ve got to be tuned in to your clients. As advisers, we’ve got to pick what’s relevant, what is going to make a difference to them.

If there is a pest or a disease which is threatening to desecrate crops, farmers will attend these meetings to learn how to control the pest or disease.

You can drag them into big picture stuff, and you can drag them into crop threatening stuff...we had a mice meeting in the height of the mice plague and we had seventy growers there...

Farmers also like to attend field days and meetings pertaining to new farming practices such as brown manuring.

There is a big push around Boree Creek to do brown manuring. We had a field day...Sixty growers attended...Came from as far away as West Wyalong.

Farmers are no longer attracted to attending field days pertaining to new products.

They don’t want to hear reps [sic] talking about their products. They are not interested in it anymore. Once upon a time, when a new product was available, they wanted to be all over it, but now, I don’t think it is as important.
Some advisers and consultants will organise a field day or a meeting if there is a new topic that they know their clients do not know much about, or if there is something that, in their opinion, their clients can improve on to raise productivity and profitability.

*If I find new information or if I see something that they are not doing well.*

To ensure the event is successful, organisers must deliver the message effectively.

*Usually as a cluster of people, you think well, how do I get their attention on this to make sure it happens the right way? Or, this is really something they should be taking up in the next twelve months.*

Broad mixes of farmers attend field days, seminars and meetings and they provide an invaluable opportunity to network.

*...the opportunity to concur with your peers, compare notes.*

Field days, seminars and meetings can also be a source of inspiration and optimism for farmers.

*Reassurance that you’re doing it right. There is no doubt that farmers attend field days so that they can converse.*

### 6.3.4.2. Media and the internet

Most farmers are negative by nature and the media exacerbates the problem by mostly reporting on negative issues. At the time the semi-structured interviews were undertaken, the media was reporting that the year 2013 was going to be a drought because the autumn break had not arrived. However, a late autumn break does not necessarily mean drought as spring rainfall is more important than autumn rainfall.

Some consultants have started using Twitter and uploading YouTube videos, and both channels of communication had been well received by clients. “Farmers are visual learners”. Most clients had not previously used Twitter but now have a reason to. Uptake of iPads and iPhones has been greater than seventy per cent with clients and they are encouraged to upload their own photos. Many clients SMS information to their consultants which the consultants find very convenient.
6.3.5. **Multi-institutional relationships**

Whilst there is some evidence of the various sectors working in collaboration with one another, the data mostly suggests the sectors are generally not working collaboratively.

*We need better collaboration between the public and private sectors.*

The limited collaboration is largely due to competition both between and within the sectors, as well as some sectors undervaluing the importance and influence of other sectors, largely agribusiness.

*Needs to be better relationship [between] private and public.*

Data from the group exercise and the semi-structured interviews suggest that in Western Australia, the sectors are collaborating well in dealing with environmental and economic issues including climate change and international markets. In Victoria, the public sector is continually making changes to work more effectively with the private sector in achieving better natural resource management and production outcomes to maximise the benefits for clients and the community.

*VIC DPI is currently making changes to try and work differently with the private sector. They are trying to maximise the benefit for clients and the community, achieving better NRM and production outcomes. This is a huge change and will take time.*

In New South Wales on the other hand, the public sector does not value forming collaborative partnerships with private consultants and they have an antagonistic relationship, viewing each other as competitors.

*There is a need for greater...dialogue and interaction with private sector stakeholders.*

Further, agribusinesses do not work collaboratively with other agribusinesses due to competition. Similarly, private consultants do not generally work collaboratively with other private consultants. In addition, private consultants do not generally work collaboratively with agribusiness as a result of a perceived competition for clients.

*...Private consultants and agribusiness don’t like working together because they are competing for clients....*
However, one private consultant who participated in the semi-structured interviews said he collaborates with agribusiness advisers and encourages his clients to seek advice from sources other than himself.

Several other reasons were suggested for the ineffective relationships between the sectors. Findings from the semi-structured interviews and the group exercise suggest the sectors have different objectives and projected outcomes. Therefore, their “...definition of success” varies and inhibits the formation of collaborative relationships. As one interviewee observed:

*We live in two worlds: government is about bang for buck, accountability that is visible, outcomes in a short term in office — opposite to what NRM is trying to achieve.*

To overcome this challenge, opportunities need to be identified which have common objectives and outcomes.

*We need to better identify shared opportunities between the public and private sectors to ensure positive outcomes for all.*

Collaborative relationships will only form if the sectors agree on common objectives and outcomes which benefit all stakeholders.

*Public/private engagement will only work if interests are clearly aligned.*

Further, the cultures of the public and private sectors differ considerably and this also inhibits the formation of constructive relationships.

*When people don’t come from a shared vision, there are inefficiencies...*

The public and industry sectors perceived “creating new partnerships” and building “relationships” and “linkages” with “next-users” as important. ‘Next users’ can be defined as those who work directly with farmers and the local community and “who will make an impact on the ground”. Service providers need to continue working directly with farmers on locally important issues.

*Collaboration methods are best based on regionally focussed issues.*
Stakeholders also need to decide who is the best equipped to deal with particular issues.

*There needs to be a discussion to identify and agree on common gaps at the local level, and who is best equipped to fix them.*

The private sector did not mention the importance of working directly with farmers on regional issues because they are already doing so. They have already established strong relationships with farmers.

Industry as well as the public sector also suggested farmers need assistance to manage change.

*Help producers manage change.*

The private sector did not mention this as an important consideration. This notion is explored later in Chapter Eight.

Agreed comments from the open discussion at the end of the group exercise were that the public and private sectors are converging and working more closely together than ever before. The public sector is partnering with the private sector more and the private sector is becoming more socially responsible. The general consensus from the discussion was that there are more opportunities for the public and private sectors to work together and it is really important they do so.

*There is a need for us all to respect all parties involved in the issue...and find ways to work collaboratively together for the benefit of all.*

Stakeholders within sectors also need to work collaboratively.

*Private consultants and agribusiness need to start working together. There is a divide and we need to stop it.*

A forum where relationships between the sectors could form naturally was suggested.

*...Important that there is a forum that allows natural relationships to form...Need to nurture the formation of relationships between the public and private sectors.*

Increased networking across disciplines was also perceived as important.

*...Increased research networking across disciplines.*
It was also suggested that it was important to consider the needs of the private sector which may not always be well represented at forums such as the group exercise.

*I would like to hear more from the private sector operators about their needs.*

Reporting truthfully back to government on the needs at a local level was also perceived as important.

*Continue to emphasise working ‘on property’ and grass roots with direct feedback to government — don’t...tone down the feedback.*

It was also proposed that the business of the private sector is to put public sector information into a farmer friendly context and this needs to be pursued further.

Nonetheless, the issue of multi-institutional relationships was perceived as complex and important.

*This is a complex issue. The issues being discussed are real and very important.*

The mood at the end of the group exercise was that the public sector, which was best represented in the group exercise, felt uncomfortable discussing this topic because collaborating with other stakeholders is an issue the public sector needs to considerably improve on.

*The public sector felt threatened and this was a topic they felt very uncomfortable talking about.*

6.3.6. Perceptions

Each sector’s perception of one another was gathered in the group exercise and semi-structured interviews. While some perceptions were fairly accurate, others were not. The sectors differ in their perceptions of one another and some of these perceptions inhibit the development of constructive relationships. For instance, agribusiness has a limited value of APEN, and the public sector underrates the influence of agribusiness on farmer decision-making. The public sector is limited in its acknowledgement of the importance of agribusiness and its potential as a catalyst for change. The university and private sector perceptions of public sector drivers were closely aligned to what the public sector stated were its drivers. On the contrary, public sector perceptions of private sector drivers were very dissimilar to the stated drivers of the private sector.
The university sector perceived the main driver of the public sector to be its responsibility to the public, followed by ensuring the sustainability of environmental assets. Regulation (development as well as enforcement) and market demand were also perceived as significant drivers.

Industry and the private sector also had similar perceptions of the public sector. In addition, they both noted that the public sector works in short-term timeframes, is restricted by budgets and public perceptions are important.

The university sector perceived profitability as the main driver of the private sector, followed by social responsibility and market demand. The public sector perceived profit, client relationships, trust, responsiveness to client needs and client satisfaction as the main drivers of the private sector. Technical competence along with maintaining a good image and reputation were also all perceived as important. Many groups also suggested that the private sector seeks to improve and expand on its own opportunities and benefits.

All of the sectors acknowledged profit generation as a main driver of the private sector. This is to be expected, since the private sector needs to ensure its actions are profitable to ensure its own business sustainability. Further, the private sector did not dispute this when asked to state its own drivers. The notion of profitability was explored further in the open discussion as well as in the semi-structured interviews. Agribusiness explained that not only did it have to ensure the profitability of its own business; it had to also ensure the profitability of its clients’ businesses.

Several groups suggested that the private sector strives for short-term success and gains. Again, as discussed earlier in this chapter, the private sector argued that it needs to maximise the sustainability of clients in order to maximise the sustainability of its own business.

The public sector perceived that a driver of the private sector was to “build client dependability on them”. On the contrary, the private sector claimed it aimed to inform and educate its clients, empower the community and build social capital.

The public sector perceived private sector drivers were of a more long-term nature than public sector drivers. Public sector drivers tend to be short-term due to the nature of government funding and the short-term nature of projects and the need to achieve outcomes quickly.
It was also suggested that the motives of the private sector varied with the size and structure of the company. Further, private sector motives are influenced by the personal values of individual employees.

6.4. CONCLUSION

This chapter began by revisiting the research questions. The purpose of this chapter was to set the scene for the findings. The chapter presented the findings from the web survey which indicated farmers use a range of service providers in the information exchange interface to inform their decision-making. The findings indicated that the use of some information sources had increased. The findings also indicated that respondents perceived many service providers would continue to be important in the future, suggesting the information exchange interface was going to continue to be complex with so many service providers continuing to be involved in farmer decision-making.

The web survey data also indicated that farmers perceive strategic management to be important, although the data did not explain whether they have the capacity to implement strategic management and whether the information exchange interface supported them in strategic management.

The chapter continued by presenting findings from the group exercise and the semi-structured interviews which revealed changes to the information exchange interface and the complexity caused by such change. The chapter explored each service provider in detail from the perspectives of individuals within the information exchange interface, and their relationships and perceptions of one another.

It is the purpose of the next chapter to explore the concept of sustainability in relation to mixed-farming systems and the information exchange interface.
CHAPTER SEVEN: CONCEPTS OF SUSTAINABILITY

7.1. INTRODUCTION

The previous chapter established that farmers use a range of service providers in the information exchange interface to inform their decision-making. The chapter revealed that the use of some information sources had increased and many service providers would continue to be important in the future, suggesting the information exchange interface was going to continue to be complex with so many service providers continuing to be involved in farmer decision-making.

The chapter also revealed the changes to the information exchange interface and the complexity caused by such change. The chapter explored each service provider in detail from the perspectives of individuals within the information exchange interface, and their relationships and perceptions of one another.

It is the purpose of this chapter to explore the concept of sustainability in relation to mixed-farming systems and the information exchange interface. As discussed previously in Chapter Three, sustainability is a contested concept. As Section 3.3 presented, a consensus of informed opinion recognises three dimensions of sustainable agriculture: environment, economy and society. The notion of sustainability was explored in the web survey and group exercise. The findings are presented below.

Questions pertaining to sustainability were asked in the group exercise. The participants of the group exercise were asked to define the term ‘sustainability’ and list the drivers of their business. The purpose for exploring these notions was to gain an in-depth understanding of the considerations respondents thought necessary to ensure the sustainability of individual farm businesses, as well as the industry and businesses and organisations in which they were employed.

This chapter also explores strategic decision-making from the perspectives of those who act as advisers to farmers. Reiterating Chapter Four, the literature divides the decisions made by farmers into operational, tactical and strategic, based on the level of complexity of the decision and the time-frame in which the decision must be made.
Operational decisions are made frequently on a day-to-day or week-by-week basis, such as fertilising a crop. Decisions at a tactical level on the other hand include those tasks which need to be completed in the short to medium term to achieve the goals of the business. Tactical decisions are constrained by the strategy and involve completing tasks to ensure the strategic goals are reached.

*A tactical decision about a paddock should be part of an on-going plan regarding the farm.*

Strategic decisions meanwhile are those concerning the overall vision for the long-term future and include decisions on the size and scale of the business and whether to diversify or intensify. Strategic decisions are quite different from operational and tactical decisions. They are made infrequently but have long-term implications for the future of the farm.

Financial decisions regarding the farm business range from tactical to strategic. According to one private consultant who participated in the semi-structured interviews, to decide whether or not to purchase “the block next door” is tactical advice. However, there is uncertainty surrounding the definition of a tactical and a strategic decision and the findings surrounding this uncertainty are also discussed in this chapter.

### 7.2. DEFINING ‘SUSTAINABILITY’

As the literature presented in Chapter Three clearly illustrated, ‘sustainability’ is an ambiguous and contested concept. Nonetheless, within the confines of a conference group at least, it was possible to draw a broad, common definition of sustainability from the data. A common understanding was sustainability is very much a ‘triple bottom line’ concept, as reflected in the following participant statement which was jotted on the butcher’s paper.

*sustainability = triple bottom line.*

In other words, the notion of sustainability is holistic, composed of three parts: social, economic and environmental. It was propounded “*a systems approach is necessary to ensure sustainability*”. In other words, the three components need to be considered collectively to ensure the longevity of the business or industry.

*sustainability = social, environmental, economical.*
Whilst each sector agreed that sustainability is comprised of social, economic and environmental components, some sectors differed in their perceptions of what constituted economic, environmental and social sustainability respectively. However, there was also agreement and this reflects the ambiguous nature of the notion of sustainability and to a certain extent the various agendas and drivers of each group. Definitions of social, environmental and economic sustainability which emerged from the exercise are presented below.

7.2.1. Economic sustainability

To be economically sustainable, it was suggested businesses must be productive in the long term as well as profitable. The loss of productive land was an issue, and the importance of communicating the economic benefits of environmental outcomes was stressed. Subsequently, a long term perspective is necessary.

According to industry and the private sector, economic sustainability from a farmer’s perspective means, “Do I have the resources to do it?” It was also suggested that “funding availability is an issue”.

Funding priorities was another important notion which emerged from the group exercise data. ‘Industry’ claimed it needed funding to ensure its own sustainability as well as the sustainability of its respective industries. It was also suggested economical decisions are generally made by city-based professionals and this is not desirable for rural and regional areas. “Using $ efficiently”, “bang for buck” and “funding needs to be well targeted at the local focus” were other perceptions pertaining to government funding that were put forward by the local natural resource management groups.

7.2.2. Social sustainability

Meanwhile, social sustainability was perceived as vital for ensuring rural communities remain viable. Social sustainability can be achieved through encouraging future generations to stay in the community by providing services and employment opportunities, encouraging the children of farming families to return or stay on the farm, and welcoming newcomers to the community and assisting them to develop social networks.

It was also suggested that social sustainability differs with “lifestyle and life-stage” and a comfortable lifestyle was important. Knowledge and education were also perceived by many groups as important
for ensuring social sustainability. Community values and addressing community concerns were also deemed important.

7.2.3. **Environmental sustainability**

While “environmental stewardship” does not necessarily ensure sustainability, it was a popular perspective when the topic of environmental sustainability was discussed. ‘Environmental stewardship’ is an ethic which embodies the responsible planning and management of natural resources to ensure environmental, social and economic sustainability for both present and future generations.

*We are custodians of the land. We must look after it for future generations.*

It was perceived as vital to manage and preserve natural resources in order to ensure not only environmental sustainability, but also economic and social sustainability. The natural resource management sector observed that achieving “*regional NRM targets*” was a method of achieving environmental sustainability.

Other perceptions of environmental sustainability involved achieving and maintaining “*sustainable landscapes*”, and “*land good for the future*”. That is, preserving natural resources for future longevity.

7.2.4. **Other considerations**

Several participants elaborated by suggesting sustainability is about “*leaving whatever we are working on in a stronger position*”. That is, sustainability is not only about maintaining natural resources and social capital, but also improving such assets.

Further, participants suggested that being adaptable to change was also important for ensuring sustainability.

*Sustainability is about being able to manage change and adapt with change.*

In addition, farmers must be adequately supported to adapt and manage change.
Help farmers become more adaptable and flexible so that they become / are self-sustaining.

It was also proposed sustainability must be “equitable and ethical”.

Interestingly, ‘policy’ was not suggested as a component of sustainability, although the literature presented in Chapter Three suggests otherwise. However, “government funding” was mentioned as an important aspect of sustainability. In other words, government funding is necessary for ensuring the sustainability of organisations and programs as well as the industries and sectors they represent. Without government funding, these programs would not exist and ’end-users’, as well as their own employment and livelihoods would not be sustainable. Participants also mentioned that the public sector had the most influence on the sustainability of the current system. So, while ‘policy’ was not specifically stated as a fourth, important component of sustainability, it was discretely noted.

7.3. ENSURING THE SUSTAINABILITY OF THE FARM BUSINESS

The various sectors were asked to note their business drivers. For the purpose of this data collection exercise and the overarching research study, a driver was defined as a factor that influences the direction and actions of an organisation or business. Drivers can be internal or external to the business, and include strategic investment as well as resources. This question was asked to gain insight into and understand the influences driving the agendas and activities of the various sectors.

The business drivers were similar across all sectors. Similar themes emerged across the groups and no major differences were discovered. The overarching drivers were sustainability and resilience. All of the sectors agreed that, businesses and organisations must maximise the probability of their survival by remaining adaptable to change. Businesses must also aim to maximise the sustainability of their clients. The drivers stated by the sectors were very similar to the factors influencing sustainability which were presented in the previous section. Again, the drivers fit underneath the headings ‘environmental’, ‘economic’ and ‘social’, and are holistic in nature and cannot be separated.

7.3.1. Social drivers

The data indicated that the social drivers of a business were to engage with and develop relationships with the community, and address community needs and expectations. The aim is to build strong, healthy, independent communities through education and by acting as ‘change leaders’.
The well-being of ‘end users’ and their businesses is a priority for all sectors. Farmers and other community members need a comfortable lifestyle. They need access to educational opportunities and health services, an adequate income, a manageable work load, a healthy balance between work and family life, and time for leisure and outside interests.

All sectors were of the opinion that it is important to maintain credibility and respect within the community. Client satisfaction is important and the public sector referred to this as “public expectations and pressures”.

The private sector not only has a strong commitment to and close relationship with its clients. It is also concerned about its image, particularly its clients’ perspectives. The private sector also feels a strong moral responsibility towards its clients.

*What legacy will we leave?*

The private sector’s morals, values and beliefs strongly influence its business activities. The morals and principles of the business must “fit with [its] own values and beliefs”. The “survival and endurance” of its own business as well as its clients are the two major drivers of the private sector and each driver is of equal importance.

### 7.3.2. Economic drivers

Perceived economic drivers of business were funds, time and workforce. Funds include grants, public funding, private investment as well as profits derived from business activities. Funds are necessary to pay for business activities.

Business activities are also driven by available time and workforce. Considerations include whether or not employees have the time or the necessary skills, experience and qualifications to complete particular tasks. The business may not be in a position to increase its workforce if necessary.

Responses from the various sectors indicated that production and profitability of their own businesses and their clients’ businesses were important drivers.
Ensure [the] long term profitability of clients.

Ensuring “industry competitiveness” was also perceived as important. Businesses need to ensure they remain competitive within their industries. For instance, agribusinesses need to ensure the prices of their products match those of their competitors. Agribusinesses also need to ensure their advice is sound and they continue to provide a good service to their clients.

7.3.3. Environmental drivers

The notion of ‘environmental stewardship’ discussed earlier was suggested as an influence over the direction and actions of an organisation or business. All of the sectors felt a strong responsibility to “care for environmental assets” and “protect...natural resources”, indicating that the preservation of natural resources is vitally important to everyone. However, no reference was made as to whether or not everyone was active in preserving natural resources or if they just thought it should be done.

We are responsible for looking after ‘public goods’ i.e. those goods with a public benefit e.g. environmental assets.

Environmental assets are perceived as a ‘public good’ and group exercise participants perceived that each sector shares a “responsibility for public good”. That is, everybody is responsible for ensuring the preservation of natural resources.

One group further elaborated by stating it was not only important to conserve natural resources, but also to reverse environmental degradation.

Ensuring sustainable landscapes and reversing the loss of productive land and ensuring we don’t lose any more productive land in the future.

Interestingly, the business drivers identified by the natural resource management sector were not only concerned with the environment but also included social and economic drivers.

7.3.4. Political drivers

Several sectors mentioned they were influenced by government decisions.
Influenced by the government of the day.

These decisions could be in regard to funding or regulation.

Government decides funding availability...[and] influences regulation.

7.3.5. Resilience and adaptive capacity

Several sectors mentioned that the decisions which drive their business are sometimes made as a result of a situation out of their control such as climate change, drought, natural resource management issues or commodity prices. For some organisations, their decisions are sometimes made to ensure food security, bio-security and security of markets.

Several sectors mentioned that the need to help their clients manage change is a driver of their business.

Provide encouragement and skills [to clients] to make changes as necessary.

7.4. AMBIGUITY SURROUNDING THE DEFINITION OF A STRATEGIC DECISION

As discussed earlier in this chapter, the range and level of advice provided by agribusiness and private consultants varies significantly. For instance, some advisers only give operational or tactical agronomic advice whereas others assist farmers to develop five year business plans.

There is ambiguity surrounding the definition of a strategic decision. Agribusiness advisers argue that a five year cropping rotation is a strategic business decision. However, financial consultants disagree and claim that a five year cropping rotation is a tactical decision.

The agribusiness advisers who participated in the semi-structured interviews remarked that they assist their long-standing clients with the development of their five year plans and considered this strategic decision-making.

Yes, we provide assistance with strategic decision-making if our clients want it. We can help them with their five year plans.

Our fee-for-service is strategic.
When this finding was discussed with several private consultants in following semi-structured interviews, one consultant articulated:

*Yes, they’ll do budgets and plan cropping rotations and what each paddock should be doing in the next five years, but they don’t do long-term planning. They won’t provide assistance with superannuation, investments, succession planning. They don’t ask or help answer questions such as, ‘If you’re not selling the farm, who will the farm be passed onto and how? Do you have enough super and investments to retire? If one of the kids is returning to the farm, how will they be accommodated for? What will they be in charge of?’*

Another private consultant answered:

*Sure, they help with basic budgets but this doesn’t make them financial consultants.*

There is no clarity when defining a strategic decision. For senior agronomists in agribusiness, it could mean a five year cropping plan. For private consultants, business and financial consultants, strategic decisions are financial decisions made infrequently that drive the business. These decisions include investing on or off-farm, where to invest superannuation, planning for retirement and succession planning.

*The guys doing strategic...are focusing on the business finance side of things, not paddock planning...To go into the strategic planning, you need to have a very thorough understanding of the finances, debt structure etc. of the business. I would be surprised if agribusiness are providing that service.*

While responsive agronomy (see Section 6.3.2.1) addresses operational decisions, fee-for-service programs on the other hand mostly address tactical decision-making. Only a very few private consultants address strategic decision-making.

*Again, not all private consultancy firms offer long-term [strategic] services.*

There are several reasons for this. Firstly, it is a reflection of people’s comfort zones and training. There is no formal training in strategic advice, and specialist consultants who provide strategic advice generally have business, law or accounting backgrounds.
Further, the majority of advisers are comfortable with providing operational and tactical advice because they are trained in these backgrounds.

*A lot of our guys are technical based.*

Operational and tactical advice is also an ‘easy sell’ compared to strategic advice. It is difficult to demonstrate to the majority of farmers the value of strategic advice. This finding is discussed in more detail in the following section.

### 7.5. WHAT LEVEL OF ADVICE ARE FARMERS SEEKING?

According to the participants of the semi-structured interviews, there are three groups of farmers: those who think strategically, those who believe they are thinking strategically but are not, and those who do not think strategically at all.

*A farmer might employ a farm management consultant to provide advice on financials. They then may employ another consultant...for the paddock stuff...*

Those farmers who do not think strategically only plan for the next twelve months. They do not, for instance, consider whether they have enough superannuation to retire.

They might operate in a twenty four month cycle, because they are always thinking about next year, but there is still a fair chunk of them who don’t want to think further than year three. It’s too far away.

The majority of farmers do not think beyond a twelve month cycle and only seek advice regarding operational and tactical decisions.

*Most of our clients ask for help on operational and tactical... A big chunk of farmers still only use production agronomy.*

Those farmers who believe they are thinking strategically will say they have a five year plan, but it is unlikely to be a written, formal business plan.

*Of the farmers I know, very, very few would have a five year strategic plan.*

For those with a five year plan, only a few would actually implement the plan.
I would say half of our clients want help with a five year plan, however only twenty five per cent would do it effectively. But it’s part of their skill level as well. It’s not a high percentage.

A very small number of farmers do think strategically. This small group of farmers have a few characteristics in common. They are more ‘business-like’ with a wider ‘world-view’ and think outside their local area. They are not necessarily more educated but are more comfortable with seeking information and obtaining advice. They are more receptive to outside information.

Farmers who think strategically generally have larger scale farms and tend to work in industries which have more capital and risk involved such as the cotton industry. They realise the value of paying for strategic advice and can improve profitability by implementing that advice.

The people who want it are good planners, their whole farm is an organised scenario, they tend to operate their farm more as a business, more business focused, and have clarity about what their direction is...They are more business-like in everything they do. They are always looking for opportunities, they are looking to invest off farm, those types of things. They are not just looking within the farm the whole time.

Although only a small number of farmers seek advice regarding strategic decision-making, the service is available for those who request it.

The services are there for the farmers that want it. Absolutely.

Although few people provide assistance with strategic decision-making, it is not hard to find for those seeking it.

The service is there and done well for the farmers that want it. The thing is, that not many farmers are asking for the service.

There are several reasons behind the small proportion of farmers engaging a consultant for strategic decision-making. Firstly, assistance with strategic decision making is expensive because it is time consuming and some farmers cannot afford or justify the expense. Advice is a fixed cost and farmers must divide this cost by hectares. Therefore the cost is more expensive per hectare for the smaller-scale farmer and subsequently they cannot always justify the expense.
Secondly, some farmers do not truly value the advice.

You’ve got to demonstrate that there is value in it as well. You’ve got people who are just going to want it because they’re organised, their offices are organised, their books are organised, their financial books, but, if you put it to a farmer who’s not really tuned in, you’ve then got to be able to say, ‘Well, the value of doing this is x, y, z’, and whilst you can demonstrate that, it’s not always easy because it’s five years out. The clarity isn’t always there and it’s hard to see what the true value is.

Further, some farmers cannot simply think that far ahead.

The strategic stuff, we do it with some of our clients, but not all because some of them just want to operate in a twelve month cycle.

They are not ‘business-like’ and do not keep good records, analyse their decisions, consider risk management, or manage their business as a business. Viability to some farmers is just “making a profit this year”.

I often have discussions with people about what is a successful farming business. If the business is going to be viable, it needs to support all the people in it, it needs to support the people on a pension, it needs off-farm investment, it needs to educate the kids, and I don’t think most people think that far ahead. It’s more about, will I make a profit this year, will I have cash this year, it’s a very immediate view. There isn’t a lot of long-term planning.

Further, in order to provide a client with strategic advice, a trusting relationship must evolve first and this cannot be rushed. It takes time.

Things like finances, you need a fair degree of trust. Succession planning...we do three to four a year. Very intense. They are not things that people jump into.

Due to the infrequent nature of strategic decisions, there is not a lot of demand for assistance with strategic decision-making. One interviewee who was a partner in a private firm said it was usually their financial clients who were receiving ‘tactical help’ who would seek assistance with strategic decisions every few years when they needed it. No one would “just walk off the street” and ask for assistance with strategic decision-making.
Very rare for someone to come in and say ‘I want to do some financial analysis’. Sometimes banks will ring and say, ‘Can you look at this client? This client would like you to look at his figures’.

Nonetheless, the demand for assistance with strategic decision-making is increasing.

*facing page*

I think the long-term stuff has happened more in the last five to seven years...

There are several reasons behind the spike in demand.

...that has occurred due to the dry years of the past decade. People have had to do more planning due to the dry years. It’s also driven by banks because banks like to see longer-term plans. So that’s prompting the farmer as well.

### 7.6. SOME FARMERS JUST SEEM TO GET IT RIGHT

Chapter Four presented the myriad of influences on farmer decision-making. Section 4.6 explored how some farmers seem to have the ‘knack’ for always making the right decisions. Gibb, (2009) reports that the farmers who seem to always ‘get it right’ actually follow a set of rules to achieve their success. One of these rules is making decisions in a timely manner, as one of the semi-structured interviewees pointed out:

> What’s the difference between a good farmer and a bad farmer? Three weeks.

Another interviewee shared his perspective:

> We tend to think that we should change the way farmers think. If they are not thinking strategic, we should teach them and show them and get them thinking strategically. This is silly. Let them do what they want. They are a private business. If they were corner store owners we wouldn’t worry about changing the way they think. They are private businesses. Some are good at running their business and some aren’t. Those that aren’t good at it will eventually exit from farming and be bought out by those who are good at it. Those who are good at running a business will continue to thrive and prosper. We shouldn’t try to change the way farmers think. We shouldn’t say for example, ‘By 2020, we should have x amount of farmers thinking strategically’. This is silly.

Further, the majority of farmers do not consider the risk involved when making a decision.
And the other thing, I think when people make decisions, they look at the average, they don’t look at the risk. When people make decisions, it’s not from a risk management perspective. Culturally, we don’t have people thinking as a business, and looking at risk within a business. We just look at it as a production issue, gross margins, but if you get a failure, you lose all of that money, plus losses accumulate. People don’t account for the accumulation. If you get frost on a paddock, you lose the crop, however you don’t lose the wool of the sheep if it gets frost on it. We haven’t engaged a culture in farmers to look at it as a business, and looking at risk as well as returns. We’ve always looked at returns, but not risk. They don’t look at their business as a business and not assess risk. For example, there were farmers who were still operating with twenty per cent equity. Why are they still rolling the dice? They don’t understand the risk of the loss, and the need to protect assets. They weren’t running it as a business.

7.7. CONCLUSION

This chapter explored the notion of sustainability as perceived by the professionals who work within the information exchange interface. The respondents perceived sustainability to be a holistic concept, comprised of social, economic and environmental components. This finding is supported by the literature presented in Chapter Three.

The chapter also revealed that the sectors were driven by sustainability and resilience. The drivers were consistent across the sectors. The businesses and organisations within the sectors perceived they not only had to maximise their own sustainability, but also improve the sustainability of their clients by assisting them to adapt to change.

This chapter also presented findings relating to strategic decision-making from the perspectives of those who act as advisers to farmers. Strategic management is important for the sustainability of a business. However, there is ambiguity in the information exchange interface surrounding the definition of a strategic decision. Further, not all farmers think strategically. Additionally, for the farmers who do think strategically, there are only a few advisers who have the skills to provide support for strategic decisions. It is the purpose of the following chapter to discuss the findings presented in this chapter.
CHAPTER EIGHT: THE RELATIONSHIPS BETWEEN THE INFORMATION EXCHANGE INTERFACE AND STRATEGIC DECISION-MAKING IN MIXED-FARMING SYSTEMS

8.1. INTRODUCTION

As a result of changes in the nature and provision of public sector extension services, a multitude of service providers have appeared in the information exchange interface. Along with an unprecedented increase in choice of inputs, advances in technology and market deregulation and volatility, farmer decision-making has become more complex. There are a myriad of influences on farmer decision-making — many of which are social. When a farming system becomes mixed, even further complexity and diversity is added to the farmer decision-making ‘space’. Additionally, and as discussed in Section 4.2, ninety-nine per cent of mixed-farming systems in Australia are family-owned and operated (National Farmers Federation, 2014). This creates blurriness to the personal-professional operational environment somewhat typical of living in one’s workplace. Business and personal decisions are often made interchangeably, with reactive management of familial relationships and work demands frequently the subject of dinner table conversation.

Within this context of complexity, there are many types of farm-relevant decisions facing farmers. The purpose of the information exchange interface is to assist farmers in their decision-making. However, there appears to be limited understanding of the relationship between the information exchange interface and farmer decision-making generally (see Section Error! Reference source not found.), and even less on specifically strategic decisions. Accordingly, the focus and contribution of this thesis is to explore and provide insight into this relationship. As indicated in the literature, strategic decision-making in mixed-farming systems is complex, and this thesis reveals that change within the information exchange interface may have made it more complex. Furthermore, the information exchange interface appears more suited to operational and tactical decision-making.

Strategic decisions are concerned with the overall vision for the business and provide a framework for the future. In a mixed-farming context, they are multi-disciplinary in that a strategic decision often impacts on multiple enterprises at the same time, with various consequences.
Strategic decisions are unique and the information available on which to base them is less established and less precise than for operational and tactical decisions. Strategic decisions may require large resource commitments and can be difficult to reverse once implemented. They are also made infrequently and often have long-term implications for the business. Due to their long timeframe, they typically require the use of a substantial element of personal and professional judgement by the farmer making the decision. Such judgement, a product of a range of highly personal factors such as experience, knowledge and even culture, can sometimes be imprecise or perhaps difficult to even explain.

Despite the risk of impreciseness, strategic decisions are significant as they provide the overall, long-term direction for a business and are consequently a major factor in determining a farm business’ sustainability within its physical, social, economic and political limits.

Strategic decisions are the most fundamental, often the most difficult but, paradoxically, the most frequently underestimated decisions encountered by businesses. Markham et al. (2006) acknowledges the importance of farmers receiving strategic advice. For the majority of businesses, strategic planning and management is a difficult and unnatural process. The long-term nature of strategic decisions means they will be implemented and will operate in a future environment the business cannot fully anticipate. Fundamentally, the skill set necessary for making operational and tactical decisions is vastly different from the skills necessary for strategic decision-making. Strategic decision-making requires conceptual skills and the ability to envisage not only what environmental changes may occur long-term, but also to identify the opportunities and challenges that are likely to stem from this change. Strategic decisions are based on broad parameters rather than a detailed forecast of future events. Therefore, a manager’s ability to form accurate predictions is severely restricted.

Strategic management is more than a planning, implementation and control process. It is also a state of mind and an attitude. Managers with a strategic mindset are forward-thinking, proactive and focussed on the future. A strategic mindset develops and evaluates every decision and action in light of current and future circumstances. A strategic mindset considers all variables, internal and external to the business. It ensures the goals of the individuals involved are achieved, whilst enabling flexibility to ensure that the business’ position and means of operation are able to change quickly and easily in response to change.
This chapter discusses the complexity of strategic decision-making in mixed-farming systems in the context of the fencing to land class case study presented in Section 4.9.1.1. The capacity of farmers to strategically manage their farm businesses is very important for their sustainability. As noted previously, Australian farmers operate in a complex and constantly changing environment, subject to pressures from weather, markets, social change and environmental conditions. Adapting to change is a challenge for any business. Within mixed-farming systems, however, with their multitude of disciplinary and specialist interests all demanding an equitable, profitable and productive share of the same resources, failure to adapt to change can put the sustainability of the business into question. A strategic management approach however, can create opportunities for adaptation.

As this chapter reveals, there are several challenges which influence the capacity of farmers to strategically manage their mixed-farming systems and be adaptable to change. The information exchange interface adds further complexity to the strategic mindset and adaptive capacity of farmers. This chapter discloses many of these challenges, each with the potential to influence the sustainability of mixed-farming systems.

### 8.2. THE COMPLEXITY OF STRATEGIC DECISIONS IN MIXED-FARMING SYSTEMS

As the literature presented in the previous chapters has illustrated, strategic decisions are unique and complex. The complexity is further exacerbated in the context of family-operated, mixed-farming systems.

In the complexity of mixed-farming systems, there are many considerations which are constantly changing and many of the factors involved are unknown or difficult to quantify, or their relationship with other factors is poorly understood. On the surface, deciding how heavily to graze a pasture may seem like a simple decision but, on further investigation, there are a myriad of interconnected factors at play, and questions may arise pertaining to sustainability and the desirability of the situation and ultimately whether or not the family should stay on the farm.

In family-operated, mixed-farming systems, there are multiple decision-makers often involved in intricate relationships with each other, creating blurriness to the personal-professional operational environment. Family and community values significantly influence the business. The farming system adopted by a family is often strongly linked to tradition and the preferences of the individuals involved.
Family elements such as the availability of family labour, family goals, local services and opportunities available, off-farm income, large family expenses, if and when to have a holiday and farm succession must be considered in decision-making. Overall, farm production decisions are encased in many layers of non-production and even non-farm concerns that farmers either explicitly or implicitly take into consideration.

Section 4.9 presented a case study of a family-operated, mixed-farming business which made the strategic decision to zone and subdivide their farm according to land class. This allowed the business to expand its livestock enterprise and adjust to a rotational grazing system. To reiterate, the catalyst for the change was photos of bare hills on the farm and the family’s desire to pass the farm on to the children. For the farm business to be sustainable long-term, the business saw the need to make major adjustments to the enterprise mix (Mike Roberts Communications, 2013).

Resultantly, the business made strategic changes so farm succession was a viable possibility which was the original stimulus for the change. Prior to implementing the strategic decision, there were many factors the business may have considered. There were also many influences on the decision. The complexity surrounding the strategic decision is illustrated in Figures 16 and 17 (see Section 4.9.1.1).

Whilst exploring its options, the business discussed fencing to land class with its consultants and other farmers who had also fenced to land class. Discussing the decision with these two information sources is in line with findings from Healy et al. (2013) who discovered that advisers and other farmers were the most common sources of information among farmers.

The business in this case study was also a part of the Grain and Graze 2 program (see Section 4.9.2). Grain and Graze 2 was a collaborative program building on existing networks involving a range of service providers from various sectors within the information exchange interface. The case study highlights the importance of a supportive information exchange interface. This notion is discussed further in Section 8.5. The business learned through on-farm experimentation and evaluation as outlined in Darnhofer et al. (2010), with the support of service providers within the information exchange interface. The business received strategic business assistance to change its mixed-farming system. The complexity of the information exchange interface and its influence on strategic decision-making in mixed-farming systems is discussed in the following section.
8.3. ADVISER PERSPECTIVES ON STRATEGIC THINKING

8.3.1. Not all farmers think strategically

Regarding a strategic mindset amongst mixed-farmers, the findings from the semi-structured interviews indicate that advisers perceive that farmers fall into one of three categories: those who think strategically; those who believe they think strategically, however, their actions are not in a manner which will positively influence the sustainability of their business; and those who do not think strategically at all.

Advisers perceive farmers with a strategic mindset are typically more business-focused and have the most complete understanding of their business. These farmers can see the value in strategic advice and can improve business profitability by implementing the advice. Glyde et al. (2014) uncovered a similar finding.

Yet, it appears that advisers perceive that a strategic mindset among farmers is uncommon (see Section 7.5), with the following quote captured from the semi-structured interviews typical of many responses amongst private consultants:

...very few farmers think strategically.

Further, a strategic mindset’s importance was also universally accepted amongst consultant respondents:

What’s a viable farm? You need to think strategically. Farmer’s don’t.

Advisers perceive that there are several reasons behind not all farmers thinking strategically within a mindset that will maximise the sustainability of their mixed-farming system. First and foremost, it simply does not occur to some farmers to think strategically. Most interviewees commented:

They just don’t think that far ahead.

While the literature has revealed that strategic management is important for the sustainability of mixed-farming systems, it appears many farmers are more focused on the shorter-term where “making a profit this year” is perceived as the major element which will ensure the sustainability of
their business. Advisers perceive that farmers do not understand that poor decision-making in one year based on a desire to reduce costs can lead to detrimental expenditure and subsequently reduced profit in a following year. Other farmers do not think beyond a twelve month cycle and “…only think year-to-year”.

Further, advisers perceive that some farmers do not have a comprehensive world-view or a complete understanding of their entire business. In addition, advisers perceive that some farmers simply do not hold the necessary knowledge and skills to make strategic decisions regarding their mixed-farming systems.

Farmers don’t analyse their decisions...Farmers can’t understand risk management. They don’t think about the business as a business.

From the perspective of advisers, there are farmers who believe they think strategically, and possibly they are in a sense, although they do not think strategically in a manner which will positively influence the sustainability of their mixed-farming system. Some farmers may have long-term goals; however, they are not goals which will maximise the sustainability of their mixed-farming system.

A further issue identified during the semi-structured interviews is the cost involved in strategic management. A farmer must keep good records in order for an adviser to give them strategic advice, and this necessitates an investment in time on the farmer’s behalf. Secondly, the farmer must be willing and able to pay for the advice. Cristovao, Koutsouris, and Kügler (2012) found that privatisation tends to exclude farmers who are unable to pay from receiving advice, either directly or indirectly. This finding is also supported by Faure et al. (2017).

8.3.2. Perceived attributes of a strategic mindset

Nicholson et al. (2015) propose that the only significant difference between the more successful farmers and the remainder of the industry is their ability to make the right decision at the right time. Gibb (2009) reports on the attributes of good farm managers. According to Gibb (2009), good farm managers focus on the critical variables when making a decision. They are also experienced, observant and have a comprehensive world-view. Good farm managers seek advice from specialists without following them blindly because they appreciate they are specialists in a particular field and see only
part of the big picture. Most importantly, good farm managers act quickly and decisively. Their decisions are informed, intentional and timely.

In other words, the advisers in this study perceived good farm managers to have a strategic mindset (see Section 7.5). Farmers with a strategic mindset understand the fundamental drivers of their business and have a complete understanding of the business in its entirety. They consider current as well as any possible future challenges and opportunities when developing and evaluating every decision, ensuring a proactive approach which is essential for a strategic mindset. A proactive mindset anticipates the decision, allowing it to be addressed quickly and decisively before the opportunity is missed. Good farm managers with a strategic mindset consider all variables, internal and external to the business. A strategic mindset assesses the risk along with the gain and has an exit strategy. Their daily and annual decisions align with a strategy which ensures that the long-term goals of the individuals involved are achieved. The strategy also allows for flexibility to enable the business to adapt quickly and easily in response to any change.

This finding is supported by similar findings from Glyde et al. (2014) which revealed that financial advisers perceived that the best farmers had the most complete understanding of their farm business. Glyde et al. (2014) also revealed that financial advisers perceived such an understanding exists amongst a minority of farmers.

8.4. THE COMPLEXITY OF THE INFORMATION EXCHANGE INTERFACE

Since its early origins in agricultural show societies, agricultural extension in Australia has undergone dramatic change. As Section 2.5 explained, traditionally the major providers of agricultural extension services were state departments of agriculture, whose extension programs predominantly placed a strong emphasis on agricultural production. However, restructuring of the public sector saw its programs became more focused on group extension and environmental concerns. Furthermore, the public sector withdrew from areas perceived to be adequately supplied, or having the potential to be adequately supplied, by the private sector.

The change in nature and provision of publicly funded agricultural extension services in Australia has created a diverse and complex information exchange. A multitude of alternative service providers and institutional arrangements have appeared. Formalised partnerships between private and public sector organisations are now common. The private sector is sometimes now employed to deliver publicly
funded programs. Farmer organisations, cooperatives and groups; input supply companies; retail outlets; marketing boards; Research and Development Corporations; Cooperative Research Centres and university departments are some of the many players in the new agricultural information exchange interface.

The range and level of advice provided to farmers varies considerably. Successful Australian farmers have always adapted to changed circumstances. However, the question is whether they can continue to adapt to change in the present, dynamic information exchange interface. This literature has demonstrated that strategic decision-making in mixed-farming systems is complex (see Section 4.9). This thesis has revealed that there are few advisers in the information exchange interface that support farmers with the strategic management of their mixed-farming systems. Farmers may be limited in their capacity to strategically manage their mixed-farming systems if they are not adequately supported. It is the purpose of the next section to delve into these findings further to highlight the challenges presented by the information exchange interface on the strategic management and adaptive capacity of mixed-farming systems.

8.5. STRATEGIC MANAGEMENT SUPPORT PROVIDED BY THE INFORMATION EXCHANGE INTERFACE

Private consultants indicated in the semi-structured interviews that they have fewer clients since the drought, yet they have more business. Some of the advisers’ clients exited the industry during the drought and the advisers perceive that these clients did not have a complete understanding of their entire business, did not plan strategically and were not adaptable to change. This finding is supported by similar findings in the rice industry by Glyde et al. (2014) where advisers had clients who exited farming during the drought. These advisers perceived that their clients exited farming during the drought because they too, did not have a complete understanding of their entire business.

The findings from the semi-structured interviews indicate that while advisers perceive strategic management of mixed-farming systems as important, there are few advisers who have the skills to support farmers with strategic decision-making.

There are several suggested reasons behind this. Firstly, the advisers who participated in the semi-structured interviews revealed that many farmers do not ask for strategic support. That is, there simply is not a great demand for this level of service.
However, this thesis proposes that this is not a sufficient explanation. More importantly, the changes to the information exchange interface presented in Section 0 have added another layer of complexity to strategic decision-making in mixed-farming systems.

Firstly, this thesis suggests there is ambiguity surrounding the definition of a strategic decision (see Section 7.4) and although many of the advisers who participated in the semi-structured interviews claimed that they assisted farmers with strategic decision-making, they do not. Secondly, there are not many advisers in the information exchange interface who provide strategic management support. Most advisers only provide operational and tactical advice and there are several suggested reasons for this. Firstly, most advisers are from technical, agricultural production backgrounds and are not skilled or trained in strategic management, and they are comfortable with providing operational-tactical advice. Secondly, the nature of private sector business models encourages them to service the operational-tactical realm because of the opportunity to gain short-term profits. Agribusiness has budgets to meet and the profits are in servicing the present, not the future. In addition, the information exchange interface tends to be reactive rather than proactive. Further, not all of the sectors work collaboratively. These findings are explored further in the following sections.

The advisers interviewed had a range of perspectives on encouraging farmers to strategically manage their mixed-farming systems. One consultant proposed, “We need to get farmers thinking about it more”, whereas another consultant disagreed and took a more Darwinian perspective, indicating there is no need to worry about farmers who do not think strategically because they will be soon bought out by farmers who do:

*We tend to think we should change the way farmers think. Make them think strategic. This is silly. Let them do what they want. They are private businesses. Some are good at it and some aren’t. The farmers that are good at it will continue to be good at it and thrive and buy out the farmers that are not so good at it.*

### 8.5.1. Ambiguity surrounding a strategic decision

There is ambiguity surrounding the definition of a strategic decision, with various individuals within the information exchange interface having various interpretations (see Section 7.4). Production agronomists and agribusiness advisers who participated in the semi-structured interviews indicated that a five year paddock plan is a strategic decision because it is an important business decision. On
the other hand, the interviewees who were specialised consultants who assisted farmers with multi-
disciplinary, farm business management attested that a five year paddock plan is not a strategic
decision. The interviewees perceived that a five year paddock plan is not a strategic decision because
it is not multi-disciplinary in nature and does not encompass all aspects of the business, including
personal (familial) goals and objectives.

Strategic decisions drive the business. They are made infrequently yet have major implications for the
future direction and success of the business (see Section 4.9). Strategic decisions in a mixed-farming
system can include deciding to fence to land class, invest on or off-farm, or develop superannuation,
retirement and succession plans. A five year paddock plan is not strategic because it does not involve
major infrastructure investments, large resource commitments, it is not difficult to reverse nor does
it have major consequences for other decisions within the business.

Farmers are presented with many options every day. Some options present themselves quite
frequently, are low-risk and have minor implications for the business. However, other options present
themselves less frequently, are associated with higher levels of risk and are more difficult to reverse
and subsequently require a lot more consideration. It is confusing that the word ‘decision’ is used for
all of these situations. The same term is applied to routine as well as complex deliberations, to both
low and high-risk situations, to exploratory steps as well as irreversible actions. It is little wonder that
differentiating between decisions can be so difficult (Rosenzweig, 2013).

There is no clarity when defining a strategic decision. This is concerning because some individuals
within the information exchange interface who claim they are assisting farmers with strategic
decision-making are really only servicing the operational-tactical realm (which, it should be pointed
out, is also important — discussed later). For instance, the following comment was made by an
agribusiness adviser who claims he assists farmers with strategic management although he does not
advise beyond a tactical five year paddock plan:

    Yes, we provide assistance with strategic decision-making...We can help them with
their five year plans.

The following comment from a strategic management consultant supports the notion that
agribusiness advisers are not providing farmers with strategic advice.
They [agribusiness advisers] are not advising on such topics as superannuation, investments, succession planning. They don’t ask or help answer questions such as, ‘If you’re not selling the farm, who will the farm be passed on to and how? Do you have enough super and investments to retire? If one of the kids is returning to the farm, how will they be accommodated for? What will they be in charge of?’

In a family-operated, mixed-farming situation, strategic management involves the formulation and implementation of a strategic plan to achieve the major personal and professional goals of the farming family. The strategic plan is based on a consideration of the farm business’ available resources and an assessment of the internal and external environment in which the farm operates. The strategic plan also needs to be adaptive to changes which may occur either internally or externally to the farm business.

### 8.5.2. Very few advisers provide strategic support

A factor that might be contributing to limited strategic decision-making by farmers could be that there are very few advisers assisting farmers with the strategic management of their mixed-farming systems. As Section 8.3.1 elucidated, the advisers who participated in the semi-structured interviews indicated that most farmers sought operational and tactical advice:

*Most clients seek advice regarding operational and tactical.*

The advisers who participated in the semi-structured interviews suggested that few farmers sought advice regarding strategic management. There are several suggested reasons for this. Firstly, farmers are making operational and tactical decisions on a daily basis. Therefore, they will be regularly seeking operational and tactical advice. In addition, as conditions such as rainfall and market prices change throughout the season, farmers will continually be altering their operational and tactical plans (such as deciding to cut crops for hay rather than harvest the grain) and will be seeking advice as they do so. Therefore, there is a lot more demand for operational and tactical advice than there is for strategic decision-making. Due to the infrequent nature of strategic decisions, farmers do not often seek strategic advice.

Secondly, the advisers who participated in the interviews perceived from their experience that not all farmers think in a true, strategic business management mindset and are therefore simply not seeking assistance. Thirdly, in the information exchange interface, strategic advice generally has a charge
attached and several advisers suggested that some farmers cannot afford to pay for strategic services.
On the contrary, several advisers commented some farmers are not willing to pay because they cannot justify the expense due to such reasons as their small land-holdings. In addition, there are so few advisers providing strategic management advice for mixed-farming systems that for those farmers searching for this particular advice, some may have difficulty finding an adviser who services this area well. There are simply not many consultants offering strategic management advice for mixed-farming systems.

There are several reasons why this is so. Firstly, it is a reflection of an adviser’s comfort zone and training. This finding is supported by Klerkx and Jansen (2010) who also discovered that advisers prefer to work within their comfort zones. Secondly, very few advisers have the necessary skill set to offer strategic management advice for mixed-farming systems. Thirdly, there is no formal training in strategic management of mixed-farming systems and generally only specialist consultants who have extensive industry experience provide this service.

The majority of advisers are comfortable with providing operational and tactical advice because they are trained in these backgrounds.

*A lot of our guys are technical based.

Faure et al. (2017) acknowledge the importance of supporting the private sector to build its capacity. Additionally, this thesis revealed that operational and tactical advice is also an ‘easy sell’ compared to strategic advice. It is difficult to demonstrate to many farmers the value of strategic advice. This finding is discussed in more detail in the following section.

**8.5.2.1. The strategic services available**

The findings from the semi-structured interviews revealed that only private consultants give strategic advice and there are very few who do so. Those consultants who do provide strategic management support mostly advise on financial planning or succession planning, rather than analysing farm business structure and enterprise mix with the aim of improving productivity and profitability. There are very few financial consultants who have a strong skill set regarding farm operations. This finding is supported by similar findings in the rice industry by Glyde et al. (2014), who found that there are not many accountants with the right mix of skills and experience for establishing and managing
modern farm businesses. Thus, while these consultants provide financial advice which is strategic in the sense that it considers future, long-term goals and projections, the advice is not multi-disciplinary in the sense that it considers other issues such as the physical production aspects of the various enterprises within the mixed-farming system. In other words, it is not true, strategic advice. Findings from Glyde et al. (2014) suggest, “You could count on one hand” the number of good agribusiness consultants available.

**Agribusiness**

Agribusiness is in close contact with farmers and as the findings in Section 6.3.2 uncovered, agribusiness is considered to be the dominant advisory group to farmers and an influential change agent. This finding is supported by the literature presented in Sections 2.8 and 2.9. However, this thesis has revealed that agribusiness has a limited view of strategic decision-making. The agribusiness advisers who participated in the semi-structured interviews claim they provide strategic support to farmers because they assist with five year paddock planning. However, as the findings have revealed, and the literature has demonstrated (see Section 4.9), a five year paddock plan is not a strategic decision. Whilst agribusiness has the most contact with farmers compared to any of the other service providers, its advice is mostly associated with operational and tactical decisions. This finding is supported by similar findings from Glyde et al. (2014) in the rice industry. There are several proposed reasons behind agribusiness only servicing the operational-tactical realm. Firstly, as Faure et al. (2017) has pointed out, agribusiness must return a profit for shareholders. By providing operational and tactical advice, agribusiness is meeting a market opportunity within the industry. Secondly, this opportunity has expanded with the gradual withdrawal and change in focus of public sector agricultural extension activities. As per its business model, agribusiness is required to meet margin objectives. Staff need to promote products which will best assist them to meet margin objectives. These findings are supported by Glyde et al. (2014) who found that new staff are quickly taught to focus on sales targets and are shown methods for achieving them. However, this narrow focus on sales targets and margin objectives can have consequences.

Firstly, as noted by Klerkx and Jansen (2010), agribusiness promotes and sells products with the most profit margins, therefore its advice is not always in the best interests of the farmer. Secondly, Glyde et al. (2014) reported that an agribusiness adviser stated that his aim was to ensure farmers continued to be dependent on him for advice, ensuring future and recurring business. This contrasts with the notion of capacity building which is discussed later. This finding from Glyde et al. (2014) is similar to a finding of the interactive group exercise. The public sector perceived that the private sector aims to
“...build client dependability on them”. However, an agribusiness adviser interviewed in this study disputed these claims, claiming that agribusiness does not aim to build client dependability, but rather has its own reputation and integrity to uphold and if it gave poor advice, it would not continue to be in business.

“...If we were loading farmers up with stuff they didn’t need, we’d be broke...”.

Another agribusiness adviser who was interviewed agreed, stating “...farmers vote with their feet...”, indicating that if agribusiness was not providing a good service, farmers would not use it. Nonetheless, good advice may not be inconsistent with creating dependency. That is, agribusiness advisers could be providing good advice whilst also ensuring dependency.

Faure et al. (2017) revealed that because the private sector is funded by sales, this naturally orients the advice, although it must ensure the quality of the advice it provides. Faure et al. (2017) also revealed that the private sector will suggest a recommendation based on its product offerings. In consequence, the farmer clients buy ever more inputs. These findings have also been noted earlier by Klerkx and Jansen (2010).

Additionally, findings from the interactive group exercise revealed that the private sector perceived its aim was to inform and educate its clients, empower the community and build social capital.

Subsequently, this thesis suggests it is a balance — a balance between building client trust but also ensuring agribusiness’ economic sustainability. Glyde et al. (2014) found similar findings in the rice industry. Young and inexperienced agribusiness staff were quickly taught to focus on sales targets and shown methods of achieving them, whilst maintaining a delicate balance with developing trusting relationships with clients.

Nonetheless, the focus on sales targets and margin objectives reinforces the notion of the operational-tactical treadmill discussed in Chapter Three. Agribusiness is in a position to be an influential change agent due to its close and frequent contact with farmers. However, this thesis raises concerns because agribusiness only services the operational-tactical realm, putting its own interests before client interests whilst delicately managing a balance to promote recurring business and hence its own sustainability. Agribusiness advisers interviewed in this study said part of promoting their own sustainability means they also need to maximise the sustainability of their clients’ businesses.
However, this is not fully being achieved. Agribusiness has a limited view of sustainability which it perceives as balancing inputs with anticipated yields at the paddock level, rather than long-term planning and managing the farm structure and enterprise mix and making decisions that affect the entire business. The latter is true strategic management.

During the semi-structured interviews, agribusiness advisers agreed with the importance of farmers being proactive, looking towards the future and maintaining flexibility in their enterprise mixes and farm management. In other words, strategically managing their businesses so they are adaptable to change. However, these considerations were taken as a given rather than being deliberately influenced. To offer strategic advice, advisers must understand the entire mixed-farming system, and agribusiness is not skilled or knowledgeable in this sphere.

Agribusiness claims that it addresses strategic decision-making in its fee-for-service program but the findings from the semi-structured interviews suggest it does not. Agribusiness does not provide farmers with highly specialised, strategic, multi-disciplinary business management advice, nor does it analyse enterprise mix or seasonal operations with the aim to improve productivity or profitability. Agribusiness does not assist with financial or succession planning. A comment from one strategic management consultant highlights this:

...[Agribusiness]...They’ll do budgets. They’ll do long-term planning. But not ‘who will get the farm? Do you have enough super? Are the kids returning to the farm...how will you do it? What will the kids be in charge of?

Private consultants

Meanwhile, private consultants mostly advise on agronomy or livestock management and the findings suggest this advice mostly does not go beyond tactical. Similar to agribusiness, private consultants will recommend actions associated with chemical and fertiliser use, plant varieties and animal nutrition. According to the private consultants who participated in the semi-structured interviews, “you could count on one hand” the number of advisers who address decisions within the tactical time-frame, such as planning on a seasonal or annual scale, with a focus on improving overall farm system performance. In other words, they do not adopt a continuous improvement philosophy to the entire farm. Even fewer private consultants offer services in strategic management of entire mixed-farming systems. As mentioned earlier, those consultants who do provide strategic services are likely to engage in financial
and succession planning rather than multi-disciplinary business management of the entire mixed-farming system with an emphasis on improving productivity and profitability.

Private consultant perceptions of farmers

The private consultants and agribusiness advisers interviewed in this study indicated that not all farmers have the necessary skills and knowledge to strategically manage their business. Therefore, for the sustainability of their mixed-farming systems, it is important that these farmers are able to seek assistance. However, it is unrealistic to expect financial planners, agronomy consultants and agribusiness to be able to assist farmers with the strategic management of their mixed-farming systems. Similar findings in the rice industry were reported in Glyde et al. (2014). These advisers have their niche and whilst the advice provided is not strategic in the sense that it is long-term and multi-disciplinary, it is still important to the function of the farm business. It is not possible for them to service all farmer requirements.

Further, strategic planning is costly. The private consultants who were interviewed suggested a farmer must keep good records in order to receive strategic assistance and this necessitates an investment in time on the farmer’s behalf. Secondly, as mentioned previously, there is generally a financial charge associated with seeking specialised strategic management advice. To gain a thorough understanding of an entire business necessitates a substantial investment in time on the consultant’s behalf, as captured in this comment from a private consultant:

*Strategic advice is time consuming and hard to charge out.*

This time must be charged to the farmer and the farmer must see the benefit in this cost. As mentioned previously, the interviewees suggested that many farmers are not yet willing to pay for such service. This continues to be an emerging space. There is still little ‘service push’ and market demand. Subsequently, opportunities for advances in production are restricted to favourable reactive operational decisions, rather than direct and intended proactive, tactical decisions.

Additionally, advisers perceive that not all farmers keep good records. This presents a further challenge, as captured in the following comment from a private consultant:

*Farmers don’t keep good books which makes it difficult to give strategic advice.*
8.5.3. The importance of being proactive

Rickards et al. (2012) refer to the need to focus on the adaptive capacity of decision-makers for the sustainability of their businesses. Reiterating Section 4.9, adaptive capacity is the capacity of individuals to adapt to changing circumstances (Jacobs et al., 2015). It also refers to the conditions that enable or prevent adaptation (Kuruppu et al., 2013). Adaptive capacity is context dependent, locally specific, dynamic, subjective and necessitates a multi-disciplinary approach (Rickards et al., 2012). Biggs (2011) notes that adaptation is a continuous, ever-changing process involving cycles of decision-making, planning, action, observation and social learning.

Reiterating Section 4.9, Kingwell’s (2006) review highlighted that in order to adjust and adapt to climate change, farmers need to make strategic business changes, such as altering their existing mix of enterprises, changing rotations across soil classes, altering stocking rates and changing feeding regimes and flock structures.

The literature has identified that for sustainability, farmers must strategically manage their mixed-farming systems so they are adaptable to change. Strategic management will assist farmers to make the most of opportunities, both in the short-term and long-term. This thesis has revealed that there are very few advisers who support farmers to strategically manage their mixed-farming systems so that they are adaptable to change.

As the literature has established, mixed-farming systems are complex and their strategic management is difficult. There is potential for the information exchange interface to improve its support of farmers to strategically manage their mixed-farming systems. Presently, the information exchange interface predominantly encourages a reactive approach to the management of mixed-farming systems as opposed to a proactive approach. It does this in several ways.

The notion of the operational-tactical treadmill discussed in Section 3.2 is a reactive approach and is limited in its encouragement of the strategic management of mixed-farming systems so that they are adaptable to change. In other words, a problem arises and operational-tactical advisers react rather than implementing strategies to minimise issues becoming problems.

There is potential for the information exchange interface to improve its support of farmers to strategically manage their mixed-farming systems. As the literature in Section 4.9 identified, the
absence of a strategic mindset will do little to encourage long-term planning in a manner which will maximise the sustainability of mixed-farming systems. Subsequently, the status quo will most likely remain and the adaptive capacity of mixed-farming systems is unlikely to improve.

To improve adaptive capacity, mixed-farming systems could benefit from shifting from traditional responsive approaches to proactive methods. A proactive mindset may assist in building resilience and adaptive capacity, potentially enabling the business to respond to changing information and trends, and as Mukheibir et al. (2012) identified, such a mindset could potentially assist the business’ ability to withstand sudden shocks such as droughts, floods, bushfires and heat waves.

The predominant reactive approach of service providers can potentially hinder the opportunities of mixed-farming systems to implement proactive adaptation measures. When the external context is not conducive or supportive of making such choices, farmers may not be encouraged to change. Kuruppu et al. (2013) discovered that government programs (except for those which transfer skills and knowledge to farmers) tend to be reactive and focus on business recovery rather than being proactive and implementing preventative, preparedness and adaptation programs. Further, the participants of the interactive group exercise in this study perceived the short-term nature of government-led programs contributed to vulnerability and suggested their short-term nature was not really conducive to the sustainability of mixed-farming systems. In addition, Kuruppu et al. (2013) found that the selection and eligibility criteria for government programs can often be too rigid and inflexible.

Many of the processes outlined above are largely outside the control of individual mixed-farming businesses and reside within the broader landscape in which the public sector and other service providers operate. Subsequently, the success of efforts to build the adaptive capacity of mixed-farming systems will be influenced, at least in part, by how the information exchange interface addresses these issues. If these factors are not addressed, the adaptive capacity of mixed-farming systems could potentially be undermined.

The findings suggest assisting farmers to manage change is the responsibility of all sectors, as captured in the following comment from the interactive group exercise:

_Both [the public and private] sectors need to [help farmers] manage change and provide them with encouragement and skills to change..._
The participants of the interactive group exercise also suggested there is benefit in providing farmers with the necessary knowledge and skills to improve the adaptive capacity and resilience of their mixed-farming systems. The participants suggested that farmers must also be taught to apply the knowledge and skills to their own individual needs.

The participants also pointed out that farmers must be willing to change in order for service providers to assist them. Trust was also perceived by participants as a vital issue and they acknowledged farmers must perceive service providers as trustworthy in order for them to allow service providers to assist them. Klerkx and Jansen (2010) reported that a lack of trust causes difficulties for advisers to forge a good relationship with farmers. Additionally, advisers require skills to engage with farmers who do not clearly articulate a demand for advice and advisers may need support in this area.

Due to the complexity of mixed-farming businesses illustrated in Sections 4.9 and 8.2, an individualised approach would potentially be beneficial. Further, the participants of the interactive group exercise perceived that the success of programs would be improved if the local community was directly involved in the decision-making processes and was given the opportunity to express their needs.

The participants of the interactive group exercise also perceived that the likely success of programs would improve if the local community had ownership of the program. Additionally, participants recognised the benefit in providing adequate support to local community.

8.5.4. Collaborative partnerships

To maximise the sustainability of their mixed-farming systems, it is beneficial for farmers to address the three ‘spheres’ of sustainability (see Section 3.3). For mixed-farming systems to be sustainable, firstly, they need to be profitable — that is, to have financial sustainability. Secondly, they need to provide an enjoyable and comfortable lifestyle for the farm family and its community — that is, to have social sustainability. Thirdly, they need to be environmentally sustainable, with a positive influence on the natural ecosystem which supports the business. As previously described, the information exchange interface exists to support farmers in their decision-making. However, the findings suggest there are very few advisers who are adequately skilled and knowledgeable to offer support across all three spheres of sustainability. Indeed, no interviewees could identify any individual or service-based provider that could suitably advise on multi-disciplinary, strategic management of
mixed-farming businesses across each of these spheres. Consequently, farmers need to consult with a range of advisers across the various sectors in order to receive the support necessary to maintain a balance between these sustainability spheres. However, this situation becomes even more complex when faced with a realisation that, anecdotally at least, the various service providers across such disciplinary interests are not known to work collaboratively, potentially undermining the capacity of farmers to effectively and strategically manage their mixed-farming businesses in a manner that can maximise their overall sustainability.

The information exchange interface is complex, and it adds another layer to the complexity of strategic decision-making in mixed-farming systems. Effective, collaborative relationships between farmers and the various service providers within the information exchange interface are ideal to maximise the adaptive capacity of mixed-farming systems. Collaborative relationships between the various sectors and service providers are also ideal. This finding is supported by similar findings from Glyde et al. (2014) which revealed practice change requires a contribution from all sectors of the industry, utilising a range of communication methods.

Klerkx and Nettle (2013), Labarthe and Laurent (2013) and Prager, Labarthe, Caggiano, and Lorenzo-Arribas (2016) all report on reduced linkages and fragmentation between the various service providers as a result of the increased number of service providers in the interface. This thesis offers several reasons for the limited collaboration between the various service providers. Agricultural extension professionals who participated in this study indicated that there was an absence of connectivity within the private sector, both between various agribusiness companies as well as between agribusiness and private consultants. There was also limited connectivity between private sector advisers working directly with farmers and R&D organisations. The findings from the interactive group exercise and the semi-structured interviews indicate that collaboration could improve between the public and private sectors, and demonstrate that the dynamic nature of the information exchange interface has contributed to a disconnection in the RD&E feedback loop between farmers and R&D organisations. Murphy et al. (2013b) also identified a disconnection in the RD&E feedback loop. The following perceptions were provided by extension professionals who participated in the interactive group exercise:

There is a divide...
We need better collaboration between the public and private sectors.

There is a need for greater...dialogue and interaction.

EU SCAR (2012) suggest disconnections impede learning and hamper effective research and innovation. The findings from the web survey and the semi-structured interviews revealed that agribusiness is an important advisory group for farmers. Fifty-nine per cent of respondents stated agribusiness is an important information source and twenty-three per cent stated agribusiness was very important. Agribusiness would like further opportunities to provide input into RD&E decisions on behalf of farmers. Advisers who participated in the semi-structured interviews perceived that farmers’ needs are not being adequately heard by RD&E organisations. Stone and Broadbent (2008) reported similar findings (see Section 2.9.2.2). Murphy et al. (2013b) argues farmers need to be given the opportunity to express their needs for advice.

As Chapter Six revealed, agribusiness advisers and private consultants are in close and frequent contact with farmers since they work with individual farmers almost daily at the farm level. Farmers, agribusiness advisers and private consultants perceive that farmer’s needs for R&D are not being acknowledged by R&D decision-makers. Advisers perceive that R&D organisations do not adequately recognise the value of private sector knowledge and do not provide adequate pathways for private sector input into R&D decisions. Similar findings were reported by Paschen et al. (2017). Paschen et al. (2017) discovered that while some RDCs welcomed participatory engagement, the general consensus from research participants was that the engagement tended to be top-down and directive.

This thesis uncovered that the private sector perceives that it should have more input into R&D decisions due to their close and frequent contact with individual farmers. As the semi-structured interviews revealed, private sector advisers established farmer groups (see Section 6.3.3) from a perceived need for locally relevant R&D which was not being met by R&D organisations. Within the farmer groups, advisers successfully applied for grant funding and conducted their own R&D.

Due to the limited connectivity between farmers and R&D organisations, advisers perceive R&D lags behind the pressing issues affecting farmers.

They are always way behind what is happening in the field. And it’s dramatic.
Due to its close and frequent contact with farmers, agribusiness considers itself as an influential change agent and an effective information conduit between R&D organisations and farmers:

...if they influence just one agronomist, they influence fifty growers. As opposed to having to tackle each of those fifty growers direct.

As Chapter Six detailed, agribusiness is perplexed because it perceives that its influence as a change agent is not recognised by the other sectors (see Section 6.3.2.1). Agribusiness also perceives that R&D organisations undervalue its knowledge and expertise in comparison to private consultants.

The information exchange interface could improve its support and encouragement of professional development within the private sector. Traditionally, as Murphy et al. (2013) and Paschen et al. (2017) revealed, the private sector could source skilled and experienced staff from the public sector (see Section 6.3.2.1). However, as a result of restructuring within the public sector, this is no longer a possibility.

...no training ground in the department any more.

This finding is supported by similar findings from Stone (2005), Hunt et al. (2012) and Paschen et al. (2017) who all claim that the restructuring of RD&E within the public sector has resulted in short-term funding. In turn, this has resulted in short-term tenures rather than continuing employment. Thus, the opportunity for professional succession and the building of professional capacity within the private sector has diminished.

Murphy et al. (2013) revealed a lack of adviser capacity contributed to the disconnection in the RD&E feedback loop discussed earlier. Paschen et al. (2017) identified opportunities for greater RDC involvement in adviser capacity building. Paschen et al. (2017) found that RDCs were well positioned to provide mentoring programs for early career consultants. Paschen et al. (2017) also uncovered that RDC involvement in adviser capacity building would improve collaboration across the industry.

Additionally, as the semi-structured interviews revealed, there is also a lot of competition between businesses in the private sector when recruiting staff.

We signed a bloke up earlier in the year and he had four offers on the table.
Staff turnover is also an issue for agribusiness. High staff turnover inhibits the formation of relationships with clients which impacts negatively on both the business and the client. Hunt et al. (2012) similarly discovered that partner agency and client relationships were influenced in the information exchange interface (Hunt et al., 2012).

A further challenge experienced by agribusiness when employing university graduates was that some clients were hesitant to receive advice from someone with very limited practical experience. Different agribusinesses have different ways of dealing with this situation. However, it depends on the history of the location, as Section 6.3.2 explored. Keeping staff in small, rural towns presents a further challenge, particularly when that person does not have family ties to the local community.

The findings also raised an issue regarding in-kind contributions which are more easily contributed by public sector and industry organisations. On the contrary, it is more challenging for self-employed private consultants and other small businesses to contribute in-kind because they do not have a resource base as large as public sector and industry organisations. However, contributions from the private sector can be just as valuable. Similar findings were reported in Paschen et al. (2017).

Secondly, an element of competition exists between some service providers, as they compete with each other for government and industry funding as well as for clients within the market place. For instance, agribusinesses compete with each other for clients. Similarly, EU SCAR (2012) and Paschen et al. (2017) both reported that networking, collaboration and the sharing of learning were constrained by market-based competition in the private sector. In addition, the interactive group exercise participants in this study reported that various industry and public sector organisations compete for funding. Importantly, King and Nettle (2013) suggest that conflict between the service providers may compromise the strategic management of farm businesses (King & Nettle, 2013).

There are also cultural differences between the various service providers. As Chapters Two and Seven illustrated, the various sectors have varying perceptions of one another, particularly their business drivers and motivations. These perceptions influence their ability to work collaboratively. The findings from the interactive group exercise (see Section 7.3) suggest that barriers caused by cultural differences can possibly be overcome by the various service providers identifying common goals and shared opportunities. This finding is supported by EU SCAR (2012) which found that different service
providers were driven by different incentives and there were often insufficient incentives for them to connect with each other.

Reiterating Sections 2.10 and 4.9, the formation of constructive relationships is valuable because poor collaboration amongst government, industry and private sector service providers could potentially lead to limited information sharing (Kuruppu et al., 2013), escalation of transaction costs (Marsh, 1998), duplication of research and missed opportunities for joint learning and reflection amongst service providers (Black, 2000; Lindner, 1993; Marsh & Pannell, 1998, 2000b; Prinsley et al., 1994). Conflicting information could also become available to farmers (Coutts & Botha, 2017; Hunt et al., 2012; Prinsley et al., 1994). Moreover, there is a risk in relation to the reliability and independence of advice (Hunt et al., 2012; Prinsley et al., 1994). Whilst the findings suggest that the market place will take care of ill-informed advice, there is the possibility of farmers being negatively affected by such advice before market forces take effect. Subsequently, the onus is increasingly on farmers to be able to determine the value and relevance of information to their situation and they increasingly need to rely on their own problem-solving skills.

The findings revealed that all the sectors perceive farmer profitability as a main driver for private sector service providers. The perception is, if the farmer clients are profitable, they will spend more money with private service providers. Stone (2005) similarly suggests that the private sector has a tendency to work with clients who will be more profitable to them (see Section 2.10.2). Again, the notion of the operational-tactical realm explored earlier in this section is relevant. Agribusiness will work with farmers who will be profitable to them in the short-term due to their need to meet sales targets and profit objectives. This is at odds with the long-term economic objectives explored in Sections 3.4 and 3.5 which are necessary to maximise the sustainability and adaptive capacity of mixed-farming systems.

Additionally, the literature explored in Sections 2.8 and 2.9 suggests that the private sector may only provide advice on matters for which it has a product to address the issue. Further, the private sector may concentrate its business activities in areas of higher potential, or on higher value crops, or on better performing farmers.
Nonetheless, there is a general common ground between the private sector and R&D organisations. The ultimate goal for each stakeholder is to deliver information to farmers that farmers can understand and apply to their own businesses to increase productivity and profitability.

Whole system driven by grower because he is the common link.

The various sectors could potentially harness this common ground to collaboratively work together for the benefit of mixed-farming businesses, the agricultural industry and subsequently their own businesses and organisations. Paschen et al. (2017) suggest the preliminary step towards effective collaboration is to firstly acknowledge the diversity amongst the service providers. Paschen et al. (2017) also acknowledges that the importance of providing networking opportunities amongst the service providers who would not normally meet with one another. Faure et al. (2017) agree, adding that providing opportunities for dialogue can facilitate collaboration between service providers. In unison, (Murphy et al., 2013a) add there needs to be more industry-owned RD&E agencies, and partnerships need to be strengthened between all service providers.

Effective, collaborative partnerships between mixed-farming systems and the various service providers as well as within the information exchange interface, are ideal to maximise the resilience and adaptive capacity of mixed-farming systems. Unfavourable combinations of these relationships have the potential to undermine the adaptive capacity of mixed-farming systems. Although, these processes which impact on mixed-farming systems operate largely at scales external to individual farm businesses.

8.6. CONCLUSION

In the complexity of mixed-farming systems, many considerations are constantly changing and many of the factors involved are unknown or difficult to quantify, or their relationship with other factors is poorly understood. In family-operated, mixed-farming systems, there are multiple decision-makers often involved in intricate relationships with each other creating blurriness to the personal-professional operational environment. Community values also influence the business.

Strategic decisions are important because they provide the overall, long-term direction for a business and are consequently a major factor determining a farm business’ sustainability within its physical, social, economic and political limits. Strategic decisions are the most fundamental, often the most
difficult but, paradoxically, the most frequently underestimated decisions encountered by businesses. For the majority of businesses, strategic planning and management is a difficult and an unnatural process. In a mixed-farming context, strategic decisions are multi-disciplinary in that a strategic decision often impacts on multiple enterprises at the same time, with various consequences.

As the literature presented in this thesis revealed, for the sustainability of mixed-farming systems, strategic management is very important. Adapting to change is a challenge for any business. Within mixed-farming systems, however, with their multitude of disciplinary and specialist interests, all demanding an equitable, profitable and productive share of the same resources, failure to adapt to change can be terminal for the entire business. A strategic management approach however, can create opportunities for adaptation.

Considering the information exchange interface exists to assist farmers in their decision-making, a supportive institutional framework would benefit the sustainability of mixed-farming systems. However, the contribution of this thesis is the information exchange interface adds further complexity to the strategic management of mixed-farming systems. Strategic decision-making in mixed-farming systems, as indicated in the literature, is complex, and this thesis reveals that change within the information exchange interface has made it more complex. The information exchange interface appears more suited to operational and tactical decision-making.

This thesis has revealed that the information exchange interface provides limited support to farmers in the strategic management of their mixed-farming systems. This influences their ability to be adaptable to change. As the literature revealed, strategic management and adaptive capacity are important for the sustainability of mixed-farming systems.

This thesis reveals that there are very few advisers who support farmer strategic decision-making. There is also ambiguity surrounding the definition of a strategic decision, with many advisers claiming that they assist farmers with strategic decision-making although they do not. Most advisers only service the operational-tactical realm for several reasons.

Firstly, most advisers are from technical agricultural production backgrounds and are not skilled or trained in strategic management. They are comfortable with providing operational-tactical advice. Secondly, the nature of private sector business models encourages them to service the operational-
tactical realm because of the opportunity to gain short-term profits. Agribusiness has budgets to meet and the profits are in servicing the present, not the future.

In addition, the information exchange interface is reactive rather than proactive. It attempts to assist farmers ‘once they are drowning’ rather than ‘teaching them how to swim’. Further, there are opportunities for the sectors and service providers to work more collaboratively.

The next chapter draws concise conclusions to the thesis and answers the research questions. The chapter also critiques the available extension and adoption theory in its capacity to adequately explain the complexity of strategic decision-making in contemporary mixed-farming systems. Implications of the research are also presented.
CHAPTER NINE: CONCLUSIONS AND IMPLICATIONS OF THE RESEARCH FINDINGS

9.1. INTRODUCTION

The previous chapter established that the information exchange interface adds further complexity to the strategic management of mixed-farming systems. As indicated in the literature, strategic decision-making in mixed-farming systems is inherently complex, and this thesis reveals how change within the interface has made it more complex. Furthermore, the interface appears more suited to operational and tactical decision-making.

This chapter seeks to explore the findings from Chapters Six, Seven and Eight toward making a contribution to the theoretical interests of this research, within the context of the research aim originally stated.

As previously outlined, the focus and contribution of this thesis is to explore the complexity of the information exchange interface and its relationship with strategic decision-making for the sustainability of mixed-farming systems.

In establishing this research aim as a framework for the contribution of this thesis, several research questions were identified and investigated. This chapter revisits these areas in light of the evidence presented in the preceding chapters, clarifying the key findings presented in this thesis. The chapter also considers the shortcomings of extension theory and decision models to adequately explain strategic decision-making in modern mixed-farming systems. Implications of the research findings are also presented.

9.2. RE-VISITING THE RESEARCH INTERESTS

The original research questions that were identified and investigated involved the complexity of the information exchange interface and its relationship with the strategic management and adaptive capacity of mixed-farming systems for their sustainability. These initial research questions which were explained in Chapter One are revisited in this section.
9.2.1. The complexity of the information exchange interface

Due to the complexity of mixed-farming systems, farmers seek information and advice from the information exchange interface to assist them with their decision-making. Traditionally, agricultural extension in Australia was predominantly provided by the public sector and its programs aimed to increase agricultural production. However, more recently, its programs have focused on improving environmental sustainability.

In the past and to the present day, it has not predominantly been the province of the public sector to provide multi-disciplinary strategic advice. The public sector has provided strategic advice such as environmental management advice to ameliorate land degradation. However, this is not truly multi-disciplinary strategic advice because it does not consider all the enterprises of the business. It also does not necessarily consider familial, production or profitability considerations in detail. Therefore, while public sector programs focus on long-term factors, they are not truly strategic. Multi-disciplinary, strategic business advice has generally always been the province of the private sector. The issues surrounding this will be discussed later in this chapter.

Since its early origins, agricultural extension in Australia has changed significantly. This thesis has developed the concept of the information exchange interface to explain the complex nature of the present extension environment and the diversity of the multitude of extension providers which exist. As Chapters Two and Eight discussed, service providers from the public and private sectors work together to varying degrees and success. Farmer organisations, cooperatives and groups; input supply companies; private consultants; retail outlets; marketing boards; RDCs; CRCs and universities are some of the many service providers in the interface. This thesis separates the essential elements of the interface and explains how each of them operates and their interactions with one another as well as with farmers. This new method, the ‘information exchange interface’, is based on a theoretical view for application to analysis of the interface.

Due to the increasingly complex environment in which mixed-farming systems operate, strategic management has never been so important. There are very few advisers who offer multi-disciplinary strategic management assistance to mixed-farming businesses. Similarly, there are few farmers seeking assistance. Nonetheless, it is an ‘emerging space’ due to the complexities of mixed-farming systems.
The current focus of public sector extension is on capacity building and community engagement. Meanwhile, the private sector has emerged as the dominant adviser to farmers, assisting them in their decision-making to improve productivity and profitability. The capacity of some advisers within the private sector to service the ‘strategic space’ for the sustainability of mixed-farming systems is questionable. This notion is explored further in the following sections.

Regardless of whether the public sector is well positioned to provide strategic advice, the public sector no longer provides individualised, one-to-one advice (which is now the domain of the private sector — see Section 2.8.2) but rather, provides more generalised support to groups of farmers. Despite the historic and documented value of one-to-one extension, public sector departments over successive governments and decades have increasingly distanced themselves from any role, or responsibility, in this space. As Section 2.9.1 explored, the onus is then on the individual farmer to modify and apply the information to their own business needs.

9.2.2. The influence of the interface on farmer decision-making

The interface exists to support farmers in their decision-making. The literature suggests a supportive institutional framework would contribute to the sustainability of mixed-farming systems. Strategic decision-making in mixed-farming systems is complex, and this thesis reveals change within the interface has made it more complex. It appears the interface has never really been conducive to strategic management, and the changes within the interface have only added further complexity to an already unsatisfactory situation. Public sector advisers have not traditionally focused on strategic, multi-disciplinary farm business management. Nonetheless, public sector advisers have delved into this strategic domain, partially at least, with the early total catchment management and Landcare facilitation movement. However, despite this effort, the focus was on broader system investment and consequence, rather than on profitable and productive outcomes for individual farms. Private sector advisers have instead serviced this space, although there are only a few advisers who provide this service, partly due to farmer demand for the service. However, due to issues such as growing concerns regarding the environmental impact of agriculture, international markets, terms of trade and changing climatic conditions, strategic management has never been so important. How individual farmers understand these issues and their relevance to their own situation is not only important, but also knowing ‘who’ is working directly with farmers to make individual sense of it all is also important.
As Section 8.5.2 discussed, there is minimal strategic management support available to the managers of mixed-farming systems. This is concerning because without a strategic mindset and the development and implementation of a strategic plan, and constant review and modification of that plan under changing conditions, the sustainability of mixed-farming systems is questionable.

Moreover, as Section 8.5.1 discussed, adding to the challenge of strategic support is the considerable variation in what is considered strategic. Some advisers insist they support farmers strategically because they assist with budgeting and five year paddock plans. These decisions are not truly strategic as they are not long-term or multi-disciplinary. That is, they do not account for production, financial, family, social and environmental factors discussed earlier in Chapter Four. They also do not demand thinking about the needs for strategic decisions, such as major infrastructure or resource commitments as outlined in Section 4.5.3. Further, budgeting and five year paddock plans are also not difficult to trial or reverse once implemented. In reality, these advisers are only assisting operationally and tactically.

9.2.3. Farmer action to influence the sustainability of their mixed-farming systems

Decision-making is at the core of managing any business. As noted above, mixed-farming systems are complex. There are many factors to consider and their influence on other factors is not always understood. All of these factors change and interact continuously, as farmers adapt to changing conditions. In doing so, they create other situations requiring a decision. As the literature presented in Chapter Four discussed, factors include the following:

- in family-operated mixed-farming systems, the goals of the family and of the farm are closely inter-related;
- the family is often multi-generational, with the farm belonging to the family for decades or longer;
- the family often has a strong, emotional tie to the land;
- there are often multiple decision-makers involved in intricate relationships with one another; and,
- there is a blurred personal-professional divide which inevitably stems from living in one’s workplace.

Lifestyle, flexibility, an emotional attachment to the land, working alongside one’s children and pure enjoyment are only some of the many social drivers behind choosing to farm. Family values
interconnect with those of the wider community. Overall, farm production decisions are encased in many layers of non-production and even non-farm concerns that farmers either implicitly or explicitly take into consideration.

Mixed-farming systems have always been under pressure to adapt and improve in response to both external and internal change. The type and proportion of enterprises in mixed-farming systems is constantly changing and being re-arranged by the farmer. Due to their complexity, modifying a mixed-farming system is difficult as the farmer must shuffle many interacting components. The enterprises chosen are often strongly linked to the personal preferences of the family. It is often perceived that farmers will change their enterprise mix in response to financial incentives and market signals but this is not necessarily the case as there are many other factors at play. In mixed-farming systems, the various enterprises often use the same land in any one year and complement one another. For instance, livestock graze crop residues after harvest. The proportion of the farm allocated to each enterprise depends on such factors as soil types, topography, enterprise profitability, farmer preference and climatic conditions. Mixed-farming systems diversify risk, and predictions of climate change and increased frequency and intensity of droughts have placed more emphasis on the need for strategic decisions surrounding the selection and proportion of enterprises.

Although farmers are increasingly recognising the values and benefits of seeking and paying for specialised advice, there are still many farmers who are not seeking strategic advice. Therefore, as Section 8.5.2.1 discussed, there are considerations of market supply and demand linked to the fact that there are not many advisers servicing the ‘strategic space’.

9.2.3.1. Few farmers seek strategic advice

The findings suggest several reasons behind very few farmers seeking strategic advice. Firstly, not all farmers think in a strategic business management mindset and are therefore simply not seeking assistance. Secondly, some farmers cannot afford to pay for strategic services, whereas others are not willing to pay because they cannot judge its value or cannot justify the expense.

The advisers who participated in the semi-structured interviews said it is difficult to predict which farmers will seek strategic advice and which farmers will not. There is no literature surrounding the characteristics of farmers seeking strategic advice. However, the advisers interviewed in this study did agree it was the farmers who treated their farms more like ‘a business’ who sought strategic advice.
Further, for farmers with smaller landholdings, strategic advice is often not financially feasible because they have to spread the cost over fewer hectares, making the cost more expensive per hectare.

Some advisers who participated in the interviews suggested it was often farm businesses with ‘higher risk’ enterprises who sought strategic advice. This finding is supported by similar findings from Stone (2005).

Strategic management is costly for several reasons. Firstly, it requires the individual farmer to keep detailed records. Secondly, it also entails the adviser to spend considerable time with the farmer, learning about all aspects of their business.

Some farmers are simply not aware of ‘strategic management’. Multi-disciplinary, long-term planning is not something that they consider and therefore it is not something they seek information or advice for. Further, if farmers do not value strategic advice, there is no demand for it. If there is no demand, there is no market for advisers to service. Advisers will not offer strategic services if there are no clients that are willing to pay.

For various reasons such as climatic conditions or financial hardship, some farmers do not think or plan for more than twelve months ahead. They may be stuck on the operational-tactical treadmill discussed previously in Section 8.5.2, only considering production targets and inputs for the next twelve months, and not planning long-term.

It is difficult for farmers who are struggling financially to justify expenditure on strategic advice. Often, along with financial hardship comes stress and farmers suffering from stress often continue to do things as they have always done and do not seek alternative methods (Cooper, 2011; Long, 2012) (see Section 4.3.2).

9.2.4. The strategic management of mixed-farming systems

Strategic decisions are important because they provide the overall, long-term direction for a business and are consequently a major factor in determining business sustainability. As noted previously, strategic decisions are the most important and difficult, yet, the most frequently underestimated decisions encountered by businesses. For the majority of businesses, strategic management is a difficult process. As the previous section discussed, in a mixed-farming context, strategic decisions are
multi-disciplinary because they impact on multiple enterprises at the same time, with various consequences.

As the literature presented in this thesis revealed, for the sustainability of mixed-farming systems, strategic management is very important. Adapting to change is a challenge for any business. Within mixed-farming systems, however, with their multitude of disciplinary and specialist interests, all demanding an equitable, profitable and productive share of the same resources, failure to adapt to change can jeopardise the sustainability of the business. A strategic management approach however, can create opportunities for adaptation.

9.2.5. Supporting farmers to be adaptable to change

Along with few farmers seeking strategic advice, there are also issues surrounding the ability of the interface to provide strategic advice. As the literature revealed, strategic management and adaptive capacity are important for the sustainability of mixed-farming systems. This thesis has shown that the interface provides limited strategic management support to farmers which influences their ability to be adaptable to change.

The evidence suggests that most advisers who service mixed-farming systems are those from agricultural production, financial or legal backgrounds or professions. The advisers with agricultural backgrounds provide agricultural production advice and this is a reflection of their training. As Section 8.5.2 discussed, agribusiness advisers are in the most contact with farmers on a daily basis. However, they are very limited in their capacity to assist farmers in strategic business management due to their technical backgrounds. Advisers with agricultural production backgrounds are not skilled in strategic, multi-disciplinary business management of mixed-farming systems.

Advisers from the financial or legal professions who service mixed-farming systems, assist farmers with taxation, succession planning and investments. However, very few of these advisers have a sound understanding of the intricacies and complexities of multi-disciplinary, mixed-farming systems. As Section 8.5.2 discussed, there are very few advisers who are skilled and knowledgeable in all aspects of mixed-farming systems and who can truly and adequately assist with their strategic business management. These advisers exist in other industries however they are rarely found in mixed-farming systems, since there are many different interconnecting enterprises on a mixed-farm.
9.3. CONSIDERING THE LIMITATIONS OF EXTENSION THEORY

Essentially, the purpose of extension is to change the behaviour of farmers in order to improve their situation (Klerkx & Jansen, 2010). Traditionally, practice change in agriculture has tended to rely on top-down approaches such as innovation diffusion theory and adoption theory (which were explored in Section 2.3). Decision-making models (see Section 4.6) have also been developed in an attempt to understand the processes that farmers experience when making decisions. Research in the agricultural extension discipline has attempted to introduce alternative agricultural extension approaches in recent decades (see Section 2.4) which have also had their limitations, namely an over-reliance on local knowledge and farmer problem-solving skills; as well as a lack of acknowledgement of the diversity which exists within local communities (Cornwall et al., 1994; Scoones & Thompson, 1993; Vanclay, 1994a; Vanclay & Lawrence, 1995). More recently, Agricultural Knowledge Innovation Systems (AKIS) theory has been developed to identify, analyse and assess the various actors within an agricultural system as well as their communication and interactions with one another (Knierim et al., 2015). However, as this thesis has revealed, AKIS is limited in its capacity to explain the variation of issues, consequences, and types of decisions made at the interface of modern, capitalist-based farming systems in Australia.

As Sections 4.5 and 4.9 discussed, strategic decision-making is complex. The complexity is exacerbated in the context of family-operated, mixed-farming systems. Subsequently, this thesis suggests that innovation diffusion theory, adoption theory, participatory approaches, decision models and innovation systems theory are limited in their capacity to assist farmers with strategic decision-making in modern, mixed-farming systems. There are several suggested reasons for this.

Firstly, as the literature has detailed, due to the vast array of interconnected influences, strategic decision-making in mixed-farming systems is an individualised and personal process. The available theories and models do not give enough consideration to the individualised and personal processes a farmer experiences when making strategic decisions. There is no one theory or method that can be applied to all situations to improve the position of farmers due to the unique process each individual farmer experiences while making strategic decisions in their mixed-farming systems.

Thompson (2009) and Whittenbury and Davidson (2010) discovered there are several over-arching socio-cultural factors that influence decision-making. These factors were considered in Section 4.3. Thompson (2009) suggests that farmers’ personal perceptions, socio-cultural influences, rules of
thumb, intuition and learning preferences are rarely acknowledged in detail in the available theories and models. Thompson (2009) also suggests that agricultural research, development and extension would benefit from a more thorough understanding of the socio-cultural and psychological factors that influence farmer decision-making.

Secondly, Thompson (2009) proposed that current decision-making models do not give enough consideration to the more informal and qualitative approaches many farmers utilise in their decision-making discussed previously in Section 4.6. Murray-Prior (1998) and Thompson (2009) argue that greater attention needs to be paid to the cognitive and socio-cultural influences on farmer decision-making, and Thompson (2009) further argues that the available decision-making models tend to place them all into an unexplored ‘black box’.

Due to its limited appreciation of farmer’s individual preferences, socio-cultural influences and limitations in catering for the individuality of farmers and mixed-farming systems, the available extension theories and models are limited in their capacity to capture the complexity of competing interests within modern mixed-farming systems.

A review of the literature in Chapter Two considered aspects of innovation diffusion theory, adoption theory, AKIS and models of extension. While innovation diffusion theory has its merits, it also has many limitations. For instance, it ignores local complexity and does not take into account local uncertainties, variability and the adaptive capacity of farmers. Additionally, innovation diffusion theory outlines the characteristics of an innovative farmer. While adopter categories exist, they are not exclusive categories, and are not particularly useful for predicting adoption behaviour (Glyde et al., 2014).

Furthermore, as this thesis has highlighted, decisions become more complex depending on the timeframe in which they need to be made, with strategic (long-term) decisions being more complex than operational (short-term) decisions. In his categorisation of adopters, Rogers (1983) acknowledges that time is the critical determinant of innovativeness. However, his theory does not take the time concept further to differentiate on different types of decisions.

This thesis reveals the need to understand how time should also be interpreted from the adopter’s perspective in terms of how time is consequential. That is, the adopter makes a decision whilst being
aware of the risks and consequences associated with that decision. For instance, farmers make operational decisions every day. In hindsight, if it turns out to be a poor decision, the consequences will not be hugely problematic. A tactical decision on the other hand is more consequential, and therefore more support is necessary when making that decision. Meanwhile, strategic decisions such as fencing to land class (see Section 4.9.1) require a huge capital and intellectual investment and the consequences can be lifechanging. The available theories of change such as innovation diffusion theory and AKIS are limited in their capacity to explain the variation in the types of decisions made at the interface of modern, mixed-farming systems in Australia.

Innovation diffusion and adoption theory do not address strategic decision-making. For instance, a strategic decision cannot be trialled before adoption. ‘Innovativeness’, that is, the relative earliness that a person adopts an innovation, can become doubtful if an adoption decision does not account for strategic consequences. Additionally, adoption involves the farmer committing to the decision. However, due to their nature, the outcomes of strategic decisions are not known for years. Further, adoption theory only focuses on existing knowledge, and the outcome of an adoption decision might change considerably under a capacity building situation (see Section 4.9).

Adoption theory explains how some farmers can be slow to commit to change. Stages of awareness and interest explained within adoption theory underline the importance of ‘awareness’ and ‘knowledge’ targets for extension programs. Rather than expect adoption to occur using a top-down approach, extension activities within the information exchange interface need to cater for the individualised and personal processes farmers experience in their decision-making. Regardless, adoption theory relates to the process a farmer experiences before deciding to adopt or reject an innovation. Strategic decision-making is not an innovation. Rather, it is a philosophy about management, a state of mind and an attitude. A theory which adequately explains farmer strategic decision-making requires a different approach and method of thinking. For the sustainability of their mixed-farming systems, strategic management is very important. To shift to a strategic mindset is difficult. However, the shift becomes even more challenging when the current extension paradigm is not conducive to such a mindset. Further, extension theory does not explain why some farmers plan strategically and others do not. The findings of this research indicate that the farmers who do plan strategically operate their farms more like a business. Some farmers have a strategic mindset while others do not. For some farmers, remaining ‘viable’ just means ‘getting through next year’. The literature suggests farmers suffering from stress are unlikely to think strategically (Hounsome, 2006).
This thesis proposes that the available extension and adoption theories and models do not adequately account for strategic thinking and adaptive capacity. Rather, they promote the adoption of new ideas, products and services. They promote products and services to farmers in an attempt to improve production and profitability. Subsequently, the dominant extension paradigm services the operational-tactical realm discussed earlier in this chapter. It contributes to the operational-tactical treadmill in its promotion of products and services, reinforcing the status quo. The available theories and models do not service the ‘strategic space’.

Strategic management is not a product or service. Rather, it is a process. It is not a singular innovation. Rather, it is a world view and a function of knowledge. Strategic management is multi-disciplinary, and considers all aspects of the entire business; the entire farm system and the human management that surrounds it. Innovation diffusion theory typically relates to single innovations. It does not necessarily relate to packages of technologies. Therefore, innovation diffusion theory and adoption theory are too narrow in their focus and are subsequently limited in their capacity to adequately explain multi-disciplinary, strategic business management of mixed-farming systems.

For the reasons discussed in Chapter Four and for the reasons outlined by McGuckian and Rickards (2011), modern, mixed-farming systems are too complex to be satisfactorily generalised by innovation diffusion and adoption theory. Consequently, a change in extension thought and practice may be beneficial. A change in the approaches and methods used when assisting farmers to improve their situation may be necessary. The interface may benefit from a reconsideration of how it conducts extension. Effective extension firstly seeks to understand the social, physical and historical context of the situation before displaying knowledge and communicating new technologies (van de Fliert, 2003). Presently, farmers are not adequately supported to think strategically for the sustainability of their mixed-farming systems. The literature clearly suggests strategic management will improve the adaptive capacity of farmers. However, the common extension paradigm does not service this notion. Mixed-farming systems have become more complex and modernised, however, the intent of the service has not changed. The interface and the dominant extension approach support a products and services paradigm and extension could do more to support contemporary mixed-farming systems. An extension model which supports strategic decision-making in contemporary mixed-farming systems would consider the long-term environmental, economic and social aspects of the business. It would also consider all of the influences on farmer decision-making discussed in Chapter Four and not just
the economic influences. Further, it would acknowledge that individual mixed-farming systems are unique, and no two businesses are the same. Additionally, an extension model which supports strategic management would be adaptable and constantly evolving as conditions change.

Rogers began to acknowledge criticisms of the theory in the 1983 edition of his book, *Diffusion of Innovations*. Rogers (1983) notes that a weakness of the theory was the lack of criticism in its early development. Rogers (1962) refers to ‘innovativeness’. That is, how quickly an individual adopts a new idea compared to other individuals within the system. However, just being one of the first farmers in a region to adopt a new idea does not guarantee the sustainability of the farm business. As Strachan (2011) pointed out (see Section 4.3.3), being an innovator can have the opposite effect. Again, innovation diffusion theory is too narrow for contemporary, mixed-farming systems and consequently it is limited in its capacity to explain strategic management for the sustainability of mixed-farming systems.

More recent theories and models such as Coutts’ (2005) capacity building ladder are also limited in their capacity to explain strategic management of modern mixed-farming systems because they do not appear to consider strategic management.

As discussed in Section 2.8, Agricultural Knowledge Innovation Systems (AKIS) are defined as the stakeholders within an agricultural system working synergistically to support farmer decision-making, problem-solving and innovation in agriculture. Similar to the other available theories discussed above, AKIS is also limited in its capacity to be applied to mixed-farming systems in Australia due to the heterogeneity and constantly evolving nature of Australian mixed-farming systems.

This thesis highlights the inadequacies of existing theories to explain the highly personal and highly diverse nature of the information exchange interface. This thesis also highlights that traditional methods of information exchange (within an Australian context at least) demand interaction from the ‘top-down’ perspective. That is, agents of change have dictated how this interface is structured and operates, with little regard for the perspectives of farmers who might benefit from the exchange. This thesis has taken a broad theoretical perspective and brought together the available theories and revealed what they mean at the actual decision-making interface.
This thesis has taken a broad theoretical perspective and dissected innovation diffusion, adoption and innovation systems theories along with decision models, and considered them in the context of the actual decision-making interface. Furthermore, this thesis has revealed that this situation becomes even more complex where different consequences are realised depending on whether the decision is short (operational), medium (tactical) or long (strategic) term, and the interface inadequately supports strategic decision-making. When a temporal dimension is considered in the decision-making process, it is not likely that a traditional method of information exchange will create predictable or satisfactory outcomes.

This thesis has revealed that no single extension theory or model is universally relevant. There is no ‘one-size-fits-all’ information exchange interface. Due to the complexity, diversity and constantly evolving nature of Australian mixed-farming systems, a ‘best-fit’ approach as described by Birner et al. (2009) is most suitable. That is, an interface specific to the environmental, economic, social and political conditions under which mixed-farming systems operate is necessary. However, achieving such best-fit is challenging given the complex, diverse and evolving nature of Australian mixed-farming systems. Therefore, an adaptive, constantly evolving, best-fit approach is necessary.

9.4. IMPLICATIONS OF THE RESEARCH

There are several implications of this research (Table 10). These implications pertain to the sustainability of mixed-farming systems, the capacity of advisers to provide strategic advice, and collaboration between the service providers within the interface. These implications are discussed below.

9.4.1. Implications for sustainability

As previously discussed in Sections 3.2 and 8.5.2, short-term perspectives which aim to maximise short-term production and profits, can be detrimental to the sustainability of mixed-farming systems. Placing emphasis on inputs and yields at the paddock level, rather than long-term planning, places the natural environment and consequently food security, markets and the future of rural communities at risk.

As Section 7.6 explained, an adviser who participated in the semi-structured interviews held the view that if a farm business is not profitable and therefore is not sustainable, then that farming family
should sell the farm to someone who will manage the farm to its full potential. On the contrary, this thesis suggests for the sustainability of mixed-farming systems, extension efforts should focus on the adaptive capacity of farmers and improving their strategic management skills. Although there are many programs in place that focus on adaptive capacity, they do not necessarily focus on strategic management. If farmer strategic management skills are improved as a result of these programs, in the interests of environmental sustainability at least, it would more likely be incidental than intentional.

9.4.2. Building the capacity of advisers

The shift towards capacity building (see Section 2.6) not only involves empowering farmers, but also involves empowering individuals within the interface. As previously discussed in Section 2.8.2, advisers have frequent contact with farmers and work with them on a one-to-one basis. Therefore, this thesis suggests further research into improving the capacity of advisers to provide strategic advice in mixed-farming systems.

As Section 2.6 explored, the present focus of agricultural extension in Australia is capacity building. Dairy Australia is an example of an RDC which has developed strategic programs to build the capacity of the people within the dairy industry. In comparison, there is minimal, similar support for building capacity in mixed-farming systems. The central theme in the dairy industry is emphasis on investment in people and capacity building rather than on science and technology. Dairy Australia’s People in Dairy program provides a range of human capital development services for the dairy industry. The National Centre for Dairy Education Australia (NCDEA) is an industry-owned training organisation which partners with Registered Training Organisations and TAFEs to deliver short courses ranging from Certificate II to Diploma level, as well as facilitating traineeships and apprenticeships for the industry. Dairy Australia delivers strategic knowledge through reports and publications available online through its Dairy Library which it has invested significantly in (Dairy Australia, 2016). To improve the adaptive capacity of mixed-farming systems, similar investments in capacity building could be beneficial.

There could be benefit in training organisations developing curricula that reflect a strategic mindset. However, farmer groups also have an important role to play in articulating demand for strategic advice, as well as providing or contracting for the services for their members.

Due to its close and frequent contact with farmers, agribusiness (see Section 8.6.2.1) is possibly in a position to act as a feedback mechanism between farmers and R&D organisations. This could allow farmers to provide greater input into R&D decisions. This thesis recommends this notion be explored...
further to improve the connectivity in the RD&E feedback loop which has become quite ‘muddled’ due to the complex nature of the interface.

Although, as Section 8.6.2.1 discussed, agribusiness services the short-term operational-tactical realm. This thesis recommends that opportunities be explored to improve the strategic capacity of both agribusiness advisers and private consultants within the mixed-farming information exchange interface. While there are many successful programs which transfer skills and knowledge to farmers to improve their decision-making, there is opportunity to improve the skills of service providers within the interface. Investing in the capacity building of advisers will in turn build the capacity of farmers to strategically manage their mixed-farming systems. Although, the success of this approach would depend on farmers wanting the assistance. From the perspectives of the participants of this study, the interface is constantly evolving and strategic management is an emerging space. Advisers perceive that the demand for strategic advice will increase due to farming becoming more challenging. Therefore, the capacity building of farmers (see Section 2.6) is also important.

As Section 8.5.1 discussed, there is ambiguity surrounding strategic management. Improving the strategic capacity of advisers will assist in the notion of strategic management becoming ‘standardised’ to reduce the ambiguity and improve understanding of the processes involved in strategic management.

While advisers in the interface may acknowledge the importance of strategic business management, adaptability and sustainability in mixed-farming systems, these notions are often taken as a given rather than deliberately and constructively influenced. Strategic business management is challenging and is a profession in itself. It is little wonder that service providers in the interface have difficulty in assisting farmers in the strategic management of their mixed-farming systems. As Section 4.5 explored, it requires a different suite of skills compared to operational and tactical decision-making.

9.4.3. Collaborative approaches

The interface should adequately support farmers in strategically managing their farm businesses to maximise the sustainability of their mixed-farming systems. It is therefore a recommendation of this research that the service providers in the interface make efforts to collaborate more effectively with one another to better support farmers in the strategic management of their mixed-farming systems. There are cultural differences between the service providers which influence their ability to work
collaboratively. As Chapters Two and Six illustrated, the various sectors have varying perceptions of one another, particularly their business drivers and motivations. The findings suggest barriers caused by cultural differences can possibly be overcome by the service providers identifying common goals and shared opportunities. This thesis recommends this notion be explored further.

Currently, the interface is fragmented, and farmers would benefit from the various service providers working more synergistically. A focus on mutual interaction amongst the service providers, investigating methods they can complement each other, would be beneficial. Creating a leadership group for mixed-farming systems, which consists of members who represent the public sector, private consultants, agribusiness advisers, farmer groups and groups at the industry level such as RDCs would assist collaboration amongst the service providers. It would be the responsibility of the leadership group to identify and gather people who can contribute to developing R&D objectives and outcomes of a program. The leadership group would identify any knowledge gaps for research that are preventing innovation and change. The leadership group would also integrate research-led and farmer-led approaches, oversee action among service providers and build on partnerships, networks, collaborations and linkages. The leadership group would also be responsible for creating understanding of the commercial environment in which it is trying to innovate for example, and, developing adaptive strategies that could then be piloted for wider delivery.

This thesis has revealed that the private sector has limited opportunities to contribute to R&D decision-making. The findings uncovered in-kind contributions (see Section 6.3.3) are more easily contributed by public sector and industry organisations. It is more challenging for private consultants and other small businesses to contribute in-kind because their resource base is not as large. However, contributions from the private sector can be just as valuable. This thesis suggests that further investigations be undertaken into facilitating private sector contributions into R&D decisions. Changes to current institutional, funding and professional arrangements could improve the effectiveness of the interface.
Table 10: Recommendations of the research

<table>
<thead>
<tr>
<th>Recommendation</th>
<th>Processes Involved</th>
</tr>
</thead>
<tbody>
<tr>
<td>1. Improve farmer adaptive capacity and strategic management skills.</td>
<td>Firstly, a demand for the service must be established by creating awareness. The public sector and RDCs could fulfil this role while a market is established.</td>
</tr>
<tr>
<td>2. Improve the capacity of advisers to provide strategic advice.</td>
<td>Again, a demand for the service must initially be established. This is achieved via the above recommendation. Strategic management education and training opportunities can then be developed. Strategic management can also be included in undergraduate and Masters courses.</td>
</tr>
<tr>
<td>3. Improve collaboration amongst the service providers within the interface.</td>
<td>Establish a leadership group where members represent the public sector, private consultants, agribusiness advisers, farmer groups and groups at the industry level such as RDCs.</td>
</tr>
<tr>
<td>4. Investigate methods to facilitate private sector contributions into R&amp;D decisions.</td>
<td>Further research is proposed which investigates: - how to strengthen partnerships between the private sector and the other service providers; - how the private sector can be supported to collaborate with the other providers; and, - different funding models and incentive arrangements to support private sector involvement.</td>
</tr>
</tbody>
</table>

9.5. CONCLUSION

The interface exists to support farmers in their decision-making. However, the contribution of this thesis is that the interface is not only limited in its ability to deal with the complexity of the strategic management of mixed-farming systems, but it also further contributes to the complexity. Strategic decision-making in mixed-farming systems, as indicated in the literature, is complex, and this thesis reveals change within the interface has made it more complex. This thesis has revealed the interface provides limited support to farmers in the strategic management of their mixed-farming systems. This influences their ability to be adaptable to change. As the literature revealed, strategic management and adaptive capacity are important for the sustainability of mixed-farming systems.

This thesis reveals that there are not many advisers in the interface who provide strategic support. There is also ambiguity surrounding the definition of a strategic decision with many advisers proposing they assist farmers with strategic decision-making although they do not. Most advisers only service the operational-tactical realm for several reasons.

Firstly, most advisers are from technical agricultural production backgrounds and are not skilled or trained in strategic management. They are comfortable with providing operational-tactical advice.
Secondly, the nature of private sector business models encourages them to service the operational-tactical realm because of the opportunity to gain short-term profits. In addition, the interface tends to be reactive rather than proactive. The reactive nature of the interface does not improve the adaptive capacity of farmers. Further, there are opportunities for the sectors and service providers to work more collaboratively.

This thesis has made four recommendations. Firstly, efforts could be made to improve farmer adaptive capacity and strategic management skills. Secondly, efforts could be made to improve the capacity of advisers to provide strategic advice. These first two recommendations imply that the interface is organised and well-managed. Whereas, as this thesis has revealed, it is not. The interface is fragmented, hap-hazard and complex. Therefore, the third recommendation of the thesis is to improve collaboration amongst the service providers. The fourth recommendation is to investigate methods to facilitate private sector contributions into R&D decisions.

This thesis highlights the inadequacies of existing theories to explain the highly personal and highly diverse nature of the information exchange interface. This thesis also highlights that traditional methods of information exchange (within an Australian context at least) demand interaction from the ‘top-down’ perspective. That is, agents of change have dictated how this interface is structured and operates, with little regard for the perspectives of farmers who might benefit from the exchange.

This thesis has taken a broad theoretical perspective and brought together the available theories and revealed what they mean at the actual decision-making interface. This thesis has revealed that the available extension and adoption theories are outdated and no longer relevant. They do not apply to the principles of strategic management because it is too complex. An adaptable, constantly evolving, ‘best-fit’ extension model is needed which considers the uniqueness and complexity of family-owned, mixed-farming systems. The model must also recognise the important of strategic management and consider the long-term environmental, economic and social aspects of the business. It would also consider all of the influences on farmer decision-making and not just economic influences. There is strong evidence of effective industry programs which address the strategic capacity of farmers. Dairy Australia discussed earlier in Section 9.4.2 is an example. The Grain and Graze 2 program discussed in Sections 4.9.1 and 8.2 is another example. These two models focus on building the capacity of the people who work within these industries, as well as improving the strategic support provided by the interface. However, strategic capacity in mainstream extension is missing. This thesis has revealed
that the interface does not adequately support strategic management of mixed-farming systems. The purpose of the interface is to support farmers in their decision-making so that they can improve their situation. For the interface to adequately support farmers, it needs to encompass strategic management and assist farmers to adapt to change. Otherwise, the sustainability of mixed-farming systems is at risk.
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APPENDIX I: WEB SURVEY

RESILIENT RURAL HUMAN SYSTEMS: HOW FINANCIAL COUNSELLING AND OTHER INFORMATION SERVICES SUPPORT PRIMARY INDUSTRIES

Hello and welcome to this survey being conducted by the Department of Agriculture, Fisheries and Forestry (DAFF) and Charles Sturt University (CSU). The aim of the survey is to obtain your views and experiences of the Rural Financial Counselling Service (RFCS). We are particularly keen to draw on your knowledge and experience, either as a client or former client of the RFCS. We would like to know if you are satisfied with this service provided to you under the RFCS Program and any outcomes you achieved as a result of visiting a rural financial counsellor. We would also like to know about your experience in farming or similar industries and where you obtain information and advice. We appreciate your time and effort and thank you in anticipation. We anticipate this survey will take you approximately 20 minutes to complete. Your participation in this study is completely voluntary, however if you decide not to continue with the survey, you can withdraw at any point. Your survey responses will be strictly confidential and survey reports will not identify you as the source of any information. If you have questions at any time while you are completing the survey, you may contact Lauren Howard by email at the email address below. Thank you very much for your time and support.

Please start with the survey now by clicking on the Continue button below. Please note that once you have clicked continue at the bottom of a page, you will not be able to go back and view or change your previous responses without disrupting the survey. However, if for some reason you cannot complete the survey in one sitting, you can exit the survey by clicking on Exit Survey and Continue Later. You will then be asked for your email address. QuestionPro will send you the link to your partly completed survey so that you can complete it.

BACKGROUND INFORMATION

To begin, would you please tell us about your farm?

1. Are you currently working a farm or other agricultural/horticultural enterprise?
   a) Yes (Go to question 207)
   b) No (Go to question 2)

2. Which category best describes your role in farming? (Please select only one response)
   a) Farmer
   b) Farm manager
   c) Farm family member
   d) Other (please specify)

3. Is farming your main occupation?
   a) Yes (Go to question 5)
   b) No (Go to question 4)

4. What is your main occupation?

______________________________
5. Which of the following best describes your main enterprise type?
   a) Sheep, beef and / or grain
   b) Dairy farm
   c) Fishing and / or aquaculture
   d) Fruit and / or nut tree growing
   e) Vegetable and / or mushroom
   f) Other crop
   g) Other livestock
   h) Wine and / or beverage
   i) Small business supporting any of the above

6. Including yourself, how many people did your farming enterprise / business employ during the 2008 calendar year?
   a) None
   b) 1-5
   c) 6-10
   d) More than 10

7. How would you describe the scale/size of your farming enterprise compared to similar businesses in your region?
   a) Smaller than average
   b) About average
   c) Larger than average

8. Which State/Territory is your farming enterprise mostly in?
   a) Qld
   b) NSW
   c) Victoria
   d) Tasmania
   e) South Australia
   f) Northern Territory
   g) Western Australia
   h) ACT

9. Approximately, how long have you been operating a farm? (Please write the number of years in the space below, excluding your childhood)
   __________

10. Do you own, lease or share farm your land? (Please select as many responses as are appropriate to your situation, such as if you own part of your property and lease another part)
    a) Owned by you / your family
    b) Leased by you / your family
    c) Share-farmed by you / your family
    d) Leased or shared-farmed to another farmer
11. Approximately, what percentage of your total household income was generated off-farm in the last financial year? *(Please select only one response)*
   a) None  
   b) 1-25 per cent  
   c) 26-50 per cent  
   d) 51-75 per cent  
   e) More than 75 per cent  

12. How do you currently see your financial status in farming? Is your farm:
   f) Viable  
   g) Barely viable  
   h) Unviable  
   i) Not sure  
   j) I no longer farm  

13. What is your age?
   a) Less than 20  
   b) 20-24  
   c) 25-29  
   d) 30-34  
   e) 35-39  
   f) 40-44  
   g) 45-49  
   h) 50-54  
   i) 55-59  
   j) 60-64  
   k) 65-69  
   l) 70-74  
   m) 75-70  
   n) 80-84  
   o) 85 or more  

14. Are you male or female?
   a) Male  
   b) Female  

15. What is the highest level of education you have completed? *(Please select only one response)*
   a) No formal schooling  
   b) Primary  
   c) Secondary  
   d) Technical/Trade  
   e) Tertiary  

WE WOULD LIKE TO ASK SOME QUESTIONS TO CLARIFY YOUR SITUATION WITH REGARD TO THE RURAL FINANCIAL COUNSELLING SERVICE

16. Are you currently a client of the Rural Financial Counselling Service?
   a) Yes *(Go to question 18)*  
   b) No *(Go to question 17)*
17. Were you a client of the Rural Financial Counselling Service at any time in the past five years?
   a) Yes (Go to question 18)
   b) No (Go to thank you page)

18. Are you still involved in agriculture, fishing or an associated enterprise?
   a) Yes (Go to question 20)
   b) No (Go to question 19)

19. Did you leave your farming enterprise because:
   a) You wanted to
   b) You could no longer continue farming

20. How long have you been a client of the Rural Financial Counselling Service?
   a) Less than one year
   b) 1-3 years
   c) 4-6 years
   d) More than 6 years

21. Approximately how many times have you had contact with a rural financial counsellor during this period?
   a) 1 time
   b) 2-5 times
   c) 6-10 times
   d) More than 10 times

WE WOULD LIKE TO ASK ABOUT HOW YOU FOUND THE RURAL FINANCIAL COUNSELLING SERVICE

22. How did you first hear about the Rural Financial Counselling Service? (Please select only one response)
   a) RFCS/DAFF website
   b) RFCS brochure
   c) Word-of-Mouth
   d) Field day or other service promotion
   e) Referred by Centrelink
   f) Referred by another service or professional you received assistance from
   g) Media
   h) Other (please specify)

23. Why did you contact the Rural Financial Counselling Service? (Please select as many responses as are appropriate)
   a) Recognised a need for some assistance due to financial hardship
   b) Necessity due to drought
   c) Other (please specify)

24. Were you aware of the Rural Financial Counselling Service before you had a need to access the program?
   a) Yes
   b) No
25. Was it relatively easy to get in touch with a Rural Financial Counselling Service?
   a) Yes
   b) No

26. For you most recent consultation, how long did you have to wait to receive service?
   a) Less than 1 week
   b) Between 1 and 2 weeks
   c) Between 2 and 4 weeks
   d) More than 4 weeks
   e) Can’t remember

CLIENT SATISFACTION WITH THE RURAL FINANCIAL COUNSELLING SERVICE

We would like to know whether clients and former clients are satisfied with the outcomes of the Rural Financial Counselling Service Program and the way it was delivered.

How would you rate the RFCS in relation to:

<table>
<thead>
<tr>
<th>Question</th>
<th>Poor</th>
<th>Satisfactory</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>27. The general quality of information provided to you by the RFCS.</td>
<td></td>
<td></td>
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<tr>
<td>28. Promptness in returning phone calls.</td>
<td></td>
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<tr>
<td>29. Promptness in attending meetings.</td>
<td></td>
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<tr>
<td>30. The commitment of the RFCS to follow up on any actions they undertook to complete on your behalf.</td>
<td></td>
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</tr>
<tr>
<td>31. Their level of knowledge on the issues affecting your enterprise.</td>
<td></td>
<td></td>
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<tr>
<td>32. Their ability to develop sound options to help improve your situation.</td>
<td></td>
<td></td>
<td></td>
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</tr>
<tr>
<td>33. Their ability to communicate effectively with you and your family.</td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>

How would you rate the RFCS in relation to:

<table>
<thead>
<tr>
<th>Question</th>
<th>Poor</th>
<th>Satisfactory</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
<th>Not Applicable</th>
<th>Not Sure</th>
</tr>
</thead>
<tbody>
<tr>
<td>34. Their ability to communicate effectively with others they have contacted on your behalf.</td>
<td></td>
<td></td>
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<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>35. Their ability to connect you to other services for advice and support.</td>
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<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
The Enterprise Action Plan is used by the Rural Financial Counselling Service to provide a farm business assessment and action plan. It aims to help clients to gain a fuller understanding of their circumstances by reviewing their current financial situation and working through their available options.

36. Have you heard of an Enterprise Action Plan?
   a) Yes (Go to question 37)
   b) No (Go to question 42)

37. Did you undertake an Enterprise Action Plan?
   a) Yes (Go to question 38)
   b) No (Go to question 42)

38. How would you rate the helpfulness of the Enterprise Action Plan in your situation?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very Good
   e) Excellent

39. Has the Enterprise Action Plan contributed to improving your financial position?
   a) Yes
   b) No

40. Has the Enterprise Action Plan increased your awareness of farm business financial and operating ratios?
   a) Yes
   b) No

41. Did the Enterprise Action Plan help you plan for climate risk?
   a) Yes
   b) No

We would also like to ask you about how the Rural Financial Counselling Service referred you to other services for advice or help.

42. Were you referred to any other services?
   a) Yes (Go to question 73)
   b) No (Go to question 90)

43. Overall, how do you rate the Rural Financial Counselling Services ability to connect you to other services and support?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very Good
   e) Excellent
44. Were you referred to an accountant?  
   a) Yes (Go to question 45)  
   b) No (Go to question 49)  
   c) Not sure (Go to question 49)

45. Did you access the accountant?  
   a) Yes (Go to question 46)  
   b) No (Go to question 48)

46. How often did you use the accountant?  
   a) Many times  
   b) A few times  
   c) Only once

47. How do you rate the help provided by the accountant? (Go to question 49)  
   a) Poor  
   b) Satisfactory  
   c) Good  
   d) Very good  
   e) Excellent

48. Was the main reason why you didn’t go to the accountant because you:  
   a) Couldn’t afford to  
   b) Didn’t consider the referral relevant  
   c) Had too far to travel  
   d) Had a previous bad experience with a referral agency  
   e) Didn’t get around to it  
   f) Other reason (please specify)

49. Were you referred to someone to help you with succession planning?  
   a) Yes (Go to question 50)  
   b) No (Go to question 54)  
   c) Not sure (Go to question 54)

50. Did you access this person?  
   a) Yes (Go to question 51)  
   b) No (Go to question 53)

51. How often did you use this person?  
   a) Many times  
   b) A few times  
   c) Only once

52. How do you rate the help provided by this person? (Go to question 54)  
   a) Poor  
   b) Satisfactory  
   c) Good  
   d) Very good  
   e) Excellent
53. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

54. Were you referred to someone to help you with production / agronomy?
   a) Yes (Go to question 55)
   b) No (Go to question 59)
   c) Not sure (Go to question 59)

55. Did you access this person?
   a) Yes (Go to question 56)
   b) No (Go to question 58)

56. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

57. How do you rate the help provided by this person? (Go to question 59)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

58. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

59. Were you referred to a financial adviser?
   a) Yes (Go to question 60)
   b) No (Go to question 64)
   c) Not sure (Go to question 64)

60. Did you access this person?
   a) Yes (Go to question 61)
   b) No (Go to question 63)
61. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

62. How do you rate the help provided by this person? (Go to question 264)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

63. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

64. Were you referred to a farm / business adviser?
   a) Yes (Go to question 65)
   b) No (Go to question 69)
   c) Not sure (Go to question 69)

65. Did you access this person?
   a) Yes (Go to question 66)
   b) No (Go to question 68)

66. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

67. How do you rate the help provided by this person? (Go to question 69)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

68. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)
69. Were you referred to someone to help you with marketing?
   a) Yes *(Go to question 70)*
   b) No *(Go to question 74)*
   c) Not sure *(Go to question 74)*

70. Did you access this person?
   a) Yes *(Go to question 71)*
   b) No *(Go to question 73)*

71. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

72. How do you rate the help provided by this person? *(Go to question 74)*
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

73. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason *(please specify)*

74. Were you referred to someone to help you with people management?
   a) Yes *(Go to question 75)*
   b) No *(Go to question 79)*
   c) Not sure *(Go to question 79)*

75. Did you access this person?
   a) Yes *(Go to question 76)*
   b) No *(Go to question 78)*

76. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

77. How do you rate the help provided by this person? *(Go to question 79)*
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent
78. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

79. Were you referred to someone to help you with natural resource management / the environment?
   a) Yes (Go to question 80)
   b) No (Go to question 84)
   c) Not sure (Go to question 84)

80. Did you access this person?
   a) Yes (Go to question 81)
   b) No (Go to question 83)

81. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

82. How do you rate the help provided by this person? (Go to question 84)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

83. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

84. Were you referred to anyone else?
   a) Yes (Go to question 85)
   b) No (Go to question 90)
   c) Not sure (Go to question 90)

85. Please specify the type of professional service that person provided. (Please type your response in the space below)

_________________________
86. Did you access this person?
   a) Yes (Go to question 87)
   b) No (Go to question 89)

87. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

88. How do you rate the help provided by this person? (Go to question 90)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

89. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

CLIMATE RISK MANAGEMENT

We would like to know how well the Rural Financial Counselling Service assisted you in managing climate risks. Would you please answer the following questions.

90. Did you discuss climate risk issues (concerning drought or other problems posed by climate variability) with your rural financial counsellor?
   a) Yes (Go to question 91)
   b) No (Go to question 92)

91. How would you rate the rural financial counsellor’s provision of information to you about climate risk?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

Under the Australian Governments Climate Change Adjustment Program, clients complete an action plan with their rural financial counsellor outlining the aims and steps required to manage the impacts of climate change and improve the farms long term prospects.

92. Have you undertaken a Climate Change Adjustment Program with a rural financial counsellor?
   a) Yes (Go to question 93)
   b) No (Go to question 94)
93. Did the Climate Change Adjustment Plan assist you to prepare for climate and other risk?
   a) Yes
   b) No

94. Do you have a written drought plan?
   a) Yes *(Go to question 95)*
   b) No *(Go to question 96)*

95. Have you implemented this written drought plan?
   a) Yes
   b) No

**CLIENT OUTCOMES**

The following questions require you to provide a ranking on the effects of assistance provided by the Rural Financial Counselling Service (RFCS) on your business.

As a result of the assistance provided by the RFCS program, you:

<table>
<thead>
<tr>
<th>Question</th>
<th>Strongly disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
</tr>
</thead>
<tbody>
<tr>
<td>96. Are more aware of the financial position of your enterprise.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>97. Are more aware of the importance of cash flow budgets in managing your business.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>98. Are more aware of the importance of a farm management plan in managing your enterprise.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>99. Have a strong sense of what you need to do to improve your financial position.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>100. Are confident in your own ability to manage the finances of your enterprise.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>101. Are now able to prepare a cash flow budget without assistance.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>102. Are making, or have made, changes in the way you operate that will help improve your long term financial position.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>103. Are now able to develop and revise a farm plan to help manage risks associated with your enterprise.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>104. Generally feel more in control of your circumstances.</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
<tr>
<td>105. Have you made any other changes as a result of involvement with the Rural Financial Counselling Service?</td>
<td>☐</td>
<td>☒</td>
<td>☒</td>
<td>☐</td>
<td>☐</td>
</tr>
</tbody>
</table>
   a) Yes
   b) No
106. Overall, what degree of the changes made do you attribute to the help provided by a rural financial counsellor?
   a) Almost all
   b) Quite a lot
   c) About half
   d) Some
   e) Almost none

107. Have there been any positive changes in your circumstances arising from your use of the services of a rural financial counsellor?
   a) Yes (Go to question 108)
   b) No (Go to question 109)

108. What degree of the positive changes in your circumstances do you attribute to the help provided by a rural financial counsellor?
   a) Almost all
   b) Quite a lot
   c) About half
   d) Some
   e) Almost none

109. The next time I am faced with an event that negatively impacts on my farming enterprise (drought, flood, fires, price crashes etc), I will:
   a) Rely heavily on the assistance of a rural financial counsellor to help me
   b) Have a good idea of how to deal with the situation, but may still seek assistance from a rural financial counsellor
   c) Manage by myself because I am now well prepared to deal with these issues
   d) Seek assistance from professional advisers because I can now afford to do this
   e) Seek assistance elsewhere because the rural financial counsellor was of little help to me

110. Has your involvement with the Rural Financial Counselling Service led you to seek professional advice or assistance from others on aspects of your business beyond those they referred you to?
   a) Yes (Go to question 111)
   b) No (Go to question 112)

111. In which areas? (You can select more than one response)
   a) Succession planning
   b) Production management
   c) Marketing
   d) Natural resource management / the environment
   e) Risk management
   f) Other (please specify)

**SOURCES OF INFORMATION**

We would like to gain an understanding of where and from whom you obtain information and advice. For the purposes of your farming enterprises, we are interested in your sources of information and how useful they are to you. We would also like to know if your use of these sources has changed. Would you please answer the following questions.
112. For the purposes of your farming enterprises, do you have family members who could help you find information?
   a) Yes (Go to question 113)
   b) No (Go to question 114)

113. Do they help you find information?
   a) Yes (Go to question 115)
   b) No (Go to question 114)

114. Have they helped you find information in the past?
   a) Yes (Go to question 117)
   b) No (Go to question 118)

115. How useful are they in helping you find information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

116. Has the level of help your family gives you to find information changed in the past five years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

117. How important will your family be in helping you find information in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

118. For the purposes of your farming enterprises, are Catchment Management Authorities (or equivalent) available to you as a source of information?
   a) Yes (Go to question 119)
   b) No (Go to question 120)

119. Do you use Catchment Management Authorities (or equivalent) as a source of information?
   a) Yes (Go to question 121)
   b) No (Go to question 120)

120. Have you used Catchment Management Authorities (or equivalent) as a source of information in the past?
   a) Yes (Go to question 123)
   b) No (Go to question 124)
121. How useful are Catchment Management Authorities (or equivalent) to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

122. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

123. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

124. For the purposes of your farming enterprises, are other farmers available to you as a source of information?
   a) Yes (Go to question 125)
   b) No (Go to question 126)

125. Do you use other farmers as a source of information?
   a) Yes (Go to question 127)
   b) No (Go to question 126)

126. Have you used other farmers as a source of information in the past?
   a) Yes (Go to question 129)
   b) No (Go to question 130)

127. How useful are other farmers to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

128. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago
129. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

130. For the purposes of your farming enterprises, are private consultants available to you as a source of information?
   a) Yes (Go to question 131)
   b) No (Go to question 132)

131. Do you use private consultants as a source of information?
   a) Yes (Go to question 133)
   b) No (Go to question 132)

132. Have you used private consultants as a source of information in the past?
   a) Yes (Go to question 135)
   b) No (Go to question 136)

133. How useful are private consultants to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

134. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

135. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

136. For the purposes of your farming enterprises, is there a rural merchandise store available to you from which you can obtain information?
   a) Yes (Go to question 137)
   b) No (Go to question 138)

137. Do you use this rural merchandise store as a source of information?
   a) Yes (Go to question 139)
   b) No (Go to question 138)
138. Have you used this rural merchandise store as a source of information in the past?
   a) Yes *(Go to question 141)*
   b) No *(Go to question 142)*

139. How useful has this rural merchandise store been to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

140. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

141. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

142. For the purposes of your farming enterprises, are State Departments of Primary Industries / Agriculture (or equivalent) available to you as a source of information?
   a) Yes *(Go to question 143)*
   b) No *(Go to question 144)*

143. Do you use State Departments of Primary Industries / Agriculture (or equivalent) as a source of information?
   a) Yes *(Go to question 145)*
   b) No *(Go to question 144)*

144. Have you used State Departments of Primary Industries / Agriculture (or equivalent) as sources of information in the past?
   a) Yes *(Go to question 147)*
   b) No *(Go to question 148)*

145. How useful are State Departments of Primary Industries / Agriculture (or equivalent) to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

146. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago
147. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

148. For the purposes of your farming enterprises, are Landcare groups available to you as a source of information?
   a) Yes (Go to question 149)
   b) No (Go to question 150)

149. Do you use Landcare groups as a source of information?
   a) Yes (Go to question 151)
   b) No (Go to question 150)

150. Have you used Landcare groups as a source of information in the past?
   a) Yes (Go to question 153)
   b) No (Go to question 154)

151. How useful are Landcare groups to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

152. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

153. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

154. For the purposes of your farming enterprises, are field days available to you as a source of information?
   a) Yes (Go to question 155)
   b) No (Go to question 156)

155. Do you use field days as a source of information?
   a) Yes (Go to question 157)
   b) No (Go to question 156)
156. Have you used field days as a source of information in the past?
   a) Yes (Go to question 159)
   b) No (Go to question 160)

157. How useful are field days to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

158. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

159. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

160. For the purposes of your farming enterprises, are seminars available to you as a source of information?
   a) Yes (Go to question 161)
   b) No (Go to question 162)

161. Do you use seminars as a source of information?
   a) Yes (Go to question 163)
   b) No (Go to question 162)

162. Have you used seminars as a source of information in the past?
   a) Yes (Go to question 165)
   b) No (Go to question 166)

163. How useful are seminars to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

164. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

165. How important will this source of information be to you in the future?
   a) Very important
166. For the purposes of your farming enterprises, is the internet available to you as a source of information?
   a) Yes (Go to question 167)
   b) No (Go to question 168)

167. Do you use the internet as a source of information?
   a) Yes (Go to question 169)
   b) No (Go to question 168)

168. Have you used the internet as a source of information in the past?
   a) Yes (Go to question 171)
   b) No (Go to question 172)

169. How useful is the internet to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

170. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

171. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

172. For the purposes of your farming enterprises, are scientific journals and / or technical books available to you as a source of information?
   a) Yes (Go to question 173)
   b) No (Go to question 174)

173. Do you use scientific journals and / or technical books as a source of information?
   a) Yes (Go to question 175)
   b) No (Go to question 174)

174. Have you used scientific journals and / or technical books as a source of information in the past?
   a) Yes (Go to question 177)
   b) No (Go to question 178)
175. How useful are scientific journals and/or technical books to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

176. How has your use of this source of information changed over the last 5 years?
   a) I use this source less than I did 5 years ago
   b) I use this source as often as I did 5 years ago
   c) I use this source more than I did 5 years ago

177. How important will this source of information be to you in the future?
   a) Very important
   b) Important
   c) Not very important
   d) Not important at all
   e) Not sure

IDEAS ABOUT FARMING

The questions in this section ask for your thoughts and experiences and will enable us to draw a picture of farmers’ values and how they see the world. This will help us to better understand possible ways in which rural financial counselling and extension services can serve farmers better. Please note that there are no right or wrong answers. We only want to know what you think so just write what comes to mind first.

Please indicate whether you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>178. A slight decrease in farm profits is worthwhile if it helps to protect the environment on the farm.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>179. Farming involves understanding and working with nature.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>180. Knowing that the farm will still be productive and in good condition in the future is more important than short term profits.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>181. Profit and capital gain are only a small part of the satisfaction to be gained from being a farmer.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>182. The environmental problems that can be created by farming are exaggerated by people who are not farmers.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>183. Increased financial aid to farmers would solve the environmental problems that can be caused by farming.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
</tbody>
</table>
184. Farmers should not be held responsible for environmental problems resulting from farming because the production of food and fibre is an essential activity required by the rest of society.

185. Looking after the land is an important consideration among farmers in this area.

186. Even when eroded soil material has left the farm, it is still the responsibility of that farm.

187. Environmentally sound land management practices cost more than they are worth.

188. Protecting the environment is not an important part of being a successful farmer.

189. The control of farm environmental problems is an issue for everyone in the community.

190. The activities of farming around this area have a significant effect on the environment in other areas.

191. In my case, increasing farm sales is a far more important consideration than reducing environmental problems.

192. Farmers should be held liable for environmental damage caused by farming activities.

IDEAS ABOUT FARMING CONTINUED...

Please indicate whether you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th></th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not Sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>193. Farmers need more information on environmentally sound land management practices.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>194. Environmental problems on the farm are only quite minor in comparison with damage to the environment caused by cities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>195. Environmentally sound land management should just be considered another cost of running the farm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>196. Most farmers around here are in favour of using environmentally sound land management practices.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>197. The cost of environmentally sound land management practices is a major obstacle</td>
<td></td>
<td></td>
<td></td>
<td></td>
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</tr>
</tbody>
</table>
to farmers use of them.

198. Farmers should be allowed to produce all they can even if some environmental degradation results from their farming activities.

199. Farmers would be willing to take further measures to control environmental damage if they could be sure that land management practices would do the job.

200. It is in the best interests of farmers to invest in sound land management practices on their farms to ensure the long term success of their farms.

201. Farmers in general do not give enough consideration to undertaking environmentally sound land management practices.

202. I would not try a new chemical until it was well proven in the district.

203. There is not much point planning more than a few months ahead.

204. I regard myself as a fairly conservative and traditional farmer.

205. It does not pay to be too scientific with farming - it all depends on the weather anyway.

206. Scientific research is vital in solving a lot of the problems I have on farm.

207. Which category best describes your role in farming before you left the farm?
   a) Farmer
   b) Farm manager
   c) Farm family member
   d) Other (please specify)

208. Was farming your main occupation?
   a) Yes (Go to question 210)
   b) No (Go to question 209)

209. What was your main occupation while you were on the farm? (Please type your response in the space below)

_________________________________

210. What is your main occupation now? (Please type your response in the space below)

_________________________________

211. Thinking of the farm you have left, which of the following best describes your former enterprise type? (Please select the most appropriate response)
a) Sheep, beef and / or grain  
b) Dairy farm  
c) Fishing and / or aquaculture  
d) Fruit and / or nut tree growing  
e) Vegetable and / or mushroom  
f) Other crop  
g) Other livestock  
h) Wine and / or beverage  
i) Small business supporting any of the above  

212. Including yourself, how many people did your farming enterprise / business employ during its last calendar year of operation?  
a) None  
b) 1-5  
c) 6-10  
d) More than 10  

213. How would you describe the scale / size of your former enterprise compared to similar businesses in your region?  
a) Smaller than average  
b) About average  
c) Larger than average  

214. What State / Territory was your farming enterprise mostly in?  
a) Qld  
b) NSW  
c) Victoria  
d) Tasmania  
e) South Australia  
f) Northern Territory  
g) Western Australia  
h) ACT  

215. Approximately, for how long did you operate a farm? (Please type the number of years in the space below, excluding your childhood)  

__________________________  

216. Did you own, lease or share farm your land? (Please select as many responses as are appropriate)  
a) Owned by you / your family  
b) Leased by you / your family  
c) Share-farmed by you / your family  
d) Leased or shared-farmed to another farmer  

217. For the last financial year you were operating the farm, approximately, what percentage of your total household income was generated off-farm?  
a) None  
b) 1-25 per cent  
c) 26-50 per cent
d) 51-75 per cent
e) More than 75 per cent

218. How did you see your financial status in farming during your last year of operation? Was your farm:
   a) Viable
   b) Barely viable
   c) Unviable
   d) Not sure

219. What is your age?
   a) Less than 20
   b) 20-24
   c) 25-29
   d) 30-34
   e) 35-39
   f) 40-44
   g) 45-49
   h) 50-54
   i) 54-59
   j) 60-64
   k) 65-69
   l) 70-74
   m) 75-70
   n) 80-84
   o) 85 or more

220. Are you male or female?
   a) Male
   b) Female

221. What is the highest level of education you have completed? (Please select only one response)
   a) No formal schooling
   b) Primary
   c) Secondary
   d) Technical/Trade
   e) Tertiary

WE WOULD LIKE TO ASK SOME QUESTIONS TO CLARIFY YOUR SITUATION WITH REGARD TO THE RURAL FINANCIAL COUNSELLING SERVICE

222. Are you currently a client of the Rural Financial Counselling Service?
   a) Yes (Go to question 224)
   b) No (Go to question 223)

223. Were you a client of the Rural Financial Counselling Service at any time in the past five years?
   a) Yes (Go to question 223)
   b) No (Go to thank your page)

224. Are you still involved in agriculture, fishing or an associated enterprise?
   a) Yes (Go to question 226)
   b) No (Go to question 225)

225. Did you leave your enterprise because:
   a) You wanted to
b) You could no longer continue farming

226. How long have you been a client of the Rural Financial Counselling Service?
   a) Less than one year
   b) 1-3 years
   c) 4-6 years
   d) More than 6 years

227. Approximately how many times have you had contact with a rural financial counsellor during this period?
   a) 1 time
   b) 2-5 times
   c) 6-10 times
   d) More than 10 times

WE WOULD LIKE TO ASK ABOUT HOW YOU FOUND THE RURAL FINANCIAL COUNSELLING SERVICE

228. How did you first hear about the Rural Financial Counselling Service? (Please select only one response)
   a) RFCS/DAFF website
   b) RFCS brochure
   c) Word-of-Mouth
   d) Field day or other service promotion
   e) Referred by Centrelink
   f) Referred by another service or professional you received assistance from
   g) Media
   h) Other (please specify)

229. Why did you contact the Rural Financial Counselling Service? (Please select as many responses as are appropriate)
   a) Recognised a need for some assistance due to financial hardship
   b) Necessity due to drought
   c) Other (please specify)

230. Were you aware of the Rural Financial Counselling Service before you had a need to access the program?
   a) Yes
   b) No

231. Was it relatively easy to get in touch with a Rural Financial Counselling Service?
   a) Yes
   b) No

232. For you most recent consultation, how long did you have to wait to receive service?
   a) Less than 1 week
   b) Between 1 and 2 weeks
   c) Between 2 and 4 weeks
   d) More than 4 weeks
   e) Can’t remember

CLIENT SATISFACTION WITH THE RURAL FINANCIAL COUNSELLING SERVICE
We would like to know whether clients and former clients are satisfied with the outcomes of the Rural Financial Counselling Service Program and the way it was delivered.

How would you rate the RFCS in relation to:

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<th>Poor</th>
<th>Satisfactory</th>
<th>Good</th>
<th>Very good</th>
<th>Excellent</th>
<th>Not Sure</th>
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<td>233. The general quality of information provided to you by the RFCS.</td>
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<td>234. Promptness in returning phone calls.</td>
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<td>235. Promptness in attending meetings.</td>
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<td>236. The commitment of the RFCS to follow up on any actions they undertook to complete on your behalf.</td>
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<td>237. Their level of knowledge on the issues affecting your enterprise.</td>
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<td>238. Their ability to develop sound options to help improve your situation.</td>
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<td>239. Their ability to communicate effectively with you and your family.</td>
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</tbody>
</table>
How would you rate the RFCS in relation to:

<table>
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<tr>
<th>240. Their ability to communicate effectively with others they have contacted on your behalf.</th>
<th>Poor</th>
<th>Satisfactory</th>
<th>Good</th>
<th>Very Good</th>
<th>Excellent</th>
<th>Not Applicable</th>
<th>Not Sure</th>
</tr>
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<tbody>
<tr>
<td>241. Their ability to connect you to other services for advice and support.</td>
<td>Poor</td>
<td>Satisfactory</td>
<td>Good</td>
<td>Very Good</td>
<td>Excellent</td>
<td>Not Applicable</td>
<td>Not Sure</td>
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</table>

The Enterprise Action Plan is used by the Rural Financial Counselling Service to provide a farm business assessment and action plan. It aims to help clients to gain a fuller understanding of their circumstances by reviewing their current financial situation and working through their available options.

242. Have you heard of an Enterprise Action Plan?
   a) Yes (Go to question 243)
   b) No (Go to question 248)

243. Did you undertake an Enterprise Action Plan?
   a) Yes (Go to question 244)
   b) No (Go to question 248)

244. How would you rate the helpfulness of the Enterprise Action Plan in your situation?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very Good
   e) Excellent

245. Has the Enterprise Action Plan contributed to improving your financial position?
   a) Yes
   b) No

246. Has the Enterprise Action Plan increased your awareness of farm business financial and operating ratios?
   a) Yes
   b) No

247. Did the Enterprise Action Plan help you plan for climate risk?
   a) Yes
   b) No

We would also like to ask you about how the Rural Financial Counselling Service referred you to other services for advice or help.

248. Were you referred to any other services?
   a) Yes (Go to question 249)
   b) No (Go to question 296)
249. Overall, how do you rate the Rural Financial Counselling Services ability to connect you to other services and support?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very Good
   e) Excellent

250. Were you referred to an accountant?
   a) Yes (Go to question 251)
   b) No (Go to question 255)
   c) Not sure (Go to question 255)

251. Did you access the accountant?
   a) Yes (Go to question 252)
   b) No (Go to question 254)

252. How often did you use the accountant?
   a) Many times
   b) A few times
   c) Only once

253. How do you rate the help provided by the accountant? (Go to question 255)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

254. Was the main reason why you didn’t go to the accountant because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with a referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

255. Were you referred to someone to help you with succession planning?
   a) Yes (Go to question 256)
   b) No (Go to question 260)
   c) Not sure (Go to question 260)

256. Did you access this person?
   a) Yes (Go to question 257)
   b) No (Go to question 259)

257. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once
258. How do you rate the help provided by this person? (Go to question 260)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent
259. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)
260. Were you referred to someone to help you with production / agronomy?
   a) Yes (Go to question 261)
   b) No (Go to question 265)
   c) Not sure (Go to question 265)
261. Did you access this person?
   a) Yes (Go to question 262)
   b) No (Go to question 264)
262. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once
263. How do you rate the help provided by this person? (Go to question 265)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent
264. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)
265. Were you referred to a financial adviser?
   a) Yes (Go to question 266)
   b) No (Go to question 270)
   c) Not sure (Go to question 270)
266. Did you access this person?
   a) Yes (Go to question 267)
   b) No (Go to question 269)

267. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

268. How do you rate the help provided by this person? (Go to question 270)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

269. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

270. Were you referred to a farm / business adviser?
   a) Yes (Go to question 271)
   b) No (Go to question 275)
   c) Not sure (Go to question 275)

271. Did you access this person?
   a) Yes (Go to question 272)
   b) No (Go to question 274)

272. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

273. How do you rate the help provided by this person? (Go to question 275)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent
274. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

275. Were you referred to someone to help you with marketing?
   a) Yes (Go to question 276)
   b) No (Go to question 280)
   c) Not sure (Go to question 280)

276. Did you access this person?
   a) Yes (Go to question 244)
   b) No (Go to question 279)

277. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

278. How do you rate the help provided by this person? (Go to question 280)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

279. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

280. Were you referred to someone to help you with people management?
   a) Yes (Go to question 281)
   b) No (Go to question 285)
   c) Not sure (Go to question 285)

281. Did you access this person?
   a) Yes (Go to question 282)
   b) No (Go to question 284)

282. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once
283. How do you rate the help provided by this person? (Go to question 285)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

284. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

285. Were you referred to someone to help you with natural resource management / the environment?
   a) Yes (Go to question 286)
   b) No (Go to question 290)
   c) Not sure (Go to question 290)

286. Did you access this person?
   a) Yes (Go to question 287)
   b) No (Go to question 289)

287. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

288. How do you rate the help provided by this person? (Go to question 290)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

289. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

290. Were you referred to anyone else?
   a) Yes (Go to question 291)
   b) No (Go to question 296)
   c) Not sure (Go to question 296)
291. Please specify the type of professional service that person provided. (Please type your response in the space below)

________________________

292. Did you access this person?
   a) Yes (Go to question 293)
   b) No (Go to question 295)

293. How often did you use this person?
   a) Many times
   b) A few times
   c) Only once

294. How do you rate the help provided by this person? (Go to question 296)
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

295. Was the main reason you didn’t go and see this person because you:
   a) Couldn’t afford to
   b) Didn’t consider the referral relevant
   c) Had too far to travel
   d) Had a previous bad experience with referral agency
   e) Didn’t get around to it
   f) Other reason (please specify)

CLIMATE RISK MANAGEMENT

We would like to know how well the Rural Financial Counselling Service assisted you in managing climate risks. Would you please answer the following questions.

296. Did you discuss climate risk issues (concerning drought or other problems posed by climate variability) with your rural financial counsellor?
   a) Yes (Go to question 297)
   b) No (Go to question 298)

297. How would you rate the rural financial counsellor’s provision of information to you about climate risk?
   a) Poor
   b) Satisfactory
   c) Good
   d) Very good
   e) Excellent

Under the Australian Governments Climate Change Adjustment Program, clients complete an action plan with their rural financial counsellor outlining the aims and steps required to manage the impacts of climate change and improve the farms long term prospects.
298. Have you undertaken a Climate Change Adjustment Program with a rural financial counsellor?
   a) Yes (Go to question 299)
   b) No (Go to question 300)

299. Did the Climate Change Adjustment Plan assist you to prepare for climate and other risk?
   a) Yes
   b) No

300. Do you have a written drought plan?
   a) Yes (Go to question 301)
   b) No (Go to question 302)

301. Have you implemented this written drought plan?
   a) Yes
   b) No

CLIENT OUTCOMES

The following questions require you to provide a ranking on the effects of assistance provided by the Rural Financial Counselling Service (RFCS) on your business.

As a result of the assistance provided by the RFCS program, you:

<table>
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<tr>
<th>Question</th>
<th>Strongly Disagree</th>
<th>Disagree</th>
<th>Neutral</th>
<th>Agree</th>
<th>Strongly Agree</th>
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<td>302.</td>
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311. Have you made any other changes as a result of involvement with the Rural Financial Counselling Service?
   a) Yes (Go to question 312)
   b) No (Go to question 313)

312. Overall, what degree of the changes made do you attribute to the help provided by a rural financial counsellor?
   a) Almost all
   b) Quite a lot
   c) About half
   d) Some
   e) Almost none

313. Have there been any positive changes in your circumstances arising from your use of the services of a rural financial counsellor?
   a) Yes (Go to question 314)
   b) No (Go to question 315)

314. What degree of the positive changes in your circumstances do you attribute to the help provided by a rural financial counsellor?
   a) Almost all
   b) Quite a lot
   c) About half
   d) Some
   e) Almost none

315. Has your involvement with the Rural Financial Counselling Service led you to seek professional advice or assistance from others on aspects of your business beyond those they referred you to?
   a) Yes (Go to question 316)
   b) No (Go to question 317)

316. In which areas? (Please select as many responses as are appropriate)
   a) Succession planning
   b) Production management
   c) Marketing
   d) Natural resource management / the environment
   e) Risk management
   f) Other (please specify)

SOURCES OF INFORMATION

We would like to gain an understanding of where and from whom you obtained information and advice. For the purposes of your farming enterprises, we are interested in your sources of information and how useful they were to you. We would also like to know if your use of these sources has changed. Would you please answer the following questions.

317. For the purposes of your farming enterprises, did you have family members who could help you find information?
   a) Yes (Go to question 318)
   b) No (Go to question 320)
318. Did they help you find information?
   a) Yes (Go to question 319)
   b) No (Go to question 320)

319. How useful were they in helping you find information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

320. For the purposes of your farming enterprises, were Catchment Management Authorities (or equivalent) available to you as a source of information?
   a) Yes (Go to question 320)
   b) No (Go to question 323)

321. Did you use Catchment Management Authorities (or equivalent) as a source of information?
   a) Yes (Go to question 322)
   b) No (Go to question 323)

322. How useful were Catchment Management Authorities (or equivalent) to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

323. For the purposes of your farming enterprises, were other farmers available to you as a source of information?
   a) Yes (Go to question 324)
   b) No (Go to question 326)

324. Did you use other farmers as a source of information?
   a) Yes (Go to question 325)
   b) No (Go to question 326)

325. How useful were other farmers to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

326. For the purposes of your farming enterprises, were private consultants available to you as a source of information?
   a) Yes (Go to question 327)
   b) No (Go to question 329)
327. Did you use private consultants as a source of information?
   a) Yes (Go to question 328)
   b) No (Go to question 329)

328. How useful were private consultants to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

329. For the purposes of your farming enterprises, was there a rural merchandise store available to you from which you could obtain information?
   a) Yes (Go to question 330)
   b) No (Go to question 332)

330. Did you use this rural merchandise store as a source of information?
   a) Yes (Go to question 331)
   b) No (Go to question 332)

331. How useful was this rural merchandise store to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

332. For the purposes of your farming enterprises, were State Departments of Primary Industries / Agriculture (or equivalent) available to you as a source of information?
   a) Yes (Go to question 333)
   b) No (Go to question 335)

333. Did you use State Departments of Primary Industries / Agriculture (or equivalent) as a source of information?
   a) Yes (Go to question 334)
   b) No (Go to question 335)

334. How useful were State Departments of Primary Industries / Agriculture (or equivalent) to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

335. For the purposes of your farming enterprises, were Landcare groups available to you as a source of information?
   a) Yes (Go to question 336)
   b) No (Go to question 338)
336. Did you use Landcare groups as a source of information?
   a) Yes (Go to question 337)
   b) No (Go to question 338)

337. How useful were Landcare groups to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

338. For the purposes of your farming enterprises, were field days available to you as a source of information?
   a) Yes (Go to question 339)
   b) No (Go to question 341)

339. Did you use field days as a source of information?
   a) Yes (Go to question 340)
   b) No (Go to question 341)

340. How useful were field days to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

341. For the purposes of your farming enterprises, were seminars available to you as a source of information?
   a) Yes (Go to question 342)
   b) No (Go to question 344)

342. Did you use seminars as a source of information?
   a) Yes (Go to question 343)
   b) No (Go to question 344)

343. How useful were seminars to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

344. For the purposes of your farming enterprises, was the internet available to you as a source of information?
   a) Yes (Go to question 345)
   b) No (Go to question 347)

345. Did you use the internet as a source of information?
   a) Yes (Go to question 346)
   b) No (Go to question 347)
346. How useful was the internet to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

347. For the purposes of your farming enterprises, were scientific journals and technical books available to you as a source of information?
   a) Yes (Go to question 348)
   b) No (Go to question 350)

348. Did you use scientific journals and technical books as a source of information?
   a) Yes (Go to question 349)
   b) No (Go to question 350)

349. How useful were scientific journals and technical books to you as a source of information?
   a) Extremely useful
   b) Very useful
   c) Useful
   d) Not very useful
   e) Not useful at all

IDEAS ABOUT FARMING

The questions in this section ask for your thoughts and experiences and will enable us to draw a picture of farmers' values and how they see the world. This will help us to better understand possible ways in which rural financial counselling and extension services can serve farmers better. Please note that there are no right or wrong answers. We only want to know what you think so just write what comes to mind first.

Please indicate whether you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly Agree</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>350. A slight decrease in farm profits is worthwhile if it helps to protect the environment on the farm.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
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<tr>
<td>351. Farming involves understanding and working with nature.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>352. Knowing that the farm will still be productive and in good condition in the future is more important than short term profits.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>353. Profit and capital gain are only a small part of the satisfaction to be gained from being a farmer.</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
<tr>
<td>354. The environmental problems that can be created by farming are exaggerated by</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
<td>❑</td>
</tr>
</tbody>
</table>
355. Increased financial aid to farmers would solve the environmental problems that can be caused by farming.  

356. Farmers should not be held responsible for environmental problems resulting from farming because the production of food and fibre is an essential activity required by the rest of society.  

357. Looking after the land was an important consideration among farmers in my area.  

358. Even when eroded soil material has left the farm, it is still the responsibility of that farm.  

359. Environmentally sound land management practices cost more than they are worth.  

360. Protecting the environment is not an important part of being a successful farmer.  

361. The control of farm environmental problems is an issue for everyone in the community.  

362. The activities of farming around my area had a significant effect on the environment in other areas.  

363. In my case, increasing farm sales was a far more important consideration than reducing environmental problems.  

364. Farmers should be held liable for environmental damage caused by farming activities.  

**Ideas about farming continued...**

Please indicate whether you agree or disagree with the following statements.

<table>
<thead>
<tr>
<th>Statement</th>
<th>Strongly agree</th>
<th>Agree</th>
<th>Not sure</th>
<th>Disagree</th>
<th>Strongly Disagree</th>
</tr>
</thead>
<tbody>
<tr>
<td>365. Farmers need more information on environmentally sound land management practices.</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>366. Environmental problems on the farm are only quite minor in comparison with damage to the environment caused by cities.</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>367. Environmentally sound land management should just be considered another cost of running the farm.</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>368. Most farmers around my area were in favour of using environmentally sound land management practices.</td>
<td>☑</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
<td>---</td>
</tr>
<tr>
<td>369.</td>
<td>The cost of environmentally sound land management practices is a major obstacle to farmers' use of them.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>370.</td>
<td>Farmers should be allowed to produce all they can even if some environmental degradation results from their farming activities.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>371.</td>
<td>Farmers would be willing to take further measures to control environmental damage if they could be sure that the land management practices available would do the job.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>372.</td>
<td>It is in the best interests of farmers to invest in environmentally sound land management practices on their farms to ensure the long term success of their farms.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>373.</td>
<td>Farmers in general do not give enough consideration to undertaking environmentally sound land management practices.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>374.</td>
<td>I would have never tried a new chemical until it was well proven in the district.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>375.</td>
<td>There is not much point planning more than a few months ahead.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>376.</td>
<td>I regarded myself as a fairly conservative and traditional farmer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>377.</td>
<td>It does not pay to be too scientific with farming - it all depends on the weather anyway.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>378.</td>
<td>Scientific research was vital in solving a lot of the problems I had on farm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

(Go to thank you page)
APPENDIX II: INTERACTIVE GROUP EXERCISE

Instruction Sheet for Participants

As a group, please discuss each question below. Choose a scribe and a spokesperson to present for your group during the Discussion. Put your group number and question number with your comments on the paper provided. You have 10 minutes or less on each question otherwise you will run out of time. Some definitions of terms used are at the bottom of the page.

Question 1

a) What are your three main drivers for sustainability when shaping change?

b) What do you think the drivers are for the private or public sector (whichever one you are not)?

List the main drivers for each organisation represented in your group. Find any commonalities between your organisations and then list those that represent the main drivers for your group.

Question 2

Which drivers from question one do you feel would be most successful in shaping change for sustainability, and why? We are interested in the difference between public and private drivers.

Some definitions for this exercise.

Sustainability [is the system property of maintaining or sustaining particular system benefits over time, without running-down other system benefits. For instance, sustaining crop yields without running down soil C and nutrient levels.] can be defined as an ability or capacity of something to be maintained or to sustain itself. It’s about taking what we need to live now, without jeopardising the potential for people in the future to meet their needs. Please consider sustainability from the perspective of natural resource sustainability, financial sustainability and community / social sustainability.

The public sector includes government agencies and NGOs that have most of their funding and priorities set by government. Contact with next users and end users are usually not on a fee-for-service basis, and the desired outcomes are high public good (wider community benefits) and less so for direct private benefit. Contact is usually at a group or industry level and rarely as one-to-one consulting.

The private sector on the other hand, includes those organisations and businesses that are solely privately funded (usually on a fee-for-service or product sale basis), and focus on extending information and advising based on private goods and services, including advising ‘next-users’ and ‘end-users’, for the purposes of generating individual business income to achieve their goals.
APPENDIX III: INTERACTIVE GROUP EXERCISE

Information Sheet

This interactive session involves you and your small group discussion three questions and writing your comments on the paper provided. You will then be asked to share your comments with the rest of the larger group. The purpose of the exercise is to capture your thoughts on shaping change, on the question of sustainability and the increased diversity of stakeholders and how they provide extension services to farmers.

Once this interactive session is completed, the data will be analysed and relevant information will be included in Lauren Howard’s PhD thesis as fulfilment of the requirements for a degree of Doctor of Philosophy. In addition it will inform the thinking of the State Adoption Team of the Future Farm Industries (FFI) CRC as it considers innovative ways to ensure delivery and uptake of R&D outcomes of the FFI CRC by the target audiences it has identified in its Business Plan.

All information you provide will remain confidential. Neither your name nor any other identifying information will be used or published. A short report will be written based on the outcomes of today’s exercise. If you would like to obtain a copy of this report, you can do so by emailing Lauren at Lahoward@csu.edu.au. The report will be posted on the FFI CRC website.

The Charles Sturt University School of Agriculture and Wine Science’s Ethics in Human Research Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

Head of School
School of Agricultural & Wine Sciences
Charles Sturt University
Locked Bag 588
WAGGA WAGGA NSW 2678
T: (02) 69 332 420
F: (02) 69 332 812

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.

Both Lauren Howard and Scott Glyde, Agribusiness Director FFI CRC, thank you in anticipation of your input.
APPENDIX IV: INTERACTIVE GROUP EXERCISE

Feedback / Additional Comments Sheet

Thanks for participating in this session. We are keen to hear from you about what you gained from the session and what it prompted from you.

1. Note which grouping best describes your main role:
   - Public sector
   - Consultants to the public sector
   - Producer / producer groups
   - RDCs (or international equivalent e.g. Dairy NZ)
   - Consultant to producers
   - NRM organisation
   - University
   - Other…

2. Overall, how interesting / useful did you find this session as a learning experience? Please circle a number
   Of little interest / benefit 1 2 3 4 5 6 7 8 9 10 Of great interest / benefit
   Please comment on your rating:

3. As a result of participation, how would you rate your gains in understanding in the following:
   a) Having a better understanding of the role of the FFI CRC and similar CRCs, and how CRCs engage with extension Please circle a number
      Low 1 2 3 4 5 6 7 8 9 10 High
   b) Having gained an increase in understanding about the private sector, their drivers and way of operating Please circle a number
      Low 1 2 3 4 5 6 7 8 9 10 High
   c) Having gained insights about issues and opportunities relating to CRCs, public, private and industry sectors working better together to bring about change Please circle a number
      Low 1 2 3 4 5 6 7 8 9 10 High
   Please make any comments about any of these or other gains in understanding:

4. As a result of your participation, how likely are you to: Tick any that apply
   - Seek opportunities / more information to better connect with the FFI CRC in your work
   - Find ways to work and engage more closely with the private sector (or public sector if you are from the private sector)
   - Strengthen your networks across all sectors
5. Please provide more information on any of your selections above and/or on other actions you might take:

6. Please make any other comment about the interactive session and/or issues being discussed:

Thanks for your feedback

If you are interested in this research and would like to find out more or participate further, please write your details below.

Name.................................................................
Position............................................................
Location.............................................................
Phone.................................................................
Email.................................................................

If you are interested in the outcomes of today’s exercise and would like a copy of the report, you can email Lauren Howard at Lahoward@csu.edu.au. A summary will be provided to APEN for inclusion in ExtensionNET.
APPENDIX V: INTERACTIVE GROUP EXERCISE

Reporter’s Role Notes

Thanks for acting as the reporter. Here are some key notes on your role:

1. Your question to report back on is:

“How specifically (3x ways) would the public and private sector collaborate to shape change”?

To do this you need to consider and draw on what your group has concluded for questions 1, 2 and 3.

To remind you, the questions are:

Question 1 – Your three main drivers for sustainability when shaping change

Question 2 – then deal with three drivers in the alternative sector to yours – public or private sector

Question 3 – choose the sustainability drivers that would be most successful in shaping change – public compared to private

2. To support you in this reporting:

Please make notes for yourself on the details associated with that reporting question. Please do so on a sheet of paper and bring it back into the main room with you.

While those notes will act as your prop if / when you are called on to report, they are highly valuable to us as this distils out key information the FFI CRC is seeking.

3. Regarding your role as Group Leader:

a. Time is short for this session – please keep the discussion on track too
b. Please make sure the group moves onto question 2 after 5 minutes or so – this means we get the information being sought for that question
c. Please make sure they move to question 3 after 10 minutes – when the bell sounds
d. There will be someone roving – so if you have trouble please let us know.

Thanks for taking on this role. We appreciate you being prepared to do so. By the way if you are not called on to present please feel free to stand up during the Discussion and let us know any key things that emerged from your group.
APPENDIX VI: SEMI-STRUCTURED INTERVIEWS

INTERVIEW PROTOCOL

Background

Traditionally, the major providers of agricultural extension services in Australia were the state departments of agriculture. However, since the 1980s, there has been a gradual withdrawal of public sector extension services, and the nature of the information / advice they give and how it is delivered has changed.

As a result of these developments, there is now a diversity of stakeholders involved in extension in its many forms. A multitude of alternative service providers and institutional arrangements have appeared. Formalised partnerships between private and public sector organisations and quasi public sector organisations are now common. Private bodies are also now being employed to deliver government funded programs. Farmer organisations, cooperatives and groups; input supply companies; retail outlets; marketing boards; research and development corporations; cooperative research centres and university departments are some of the many players in the new extension environment in Australia.

The aim of this research project is to explore the influence of the increasing role of the private sector and various extension related industry groups on farmer decision-making. Questions of interest include: where or from whom do farmers seek information and advice from to assist them with their decision making; and exactly what advice / information do farmers seek from which source to assist them with their decision making?

Questions

1. Would you mind telling me a bit about what it is that you do?
2. What sort of information / advice do your clients seek from you?
3. Present some findings from survey and plenary session. What are your thoughts on these findings?
4. The literature separates the decisions farmers must make into three groups, depending on their complexity and the time frame in which the decision must be made:
   - Decisions at the operational level are concerned with everyday operations e.g. planting or fertilising a crop. Operational decisions require technical expertise and tend to be well-structured i.e. the desired outcome is known and the information is available from within the business.
   - Tactical decision making involves what needs to be done in the short to medium term to achieve the aims of the business. Time frames for tactical decisions in farming tend to be associated and with the biological cycles of the crops and livestock. Annual cycles are common. Problems and their solutions are relatively well defined but there is a greater degree of uncertainty than in operational decisions.
   - The strategic level is about the overall vision for the long-term future of the business. Strategic decisions are quite different from operational and tactical decisions. They are made infrequently but can have a very large impact on the future of the farm.

In your experience, which extension providers are servicing:
   a) Decision-making at the operational level?
b) Decision-making at the tactical level?

c) Decision-making at the strategic level?

(With prompting and probing, explore what is being done well, what is being done poorly, issues, concerns etc.).

5. I would like to organise a focus group with farmers. Do you know of anyone who would be interested in participating?
APPENDIX VII: SEMI-STRUCTURED INTERVIEWS

INTERVIEW CONSENT FORM

Agricultural Extension Service Providers and Farmer Decision-Making

Consent Form

Chief Investigator
Lauren Howard
PhD Candidate
P: (02) 69 33 2749
E: lahoward@csu.edu.au

Supervisors
Adjunct Assoc Prof Ian Gray
P: (02) 69 33 2701
E: igray@csu.edu.au

Dr. Scott Glyde
P: (02) 69 33 2385
E: sglyde@csu.edu.au

I, the undersigned, have been advised of the general subject area and the purpose of the above research project by the research team. I have been given the opportunity to ask questions about the research and received satisfactory answers.

I understand that any information or personal details gathered in the course of this research about me are confidential and that neither my name nor any other identifying information will be used or published without my written permission.

I understand that I am free to withdraw my participation in this research at any time, and if I do I will not be subjected to any penalty or discriminatory treatment.

Finally, I have been assured that this research has been approved by Charles Sturt University’s School of Agriculture and Wine Science Ethics in Human Research Committee and any data I provide is confidential to the interview team and stored securely.

Name: ______________________________________________
Signature: ___________________________________________
Date: ____________________________

Charles Sturt University’s School of Agriculture and Wine Science Ethics in Human Research Committee has approved this study. I understand that if I have any complaints or concerns about this research I can contact:

Dr. Scott Glyde
School of Agriculture & Wine Science
Charles Sturt University
Locked Bag 588 WAGGA WAGGA NSW 2678
T: (02) 69 332 385
E: sglyde@csu.edu.au

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.
APPENDIX VIII: SEMI-STRUCTURED INTERVIEWS

INTRODUCTORY EMAIL

SUBJECT: PhD research project – your input please.

Hello xxxx,

My name is Lauren Howard. I am a PhD student at Charles Sturt University in Wagga Wagga. My research project explores increased private sector and industry involvement in agricultural extension service provision on farmer decision-making (please see attached information sheet). I am in the later stages of my PhD and I am currently organising a suite of interviews with people who work in agriculture and have an understanding of the decisions made by farmers in their farm businesses.

I was hoping to have a discussion with you (over the phone) sometime soon about my research topic and capture your understanding of increased private sector and industry involvement in agricultural extension service provision on farmer decision-making.

I only work on my PhD part-time due to other commitments so if we could organise a suitable time on a Thursday or Friday, that would be great. However if a Thursday or Friday doesn’t suit, could you please name a date which suits you and I can make it work. I must have all interviews completed by 31 May 2013 to meet deadline requirements.

Also, is there anyone else you could recommend that I speak to regarding this topic? I’m interested in speaking to anyone who works in the private, industry or public sectors; whether they be agronomists, livestock advisors, farm management consultants, financial advisors etc. – anyone who has an understanding of the decisions made by farmers in their farm businesses.

I appreciate your time and look forward to hearing from you.

Kind Regards,

Lauren Howard
PhD Candidate
School of Agriculture and Wine Science
Charles Sturt University
Locked Bag 588
Wagga Wagga, NSW 2650
APPENDIX IX: SEMI-STRUCTURED INTERVIEWS

INTERVIEW INFORMATION SHEET

Agricultural Extension Service Providers and Farmer Decision-Making: Information Sheet

Chief Investigator: Lauren Howard  
PhD Candidate  
lahoward@csu.edu.au  
(02) 69 33 2749

Supervisors:  
Adjunct Assoc Prof Ian Gray  
igray@csu.edu.au  
(02) 69 33 2701

Dr. Scott Glyde  
sglyde@csu.edu.au  
(02) 69 33 2385

Agricultural extension services in Australia have changed. Traditionally, the major providers of publicly funded agricultural extension were the state departments of agriculture, whose extension programs placed a strong emphasis on agricultural production. However, the 1980s saw a review of state departments of agriculture and their restructuring which in turn, affected the services they provided. The public sector became more focused on environmental (typically public) benefits rather than production (typically private) benefits. Furthermore, they withdrew from areas perceived to be adequately supplied, or having the potential to be adequately supplied by the private sector.

As a result of these developments, there is now a diversity of stakeholders involved in extension in its many forms. The purpose of this research project is to investigate the influence of the increased private sector and industry involvement in agricultural extension service provision on farmer decision-making. The project involves a series of semi-structured, informal interviews with people involved in agriculture. All information you provide will remain confidential. Neither your name nor any other identifying information will be used or published. With your permission, the interview will be digitally recorded however I can switch the recorder off at any time if it makes you feel uncomfortable. We expect that the interview will take approximately one hour however you can withdraw from the interview at any time without penalty or discriminatory treatment. We do not believe there are any risks or obligations to you in participating in the interview. We appreciate your time and effort and thank you in anticipation.

Once all interviews are completed, the data will be analysed and relevant information will be included in my PhD thesis as fulfilment of the requirements for a degree of Doctor of Philosophy.

The School of Agriculture and Wine Science’s Ethics in Human Research Committee has approved this project. If you have any complaints or reservations about the ethical conduct of this project, you may contact the Committee through the Executive Officer:

Scott Glyde  
SAWS, Charles Sturt University  
Locked Bag 588  
WAGGA WAGGA NSW 2678

Any issues you raise will be treated in confidence and investigated fully and you will be informed of the outcome.
APPENDIX X: WEB SURVEY FINDINGS

The sample demography
This first set of aggregated findings describes the features and characteristics of the respondent data sample. Each table below reports percentages of respondents and indicates the effective sample size; that is with non-response or ‘missing cases’ excluded. In total, the survey attracted 429 responses. No negative or derogatory correspondence regarding any aspect of the survey was received by the investigative team.

Period farming
Respondents were asked how many years they had spent operating a farm, excluding their childhood years (Table 11). The mean period of time operating a farm was 27 years.

Table 11: Time spent (years) operating a farm

<table>
<thead>
<tr>
<th>Time (years)</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>1-10</td>
<td>12.9</td>
</tr>
<tr>
<td>11-20</td>
<td>26.1</td>
</tr>
<tr>
<td>21-30</td>
<td>23.3</td>
</tr>
<tr>
<td>31-40</td>
<td>23.3</td>
</tr>
<tr>
<td>41 or more</td>
<td>14.4</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>326</td>
</tr>
</tbody>
</table>

Age
The sample clustered in the 40 to 64 years age range (Table 12).

Table 12: Age distribution of respondents

<table>
<thead>
<tr>
<th>Age (Years)</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>20-34</td>
<td>4.7</td>
</tr>
<tr>
<td>35-44</td>
<td>23.1</td>
</tr>
<tr>
<td>45-54</td>
<td>29.5</td>
</tr>
<tr>
<td>55-64</td>
<td>30.0</td>
</tr>
<tr>
<td>65 or more</td>
<td>12.7</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>424</td>
</tr>
</tbody>
</table>
Gender

70.9 per cent of the sample were male and 29.1 per cent female (n = 423) (Table 13).

Table 13: Respondents by gender

<table>
<thead>
<tr>
<th>Gender</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Male</td>
<td>70.9</td>
</tr>
<tr>
<td>Female</td>
<td>29.1</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>423</td>
</tr>
</tbody>
</table>

Education

Education was measured by asking for the highest level of education completed (Table 14). A secondary level of education was the highest level of education completed by the largest proportion of respondents (50.5 per cent).

Table 14: Highest level of education completed

<table>
<thead>
<tr>
<th>Level of Education</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Primary</td>
<td>2.4</td>
</tr>
<tr>
<td>Secondary</td>
<td>50.5</td>
</tr>
<tr>
<td>Technical/Trade</td>
<td>21.0</td>
</tr>
<tr>
<td>Tertiary</td>
<td>26.2</td>
</tr>
<tr>
<td>Total</td>
<td>100¹</td>
</tr>
<tr>
<td>N</td>
<td>424</td>
</tr>
</tbody>
</table>

The Farm

This second set of aggregated findings shifted the focus to the physical and human characteristics of the farms.

¹Discrepancies in totals are due to rounding
Location

Farms of respondents were distributed around all States, but none were located in either of the Territories. The largest proportion of respondents was in Victoria, with a similar number in New South Wales (Table 13).

Table 15: Respondents by state

<table>
<thead>
<tr>
<th>State/Territory</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Victoria</td>
<td>40.2</td>
</tr>
<tr>
<td>NSW</td>
<td>35.0</td>
</tr>
<tr>
<td>South Australia</td>
<td>12.4</td>
</tr>
<tr>
<td>Tasmania</td>
<td>6.1</td>
</tr>
<tr>
<td>Qld</td>
<td>5.8</td>
</tr>
<tr>
<td>Western Australia</td>
<td>0.5</td>
</tr>
<tr>
<td>ACT</td>
<td>0.0</td>
</tr>
<tr>
<td>Northern Territory</td>
<td>0.0</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>428</td>
</tr>
</tbody>
</table>

Main Enterprise Type

More than two-thirds of respondents identified their farms as ‘sheep, beef or grain’. The remainder were distributed across categories with the largest being dairy (Table 16).

Table 16: Main enterprise type

<table>
<thead>
<tr>
<th>Enterprise</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sheep, beef and / or grain</td>
<td>64.8</td>
</tr>
<tr>
<td>Dairy farm</td>
<td>10.5</td>
</tr>
<tr>
<td>Fruit / nut / vegie / mushroom</td>
<td>5.8</td>
</tr>
<tr>
<td>Small business supporting any of the above</td>
<td>5.1</td>
</tr>
<tr>
<td>Wine and / or beverage</td>
<td>7.5</td>
</tr>
<tr>
<td>Other</td>
<td>6.3</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>429</td>
</tr>
</tbody>
</table>

Employees

Respondents were asked ‘including yourself, how many people did your farming enterprise employ during the 2008 calendar year’. The majority of respondents had employees during the calendar year of 2008, with most reporting between one and five (Table 15).
Table 17: Number of employees

<table>
<thead>
<tr>
<th>Number of Employees</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>16.4</td>
</tr>
<tr>
<td>1-5</td>
<td>70.9</td>
</tr>
<tr>
<td>6-10</td>
<td>6.1</td>
</tr>
<tr>
<td>More than 10</td>
<td>6.6</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>426</td>
</tr>
</tbody>
</table>

Relative Scale

Respondents were asked to describe the size of their farming enterprise compared to similar businesses in their region. ‘About average’ was the most common response (Table 18).

Table 18: Scale / size of the farming enterprise compared to similar businesses in the region

<table>
<thead>
<tr>
<th>Scale / Size</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Smaller than average</td>
<td>29.0</td>
</tr>
<tr>
<td>About average</td>
<td>57.1</td>
</tr>
<tr>
<td>Larger than average</td>
<td>13.9</td>
</tr>
<tr>
<td>Total</td>
<td>100</td>
</tr>
<tr>
<td>N</td>
<td>424</td>
</tr>
</tbody>
</table>

Financial Aspects and Implications

Aspects of farm financial management are reported separately in this section.

Off-farm income

Respondents were asked approximately what percentage of their total household income was generated off-farm in the last financial year. Almost one third of respondents relied entirely on their farm enterprise for income (Table 17). That is, they generated no off-farm income. The next largest proportion of respondents indicated they generated less than one quarter of their income off-farm.

Table 19: Percentage of total household income generated off-farm

<table>
<thead>
<tr>
<th>Percentage of Income generated off-farm</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>None</td>
<td>32.1</td>
</tr>
<tr>
<td>1-25 per cent</td>
<td>30.9</td>
</tr>
<tr>
<td>26-50 per cent</td>
<td>15.0</td>
</tr>
<tr>
<td>51-75 per cent</td>
<td>10.5</td>
</tr>
<tr>
<td>More than 75 per cent</td>
<td>11.6</td>
</tr>
<tr>
<td>Total</td>
<td>100(^1)</td>
</tr>
<tr>
<td>N</td>
<td>421</td>
</tr>
</tbody>
</table>
Perceived financial status

Respondents were asked how they saw their current financial status in farming. Half of the respondents described their businesses as barely viable.

Table 20: Perceived financial status in farming

<table>
<thead>
<tr>
<th>Perceived Financial Status</th>
<th>Per cent of respondents</th>
</tr>
</thead>
<tbody>
<tr>
<td>Viable</td>
<td>38.9</td>
</tr>
<tr>
<td>Barely viable</td>
<td>51.3</td>
</tr>
<tr>
<td>Unviable</td>
<td>5.3</td>
</tr>
<tr>
<td>Not sure</td>
<td>3.6</td>
</tr>
<tr>
<td>I no longer farm</td>
<td>1.0</td>
</tr>
<tr>
<td>Total</td>
<td>100^1</td>
</tr>
<tr>
<td>N</td>
<td>419</td>
</tr>
</tbody>
</table>

Sources of Information

For a suite of information sources, respondents were asked if those information sources were available to them. If they were available, respondents were asked if they used it. If they used that information sources, respondents were asked how useful it was, how had their use changed in the past five years, and how important the perceived the information source would be to them in the future. If respondents indicated they didn’t use the information source, they were asked if they had used it in the past. Again, responses are shown as a percentage of overall responses.
<table>
<thead>
<tr>
<th>INFORMATION SOURCE</th>
<th>YES, IT IS AVAILABLE</th>
<th>YES, I USE IT NOW BUT NEVER EVER USED</th>
<th>I HAVE IN THE PAST</th>
<th>INFORMATION SOURCE HAS THE LEVEL OF YOUR USE CHANGED IN THE PAST FIVE YEARS?</th>
<th>HOW IMPORTANT WILL THIS INFORMATION SOURCE BE TO YOU IN THE FUTURE?</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>I USE THIS SOURCE AS OFTEN AS I DID FIVE YEARS AGO</td>
<td>I USE THIS SOURCE MORE THAN I DID FIVE YEARS AGO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NOT USEFUL AT ALL</td>
<td>NOT USEFUL</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>NOT USEFUL</td>
<td>LESS THAN FIVE YEARS AGO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>USEFUL</td>
<td>AS I DID FIVE YEARS AGO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>VERY USEFUL</td>
<td>AS FIVE YEARS AGO</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
<td>EXTREMELY USEFUL</td>
<td>FIVE YEARS AGO</td>
</tr>
<tr>
<td>Family Members</td>
<td>71.6</td>
<td>90.3</td>
<td>20.3</td>
<td>79.7</td>
<td>23.9</td>
</tr>
<tr>
<td>CMAs</td>
<td>69.2</td>
<td>56.9</td>
<td>18.7</td>
<td>81.3</td>
<td>9.8</td>
</tr>
<tr>
<td>Other Farmers</td>
<td>92.1</td>
<td>95.7</td>
<td>56.3</td>
<td>43.8</td>
<td>25.0</td>
</tr>
<tr>
<td>Private Consultants</td>
<td>77.0</td>
<td>55.0</td>
<td>30.6</td>
<td>69.4</td>
<td>21.6</td>
</tr>
<tr>
<td>Rural Merchandise Store</td>
<td>92.5</td>
<td>88.6</td>
<td>29.4</td>
<td>70.6</td>
<td>18.6</td>
</tr>
<tr>
<td>State Depts</td>
<td>90.2</td>
<td>80.3</td>
<td>49.5</td>
<td>50.5</td>
<td>10.9</td>
</tr>
<tr>
<td>Landcare</td>
<td>75.2</td>
<td>45.8</td>
<td>19.4</td>
<td>80.6</td>
<td>13.6</td>
</tr>
<tr>
<td>Field Days</td>
<td>94.9</td>
<td>86.8</td>
<td>54.3</td>
<td>45.7</td>
<td>23.9</td>
</tr>
<tr>
<td>Seminars</td>
<td>84.3</td>
<td>72.8</td>
<td>37.9</td>
<td>62.1</td>
<td>17.3</td>
</tr>
<tr>
<td>Internet</td>
<td>94.1</td>
<td>95.8</td>
<td>42.1</td>
<td>57.9</td>
<td>37.7</td>
</tr>
<tr>
<td>Scientific Journals / Technical Books</td>
<td>78.2</td>
<td>75.9</td>
<td>32.9</td>
<td>67.1</td>
<td>15.1</td>
</tr>
</tbody>
</table>
Attitude

Respondents were asked whether they agree or disagree with a range of statements. Their responses are presented below as frequencies.

<table>
<thead>
<tr>
<th>Statement / Question</th>
<th>Strongly Agree (%)</th>
<th>Agree (%)</th>
<th>Not sure (%)</th>
<th>Disagree (%)</th>
<th>Strongly Disagree (%)</th>
<th>Total (%)</th>
<th>N</th>
</tr>
</thead>
<tbody>
<tr>
<td>A slight decrease in farm profits is worthwhile if it helps to protect the environment on the farm.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100(^1)</td>
</tr>
<tr>
<td>Farming involves understanding and working with nature.</td>
<td>8.1</td>
<td>48.6</td>
<td>17.4</td>
<td>18.5</td>
<td>7.3</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Knowing that the farm will still be productive and in good condition in the future is more important than short term profits.</td>
<td>43.7</td>
<td>54.1</td>
<td>1.1</td>
<td>0.3</td>
<td>0.8</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Profit and capital gain are only a small part of the satisfaction to be gained from being a farmer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>The environmental problems that can be created by farming are exaggerated by people who are not farmers.</td>
<td>30.4</td>
<td>56.4</td>
<td>8.6</td>
<td>3.7</td>
<td>0.9</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Increased financial aid to farmers would solve the environmental problems that can be caused by farming.</td>
<td>23.7</td>
<td>45.1</td>
<td>11.0</td>
<td>17.5</td>
<td>2.8</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Farmers should not be held responsible for environmental problems resulting from farming because the production of food and fibre is an essential activity required by the rest of society.</td>
<td>47.2</td>
<td>38.8</td>
<td>9.0</td>
<td>4.2</td>
<td>0.8</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Looking after the land was an important consideration among farmers in my area.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Even when eroded soil material has left the farm, it is still the responsibility of that farm.</td>
<td>25.2</td>
<td>28.0</td>
<td>26.3</td>
<td>17.3</td>
<td>3.1</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Environmentally sound land management practices cost more than they are worth.</td>
<td>14.5</td>
<td>26.2</td>
<td>20.2</td>
<td>33.0</td>
<td>6.0</td>
<td></td>
<td>100</td>
</tr>
<tr>
<td>Protecting the environment is not an important part of being a successful farmer.</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>100</td>
</tr>
</tbody>
</table>

\(^1\) Includes respondents who neither agreed nor disagreed (Not sure)
The control of farm environmental problems is an issue for everyone in the community.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>22.1</td>
<td>44.8</td>
<td></td>
</tr>
<tr>
<td>20.1</td>
<td>11.8</td>
<td></td>
</tr>
<tr>
<td>1.1</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

The activities of farming around my area had a significant effect on the environment in other areas.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>6.4</td>
<td>29.2</td>
<td></td>
</tr>
<tr>
<td>26.3</td>
<td>30.1</td>
<td></td>
</tr>
<tr>
<td>8.1</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

In my case, increasing farm sales was a far more important consideration than reducing environmental problems.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>4.5</td>
<td>18.8</td>
<td></td>
</tr>
<tr>
<td>24.1</td>
<td>41.5</td>
<td></td>
</tr>
<tr>
<td>11.1</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Farmers should be held liable for environmental damage caused by farming activities.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>2.3</td>
<td>19.2</td>
<td></td>
</tr>
<tr>
<td>33.8</td>
<td>29.2</td>
<td></td>
</tr>
<tr>
<td>15.5</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Farmers need more information on environmentally sound management practices.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>11.6</td>
<td>59.0</td>
<td></td>
</tr>
<tr>
<td>16.3</td>
<td>12.2</td>
<td></td>
</tr>
<tr>
<td>0.9</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Environmental problems on the farm are only quite minor in comparison with damage to the environment caused by cities.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>38.5</td>
<td>36.4</td>
<td></td>
</tr>
<tr>
<td>19.2</td>
<td>5.2</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Environmentally sound land management should just be considered another cost of running the farm.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>7.9</td>
<td>59.5</td>
<td></td>
</tr>
<tr>
<td>17.0</td>
<td>12.6</td>
<td></td>
</tr>
<tr>
<td>2.9</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Most farmers around my area were in favour of using environmentally sound land management practices.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>13.7</td>
<td>58.6</td>
<td></td>
</tr>
<tr>
<td>20.4</td>
<td>6.7</td>
<td></td>
</tr>
<tr>
<td>0.6</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

The cost of environmentally sound land management practices is a major obstacle to farmers’ use of them.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>20.5</td>
<td>40.8</td>
<td></td>
</tr>
<tr>
<td>22.3</td>
<td>16.1</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Farmers should be allowed to produce all they can even if some environmental degradation results from their farming activities.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>0.9</td>
<td>7.9</td>
<td></td>
</tr>
<tr>
<td>20.2</td>
<td>56.1</td>
<td></td>
</tr>
<tr>
<td>14.9</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Farmers would be willing to take further measures to control environmental damage if they could be sure that the land management practices available would do the job.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>10.9</td>
<td>63.8</td>
<td></td>
</tr>
<tr>
<td>22.1</td>
<td>2.9</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

It is in the best interests of farmers to invest in environmentally sound land management practices on their farms to ensure the long term success of their farms.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>35.4</td>
<td>60.8</td>
<td></td>
</tr>
<tr>
<td>3.2</td>
<td>0.3</td>
<td></td>
</tr>
<tr>
<td>0.3</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>

Farmers in general do not give enough consideration to undertaking environmentally sound land management practices.

<table>
<thead>
<tr>
<th>Percentage</th>
<th>Frequency</th>
<th>Comments</th>
</tr>
</thead>
<tbody>
<tr>
<td>1.2</td>
<td>17.2</td>
<td></td>
</tr>
<tr>
<td>21.0</td>
<td>44.3</td>
<td></td>
</tr>
<tr>
<td>16.3</td>
<td>100.1</td>
<td></td>
</tr>
</tbody>
</table>
I would have never tried a new chemical until it was well proven in the district. 16.1 35.5 20.5 24.9 2.9 100 341

There is not much point in planning more than a few months ahead. 2.6 9.6 5.6 49.4 32.7 100 342

I regard myself as a fairly conservative and traditional farmer. 8.5 36.5 13.2 31.9 9.9 100 342

It does not pay to be too scientific with farming – it all depends on the weather anyway. 6.4 22.8 15.8 41.2 13.7 100 342

Scientific research was vital in solving a lot of the problems I had on farm. 17.5 44.0 21.9 41.6 2.0 100 343
APPENDIX XI: STATISTICAL ANALYSES OF THE WEB SURVEY QUESTIONS

The web survey questions were statistically analysed and no significant correlations were found. Nonetheless, the statistical analyses conducted are presented here in this appendix.

1. ATTITUDE TOWARD CONSERVATION

An environmental attitude variable was created using the following questions from the survey:

- A slight decrease in farm profits is worthwhile if it helps to protect the environment on the farm.
- Knowing that the farm will still be productive and in good condition in the future is more important than short term profits.
- The environmental problems that can be created by farming are exaggerated by people who are not farmers (reversed).
- Farmers should not be held responsible for environmental problems resulting from farming because the production of food and fibre is an essential activity required by the rest of society (reversed).
- Environmentally sound land management practices cost more than they are worth (reversed).
- Protecting the environment is not an important part of being a successful farmer (reversed).
- The activities of farming around this area have a significant effect on the environment in other areas.
- In my case, increasing farm sales is a farm more important consideration than reducing environmental problems (reversed).
- Farmers should be held liable for environmental damage caused by farming activities.
- Environmental problems on the farm are only quite minor in comparison with damage to the environment caused by cities (reversed).
- Environmentally sound land management should just be considered another cost of running the farm.
- The cost of environmentally sound land management practices is a major obstacle to farmers’ use of them (reversed).
- Farmers should be allowed to produce all they can even if some environmental degradation results from their farming activities (reversed).
- It is in the best interests of farmers to invest in sound land management practices on their farms to ensure the long-term success of their farms.
The relationship between environmental attitude and demographics was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of assumptions of normality, linearity and homoscedasticity. There were no significant correlations found between the two variables.
<table>
<thead>
<tr>
<th>Table XI2: Correlations among environmental attitude variable and use of information sources</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>Environment Attitude</strong></td>
</tr>
<tr>
<td>---------------------------</td>
</tr>
<tr>
<td><strong>Environmental Attitude</strong></td>
</tr>
<tr>
<td><strong>Family Members</strong></td>
</tr>
<tr>
<td><strong>CMAs</strong></td>
</tr>
<tr>
<td><strong>Other Farmers</strong></td>
</tr>
<tr>
<td><strong>Private Consultants</strong></td>
</tr>
<tr>
<td><strong>Rural Merchant Stores</strong></td>
</tr>
<tr>
<td><strong>State Depts</strong></td>
</tr>
<tr>
<td><strong>Landcare</strong></td>
</tr>
<tr>
<td><strong>Field Days</strong></td>
</tr>
<tr>
<td><strong>Seminars</strong></td>
</tr>
<tr>
<td><strong>Internet</strong></td>
</tr>
<tr>
<td><strong>Journals</strong></td>
</tr>
</tbody>
</table>

**Sig. (2-tailed)**

| **Environment Attitude** | .027 | .051 | 129 |
| **Family Members** | .149 | .781 | 129 |
| **CMAs** | .307 | .184 | 129 |
| **Other Farmers** | .027 | .133 | 129 |
| **Private Consultants** | .051 | .133 | 129 |
| **Rural Merchant Stores** | .027 | .155 | 129 |
| **State Depts** | .027 | .155 | 129 |
| **Landcare** | .027 | .155 | 129 |
| **Field Days** | .027 | .155 | 129 |
| **Seminars** | .027 | .155 | 129 |
| **Internet** | .027 | .155 | 129 |
| **Journals** | .027 | .155 | 129 |

**N**

| **Environment Attitude** | 317 |
| **Family Members** | 204 |
| **CMAs** | 129 |
| **Other Farmers** | 129 |
| **Private Consultants** | 129 |
| **Rural Merchant Stores** | 129 |
| **State Depts** | 129 |
| **Landcare** | 129 |
| **Field Days** | 129 |
| **Seminars** | 129 |
| **Internet** | 129 |
| **Journals** | 129 |

*Correlation is significant at the 0.01 level (2-tailed).

*. Correlation is significant at the 0.05 level (2-tailed).
The relationship between environmental attitude and use of information sources was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of assumptions of normality, linearity and homoscedasticity. There was a strong, positive correlation between environmental attitude and use of Catchment Management Authorities as a source of information, r=-.281, n=129, p<.001, indicating respondents who had a strong environmental attitude also found Catchment Management Authorities to be a very useful source of information.

Table XI3: Correlations among environmental attitude variable and change in use of information sources

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<th>Rural Merchandise Stores</th>
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The relationship between environmental attitude and respondents change in use of particular information sources over the past 5 years was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of assumptions of normality, linearity and homoscedasticity. There were no significant correlations found between the two variables.

The relationship between environmental attitude and future importance of particular information sources as perceived by the respondents was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of assumptions of normality, linearity and homoscedasticity. There were no significant correlations found between the two variables.

There were also no significant correlations found between environmental attitude and whether or not respondents could perceive if a particular source of information was going to be important in the future.

There are not many significant relationships involving ‘environmental attitude’. Only one strong, significant correlation was found and that was with change in use of CMAs (.281**).

2. INNOVATIVENESS, PLANNING, TRADITIONALISM AND ATTITUDE TOWARDS THE ROLE OF SCIENCE IN FARMING

Respondents were asked whether they agree or disagree with the following statements:

- ‘I would have never tried a new chemical until it was well proven in the district’ – referred to as ‘innovativeness’ in analysis.
- ‘There is not much point in planning more than a few months ahead’ – referred to as ‘planning’ in analysis.
- ‘I regard myself as a fairly conservative and traditional farmer’ – referred to as ‘traditionalist’ in analysis.
- ‘It does not pay to be too scientific with farming – it all depends on the weather anyway’ – referred to as ‘anti-science’ in analysis.
- ‘Scientific research was vital in solving a lot of the problems I had on farm’ – referred to as ‘pro-science’ in analysis.
Respondents were given 5 response options: ‘strongly agree’, ‘agree’, ‘not sure’, ‘disagree’, or ‘strongly disagree’.

- The higher the response value for the ‘innovativeness’ question, the more innovative the respondent i.e. they were willing to trial new technologies before their neighbours had trialled them.
- The higher the response value for the ‘planning’ question, the more the respondent places on planning.
- The lower the response value for the ‘traditionalist’ question, the more the respondent agrees with the statement and the more conservative and traditional they believe they are.

The ‘anti-science’ and ‘pro-science’ questions relate to the importance respondents place on the role of science in farming. The higher the response value for the ‘anti-science’ question, the more the respondent disagrees with the statement and places more value on the role of science in farming. The higher the response value for the ‘pro-science’ question, the more the respondent disagrees with the statement and places less importance on the role of science in farming.

The responses to these questions were tested with the demographic and extension questions to see whether any correlations existed. The results of these analyses are presented below.

Table XI5: Correlations among innovativeness, planning, traditionalist, anti-science and pro-science and demographics

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<tr>
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<th>Innovativeness</th>
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<th>Anti-Science</th>
<th>Pro-Science</th>
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**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

No statistically significant correlations were found.
**Table XI6: Correlations among innovativeness, planning, traditionalist, anti-science and pro-science and use of information sources**

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<th>Anti-Science</th>
<th>Pro-Science</th>
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**. Correlation is significant at the 0.01 level (2-tailed).**  
*. Correlation is significant at the 0.05 level (2-tailed).  

The only statistically significant correlation found was between seminars and pro-science.
Table XI7: Correlations among innovativeness, planning, traditionalist, anti-science and pro-science and change in use of information sources

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**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

No statistically significant correlations were found.
Table XI8: Correlations among innovativeness, planning, traditionalist, anti-science and pro-science and future importance of information sources

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**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

No statistically significant correlations were found.
Table XI9: Correlations among innovativeness, planning, traditionalist, anti-science and pro-science and whether respondents could perceive if a particular information source was going to be important in the future

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**. Correlation is significant at the 0.01 level (2-tailed).  
*. Correlation is significant at the 0.05 level (2-tailed).

No statistically significant correlations were found.

2.1. Innovativeness

There were no strong, significant correlations found between innovativeness and demographics.

There were also no strong, significant correlations found between innovativeness and use of information sources.

There were also no strong, significant correlations found between innovativeness and change in use of information sources over the past 5 years.

364
There were also no strong, significant correlations found between innovativeness and future importance of information sources as perceived by respondents.

There were also no strong, significant correlations found between innovativeness and whether or not respondents could perceive if a particular information source was going to be important in the future.

A Chi-square test for independence (with Yates Continuity Correction) indicated a significant association between innovativeness and main enterprise type (Pearson Chi Sq = 36.181; Df = 20; AS = 0.015).

2.2. Planning

There were no strong, significant correlations found between planning and demographics.

A Chi-square test for independence (with Yates Continuity Correction) indicated a significant association between planning and farm location (Chi-Square = 58.688; Df = 20; AS = 0.000).

There were also no strong, significant correlations found between planning and use of information sources.

There were also no strong, significant correlations found between planning and change in use of information sources over the past 5 years.

There were also no strong, significant correlations found between planning and future importance of information sources as perceived by respondents.

There were also no strong, significant correlations found between planning and whether or not respondents could perceive if a particular information source was going to be important in the future.

2.3. Traditionalism

There were no strong, significant correlations found between traditionalism and demographics.

There were also no strong, significant correlations found between traditionalism and use of information sources.

There were also no strong, significant correlations found between traditionalism and change in use of information sources over the past 5 years.

There were also no strong, significant correlations found between traditionalism and future importance of information sources as perceived by respondents.

There were also no strong, significant correlations found between traditionalism and whether or not respondents could perceive if a particular information source was going to be important in the future.

2.4. Anti-Science

There were no strong, significant correlations found between anti-science and demographics.
There were also no strong, significant correlations found between anti-science and use of information sources.

There were also no strong, significant correlations found between anti-science and change in use of information sources over the past 5 years.

There were also no strong, significant correlations found between anti-science and future importance of information sources as perceived by respondents.

There were also no strong, significant correlations found between anti-science and whether respondents could perceive if a particular information source was going to be important in the future.

2.5. Pro-Science

There were no strong, significant correlations found between pro-science and demographics.

A Chi-square test for independence (with Yates Continuity Correction) indicated a significant association between pro-science and gender (Chi-Square = 16.229; Df = 4; AS = 0.003)

The relationship between respondent attitude towards the role of science in farming and use of information sources was investigated using Pearson product-moment correlation coefficient. Preliminary analyses were performed to ensure no violation of assumptions of normality, linearity and homoscedasticity. There was a strong, positive correlation between attitude towards the role of science in farming and use seminars as a source of information, \( r = -0.341, n=210, p<.000 \), indicating respondents who believed science played an important role in farming also found seminars to be a very useful source of information.

There were also no strong, significant correlations found between pro-science and change in use of information sources over the past 5 years.

There were also no strong, significant correlations found between pro-science and future importance of information sources as perceived by respondents.

There were also no strong, significant correlations found between pro-science and whether or not respondents could perceive if a particular information source was going to be important in the future.

3. USEFULNESS
Table XI10: If respondents found one particular source of information useful, what other information sources did they also find useful?

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<th>Source of Information</th>
<th>Family Members</th>
<th>CMAs</th>
<th>Other Farmers</th>
<th>Private Consult.</th>
<th>Rural M/dise Stores</th>
<th>State Depts</th>
<th>Landcare</th>
<th>Field Days</th>
<th>Seminars</th>
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<td>.265</td>
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<td>.121</td>
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* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

Of the sources of information they used, respondents were asked how useful they found each of those sources of information. Respondents were asked to rate the usefulness of each information source on a scale of 1 to 5; 1 being extremely useful and 5 being not useful at all.
3.1. Family members

No strong, significant correlations were found among family members and the usefulness of information sources. Respondents who found their family members to be a useful source of information did not find any other sources of information particularly useful. There were significant correlations between family members and internet as well as scientific journals, but these correlations were weak (.212 and .177 respectively).

3.2. Catchment Management Authorities

Respondents who found CMAs to be a useful source of information also found state departments and Landcare to also be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .395.

3.3. Other farmers

Respondents who found other farmers to be a useful source of information also found rural merchandise stores, field days, seminars and the internet to also be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .655.

3.4. Private Consultants

Respondents who found private consultants to be a useful source of information did not find any other sources of information particularly useful. There were significant correlations between private consultants and field days, seminars as well as the internet, but these correlations were weak (.221, .212 and .212 respectively). I did a Pearson correlation with usefulness of private consultants and demographics, the attitude variable and innovativeness, planning, role of science in farming and traditionalist questions. The only significant correlation was between the usefulness of private consultants and ‘how do you currently see your financial status in farming: is your farm a) viable b) barely viable c) unviable. R = .193* (not very high), n = 160, p<.015. I used cross-tabs to test usefulness of private consultants with gender, main enterprise type and state / territory located in. No significant associations were found.

3.5. Rural Merchandise Stores

Respondents who found rural merchandise stores to be a useful source of information also found other farmers, state departments and field days to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .612.

3.6. State Departments

Respondents who found state departments of agriculture / primary industries and equivalent to be useful sources of information also found CMAs, rural merchandise stores and seminars to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .519.
3.7. **Landcare**

Respondents who found Landcare to be a useful source of information also found CMAs to be a useful source of information. A reliability test was conducted, and the Cronbach Alpha value was .459.

3.8. **Field Days**

Respondents who found field days to be a useful source of information also found other farmers, rural merchandise stores, seminars, internet and scientific journals to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .7. Crosstabs were conducted and no significant associations were found.

3.9. **Seminars**

Respondents who found seminars to be a useful source of information also found other farmers, state departments, field days, internet and scientific journals to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .701. A variable was created from these sources of information and it was tested against the demographics and attitude questions. No significant associations were found.

3.10. **Internet**

Respondents who found the internet to be a useful source of information also found other farmers, field days, seminars and scientific journals to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .692.

3.11. **Scientific Journals**

Respondents who found scientific journals to be a useful source of information also found field days, seminars and the internet to be useful sources of information. A reliability test was conducted, and the Cronbach Alpha value was .637.
### Table XI1: Correlations among usefulness of information sources and demographics

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* Correlation is significant at the 0.05 level (2-tailed).
** Correlation is significant at the 0.01 level (2-tailed).

No strongly significant associations were found between sources of information and demographics.
4. CHANGE

Table XI12: If respondents have changed their use of one particular information source, what other information sources have they also changed their use of?

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</table>

*Correlation is significant at the 0.01 level (2-tailed).

. Correlation is significant at the 0.05 level (2-tailed).
Of the sources of information that they used, respondents were asked how their use of that information source had changed in the past 5 years. They were asked whether they used the information source: less than they did 5 years ago; as often as they did 5 years ago; or, more than they did 5 years ago.

If a respondent used a particular information source more than they did 5 years ago, what other information sources did they also increase their use of?

4.1. **Family Members**

Respondents who increased their use of family members did not increase their use of any other information source.

4.2. **Catchment Management Authorities**

Respondents who increased their use of CMAs also increased their use of private consultants (reliability = .517).

4.3. **Other farmers**

Respondents who increased their use of other farmers also increased their use of rural merchandise stores (reliability = .514).

4.4. **Private consultants**

Respondents who increased their use of private consultants also increased their use of CMAs and seminars.

4.5. **Rural merchandise stores**

Respondents who increased their use of rural merchandise stores also increased their use of other farmers, field days and seminars.

4.6. **State departments**

Respondents who increased their use of state departments also increased their use of seminars.

4.7. **Landcare**
Respondents who increased their use of Landcare did not increase their use of any other information source.

4.8. **Field days**

Respondents who increased their use of field days also increased their use of rural merchandise stores (reliability = .498).

4.9. **Seminars**

Respondents who increased their use of seminars also increased their use of private consultants, rural merchandise stores and state departments.

4.10. **Internet**

Respondents who increased their use of the internet did not increase their use of any other information source.

4.11. **Scientific journals**

Respondents who increased their use of scientific journals did not significantly increase their use of any other information source.
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**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).
5. Perceived future importance of information sources

Respondents were asked how important they perceived each information source would be in the future. They were asked to score each information source on a scale of 1 to 5: 1 being very important and 4 being not important at all. 5 was not sure. Analysis of this question treated the ‘not sure’ responses as missing cases.

Table XI14: If a respondent perceived a particular information source to be very important in the future, what other info sources did they also think would be really important in the future?

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<th>Private Consul.</th>
<th>Rural Merch. Stores</th>
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**. Correlation is significant at the 0.01 level (2-tailed).  *. Correlation is significant at the 0.05 level (2-tailed).
### Table XI15: Correlations amongst perceived importance of information sources and demographics

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