RURAL WOMEN AS CHANGE AGENTS THROUGH ACCESS TO DIGITAL TECHNOLOGY

A Thesis submitted by

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In memory of my beloved mother

Malani Munasinghe

1930- 2015

ABSTRACT

This research presents the empirical evidence on the impact of digital technology in constructing rural women's positive identities as agents for change. Specifically, this study explores the multiple identities of rural women embedded within discourses found in literature against the discursive construction of identities by women who actively use digital technology in the contemporary family farming business. It was also intended to reveal how women's identities are in effect within the rural community in relation to agricultural knowledge sharing, whilst simultaneously assessing their agency and professional development for improved farm performance.

The field work for this study involved five focus group discussions with 42 women farmers over a 14-month period in regional communities of South West Queensland, Australia. Information was analysed using Foucauldian informed analytical methods, which investigated the process of identity construction as an interplay of technologies of power, digital technology and ethics of the self. Foucauldian-based process allowed examination of the dynamics of contemporary family farming, by identifying the relationships among digital technology, discourse, discipline, subject and identity.

Analyses of knowledge, power relations and ethics of the self in family farming suggest that digital technology provides spaces for innovation and change agency for women. The study findings revealed that digital technology served as a catalyst in shaping positive identities associated with characteristics of agents for change, but individual differences were also seen. Participants have the potential to exercise decision making power on how to act and what choices to make within family and the farm where patriarchal power still prevails. At the same time, they maintained expected behaviours, due to positive attitudes encompassed by being a good partner and good mother. This was not to be misconstrued with patriarchal oppression, rather accepted roles in an organisation where family and business could not be easily separated; i.e. blurred boundaries between the family and farm.

The culmination of this work presents an organisational behaviour-based model to reflect rural women's agency on the decision making process within their farm and the

broader community by analysing the individuals, farm (as a farm organisation), and community influence in this process. This model can be utilised to understand information flow and reaction to change within the farm organisation, and potentially design more effective approaches designed to bring about significant practice change within regional communities and on-farm. The novelty of this model is that it deals with the farming organisation as a function of the family unit and the farming business, whilst considering how the individuals — family or otherwise — affect this, and the community shapes this.

Throughout the analysis, it was apparent that digital technologies were being utilised by women, empowering themselves within their roles, from family, through farming business, to community. Participants demonstrated their skills in active community engagement as well as networking skills in agricultural information sharing. However, a perception of negative effects brought about by digital technology was also apparent, and these were usually manifest as technology increasing the disconnection between land managers and their land; i.e. farming is also a social choice whereby farmers seek to work within their fields, rather than within offices, and technology is seen as driving farmers towards the latter. Therefore, future work is required to allay such concerns and create an awareness of technology as an aide, rather than solution, through socio-psychological intervention in order to prevent potential technology-related disorders such as technology dependence. This must be considered in future digital agricultural projects because, with the continuing innovation and technology changes, it may become harder to control the balance between 'real farm life' and 'online life'. Findings of this research invites researchers to explore both the productive and constraint nature of power relationships prevailing in the contemporary family farming industry giving due recognition to moral practices of family, and with specific consideration of the role of technology in this dynamic.

CERTIFICATION OF DISSERTATION

This thesis is entirely the work of Hasanthi Buddhika Wirasagoda Arachchillage except where otherwise acknowledged. The work is original and has not previously been submitted for any other award, except where acknowledged.

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GLOSSARY OF TERMS

Subject positions – Positioning of an individual within a discursive structure. Once having taken up a particular position (role) as one's own, an individual inevitably sees the world from the vantage point of that position and in terms of particular images, metaphors and concepts (Davies & Harré, 1990, p. 46)

Subject –Possibility of being a certain kind of person who has unique personal experiences (Sclater, 2003, p. 5)

Subjectivity – Possibility for lived experience within a larger historical and political context and situating selves in webs of social relations (Sclater, 2003, p. 6)

Subjectification- The process by which individuals transform themselves in to subjects (Foucault, 1982, p. 777)

Biopower – A dominant technology of power which organises and controls human subjects as a population (Foucault, 1978, p. 137)

Discourses- Practices which systematically form the object of which they speak (Foucault, 1972, p. 49)

Governmentality – A model of governance which harnesses the productive capacities of individuals so as to govern entire population (Lemke, 2015, p. 78)

Technology – A resource that aims at efficiency towards driving on to the maximum yield at the minimum expense (Heidegger, 1977, p. 15)

Technologies of self – Techniques that allow individuals to develop relationships with the self, for self-reflection, self-knowledge and self-examination (Foucault, 1990b, p. 29)

Tactical reversal - The strategic mode of power as a form of resistance (Thompson, 2003, p. 113)

Technology – Methods, systems and devices which are the result of scientific knowledge being used for practical purposes.

Digital technology – The branch of scientific or engineering knowledge that deals with the creation and practical use of digital or computerised devices, methods and systems.

Digital agricultural projects – The projects that combine digital technology with agricultural projects in order to integrate agricultural production from the paddock to the consumer. These technologies can provide the agricultural industry with tools and information to make more informed decisions and improve productivity.

Community - All the people living in an area or a group or groups of people who share common interests. It can be prefixed to distinguish one group from other.

Smart Farming- A farming management concept using both digital and non-digital technology in managing variations in the field accurately, to grow more food using fewer resources and reducing production cost.

Big data – Data sets which could not be captured, managed and processed by general computers within an acceptable scoop (Apache Hadoop)

Internet of things- The worldwide network of interconnected objects uniquely addressable based on standard communication protocols

Cloud computing – A model for enabling worldwide, convenient, on-demand network access to a shared pool of configurable computing resources.

Disruptive technologies – New technologies that completely change the way things are done.

Telstra - Australia's largest telecommunication company

Xero - A cloud-based accounting software platform for small and medium-sized businesses.

Succession planning – The process of identifying and developing new leaders who can replace old leaders when they leave, retire or die.

Professional development – The process of improving and increasing capabilities of an individual through access to education and training opportunities in the workplace, through outside organisation, or through watching others perform the role.

Agentic behaviour – A trait of the individuals who are able to effectively respond to the changing requirements of their work or environment.

Change agent - A person who generally encourages adoption of a new idea who influences clients' innovation decisions in a direction deemed desirable by a change agency.

Family morale and harmony – In the context of this research, family morale and harmony is defined as a situation where family members acknowledge each other's achievements, that they are emotionally attached and close to each other, where they support and care for each other's welfare leading to success in their family business.

Innovation – The novel application of new or existing information, integrated in innovative ways.

On-farm innovation – Innovation that come from farmers themselves.

Co-innovation – Innovation is filtered, refined and adopted by both the farmers within, and outside, the community.

Socio-psychological interventions – Therapeutic techniques used to prevent technology addiction considering both social and psychological factors.

LIST OF ABBREVIATIONS

ABS – Australian Bureau of Statistics

ABARES – Australian Bureau of Agricultural and Resource Economics and Sciences

ACMA – Australian Communication and Media Authority

AFI – Australian Farmer Institute

AIA – Australian Infrastructure Audit

ANT – Actor-Network Theory

APO – Australian Productivity Commission

APEN – Australasia-Pacific Extension Network

CEO – Chief Executive Officer

CGIAR – Consultative Group for International Agricultural Research

CSIRO – Commonwealth Scientific and Industrial Research Organisation

DOE – Department of Environment

DIISR – Department of Innovation, Industry, Science and Research

DPI – Department of Primary Industries

FAO – Food and Agriculture Organisation

FDA – Foucauldian Informed Discourse Analysis

FG – Focus Group

FO – Farmer Organisation

ICT – Information and Communication Technology

ICTs – Information and Communication Technologies

ISP – Internet Service Provider

IOT – Internet of Things

NEST – National Agribusiness Education and Labour Taskforce

NFF – National Farmers' Federation

NBN – National Broadband Network

NGO – Non-Government Organisation

OB – Organisational Behaviour

P – Participant

PMSEIC – Prime Minister's Science, Engineering and Innovation Council

RIRDC – Rural Industries Research and Development Corporation

RIRG – Rural Innovation Research Group

RWICT – Rural Women's Interactive Communication Technologies

SELN – State Extension Leaders Network (Australia)

TA – Thematic Analysis

USQ – University of Southern Queensland

UNGC – United Nations Global Impact

WFO – World Farmers Organisation

CHAPTER1: INTRODUCTION AND JUSTIFICATION OF THE RESEARCH

> "*Women play an increasingly influential role in every aspect of rural Australia – they share a passion for a viable and sustainable future for Australian agriculture, and they are making important decisions about things like succession planning, financial management, and keeping the family unit strong. This award, the highest recognition for rural women in Australia, highlights the ability of women to lead their communities, bring about change, drive innovation and build resilient rural communities" (Speech by Susan Bower, Westpac Head of Agribusiness at RIRDC Rural Women of the Year Award 2015).*

Bower's quote highlighted Australian women's contribution to their community in multiple ways and their skills in handling multiple identities successfully for the betterment of farming, family and the community. This PhD research undertakes exploration of available literature and focus group discussions in order to reveal a portrait of rural women within contemporary family farming in a digitally advanced Australian society.

1.1 Introduction

The purpose of this thesis is to explore the way in which Australian rural women construct their identities and utilise their differences, as a source for creative change both in their family farming businesses and the community. This is done by examining how their use of digital technology[1] affects their opportunities for action. Thus, the study locates identity construction in individual contexts, as well as in the structural setting of their environment around which their identities are constructed. The need for this research is arguably greater because rural women's environment – the family,

[1] The branch of scientific or engineering knowledge that deals with the creation and practical use of digital or computerised devices, methods and, systems.

farm and the community[2]- are becoming increasingly automated and data-driven due to rapid development of technology, requiring positive identities which are embedded with professional, innovative and agentic skills to manage the farm as a farm business organisation.

Stemming from this, rural women's construction of new subject positions (identities)[3] that may lead to the enhancement of professional, innovative and agentic skills in their farming business organisation and their local community, is therefore a topic of interest. The research reported in this thesis further explores the contribution of digital technology towards positive identity development as change agents[4] and how they use digital technology as a tool for professional development[5] in order to conduct the family farm as a farm organisation to enhance its performance. At the same time, the thesis investigates how these skills can be utilised not only as a way of improving farm performance, but also empowering them to play a much greater role in the community in sharing agricultural information to, from and within their community (strengthen existing agricultural extension feedback loop), while empowering them through their own contextual abilities.

Therefore, this chapter will present an overview of the research by:

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[2] All the people living in an area or a group or groups of people who share common interests. It can be prefixed to distinguish one group from other.

[3] Positioning of an individual within a discursive structure. Once having taken up a particular position(role) as one's own, an individual inevitably sees the world from the vantage point of that position and in terms of particular images, metaphors and concepts (Davies & Harré, 1990, p. 46)

[4] A person who generally encourages adoption of a new idea "who influences clients' innovation decisions in a direction deemed desirable by a change agency.

[5] The process of improving and increasing capabilities of an individual through access to education and training opportunities in the workplace, through outside organisation, or through watching others perform the role.

1) Introducing the background context of the research, as related to rural women, including national priority areas, agricultural extension and the role of technology in this;
2) Identifying key research in relation to the purpose of the work, in order to justify the requirement for the research;
3) Synthesising the problem statements and the importance of addressing these;
4) Identifying the theoretical constructs;
5) Providing the overarching aim, the core aims within this; and,
6) Articulating the major research questions, and their components, to illustrate how this study will achieve its research objectives, underpinned by theoretical constructs.

The structure of the thesis is presented at the end of this chapter with a summary as to what each chapter delivers to the reader.

1.2. Introducing the background context of the research

This study locates identity construction in both the individual context, and in the context of the structural setting of the individual's environment. Thus, it is important to look at how they navigate their identity construction within national culture, embedded in social, historical and political context. The following discussion provides an understanding of the dynamics of the agricultural industry, and relevant digital technology and social landscape as important macro contextual factors that may shape and reshape rural women's identity as agents for change.

1.1.1 Technology and a global shift in agriculture

The United Nations Food and Agriculture Organization (FAO) has estimated that by 2050 food production worldwide will need to increase by 70 percent in order to feed an estimated global population of 9.5 billion people (FAO (1993). Global research, including UNGC (2017), has shown the potential of digital technology to make agriculture more productive, more consistent and to use time and diminishing resources such as land and water more efficiently. It is evident that digitalisation is reshaping agricultural industries, making farmers more connected, integrated and

informed than ever before (WFO, 2017). Future agriculture is now focusing on combining Cloud Computing and the Internet of Things (IOT) to promote the modernisation of agriculture, with the intent that technology integration will effectively solve issues in relation to agricultural extension, farm labour efficiency and rural development (Gandhi & Armstrong, 2014; Kern, 2000; Tang, Zhu, Yan, Zhou, & Wu, 2002; TongKe, 2013; Unwin, 2009).

The above benefits of digital technology can only be achieved if farmers receive accurate information and at the right time, and provided that farmers' skills and knowledge in taking advantage of information currently exist to an extent that allows them to utilise this technology and access the information (Dobermann & Nelson, 2013; Nakasone & Torero, 2016; UNGC, 2017). Therefore, the farming sector must build strategies and explore ways of unlocking existing potential, and prepare for future challenges, in the present moment. There is also a need for global researchers to identify the potential of agricultural extension services and the farmers' capacity to manage, deliver, absorb and use information in order to leverage farm productivity. Kelly, Bennett, and Starasts (2017) describe networked learning – by way of the internet and digital communities – as a means to assist agricultural extension, professional development and innovation, although the adoption of such technologies requires change agents to facilitate the change.

There is a perception that digital literacy and time constraints act as barriers to the adoption of technology in farming communities (Moosa, 2010). Disruptive (or innovative) technologies are rapidly adopted as their usefulness is immediately obvious. However, it is not possible for all useful technologies to be disruptive.

Additionally, there is an emerging plethora of technological choice and service. Farming communities will rely on change agents to motivate adoption of useful and trusted technologies, and in doing so shape the communities these technologies are introduced into. These change agents are therefore entrusted, either directly or inadvertently, by the community to shape the community. Historically, women have shaped their rural communities for many years and their contribution to agriculture in a significant way (Dale-Hallett, 2016). Rural women have demonstrated their skills as

vibrant agents of change and invaluable repositories of community knowledge (CGIAR, 2012). Therefore, unleashing the potential of the agentic skills of rural women helps bring useful and trusted technologies to farms at the community level. Therefore, considering this shift in global agriculture, this research integrates perspectives on agriculture, digital technology, and the identity creation of rural women to understand what makes rural women more likely to be change agents in their community. These perspectives are briefly explained in the following sections.

1.1.2 Digital technology, agriculture and rural women: An Australian perspective

1.1.2.1 Digital technology

Many sectors of the Australian economy have been significantly influenced via Information and Communications Technology (ICT) development over the last few decades (Reeson & Rudd, 2016). According to the recent Australian Infrastructure Audit (AIA) in 2011, the economic contribution of ICT was $21 billion in that year and expected to increase approximately $42 billion by 2031 (AIA, 2015), with an estimated $120 billion potential impact on the economy.

According to the 'Enabling the Internet of Things for Australia' report prepared in 2015, Australia is planning another big leap in the ICT sector by implementing the Internet of Things and Big Data over the next decade (Koch, 2017). The aim is the interconnection of all devices via the internet (Internet of Everything – IoE) to create an ambient, networked computing environment through continued expansion of smart sensors, cameras, software, databases, including big data analysis, and cloud computing (AIA, 2015). The Australian agriculture sector has become a key sector of focus, as connectivity in rural communities was effectively completely non-existent, or, where existing in the last 20 years, highly inefficient, meaning there are many development opportunities for technology companies. However, the effectiveness of adoption of digital technologies within the agricultural sector depends on the capacity of farmers to understand, manage and make use of new knowledge (Nakasone & Torero, 2016). The next section briefly identifies the contribution of digital technology to Australian agriculture.

1.1.3 Digital technology and agriculture

According to Malcolm, Sale, and Egan (1996), Australian farmers will face two major challenges in the next forty years. One challenge will be helping their fellow farmers from all around the world to supply adequate food and fibre, efficiently and cheaply enough, to feed a population of around 9.5 billion people by 2050. The second challenge will be to increase food production while dealing with and adapting to significant changes in climate, availability of natural resources, markets and the changing composition of the agriculture labour force. Therefore, workforce development and improved productivity in agriculture are fundamental elements of a robust Australian economy (NFF, 2014). And digital technologies have the potential to revolutionize Australian agriculture and make possible the next big leap in productivity (Australian Farm Institute, 2016).

Literature suggests that the use of ICT in Australian agricultural industries accelerates practice adoption and change, creating greater economic benefits for the country (Godfray, Beddington, Crute, Haddad, Lawrence, Muir, Pretty, Robinson, Thomas, & Toulmin, 2010). In a similar fashion to the agricultural revolution of the 19th century, the rapid growth of ICTs over the past decades is expected to drive agriculture in new directions (AFI, 2017). It is also assumed that digital approaches will play a significant role in closing the yield gaps and potentially reducing costs and adding new value to supply chains (CSIRO, 2015).

While capital investment in Australia shows a positive effect on economic growth, it also has a significant impact on labour productivity (Shahiduzzaman & Alam, 2014). Research has shown that Australian farmers have a positive attitude towards ICTs (Rolfe, Gregor, & Menzies, 2003; Salim, Mamun, & Hassan, 2016). Research indicates that computers and the internet were used on 58 percent of farms in 2000, but increased to 90 percent in 2008 (James, 2015). Agricultural extension has played an important role in linking new information and technology to farming communities. Unlike traditional extension services, the emerging model of demand-driven extension incorporates innovative partnerships and a variety of communications and information flows to and from rural communities (Kemoni, Wamukoya, & Kiplang'at,

2003). The continuing rapid development of ICT is probably the biggest factor for facilitating and reinforcing change in agricultural extension (Jones & Garforth, 1997) in the agricultural sector. Therefore, it is important to have background knowledge of digital technology in relation to agricultural extension.

1.1.4 Digital technology and agricultural extension

The role of Australian agricultural extension is to build capacity and resilience in Australian farming industries (Hunt, 2014). This is considered as a broad concept where actions are required beyond the traditional extension role of training and education. In order to build a better resilient rural community, extension needs to be associated with agricultural knowledge systems (Röling, 1992) aimed at facilitating the transfer of knowledge to enable change, and providing a feedback loop to researchers to further enhance innovation. The process of agricultural research, development and extension (RD&E) restructuring in Australia in the early 1990s has affected the nature and delivery of extension services they were willing to provide through the public sector (Coutts, Roberts, Frost, & Coutts, 2005; Marsh & Pannell, 2000).

In the past, Australian agricultural extension services were largely publicly funded, with this funding highly diminished and effectively stagnant from the 1990s (Hunt, 2014). State governments withdrew the bulk of public funding of agricultural extension based on the notion that agricultural enterprises were becoming highly diverse and that the private market would subsequently fulfil the extension requirement. However, no such private extension market has been realised from that point to the present because the privatisation of agricultural extension has weakened the research-extension link and the feedback loop, resulting in a failure in the agricultural knowledge systems approach in extension (Botha, Coutts, & Roth, 2008).

ICT has the potential to realise either a public or private extension market, if effectively constructed (Kelly et al. 2017). Pannell and Vanclay (2011) have suggested that agriculture will continue to change in response to technology, markets and climate and a continued growth in the use of advanced information and communication technologies in agriculture, providing information to farmers in novel ways. Australian

farmers are increasingly using information on the web via smart devices and these new digital tools offer farmers the ability to access information in their own time, in their own way, and at a location that is convenient for them (Roberts & McIntosh, 2012).

There are many possibilities for the potential applications of technology in agricultural extension (FAO, 1993; Zijp, 1994). Information could be considered as the most effective tool for farmers in acquiring knowledge and making decisions (Gandhi & Armstrong, 2014). Higgins (2011) points out that the rapid expansion of broadband into rural areas is important for information exchange in agricultural extension. According to Sulaiman V, Hall, Kalaivani, Dorai, and Reddy (2012) ICTs will be useful in providing a rapid means of communication, synthesising data and assisting with overcoming the 'tyranny' of distance. However, they further point out that ICT alone will not be sufficient to drive this change. Kelly et al. (2017) present the set, and the social and epistemic design that online extension platforms will require in order to develop meaningful and authentic digital communities, which they postulate operate with similar dynamics to physical communities; i.e. the human to human connections must be developed over time, alongside simultaneous development of a community's social fabric. It is also feasible that ICTs could be employed to overcome the private extension market failure. However, without a social approach addressing human interaction, the contribution of ICT's in presenting new knowledge and being a tool for using it is debatable (Sulaiman V et al., 2012).

1.1.5 A social approach to digital technology and agricultural extension

Previous researchers have expressed concern that the contribution of ICT to agricultural extension must have a social approach addressing human interaction, rather than focus on simple dissemination of information (Bennett, 2015; Kelly et al., 2017; Sulaiman V et al., 2012). Recent digital platform concepts suggest that a networked learning approach to extension will provide the social interaction element in conjunction with connecting farmers to their data and the power of big data (Bennett, 2015). ICT-based networked agricultural extension approaches are capable of addressing most of the socio-economical barriers faced by rural communities when

accessing the existing agricultural extension service. According to Kelly et al. (2017) farmers experience: (1) disconnectedness due to rural remoteness; (2) dispersed spatial distribution and; (3) time restrictions due to busy rural lives. Therefore, ICT-based agricultural extension approaches help eliminate such barriers and offer effective technology transfers and integrated social development through mutual benefits.

However, the development of human-human interactions for agricultural extension is also expected to encounter challenges such as successful interactivity between actors involved (Kelly et al., 2017). One of the challenges is to overcome barriers to make it possible for people to participate in such approaches. The ACMA report outlines the importance of identifying enablers such as a thriving start-up community, as well as inhibitors such as skill shortages (ACMA, 2016) for a better technology deployment. Additionally, despite the promises ICT brings to society, it is expected that organisations will encounter many obstacles when they seek to apply these technologies in rural communities to realise their strategic goals (National Research NRC, 2000).

This emphasises a need for an agricultural knowledge systems approach that promises farmers' a "resource endowment and knowledge base" (Gwandu, Mtambanengwe, Mapfumo, Mashavave, Chikowo, & Nezomba, 2014, p. 91) that will strengthen the research-extension link and the feedback loop (Botha et al., 2008). Therefore, the farming sector will need to build their strategies while thinking of both unlocking today's potential and preparing for future challenges. Addressing the challenges of building a better connectivity between actors results in a greater awareness of research, innovation and knowledge construction through interaction. This leads to professional development and a sense of agentic behaviour (Kelly et al., 2017) by farmers involved in the process. In order to make this transformation a reality, these farmers involved in the process need to have a positive attitude towards ICT and related user skills in connecting and communicating with a range of people. Although ICT applications are said to be well embedded in the social fabric, not all contribute equally, and thus the realities are less transformatory than imagined (Selwyn, 2008).

Several researches reveal that women were more active than men in their use of digital technology in general and more actively using ICTs for farming related research and innovation (Bennett, 2015; Bryant, 1999; Mackrell, Hellens, & Nielsen, 2009). Several studies have identified women's inherent skills in human relations, synthesizing information, problem solving, and create linkages needed to get things done (Adler, 1997; Gardner, 1993; Gray, 1989; Wells & Tanner, 1994). Even though these qualities are not exclusive to women, studies suggest that women demonstrate these skills more frequently than men (Gardner, 1993; Gray, 1989). Therefore, it is in the promotion of women as integrators and mediators in online extension platforms, that the potential of ICT can best be harnessed, and society benefitted.

1.1.5.1 Rural women's skills and positive attitudes towards social connectedness and digital technology

According to aspects of women's cultural heritage displayed in Museums Victoria's Victorian Cultural Collection, senior curator Dale-Hallett (2016) contended that the contribution of Australian women to sustained families , farm and communities. In addition to the variety of tasks required of them for the sustaining of farm and the family, women were the glue that held the community together during adverse conditions.

Rural women have played a leading role in community development. Their role has been multifunctional and included strengthening family connectedness, healing and rebuilding spirits, building relationships and assisting in negotiation with external institutions such as banks. One notable Australian woman – an iconic Queensland woman, Lady Florence Bjelke-Petersen who gave a strong voice to rural women across the country – is famous for using pumpkin scones as a communication tool which enabled her to better connect with people within rural communities (Dalton, 2013; Motherwell, 2017).

Australian women's leadership and innovation are demonstrated as they explore new opportunities such as organising community farmers' markets and reinventing food preservation techniques used in ancient Australia. Similarly, recent researches

highlight women's positive experiences with ICTs, and their enthusiasm, strategic and technical skills (Hay & Pearce, 2014; McQuillan, 2010).

Rural women have been described as developers of authoritative voices in the community and they have demonstrated their role as producers of knowledge (McQuillan, 2010). This suggests that rural women have successfully demonstrated the dynamics of their positive identities over many years. These women have displayed diverse inherent qualities in public and private spheres, particularly in being the 'glue' that keeps others together, in healing and rebuilding broken spirits, and in being multitaskers. Based on the findings, this research hypothesises that the identity of 'rural women' is a positive identity stemming from the interplay of positive attitude and various skills such as in innovation, leadership, community development and building relationships both in public and domestic spheres. Their positive characteristics are demonstrated through the identities they display performing various tasks available or allocated to them within a given time and space. This research aims to explore this identity, based on empirical evidence in the present context of family farming in Queensland, Australia.

1.1.5.2 Attitude shaping practice – agents for change?

Board (1997) argues that better decisions in the rural sector would flow from increased diversity in human resources by harnessing the expertise and numerous skills of rural women. The findings of Mackrell (2009) identified an improved adaptive ability of farm women in farm management, due to an increased use of computer-based decision support tools. Bryant (1999) contended that many rural women were increasingly aware of the decision making and farm management possibilities of computer programs and recommended that farm men and women work collaboratively to enter data, analyse, and interpret it. McQuillan (2010) contended that women have developed an identity as producers of knowledge, setting aside the stereotype of women as consumers and passive objects. Further, rural women have undertaken significant leadership in community development and have been described as 'new pioneers' in the adoption of new ICTs (Grace et al., 1996; RWICTs Team, 1999). This research hypothesises that, considering their positive identity

dynamics, a rural woman's portrait can be redefined and refigured as an agent for change who enables a research-extension link and feedback loop back to the knowledge system through access to digital technology. Moreover, O'Sullivan and Taylor (2004) argue that a change agent[6] is a self-constructed identity and not imposed by any external, social, political or economic systems (O'Sullivan & Taylor, 2004). Thus, an examination of identity construction by farm women is important for understanding their agency. It is evident that rural women's professional development as change agents not only helps social transformation, but also aids in their own personal transformation which in turn could be a catalyst for social change.

1.2 Addressing the gap and developing the problem statement

Previous studies concerning rural women and digital technology in agriculture within Australia have focused on empowering rural women through digital technology, with the common feminist assumption that rural women are "undervalued, marginalized, not recognized, voiceless, invisible and silent" (Alston, 1998c; Alston, Clarke, & Whittenbury, 2018; Alston & Wilkinson, 1998) Historically, much research over the last century have noted the domination of masculinity (men) over femininity (women), as well as the invisibility and underestimation of women's contributions in farming activities (Alston, 2003; Alston et al., 2018; Bock & Derkzen, 2007; O'Hara, 1998; Sheridan & McKenzie, 2009; Shortall, 1992). Several authors who have worked on women's leadership development, empowerment or emancipation in the agricultural sector have clearly shown that the gendered construction of the family, community and business roles continue to be major barriers to women's access to leadership positions in agriculture, regional organisations and also in the corporate sphere (Alston, 2000; Pini, 2008; Sheridan & McKenzie, 2009; Sinclair, 2005, 2007). Most approaches used in previous research give women and gender the central focus (Hesse-Biber, 2011) and give consistent priorities in challenging a patriarchal social order and working to empower women for equal power, and equal opportunity.

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Despite the prevalence of patriarchal power, women have always played a significant role in the stability of their family, farm and the community, such as in contributing to approximately fifty percent of the output of farming communities. However, an archaeological analysis revealed that the nature of women's farm work is often unacknowledged because most of their work is intangible and characterised by relationships and oral traditions (Dale-Hallett, 2016). Despite this 'invisibility' in the public sphere, they have, however, continually displayed agentic actions such as leadership and innovation by exploring new opportunities for their family business, for example (Dale-Hallett, 2016). Therefore, understanding the empowerment mechanism for this is of interest to this work.

Advancement of technology, commercialisation of the family farm (as a business) and de-traditionalisation of European-Western culture have largely contributed to transform the meanings of dominant discourses around gender roles, portraying women farmers' roles as diverse and important to farm operations. Nevertheless, as a result of continuing agricultural societal transformations, gender roles and their identities have been changing (Verdon, 2010). The dynamics of women's farm roles and the acquisition of multiple subject positions do not suggest a prevalence of gendered division of labour and patriarchal power, but it can be argued that technology has expanded women's space in the contemporary family farming.

Moreover, considering family farming as a co-existence of family and the business, power relationships relating to farm roles within a family cannot be challenged merely for gender equity, but must be considered according to the types of bonds (by birth and marriage) between family members. Thus, personal and collective commitment should be given due consideration in this research. Therefore, this research spans this literature gap by exploring the shifting nature of rural women's multiple subject positions within Australian agriculture as it transitions into a state of digital technological advancement.

Therefore, the problem statement of this research is:

The current digital technology transformation in agriculture will result in rural communities with enhanced connection, creating farm efficiencies, and allowing equivalent transfer of knowledge to urban community counterparts. Women will be extremely important change agents within this transformation and maintain numerous positive identities that help to build a stronger, more connected, and authentic community while contributing to the performance of their farming business. However, the current reality is one where practice change is slow, even with the advent of digital technology. Technological development difficulties aside, the problem of utilisation of technology is only solved when sufficient time to learn to use the technology exists and the apparent benefits are clear. Without the empowerment of change agents within farming communities, rural communities will not realise the full potential of their equivalent urban counterparts within the short-term.

Through revealing the process of positive identity construction of rural women as change agents, and exploring their access to digital technology, the process of resilient family farming in the context of Western Queensland in Australia will be documented in response to the problem. This approach will serve to highlight the importance of women in digital technology transformation, establishing them as clear agents for change. It will also aid in understanding how the farming family unit maintains and builds resilience within business, community, family and community environments.

1.3 Theoretical background

Identity has been a subject in many research studies focusing on farm women (Alston, 2003; Alston et al., 2018; Bock & Derkzen, 2007; O'Hara, 1998; Sheridan & McKenzie, 2009; Shortall, 1992). Although 99 percent of farm women work in family operated farms, little attention thus far has been paid to the complex power relations within the family farming unit within Australia, where the family-farm is considered to be a strong business model (Schneider, 2016). Failure to consider family and business as a unit

where family morale and harmony[7] is a driving force towards success, has created negative identities for rural women as "marginalized, not recognized, voiceless, invisible and silent" partners in agriculture (Alston, 1995b, 2000; Alston et al., 2018; Shortall, 1992). Such an identity for women has been perpetuated throughout history, despite the fact that changes in rural women's identities are clearly visible within agriculture (Brandth, 1995; Brandth & Haugen, 2005; Brasier, Sachs, Kiernan, Trauger, & Barbercheck, 2014). Family farming is incorporated with family values, collective commitment and continuity. Partners are ready to share success or failure in their joint efforts (Verdon, 2010). An approach which explores rural women's emerging identities, as well as their existing identities, such as farmer, mother, partner, sister, daughter, neighbour, friend etc., and their roles of keeping up family morale and ensuring family harmony (Adams, 2004), is best suited to this study. Stemming from this concept, this research aims to develop a conceptual framework considering rural women's differences, diversity and the complex power relations within the structural setting of family business into account.

The approach to the notion of rural women's identity construction in this study is based on the work of Foucault (1926-1984) on the constitution of the subject (identity construction) where this research uses a conceptualisation of identity construction as an interplay of the environment (family, farm, community, infrastructure) and of individuals' agency and moral conduct, revealed through a set of practices. This means that the process of identity construction by rural women in the context of family farming is viewed neither the production of the environment, nor displaying freewill, but as a constant interplay of two. This approach to the exploring of the identity construction is articulated by (Foucault, 1988c) as *technologies of self and power*, is conceptualised in this study as the interaction between the agency and moral conduct

[7] A situation where family members acknowledge each other's achievements, that they are emotionally attached and close to each other, where they support and care for each other's welfare leading to success in their family business.

of rural women and the structural components of their family, farm and the community.

The research questions are addressed by analysing all the relevant data (focus group discussion transcripts) through Foucauldian Discourse analysis (FDA) that facilitates understanding of the interplay between various power relations between the family, the farm business and the community as constructed at the level discourse is proposed for this study. Individuals' identities are constituted within discourses, but discourses are dynamic and variable as are identities. The works of two thinkers – Judith Butler and Michel Foucault – consider that identity is a social construct and changes with time and space (Butler, 1988, 2004, 2011; Foucault, 1982, 2005). The methodical approach chosen for this study is Butler's theory of performativity which explains how identity is formed through a set of repetitive acts (Butler, 1988), in combination with Foucault's work on knowledge/power relations, familial power, ethics of the self and its determining role in generating meaning, and identity.

It is commonly assumed that power is always negative and repressive, but Foucault challenged this notion of power by analysing modern power as productive and creative for certain types of subjects (Foucault, 1977). In addition to that, how rural women actively modify their interior behaviour through exterior experience of the world (such as digital technology, farming practices, external power relations) can be described using Foucault's philosophy of ethics and morals of individuals – referred to as technologies of the self (Foucault, 1988d) – as well as Butler's philosophy of critiques of the self as a self-transformative practice (Butler, 1997, 2004). Therefore, Foucauldian and Butlerian lenses have the ability to bring the relationships among rural women, digital technology, discourse, power, knowledge, discipline and subject into intense focus.

Even though Foucault has not considered power relations in discourses related to agriculture and farming as one of his main study areas, his works on other institutions (hospitals, asylums, families and prisons) can be used as a toolbox (McLaren, 2009) for a particular focus of inquiry as long as the user ensures a coherent connection with Foucault's philosophical aims and approaches (Fadyl, Nicholls, & McPherson, 2013;

Hook, 2001). Therefore, to reveal the process of positive identity construction of women as change agents – specifically in relation to digital technology in agriculture – within the numerous connections of the farming family unit, a Foucauldian approach provides a novel means by which to explore the power structures and their influences.

1.4 Key aims and research questions

1.4.1 Aims of the research

Specifically, this research is based on the hypothesis that digital technology can act as a catalyst for the construction of multiple positive identities for rural women. Consequently, the broad aim of this research is to explore the concept of identification of rural women as change agents through access to digital technology. In order to limit the scope of this broad topic, the research aim has been subdivided into three core aims that together addressing the overarching aim. These core aims are:

- To investigate how rural women, construct their identity that may lead to the enhancement of their professional, innovative and agentic skills, in the context of digital technology.
- To identify how rural women can be more effective as change agents in the agricultural industry and in their communities in organising and filtering agricultural knowledge to enhance farm performance in their farms and their communities.
- To evaluate how rural women are supported by their interpersonal relationships towards their capacity to create and leverage a more resilient, social and economic environment for the farming family and their various communities.

These aims can be achieved through understanding the historical background and the real-world situation of rural women in the context of Australian farming families. In particular, this thesis focusses on those women in rural western Queensland who have been extensively using digital technology.

1.4.2 Research Questions

In order to achieve the above aims of this research, the following main research question, and three sub questions, have been formulated to address the significant gap identified by the literature review through the problem statement.

The overarching research question is:

- How is digital technology utilised within the construction of rural women's identity as change agents within their community?

In order to refine the scope of investigation for the major research question, three subordinate questions have been developed and are as follows:

1. How do rural women construct professional identities as change agents?
2. How do rural women use digital technology to transfer agricultural knowledge to their farming community?
3. How are rural women supported by their families and their various communities for the enhancement of their professional, innovative and agentic skills?

1.5 Detailed structure of the thesis

The thesis contains eight chapters. This introductory chapter provides the necessary background, applied and theoretical, to develop the research aims and the research questions on which the study is structured.

Chapter Two presents the literature review relevant to this study, with special attention to the contribution of rural women to Australian agriculture. The chapter also reviews the literature concerning the historical contribution of extension services and ICTs.

Chapter Three details the definition of the theoretical and methodological framework utilised in this research. Foucault's philosophy on technologies and how they are applied in this research is explained. Foucault's notion of the 'toolbox', which is used

to explore key principles and methodological imperatives, is also discussed in detail. Definitions of key words introduced by Foucault in relation to his critical discourse analysis are also included.

Chapter Four presents and discusses the method of analysis used in this particular research, according to the theoretical framework introduced, and presents a general interpretation of the results to show how rural women construct dominant subject positions during focus group discussions.

Chapter Five presents an analysis and interpretation for research question 1 in order to answer how women farmers negotiate gender roles in order to construct a professional identity as change agents.

Chapter Six presents an explorative analysis and interpretation for research question 2 on how rural women use digital technology to transfer agricultural knowledge to their farming communities.

Chapter Seven investigates how women, their family members and their communities construct and position women as change agents. This is explored through the third question of how rural women's professional development and innovation skills are viewed by their family and their community.

Chapter Eight, the final chapter, integrates all themes that emerged from the data, as well providing limitations and future research needs. It concludes with a brief conclusion to the overall thesis.

CHAPTER 2: LITERATURE REVIEW

2.1 Introduction

The study aims to explore the capacity of women farmers to utilise digital technology as a catalyst for the construction of positive identities as change agents. The purpose of this chapter is to address the central concept of the study – women farmers' identity construction as an interplay of the structural components of the environment and agency – through a critical review of the literature looking into the links between external influences and internal dispositions that reside within them. Based on this, this review aims to find out what is already known about the context and what trends and issues emerge as opportunities to be further explored. It is also important to identify the gaps and questions that need to be verified and addressed during data collection. Therefore, this chapter considers the changes in the structural setting of the Australian agricultural sector and its influence on rural women's identity construction. Moreover, this section specifically outlines rural women's spatial and temporal identity dynamics within a changing structural setting with which they interact. The importance of this review is to contextualise the study design and relate the purpose of the study to its context.

This is followed by a brief introduction to agricultural extension and how it has played a significant role in the development of Australian agriculture. The role of digital technology in the process of agriculture transformation, its effect on family farming, and rural women's traditional farm related work is then discussed. Specific attention is placed on the rural women's contribution to Australian agriculture and their positive identity dynamics over history. Leading on from this, contextual exploration, rural women's skills in actively using digital technology, and its impact on positive identity dynamics, is investigated. This is followed by a discussion identifying possible opportunities for rural women to position themselves as professional on-farm change agents in their community.

To aid in the exploration of the research problem statement, and in limiting the scope of the literature review, the review is divided into three sub sections as follows:

1. Transforming agriculture through digital technology. This section discusses the background of agriculture throughout history, highlighting opportunities and challenges that need to be addressed to feed the growing population. Special emphasis on agricultural extension, digital technology, family farming and factors affecting agriculture transformation are discussed in this section.
2. The historical context of women's contribution to agriculture. In this section the changing nature of women's role in 'work' throughout history, and the perceived positive attitude of women towards digital technology, is explored.
3. Intertwined perspectives of positive identity. How multiple identities empower women as change agents is investigated in this section through a holistic examination of agriculture, digital technology, farm women, and their identity construction as emerging on-farm innovators.

2.2. Transforming agriculture through digital technology

The background of Australian agriculture and its changing context, the role of digital technology in farming, the nature of digital technologies used by farmers, and the social effect of the changes to practice that this technology brings, are central to this section.

2.2.1. Australian Agriculture

Covering 58 percent of Australia's land mass, agriculture continues to be an important pillar of Australia's economy. Its critical contribution to the Australian economy in gross domestic production and in export earnings has been significant throughout history, present and will continue to be into the future. Many Australians are directly or indirectly involved in farming, meaning that there is an inextricable link to the land and rural communities for many Australians. While digital technology and internet connectivity are relatively new to Australian agriculture, as compared to other western countries, like most industries, Australian agriculture has experienced unforeseen

gains in productivity and output, through the application of new technology and science, over the last 100 years (ABS, 2000).

At the turn of the century, much of the energy used to operate farms came from manual labour, while most of the remainder came from horses, bullocks and steam power. Large scale farming and grazing relied upon the availability of large numbers of unskilled workers. According to the Department of Environment (DOE), even though the dry climate and weathered soil of Australia presented challenges to farmers from the start, the country was well suited for production of high quality wool, which dominated early agriculture within Australia and continues as a major agricultural industry (DOE, 2010). Broad acre cropping in Australia became feasible through the development of several Australian inventions and technological advances, which allowed further expansion of the industry over the last century. These inventions included "the stump jump plough, the combine harvester, the discovery and use of water held underground in the Great Artesian Basin, [and the] development of irrigation around Mildura" (ABS, 2000). As a result of this, primary production in the current context is characterised by great diversity, with meat cattle, dairying, sugar cane and a wide range of horticultural crops grown since the end of last century. The pioneering of agriculture on a broad-acre scale within Australia is testament to the innovation that exists within the industry; i.e. there is a strong history of innovation driving Australian agriculture to where it is today (Boon, 2010).

By the early part of the 20th century, Australia's agricultural production had rapidly increased and output expanded largely beyond the needs of the Australian population. This increased production led Australia to become one of the world's major food exporters (DOE, 2010). According to The Prime Minister's Science, Engineering and Innovation Council (PMSEIC), earlier this century Australian farmers were producing enough food to feed 60 million people (PMSEIC, 2010). This equates to the average Australian farmer growing enough food to feed 600 people every year – 150 of these being Australians with the remaining 450 living overseas (Keogh, 2009). Australia's agricultural businesses are mainly engaged in cattle farming, dairy cattle farming, sheep farming or grain growing, or a mixture of two or more of these activities (Trewin,

2005). This clearly establishes Australian agriculture as an important global contributor, which is significant as this output comes predominantly from a family-farming business model, rather than a corporatized structure. However, corporatisation of farming is increasing.

In recent years, the most valuable commodities produced by Australian farmers have been beef and veal, wheat, milk, wool, vegetables, fruit and nuts, and lamb and mutton. Much of this produce is exported contributing significantly to global markets. The gross value of Australian agricultural production in 2017-18 was forecast at AUD$59 billion, with beef and wheat the top two commodities. It is expected this will grow to AUD$63 billion by 2022-23 (ABARES, 2018). Furthermore, export earnings of canola, cotton, barley, lamb, wool, wheat and live cattle is forecast to rise in 2018-19 (ABARES, 2018), with the top five export destinations being China, the United States, Japan, the Republic of Korea and Indonesia. Rising food demand in Asia has increased the share of total farm exports from 52 percent to 69 percent over the last decade, and it is expected to remain above the global average (ABARES, 2018). Therefore, professional development and innovation changes are necessary to ensure Australia can continue to take full advantage of the growing export market. Australia needs to expand its regional and international markets, introducing novel ways of undertaking agribusiness, the promotion of new products and the creation of new markets where everyone is involved in improving competitiveness and efficiency (Board, 1998). Given most enterprises operate a family-farming business model, this professional development and innovation is more than a simple business proposition, it is also a social undertaking affecting the individual family unit and the surrounding rural community. Understanding how change comes about and operates within this model is therefore paramount to practice change activities.

The United Nations Food and Agriculture Organization (FAO) has estimated that by 2050 food production worldwide will need to increase by 70 percent. Similarly, Fraiture, Wichelns, Rockström, Kemp-Benedict, Eriyagama, Gordon, Hanjra, Hoogeveen, Huber-Lee, and Karlberg (2007) highlight the importance of meeting food and fibre requirements of a growing population and its effect on competition for

freshwater resources and the concept of producing more with less, or existing, land resources. In order to feed the world population of nearly seven billion today, which is continually expanding, agriculture becomes the most important activity for human longevity. The agricultural requirement for land, water and human labour currently requires more than any other industry (McKenzie, 2013). This indicates future barriers and challenges that should be addressed in seeking to fully realise the potential of the agricultural sector. The next section discusses the challenges and opportunities that need to be considered in achieving the expected growth of the agricultural sector in Australia.

2.2.2. Challenges and opportunities

Malcolm et al. (1996) have shown that Australian farmers face two major challenges in the next forty years: 1) helping their fellow farmers from all around the world to supply enough food and fibre, efficiently and cheaply enough, to feed a population of around 9.5 billion people by 2050; and, 2) to increase food production while dealing with and adapting to significant changes in climate, natural resources, markets (Malcolm et al., 1996) and a diminishing agriculture labour force. Additionally, ABARES Executive Director, Dr Steve Hatfield-Dodds (ABARES, 2018) identified five key issues that in turn present opportunities to Australian agriculture:

1. The global competitiveness race;
2. Asia's re-emergence as a global power;
3. Evolving consumer preferences;
4. Resource scarcity; and
5. Climate variability and challenge.

He also emphasised the significance of responding to these challenges and opportunities in shaping the future of the Australian agriculture sector. ABARES Executive Director Karen Schneider further identified the need for investment in land, technology and people in order to improve productivity. Therefore, efficient management of scarce resources, workforce development (NFF, 2014) and improved productivity through new technology adaptation in agriculture are fundamental

elements of a robust Australian economy. The next section presents the means of addressing these challenges and utilising opportunities through the existing agricultural workforce, Australia's natural resources, current extension services, and advances in digital technology, with the overall goal of improving productivity in the agricultural sector.

2.2.3. Addressing the challenges and realising the opportunities

It is evident that innovation is the key to exploiting opportunities and addressing challenges (DIISR, 2011) in the agricultural sector, as innovation delivers new ideas, new ways of undertaking farming practices, provides efficient use of natural resources, reduces production cost in the long run, and opens new markets for agricultural products. DIISR (2011) has recognised that the application of digital technologies in the agriculture sector, as a tool to recognise and explore the potential of transformational change, has much to offer, while also highlighting the importance of a skilled workforce in the sector as coexistent. The level and quality of the workforce is one of the key issues that needs to be addressed in lifting productivity and raising innovation levels (Toner, 2011).

There are approximately 85,681 farm businesses in Australia (NFF, 2017) ranging from large multinational companies through to small family owned businesses (ABS, 2012). The agriculture industry has a workforce of more than 304,200 people accounting for about three (3) percent of the national workforce (ABS, 2017). The majority of this workforce is situated within regional Australia, utilising over 371 million hectares of land or 58 percent of the total land mass (ABS, 2017). The complete agricultural supply chain, including the affiliated food and fibre industries, provides over 1.6 million jobs to the Australian economy (NFF, 2017). The largest contributors to employment in the industry are the sheep, beef cattle and grain farming sectors comprising mostly family operated farms (99 percent), with very few farms operated as public or large companies (NFF, 2014).

The idea of family-farming as a business model is often misconstrued as inefficient. However, most of the capital in the Australian farm sector is generated by family farms

that have higher returns than the corporate farm sector (Schneider, 2016). Therefore it is important to focus on skills development of family members to take advantage of technology in order to build family farms as a strong business model (Schneider, 2016). Previous researchers emphasised rural women's significant contribution in keeping the family farm as a strong economic and social unit by playing multiple roles (Alston, 1995b, 2003; Haslam-McKenzie, 1997; Hay & Pearce, 2014). In addition to their domestic reproductive responsibilities, women have played an active role in productive farm activities such as land clearing, ploughing and harvesting (Dale-Hallett, 2016).

Although women's historical contribution to family farming has not been documented in numbers, a recent report of the National Agribusiness Education and Labour Taskforce revealed that women accounted for 45.7 percent of employment averaged across all agricultural industries (NEST, 2014). Women are critical to Australia's labour force, not just in making up numbers, but bringing valuable skills and diversity of thought (Poynton & Rolland, 2013). Therefore, improving women's representation in the sector is likely to contribute to improved innovation and productivity within agriculture (NEST, 2014). Indeed, the above findings suggest that women have historically played critical roles in rural community development and family-farming success.

Women's involvement at all levels of the agricultural sector, including as leaders, should lead to diversity of thought, approach and implementation. The potential for women to initiate changes to the agricultural sector must be seen as an essential contribution to increasing competitiveness and efficiency in the sector (Dimopoulos & Sheridan, 2000). It is also evident that future productivity gains could be achieved by combining better extension efforts and building human capital through labour and skills (Gray, Oss-Emer, & Sheng, 2014). In the case of northern Queensland, the Australian government is focused on addressing these gaps by improving cross-sector and transformational research and extension services to facilitate the adoption of innovation by farmers (CommonwealthofAustralia, 2015a). The following section

reviews current Australian agricultural extension services and how it should be in future.

2.2.4. Agricultural extension for adaptation of innovation

Before the beginning of the first Australian agricultural revolution, farmers themselves shared information concerning the approach to improving farm productivity. Most of the early major historic agricultural innovations occurred on-farm through interactions between farmers and communities (Boon, 2010), where agricultural research and information sharing was not institutionalised. With the establishment of agriculture colleges in the 1880s, followed by the Australian state department of agriculture, agricultural extension emerged and became a conduit for introducing research recommendations to producers (Boon, 2010; Jones, 1986).

Over time, different scholars proposed multiple definitions for 'agricultural extension', although a common emphasis has been placed on the importance of psychological aspects such as utilising people's own knowledge and resources, and as a communication process for economic change (Boon, 2010), or practice change as it is referred to today.

According to the State Extension Leaders Network (SELN), agricultural extension is broadly defined as the process of enabling change in individuals, communities and industries involved in the primary industry sector and natural resource management (SELN, 2006). Enabling change opens up a broader role for extension beyond dissemination of knowledge and information. However, the present agricultural extension system has not been able to fully demonstrate its 'broader role' and an effective use of enablers of change, despite the fact that agricultural extension policies and service delivery were transformed over the last two decades, aiming to achieve such change. If the above definition is to become a reality, a networked approach which facilitates an effective production, circulation and utilisation of knowledge by each actor of the network is needed. While such approaches require a legitimised base through legal and policy recognition, it is also important to identify the potential

enablers of change, mediators and integrators of knowledge systems by critically reviewing the existing agricultural extension system.

Historically extension has been used as a policy instrument for over a century in Australia (APEN, 2012). During the 1970s most of Australia's agricultural extension efforts had been dominated, traditionally, by State Government departments of agriculture (DPI, 1976). While extension had generally remained a function within individual industrial divisions, much effort had been devoted to the development of extension services that operated on a whole farm basis. Co-ordination of local extension activities was central to this development and was assisted by regionalisation of extension services. The Department of Primary Industry played a vital part in liaison with the states and administered Australian Government funds which have made a significant contribution to the development of State extension services (DPI, 1976). Funds for extension services have been made available by the Australian Government since 1948 for effective extension operation. The non-government sector was usually seen as a 'support' force for extension in regard to most technical and economic information. This meant that if the public extension system was to downsize, or withdraw completely, that it was unlikely that the private extension portion of the market would be sufficient to sustain requirements.

From early on, technology has been a key driver of agricultural extension proliferation. The influence of radio in agricultural extension was enormous in propagating agricultural information and popularising extension and research. In the late 1970s, television was gaining importance as an agricultural extension medium. Rural publications, particularly weekly papers and magazines, played a most valuable part in agricultural extension (DPI, 1976). This technology provided a means for numerous extension information sources beyond State Governments such as: non-government agricultural consultants, banks, agricultural chemical and fertiliser companies, agricultural colleges, universities, stock companies, processing companies and farmer organisations. Via this technology, all extension stakeholders shared different operations/approaches to farming and provided different influences on agricultural extension. Therefore, it is quite apparent that there has been a continual symbiotic

relationship between technology and agricultural extension, with the view to create change. Considering this, the government is focused on flexible delivery of agricultural extension services that best uses new technology in order to meet primary producers' needs and recognise the role of commercial extension services.

Commercialization of government extension delivery has not been met with great success in Australia (Cary & Wilkinson, 1995). The challenge of rethinking publicly funded extension delivery with fewer resources presents opportunities for extension services. These opportunities include the ability to identify their strengths as seen by farmers, to identify the roles public agencies should have in contrast to the roles of commercial extension, and to facilitate technology transfer through wider networks which may include commercial extension agencies. Hunt, Birch, Coutts, and Vanclay (2012) pointed out that the growth of extension in Australia has hypothetically followed a four-phase cycle of: (1) crises, (2) highs, (3) awakenings and (4) unravelling, and that we are currently in the unravelling phase. Extension has been identified as contributing to the capacity and resilience of Australia's rural industries. The funding for rural research and development (R&D) and related extension activity in Australia was estimated (in 2011) to cost $41.5 billion per annum (APO, 2011) and for every $1.0 the government invests in agricultural R&D, farmers generate $12 within 10 years (DOA, 2014). However, the investment in agricultural extension has essentially been static since the late 1990s (Kelly et al. 2017).

Irrespective of investment requirements and adequacy, in order to increase the productivity of Australian agriculture, five activators have been identified (Marslen, 2015; Nossal & Gooday, 2009). These are:

- Research and development of new knowledge and technology;
- Innovation adoption through facilitating innovation, improving incentives and the industry's capability to adopt new knowledge;
- Removal of policy regulations or other impediments that prevent innovation;
- Improvements to market access; and
- Addressing environmental pressures that pose a threat to productivity growth.

Marsh and Pannell (2000) suggested that agriculture will continue to change in response to technology, markets and climate. Continued growth in the use of advanced information and communication technologies (ICTs) in agriculture, and providing information to farmers in novel ways, was therefore an expected outcome of this use. Australian farmers are increasingly using information on the web via smart devices. These new digital tools offer farmers the ability to access the required information in their own time, in their own way and at a location which is convenient for them (Roberts & McIntosh, 2012). According to the NSW DPI, surveys conducted in 2012 show that between 40 and 61 percent of farmers and advisors own smart devices. A large number of commercial businesses, industry organizations, individuals and government extension services are now using a range of digital technologies for information (Roberts & McIntosh, 2012). On the other hand, Taylor and Gibson (2017) argue that the use of digital technology is socially and culturally determined and that digital space cannot be a neutral and democratic space for sharing knowledge and information. Based on this, it can be assumed that digital technology can be used as a powerful enabler of change in sharing and accessing information in rural farming communities if it is professionally and ethically regulated.

Despite the above pitfalls, the continuing rapid development of telecommunications ICTs is probably the biggest factor for change in extension, and one which will facilitate and reinforce other changes (Jones & Garforth, 1997). There are many possibilities for the potential applications of technology in agricultural extension (FAO, 1993; Zijp, 1994). It could be considered that the most effective tool for any farmer is information to acquire knowledge and make decisions based on that knowledge (Armstrong, Gandhi, & Lanjekar, 2012).

However, some researchers argue that the contribution of ICTs in putting new knowledge in the hands of farmers, and transferring this to use, is still debatable (Sulaiman V et al., 2012). For example, ICT enabled knowledge transfer needs human interaction intertwined with socio-behavioural, socio-economic, and structural factors, rather than solely with technological components (Bibri, 2013; Kelly et al., 2017).

Higgins (2011) pointed out that the rapid expansion of broadband into rural areas is important for information exchange in agricultural extension, while Beardon (2004) argues that the impact of ICT-based projects has fallen below the optimistic expectations that were placed upon them. However, according to Sulaiman V et al. (2012) ICTs will be useful in providing rapid means to communicate, synthesise data and overcome the problems of distance. Thus, it is highly feasible that ICTs can be employed to overcome the private extension market failure, provided the human dimension is not lost. On this basis, it is prudent to investigate the present status and the future possibilities of digital technologies in the context of the Australian farming sector.

2.2.5. The role of digital technologies in farming in Australia

As farmers undertake a number of professional roles, they face greater time constraints in balancing their farm work and domestic work, as well as community work (DOA, 2014). Therefore, the use of time saving technologies, such as digital communication technologies, has the potential to combat the notion of being 'time poor'. On the other hand, this time saving is based on the assumption of digital literacy and adequate connectivity that may not necessarily represent the true reality facing farming communities within Australia.

Although Australia has high levels of food security, Australian farmers need to maintain a profitable and competitive farming system in order to ensure sustainability and longevity of food production systems in the face of natural disasters, adverse weather conditions, and sudden and unexpected climatic events (Sparkes & Stoutjesdijk, 2011), as well as competing industry and land requirement issues. Stienen, Bruinsma, and Neuman (2007) asserts that ICTs will play an important role in overcoming challenges such as shortages of land and water, decreasing soil fertility, the effects of weather and the rapid decline of land fertility.

Bearing in mind that ICTs are defined as technologies that facilitate communication, processing, storage, retrieval and transmission of information by electronic means (Ajani & Agwu, 2012), digital technologies have the potential to revolutionize

Australian agriculture and make possible a considerable step towards increase in productivity (AFI, 2017). The already rapid growth of ICTs over past decades is expected to drive new directions for agriculture (Australian Farm AFI, 2017). It is also assumed that digital approaches will play a significant role in closing the yield gap (gap between potential and actual yield) and possibly in reducing costs within, as well as adding new value to, supply chains (CSIRO, 2015). Other important uses of ICTs in agriculture will be cheap lightweight robotic platforms with functions such as navigation, path planning and obstacle avoidance, as well as potential for undertaking tasks such as planting, weed control and pest management. In addition, cheap, low power wireless data loggers to monitor soil moisture, pest and disease occurrence, as well as micro-sensors to monitor crop health, water quality, grain quality and livestock health, will all aid in the collection, storage and communication of on-farm information (CSIRO, 2015). Although the direct incorporation of these resources into existing farming systems may simply be doing things the same way, they will be done more efficiently.

There exists an important opportunity to utilise digital technologies on-farm and off-farm to rethink how agriculture is conducted, and what the agricultural system looks like. Conversely, this rethinking will not occur without Australian agricultural stakeholders taking the time to innovatively understand how the system could be changed without necessarily compromising productivity levels and longevity. Quite simply, there exists a tension between digital technologies as drivers of practice change, and the social undertaking of rural community innovation.

2.2.6. The social impact of ICT on the agricultural community

In recent studies carried out in partnership with the Queensland beef industry, Hay and Pearce (2014) have shown that technology adoption in farming practices promises to boost the sector's productivity and profitability in decision making concerning planning, production and marketing. The new technologies may not only bring changes to farming practices, but they also affect the farming lifestyle. The rise of the internet connectivity within Australian rural regions over the last two decades has largely helped reduce transaction costs in communication, storage and analysis of

information (Australian Productivity AustralianProductivityCommision, 2016; CSIRO, 2015). Banking or paying bills online at home saves time by cutting down trips to town. However, socialising with friends, and catching up on what is happening in the region, could now be lost opportunities for community connectedness, with the threat of the advancement of ICT reducing community contacts and leading to isolation.

Developments in mobile devices, data stored on remote cloud servers, and high speed broadband networks, can help integrate both local data from the farm and integrate this with external information such as weather or price forecasts (Bennett, 2015; Berner, Graupner, & Maedche, 2014; CSIRO, 2015). The ability of ICTs to collect, store, integrate and disseminate knowledge has strongly influenced the development of the knowledge-based economy (Roberts, 2000). When agricultural knowledge is facing concerns from an economic perspective, these can be closely related to the practice change from public to private extension markets in the Australian agricultural extension system. As the private extension agencies have inclined towards a cost-recovery, fee-for-service base approach (APEN, 2012) the supply of a holistic extension service that includes: (1) transfer of technology and information dissemination; (2) problem-solving and decision-making; (3) education, training and learning; and (4) participatory/human development (Van Beek, 1997) has not yet been met (APEN, 2012). From this has risen a need for a paradigm change in extension services that incorporate the abovementioned elements concerning social, economic and pedagogical aspects of extension. Due to the cost of services and the stagnant public investment in extension (Kelly et al., 2017) more attention has to be paid to find cost-effective holistic extension approaches without further costs imposed on farmers. The epistemic design of networked learning that facilitates both learning and knowledge production within the system proposed by Kelly et al. (2017) can serve to achieve such holistic systems discipline if it is coupled with the existing extension service.

Another key social challenge in networked extension will be to provide platforms for farmers to store, access, re-use and even market their own data with appropriate protections of intellectual property ownership and privacy (AFI, 2017; Berner et al., 2014; Manyika, Chui, Brown, Bughin, Dobbs, Roxburgh, & Byers, 2011). Therefore, it

can be suggested that in addition to an establishment of proper information privacy policy, extension requires empowered and ethically sound agents for change who will champion a shift in thinking.

2.2.7. Addressing the challenges in adopting digital technology

All new technologies face adoption challenges. The most common challenges faced by farmers overall – not just women – are: (1) learning and developing new skills (digital literacy); (2) managing large volumes of data in relation to decision making and determining the trustworthiness of information; (3) the ethical and moral aspects of the impact of digital transformation on family, farm and the community; (4) the cost of digital devices, connectivity and infrastructure; (5) state policies and regulations and; (5) weakened extension services in communicating new technologies to farmers and farm-based experiences to researchers (Cutler, 2008; Kelly et al., 2017; Nettle, Santhanam-Martin, & Ayre, 2015). However, the types and the degree of severity of these challenges may not be the same across the country and different farmers may attach different values to them. Therefore, it is vital to identify and effectively address the challenges that arise throughout the adoption process in order to harness the full potential of any technology.

These challenges that farmers face can be addressed by various means, and particularly by innovation. According to Nettle, Brightling, and Hope (2013), innovation occurs when the ideas and resources of different organisations connect effectively within a system, thus creating a dynamic situation where farmers are recognised as generators of innovation and ideas (RIRG, 2014). According to Cutler (2008), an innovation system is an open-ended cycle where knowledge production, knowledge application and knowledge diffusion occur simultaneously. Therefore, an innovation system has the capacity to generate possible solutions in order to address challenges through its dynamic, evolving and learning process.

However, Australia's role of supporting innovation is ambiguous and innovation systems are often disconnected (Dodgson, 2015). Nettle et al. (2015) submit that agricultural innovation needs to be understood as a systematic process that includes

farmers, communities, developers and suppliers of technology, private and public agricultural extension services, policymakers and regulators, and the market. They further assert that a focus is needed not just in the 'hardware' (new idea or technology) but also on the 'software' (skills and knowledge of humans who use and derive benefits from the technology) and the 'orgware' (the formal and informal interaction between stakeholders) that are required to support successful and sustained technology transformation (Nettle et al., 2015). Based on this, it is suggested that the challenges associated with technology adoption by farmers can be better addressed through facilitating an innovative culture and networked interactions between farmers, the research sector and other related institutions.

Networking is also very important for farmers when facing their challenges. Recent digital platform concepts suggest that a networked learning approach to extension will provide the social interaction element in conjunction with connecting farmers to their data and the power of 'big data' (Bennett, 2015; Kelly et al., 2017). A pilot investigation concerning the adoption of a data-based approach to farm management for the beef industry, including a networked learning forum, was workshopped with a farmers' group consisting of 16 participants (Bennett & Rose 2014). This workshop revealed an interesting finding in that the majority of male farmers viewed research and innovation as an extracurricular activity, rather than integral to their farming system management; i.e. it was not considered 'work' (Bennett & Rose, 2014). At this same workshop, whilst only three women attended, all of which identified as farmer's wives, it was found that these women were more active in their use of ICTs in general and were more actively using ICTs for farming related research and innovation during work hours. A survey of Queensland women graziers done by Hay and Pearce (2014) revealed that women use most components of online technology three times more often than men. Applying the concept of identity as an interplay of the structural environment and agency, we can see in the literature that this development of identity can be further utilised to advance the objectives in the national agricultural agenda. With the above findings in mind, it can be hypothesised that farm women's attitudes towards innovation and their apparent earlier adoption of digital technology, as compared to their male counterparts, can be used as 'orgware' to support the

successful and sustained deployment of relevant technology to the farm at the right time.

2.3. Women's contribution to agriculture

In order to identify women's roles as on-farm change agents, it is important to discuss the contribution of farm women to Australian agriculture and the rural community up to the present time. Thus, this section discusses and defines the role of farm women as change agents within the community relating to this study.

2.3.1. Background

First, however, it is important to delve even deeper into history. Hansen, Jensen, and Skovsgaard (2015) have analysed the association between years of agriculture and the female labour force participation rates on both an entire planet and European scales, revealing that hunter-gatherer societies gave equal bargaining power to both men and women.

In ancient villages, economic decisions and participation in community politics were shared and both genders were welcomed to contribute based on individual skills and interests (Oakley, 2005). Women in hunter-gatherer societies were more independent compared to agricultural societies (Iversen & Rosenbluth, 2010). The Neolithic Revolution developed societies into more intensified agricultural societies, with increased population growth and land scarcity (Boserup, 1970; Burton & White, 1984), adopting patriarchal cultural norms and beliefs (Hansen et al., 2015). Agricultural intensification created a division of labour and this increased male bargaining power within the family, which gradually translated into norms and behaviour-shaping cultural beliefs and gender roles in societies (Hansen et al., 2015). Although some findings suggest that the division of labour associated with agricultural intensification has a persistent negative impact on the position of women in society (Borck, 2014; Boserup, Tan, & Toulmin, 2013; Cutillo & Centra, 2017; Hansen et al., 2015), several other authors contend that the division of gender roles has created for women more room to manoeuvre by allowing them multiple identities, whereas men are tied to the

productive role of agriculture (Alesina, Giuliano, & Nunn, 2013; Brandth, 2002; Brandth & Haugen, 2011; Seuneke & Bock, 2015; Stenbacka, 2017).

Similarly, in the context of Australian agriculture, women are key partners in farm businesses and are responsible for 40-50 percent of the output on Australian family farms (Alston, 1998c). They are involved in both strategic decision-making and critical operational activities. Informed, skilled and engaged women have great potential to make a significant difference within the Australian agricultural sector (Elix & Lambert, 2000), particularly in displaying multiple identities. Although both men and women have demonstrated their abilities in developing multifunctional identities in the context of family farming , women have played a leading role in crossing the boundaries of the farm and connecting with new networks in new contexts (Dale-Hallett, 2016; Seuneke & Bock, 2015). Some researchers highlight that multifunctional identities can entail full-time involvement in work and a very busy life for women, but they still celebrate their creativeness and innovativeness as rural entrepreneurs (Brandth, 2002; Sireni, 2015). Another study revealed that men and women on family farms negotiate responsibilities for both farm and household labours, based on individual preferences when they perform multiple and shifting identities (Barlett, 1993). In this present research, it is hypothesised that rural women's multifunctional identities are supportive of their agentic actions of finding new directions for change and opportunities for innovation.

2.3.2. Gender roles as repressive

According to the information gathered from diaries and letters produced by farm women over the last two hundred years, Alston (1998b) points out that, historically, women have played a vital role in the development of agriculture in this country. Since European settlement of Australia, the contribution of women in farming has not been given due recognition (ABS, 2003) with agriculture being portrayed as a masculine activity (Alston, 1998c). Despite women's significant contribution to the Australian agriculture sector, they exercise significantly less power in the sector than men (Marslen, 2015). Furthermore, Elix, Lambert, and Gordon (1998) show that women in agriculture are both the 'glue' that holds the family farm together by taking a major

responsibility for family maintenance and hands-on-farming, as well as being planners and creative strategists. Some research on Australian farm women emphasises that farm roles have been developed based on gender stereotypes and the prevalence of traditional gendered division of labour (Alston, 1995a, 1998a, 1998b, 2000, 2003).

The above review implies that patriarchal power is the underlying determinant of gendered labour division which undermines women's work as subordinate to men's work. Another comprehensive review of the above literature has noted that many of these analyses have given only a "little room for variation of women farmers' identities beyond wifehood" (Bryant, 1999, p. 237). Based on this, it is suggested that a broader and more influential framework that would capture women's own construction of identities through work, social relations and family life is needed for future research on women in agriculture.

In recent years, there has been growing recognition of the many roles women play in agriculture (ABS, 2003). Kruss (2015) states that women are playing an ever-increasing role in the decision making of farming and agribusiness and they are occupying a rising number of diverse roles throughout the industry in numerous ways, such as innovation, supporting their families, increasing agricultural production, bio-security and natural resource management. Kelly and Shortall (2002) have shown that women play an active role in effecting successful change within their rural communities, but they have continued to be overlooked in their community. As the relevant literature suggests, women farmers have demonstrated an understanding of sustainability that incorporates lifestyles, families and communities. This knowledge is derived from the experience of many women who engage in the specific discursive practices of farmer, labourer, housewife, mother, friend, daughter, sister and neighbour. These discursive practices enable women farmers to gain knowledge, but at the same time these women do not have recognised legitimate means for claiming knowledge (power) and positions of knowledge transfer, as women are not recognised in the industry (Dowling, 2011). Even though some women are involved in action to bring about political or social change and assert their knowledge, women are not necessarily

recognised as possessing knowledge (Dowling, 2011), and therefore are not necessarily recognised as change agents.

The literature cited above implies that women contributing to family farming are agents for change, but they have no legitimate basis for claiming this as 'work', nor a recognised role in the rural community. Feminism broadly tends to assert that women have been subordinate to men and their main focus is to overcome this subordination (McLaren, 2012) through emancipatory, progressive politics. Feminists extend their contribution to overcoming oppression based on class, ethnicity, ability and gender, struggling to achieve social justice for normative ideals (McLaren, 2012). With the development of modern societies, this traditional view has started to be challenged, and potentially changed (Heelas, Lash, & Morris, 1996). This leads to changes in the nature of some prominent discourses in farming, namely in the areas of masculine identity, the woman farmer, and gender roles over the period. With these changing identities within an increasingly competitive farming sector, common discourses such as "undervalued, not recognized, invisible, voiceless" used in previous research on farm women have now become arguable (Brasier et al., 2014; Sireni, 2015). In building this argument and seeking to understand the farming family power structure dynamics, an alternative lens from which to view the Australian agricultural industry, and the rural communities it encompasses, is required.

2.3.3. Gender roles as productive

Based on the experiences of three leaders in the Australian horticultural sector, Katrina Myers, Tania Chapman and Anne Mansell, there are many actors and many roles in the agricultural sector. There is room and opportunity for all who have different skills. It is not a matter of a power struggle, or competition between men and women, or of diminishing the role of men, rather it is about the creation and implementation of opportunities to enhance the recognised contribution of women (Brown, 2017). This idea has been underpinned by several researchers who investigated differences such as gender, class, race etc. through an optimistic lens. Sawicki (1991) explained Audre Lorde's vision as being that difference is not necessarily counter-revolutionary, rather, finding ways of discovering and utilizing

differences as a creative change and learning to live with differences, may be one of the keys to disarming the power of oppression (Sawicki, 1991). Further research on farm women's role in the development of multifunctional entrepreneurship on family farms revealed that farm women's roles are more flexible and capable of creating opportunities, whereas their partners' prominent roles have tied them up to defined farm work (Seuneke & Bock, 2015). This insinuates that there are beneficial aspects within gender roles, but also some remaining significant challenges.

Although women's traditional farm roles as bookkeeper and financier are regarded as 'gender roles', those roles in turn have been creating more opportunities to engage with digital technology. Hay and Pearce (2014) found in their studies that women were driving technology from the homestead to the paddock, highlighting a shift away from men as sole decision makers in the business, and more towards them playing a larger role in farming diversification and productive partnerships. The findings of Mackrell et al. (2009), identified an improved adaptive ability in farm management by farm women, due to increased use of computer-based decision support tools. While Bryant (1999) contended that many rural women were increasingly aware of the decision making and farm management possibilities of computer programs, they recommended that farm men and women work collaboratively to enter data, analyse, and interpret it. In addition, Board (1997) argues that better decisions in the rural sector would result from increased diversity in human resources, gained by harnessing the expertise and numerous skills of rural women. As such, it can be argued that women's specific backgrounds, positions and types of farm work (gender roles) could be their key to unlocking the door to a new future (Seuneke & Bock, 2015) in relation to the development of innovation skills through digital technology.

However, there is little previous research carried out to support this argument in the Australian context. Therefore, the following literature supports the focus of this research and helps justify to the reader how the argument is reasonable in the contemporary family farming unit. Furthermore, how investigation and support of this argument has been empirically conducted in countries t share similar cultural and economic backgrounds lends a body of weight to the argument.

2.3.4. Changing identities of rural women with a paradigm shift in farming practice

In order to get a better understanding of the status of farm women in a community, there is the requirement to explore their roles and influence as change agents, recognised or otherwise; it is further worthwhile to define the community and the change agent within the context of the research participants in this study. Analysing British history during the interwar period to the present, Nicola Verdon (2010) and Laoire (2002) pinpointed that, commercialisation and rationalisation of agriculture have been transforming gender roles and their identities, thereby accelerating social and cultural change in regional farming communities. Laoire (2002) further discussed the changing nature of masculine identities among young farmers and the equal importance of farm management and technology associated with masculinity and administration with femininity in Rural Ireland. Contzen and Forney (2017) described the importance of gender inequalities in family farming for a sustainable food system, outlining that certain types of farming-family configurations help enhance gender equality in Switzerland. Brasier et al. (2014) documented farm women's multiple and shifting identities as farm operators and farming partners (while recognizing them as farmers) within North Eastern United States. Brandth (1995); Brandth and Haugen (2005) documented the challenges and dynamics of masculinity due to men's involvement in outfield tourism in Norway, and in doing 'service work' that introduce features of femininity.

The above reviews suggest that agricultural transformation along with improved skills and knowledge have shifted the traditional gender boundaries by blending both men's work and women's work. Therefore, the assertion of the categories of 'feminine' and 'masculine' is inevitably problematic. Similarly, Butler (1990) argues that the attempt to ground female identity politics in an essential, naturalised sexual identity as 'women' or 'female', excludes and misrepresents those who do not recognise themselves within the terms of that identity. Butler (1990) further asserts that Foucault's work on identity as constructed demonstrates the role of social norms in regulating how individuals perform their gender roles. Stemming from this, it can be argued that rural women's multiple identities are a set of repeated acts that offer

women more space to position themselves in the farming sector – but these positions need to be earned. Butler's theory of performativity suggests that gender should not be constructed as a stable identity because "gender is an identity tenuously constituted in time, instituted in an exterior space through a stylized repetition of acts" (Butler, 1990, p. 179) can be used as a theoretical base for understanding the performance of rural women's multiple roles and shifting identities in this research.

While the literature identified the contribution of detraditionalisation, as well as commercialisation and technology, as key factors in the changing identities of farm women, Seuneke and Bock (2015) observed the association and application of experience, knowledge, behaviour and emotions leading to opportunity recognition, exploitation, creativity and innovation in the personal and social emergence of women's entrepreneurial identity. Therefore, it can be hypothesized that women farmers' identity construction in the context of family farming can be viewed as neither emancipation from oppressive (male) power, nor a manifestation of free will, but as resulting from a constant interplay of these two and revealed through various technologies. It is commonly assumed that power is always negative and repressive, but Foucault challenged this notion of power by analysing modern power as productive and creative of certain types of subjects (Foucault, 1977).

2.3.5. Dynamics of power, resistance and agency: A Foucauldian perspective

Foucault's work (1926-1984) has become an important tool for researchers in different fields of studies, especially among researchers who are committed to critical analysis (Powers, 1996). Literature has suggested that there has been a substantial increase in Foucauldian scholarship (Woolhandler, 2014) in the field of law (Baxter, 1996; Fitzpatrick, 2017; Hunt, 2017; Woolhandler, 2014), psychology (Arribas-Ayllon & Walkerdine, 2008; Hook, 2001; Yates & Hiles, 2010), education (Ball, 2013; Thomson, Hall, & Jones, 2013; Walshaw, 2007), sociology (Moreton-Robinson, 2006; Power, 2011) and digital technology/ICT (Floridi, 2014; Willcocks, 2004, 2006; Willcocks & Lioliou, 2011; Zuboff, 1985) with a growing vision of how power operates in modernity and how these fields evolve in the twenty-first century (Woolhandler, 2014). Gutting (2005) – editor of the highly influential book in the field of ICT, *The*

Cambridge companion to Foucault – noted that Foucault has indeed constructed theories and methods, but these constructions are always subordinate to the tactical needs of a particular study. "They cannot be used as general engines of war in order to position against any target. This is why each of Foucault's books has the air of a new beginning" (Gutting, 2005, p. 4). This suggests there is a suitability and adjustability in using Foucault's work to study the dynamic nature of different fields, rather than restricting the approach to a set of theories, or a single methodology. Accordingly, Foucault's work can be suitably applied in this particular research for the exploration of knowledge and power dynamics in the field of women and farming.

According to Foucault, prior to the seventeenth century power was monopolised by monarchies and coordinated by a single person (king or queen) (Foucault, 1977). After the seventeenth century, the population began to increase, and the government started to be concerned about managing and caring for people as resources. At this stage, disciplinary power (bio-power) became more prominent, targeting the human body as an object to be manipulated and trained by watching, regulating and controlling (Foucault, 1977). These practices of discipline and training optimized the body's capacities, skills and productivity and such manipulated bodies came to be termed docile bodies (Foucault, 1977).

Disciplinary power has enabled shifting of power from a juridical system of law to 'norms' as the primary instrument of social control. Foucault further assumed that this replacement of the law by norms was linked with the development of the human and social sciences. At the same time, discourses of sex and sexuality became a crucial political issue in a society controlled by bio-power – where, according to Foucault, power is owned by no one (Foucault, 1978). Unlike juridical power, Foucault asserted that modern bio-power is productive rather than repressive and interacts with knowledge produced by different institutions and systems such as medicine, public health, prisons etc.

According to Foucault, power is not always negative or repressive, but also positive and productive (Foucault, 1980). While power structures repress and constrain certain components of society, it also enforces some rules and norms in order to shape the

desires and needs of individuals (Simons, 2015) in the form of agency. Hay (2010) defined agency as 'the intentional and motivated capacity to act in everyday life' (p. 260). As such, women farmers are not passive products of patriarchal power relations who merely follow the models set by structures, rather, they are capable of choosing how to act and what choices to make in their environment (Campbell-Thomson, 2011). Similarly, Foucault (1988d) conceptualised agency as 'technologies of self' that are exhibited by farm women to effect, by their own means, or with the help of others, and to transform themselves; changing their bodies, souls, thoughts, conduct, and their way of being – all of this subsequently affecting the communities in which these women exist. Therefore, Foucault's technologies of the self can be used as the theoretical basis for understanding rural women's agency in this present study.

2.3.6. Technologies of the self

Technologies of the self are different kinds of operations on someone's own "body and soul, thoughts, conduct and way of being that he [or she] does, by [themselves] or with the help of others in order to transform [themselves] to reach a state of happiness' (Foucault, 1988d, p. 18). Therefore, the notion of power is not seen simply as repression, coercion or domination. Foucault described individuals as self-determining agents capable of challenging and resisting the structures of domination in modern society (McNay, 1992). Foucault explained that this liberation is necessary from the oppression, but it itself does not make a person happy (Foucault, Rabinow, & Hurley, 1997). Liberation clears the pathway towards new power relationships, which must be managed by practices of freedom. Ethics of freedom involves the care of the self, knowing the self and the care for others. Practice of care of the self throughout life helps a person to gain an understanding of the self and knowledge of the self, which ultimately leads to new experience and discovery (Batters, 2011).

This discussion of the literature supports the research objective of exploring the integrated perspective of agriculture, digital technology and farm women's ethics of the self; particularly, women's ethics of self in reference to constructing positive identities as emerging on-farm innovators. The positive identity development that is conceptualised as "the internal organisation of a coherent sense of self" (Catalano,

Berglund, Ryan, Lonczak, & Hawkins, 2004, p. 106) can be achieved at both the individual and the social levels (Tsang, Hui, & Law, 2012).

Table 2.1. *A non-exhaustive table providing positive identity exemplars as observed in Australian rural women farmers. The identities are not meant to be restrictive in scope but are provided to help identify the various roles women take on, the characteristics of these, and the resulting positive potential for the family unit and community.*

Identity exemplar	Characteristics	Positive potential	References
Community leader	• Networked • Social • Respected • Influential	• Maintains a sense of community • Develops strong links to other communities through authentic relationships	(Grace & Lennie, 1998; Janes & Collison, 2004; Spears, 2010)
Mother	• Caring • Supportive • Loving • Interdependence	• Responsive to needs of others • Empathetically looks at community issues • Happiness and satisfaction • Shared responsibilities	(Jennings & Stehlik, 2000; Mogadime, Mentz, Armstrong, & Holtam, 2010; O'Donnell & Stueve, 1980; Wong, McElwain, & Halberstadt, 2009)
Financial officer	• Competent • Responsible • Confident • Assertive	• Brings strategic input to the business • Continuous professional development	(Burgess & Tharenou, 2002; Hay & Pearce, 2014)
Farmer	• Self-motivated • Flexible • Skilful • Risk taking • Patience • Resilient	• Copes with risk and change • Identifies and prioritises needs • Selects and adopts relevant technologies • Achieves life satisfaction	(Jennings & Stehlik, 2000; McGuire, Morton, & Cast, 2013; Wilken, 1990)
Change manager	• Authoritative • Inspirational • Receptive • Communicates effectively	• Represents the needs and interests of the community • Plans and executes activities creatively • Aligns with other project teams • Potential change agent	(Grace & Lennie, 1998; Milestad, Dedieu, Darnhofer, & Bellon, 2012; Smollan, 2013)
Neighbour	• Friendly • Helpful • Approachable	• Shares experience with the community • Understands the local community	(Hay, 2010; O'Donnell & Stueve, 1980; Poindexter, Heider, & McCombs, 2006)
Entrepreneur	• Technically competent • Innovative • Proactive • Imaginative	• Controls and manage risk • Identifies opportunities and threats • Encourages out-of-the-box thinking in community	(Sarri & Trihopoulou, 2005; Seuneke & Bock, 2015; Tanner, 1999)
Community member	• Friendly • Responsive	• Aware of surroundings • Identifies local knowledge • Respects community goals	(Lennie, 2002; Mogadime et al., 2010; Teather, 1992, 1996)
Life-long learner	• Self-motivated • Self-directed • Professional • Adaptive • Networked • Involved	• Continuous professional development • Explores new opportunities • Shares skills and knowledge with the community • Constructs knowledge within the community	(Balasubramanian, Thamizoli, Umar, & Kanwar, 2010; Jennings & Stehlik, 2000; Livneh, 1988; Mocker & Spear, 1982)

Moreover, an individuals' ability to balance multiple identities and maintain complementary relationships with another reflects their positive identity (Cheng,

Sanchez-Burks, & Lee, 2008; Morgan & Creary, 2011; Powell & Greenhaus, 2010). Hence, rural women's positive identities (see:

Table *2.1*) should be expected to result in a favourable psychological and motivational persona, thus reducing identity conflicts. Multiple, well-balanced and well-adjusted positive identities of women are suggested as influencing a less stressful environment in the family, as well as the community, and as increasing life satisfaction (Karelaia & Guillén, 2014).

2.4. Intertwined perspectives of positive identity

The concept of identity or subject position (used interchangeably) can be described as a set of meanings attached to persons (Gecas, 1982). Subject position refers to the positioning of an individual within a discursive structure. Identity construction is defined as a dynamic and social process that involves ongoing interactions and negotiations with self and others (Buckingham, 2008; Foucault, 2005; Jenkins, 2014). Foucault further described identity as a work of art where an individual consciously or unconsciously constructs herself through past and current experiences, social influences and interactions, as well as with an understanding of the self through reflection (Foucault et al., 1997). Similarly, the concept of symbolic interactionism is also based on the idea that a person acts according to her interpretation of the meaning of the world (Blumer, 1986; Manning, 2000). Butler's (1990) view of identity in relation to gender is that it is a learned performance of behaviour rather than the expression of a prior reality. In ethical perspectives, positive identity is described when it is infused with qualities such as wisdom, integrity, courage, justice and resilience (Morgan & Creary, 2011; Peterson & Park, 2003). Identity is positive when it is regarded as favourable by the person who holds it and when it is progressive with adapting to new roles at work (Creed, DeJordy, & Lok, 2010; Ibarra, 1999; Morgan & Creary, 2011). Based on the above review and *Table 2.1*, change agency and professional development can be regarded as potential positive identity traits. As such, a change agent is one of the possible positive subject positions available for rural women, who are constantly negotiating and adapting to new roles. In order to reveal positive identities, this current research looks at the identity construction of farm

women based on the views of Foucault, Blumer, Manning and Butler who suggest that an individual may possess multiple identities through her different actions and reactions within different social and professional situations. Therefore, it is important to look at how professional identity, change agent and change agency are defined in the literature.

2.4.1. Professional identity

In the career literature, professional identity is defined as one's professional self-concept based on attributes, beliefs, values, motives and experiences (Ibarra, 1999; Schein, 1978). This definition is based on the basic assumption that professional identity is constructed over time with varied experiences and meaningful feedback that allow individuals to acquire insight into their preferences, talents and values (Schein, 1978). Existing literature also suggests that professional identity change is associated with work role change that gives more autonomy and a degree of privilege to the role holder (Benveniste, Edwards, Lee, Schneider, Von Hanxleden, Hanxleden, Aguado, Auger, Barros, & Boucaron, 1987; Slay & Smith, 2011). Professionalism is defined as the combination of all the qualities that are connected with trained and skilled people (Cambridge Dictionary, 2018). It is also defined as the acquisition of specialist knowledge; and the ability to meet high standards, to self-regulate and to exercise high levels of autonomy (Penguin English Dictionary, 2000).

Recent studies have referred to professional development as stemming from the verbal and tactical skills needed to perform a particular career, or general skills accumulated through continuous education coupled with skills in the area of personal development (Bulei & Dinu, 2013). Moreover, professional development is a process of adapting to changing technology, the practice of a profession or lifelong learning. This definition implies a close relationship between professionalism and change agency. Drawing on Foucault, (1977, 1980), professionalism is a discourse seeking increased power to enable change, the intention to challenge obstacles, and hold positions within the system. Similarly, it is a way change manifests through power relations that constrain and enable actions (Hilferty, 2008). A successful professional identity construction is important for careers that have shifting boundaries (Slay &

Smith, 2011) such as smart farming. Based on this, the study of the process of professional identity construction by rural women, as active users of digital technology in farm related work and their interactions with the community, is much needed. The identification of rural women who are potential community actors, is of obvious interest for agricultural policy makers as it helps them to discover and forecast future directions.

2.4.2. Change agency and change agent

- A change agent is described as a person who generally encourages adoption of a new idea "who influences clients' innovation decisions in a direction deemed desirable by a change agency" (Rogers, 1995, p 27). There are a number of identified characteristics of a successful change agent, as follows (adopted from De Berranger, Tucker, & Jones, 2001; Rogers & Williams, 1983): Interpersonal communication skills;
- Technical knowledge;
- Compatibility with clients' needs or knowledge about clients;
- Empathy; and,
- Self-esteem.

Self-esteem is one of the attributes of positive identity and it is closely linked with one's creativity, innovation, the feeling of self-empowerment and efficacy (Borba, Borba, & Reasoner, 2005; Branden, 1995).

It is also important to note that farmers' require creativeness and innovativeness in order to tackle future challenges and best use opportunities introduced by smart farming (Clercq, Vats, & Biel, 2018). Therefore, there is a need for changes in the identities of rural women, and farmers in general, with paradigm change within agriculture. The identity of a change agent will subsequently be defined by the understanding of what on-farm innovation, and the role of farm women as change agents is, in the context of family farming.

2.4.3. Making sense of change agents in the context of family farming

ICT itself is generally considered as a powerful change agent (Devi & Bimol, 2013) in transforming farming culture, as well as the capacity of innovation, and the change agency of women (McQuillan, 2010). McQuillian further asserts that women who are engaged in ICT related work develop positive identities as innovators and change champions, thus innovation and change are central to ICT programs (McQuillan, 2010). In agriculture, innovation is expected to be delivered to other farmers by a change agent to achieve a desired (practice) change in the structure and function of a farm. Even though the definition of the 'change agent' differs according to organisational type, there are key similarities. Jacoby (2017) has identified characters of a change agent both as including being both a problem identifier and a problem solver. Jacoby (2017) asserts that a change agent will study the situation, develop potential solutions and take actions to address the problem. Table 2.2. summarises the common characteristics of change agents in order to understand how the multiple positive identities of women are well-suited to their acting as agents for change in communities in rural Australia.

Applying the characteristics from Table 2.2. to farm women, it is important to identify what their responsibilities are as change agents in the context of family farming, how they are currently performing as change agents in their community, and the characteristics they acquired as the empowerment mechanism led them towards becoming potential change agents. Research from Ireland conducted by McQuillan portrays women's positive experiences with ICT, identifying their enthusiasm, strategic and technical skills as well as their contributions as innovators and change agents (McQuillan, 2010). McQuillan also describes women as visible developers of authoritative voices in the community who demonstrate their role as producers of knowledge. Rural women are practising significant leadership in community development, and have been described as the 'new pioneers' in the adoption of new ICTs (Grace, Lundin, & Daws, 1996; Lennie, 2001).

Table 2.2. *The common characteristics of change agents*

Characteristic	Descriptor	Impact	References
Problem identifier	• Capable of seeing problems where others don't, or are yet to • Describes problem in a progressive manner that empowers stakeholders • Provides critique on the way forward as a part of the problem identification process	• Mitigates key issues or allows the organization/community to adapt to the potential issue • Empowers the stakeholders to deal with issues proactively	(Cunningham, Woodward, Shannon, MacIntosh, Lendrum, Rosenbloom, & Brown, 2002; Lunenburg, 2010)
Connector	• Builds trust and acceptance among other traits • Facilitates connectedness	• Improved acceptance of change by community • Integrates targeted stakeholders for better information sharing • Develops collaborative linkages	(Fullan, 2012; Lunenburg, 2010)
Self-motivator	• Listens, observes and learns • Inspired by role-models	• Identifies motivators within the community • Accelerates the change process	(Nikolaou, Gouras, Vakola, & Bourantas, 2007)
Self-Efficacy	• Inclined to try new ideas • Willingness to support change • Positively looks at critical career events and changes	• Adopts measures to needs of tasks • Builds positive attitudes towards change among others	(Armenakis, Harris, & Mossholder, 1993; Bandura, 1986; Cunningham et al., 2002)
Psychological resilience	• Ready to accept and apply change • Tolerates failures and learns from them • Enjoys dealing with new and unusual situations	• Actively participates in the change process • Celebrates success and accept failures equally • Less stress and tension towards change	(Bandura, 1986; Block & Kremen, 1996; Gist & Mitchell, 1992; Nelson, Cooper, & Jackson, 2013)
Competencies-Skills	• Possesses sound knowledge and technical expertise • Manages time and space effectively	• Clarifies and specifies goals in an achievable manner • Clearly plans and organizes activities concerning change effort	(Crawford & Nahmias, 2010; Kendra & Taplin, 2004; Nikolaou et al., 2007)
Openness to experience	• Involved with experimentation and personal practices	• Translates experience into tacit knowledge and uses this in the change process	(McCrae & Costa, 1997; Nikolaou et al., 2007)
Moral and ethical commitment	• Is consistent with social and organisational values. Maintains organisational morale and morality • Self-evaluation and self-reflection	• Concerned with justice and equity among everyone in the community • Respects privacy and security within the community and processes of change	(Bono & Judge, 2003; Judge, Erez, Bono, & Thoresen, 2003; Mogadime et al., 2010; Nikolaou et al., 2007)
Empathy	• Understands and shares the feelings of others • Helps community members when they are in need	• Mitigates the personal issues of stakeholders and keeps everyone happy	(Lunenburg, 2010; Olson & Eoyang, 2001)

Rogers (1995) further states that change agents generally encourage adoption of a new idea, however in some cases they may slow down or even hold up the adoption of an innovation that is undesirable or irrelevant for their community. In this manner,

the role of women as change agents for the farming community is a vital one within the social fabric that community exists within.

Cohen (1982) has shown that social belonging and attachment provide powerful motives for achieving one's goals in a community, with specific reference to women. As literature has explored, farming communities for this research could be defined in two different ways (Crow & Allan, 1995; Lee & Newby, 1983; Willmott, 1986): Firstly, as a territories or places which share the same geographical conditions such as climate, natural resources, and rural remoteness of locale (e.g. Western Queensland regional communities); and, secondly, as a group of people with diverse characteristics sharing common perspectives (MacQueen, McLellan, Metzger, Kegeles, Strauss, Scotti, Blanchard, & Trotter, 2001), and working in the same farming industry (Graziers, grain growers, cotton growers etc.). These latter definitions of community play a crucial symbolic role in generating people's sense of belonging (Crow & Allan, 1995).

People construct community symbolically, making it a resource and repository of meaning, and a referent of their identity (Cohen, 1982). Individual identity relates closely to cultural and social identity, which incorporates roles in a social setting. Identity is constructed by adopting social roles through personal experience (Hampton & Toombs, 2013). It is logically apparent that as a sense of community increases, then the boundaries between an individual's multiple identities diminish as defined lines, blurring and blending to the extent that they are highly co-dependent. This notion suggests that farm (as a business), family and community will also not be compartmentalised in rural communities with a strong social continuity throughout that is highly related to the individuals of the whole.

The meaning of one's identity is negotiated with family and society members. Social identity defines the individual and their positions in the community and establishes accepted relationships and interactions. Therefore, identity studies allow researchers to understand those relationships and their sense of belonging to a specific group at family, community or national levels (Hampton & Toombs, 2013 ; Marks & Thompson, 2010). Having the identity of a change agent is an understanding that they bring to

their professional work (O'Sullivan & Taylor, 2004). 'Change agent' is a self-constructed identity and not imposed by any external, social, political or economic systems (O'Sullivan & Taylor, 2004). Therefore, it can be suggested that farm women's professional development as change agents not only assists with social transformation, but also with their own personal transformation which in turn could be an additional catalyst for social change.

2.4.4. Digital technology and change agents

Digital technology, especially social media, has transformed within the digital landscape beyond its use as a simple social networking tool, into allowing individuals to share content and opinions to a global audience, bypassing traditional media or other modes of information transmission (Loiseau & Nowacka, 2015). This suggests that digital technology is a powerful tool for change agents to utilise, but in communities where trust is the currency of knowledge transfer, social networking digital technology's lack of moderation presents some hesitation; i.e. trust is diminished with the advent of 'fake news'. This makes change agents even more important in the use of digital technologies for farming communities, as they become the moderators of information accuracy by proxy; the brokers of trust. To implement changes in the community, change agents need to overcome potential resistance from other members of the organisation as they encourage them to adopt new practices (Kanter, 1983; Van de Ven, 1986).

Change implementation within an organization can be conceptualized as an exercise in social influence, defined as the alteration of an attitude or behaviour by one person in response to another person's actions (Marsden & Friedkin, 1993). It is important to focus on how the position of change agents within community networks (in this case women farmers) affects their success in initiating and implementing organizational change. Also, the degree of connection to each other (structural closure) has important implications for generating novel ideas and exercising social influence. A high degree of structural closure creates a cohesive network of tightly linked social actors, while a low degree of structural closure creates a network with structural holes and highly diminished brokerage potential (Burt, 2005; Coleman, 1988). These

linkages can be strengthened through digital platforms such as Facebook, Twitter, YouTube and blogs in addition to their usage as sources of information.

It is important to note that there exists already many Australian rural farm women contributing to knowledge sharing, not only in their communities, but around the world, as evidenced from the numerous social networking platforms. Some of the blogs and discussion forums maintained by Australian farm women are *Bush Bel;*, *Cattle, Kids and Chaos; Farmer has a Wife; The Farmer's Wife; Fiona Lake's Blog* and *Farm Wives' Support Group* (Web, 2017), just to identify a few. This supports the hypothesis that women are actively engaged with digital communication technologies, and further that women might be successful actors for practice change in the agricultural industry as on-farm innovators.

2.4.5. Innovation in family farming

According to Röling (2009), agricultural innovation is understood as a process of technical and institutional changes at farm and higher levels that effect productivity and sustainability. While most agricultural innovations are introduced by large companies and research institutions, farmers themselves, have been strong innovators of cropping and livestock systems (Salembier, Elverdin, & Meynard, 2016). As farmers are continuously working with farms and experiencing change, they have the capacity for innovation, combining empirical and scientific knowledge on-farm (Altieri, Funes-Monzote, & Petersen, 2012).

There are opportunities presented to rural farmers to be integrated into the agricultural knowledge sharing network and expand their roles as change agents (Kelly et al., 2017) Kelly et al., 2017). An example is the multiagency research project on the use of farmers' knowledge to identify the ways to better manage farming systems under changing climates, which was commissioned through the Australian Government's Climate Research Program (Commonwealth of Australia, 2015b). These integrated approaches can be the steps towards 'open innovation' and 'co-innovation' in the farming sector. Based on the above review, it is evident that with the

advancement of digital technology, boundaries of knowledge and innovation are becoming blurred.

Co-innovation was first coined by Chesbrough (2003) and again redefined by Chesbrough and Bogers (2014, p. 17) as “a distributed innovation process based on purposively managed knowledge flows across organisational boundaries” (p. 17). Although it was first applied to large business firms, it is suggested that the concept of co-innovation is suitable for application in various types of innovation phenomena (Chesbrough & Bogers, 2014), including communities (Fleming & Waguespack, 2007), with reference to identity, reputation, and physical interaction (Lakhani & Von Hippel, 2004; O'Mahony & Ferraro, 2004).

Co-innovation communities may consist of both users and producers and may come up with economically or/and socially valuable innovations through creating, adapting, adopting or disseminating innovations and managed knowledge. Researchers are defining such communities under study as innovation communities, knowledge producing communities, user communities or virtual communities. Bennett (2015) identifies the importance of developing digital platforms that capture the process, machine, and human mediated data on-farm, with off-farm ancillary data flowing into this platform, but specifically involving a networked community in the co-creation of knowledge. (Bennett, 2015) describes this as a force multiplier in terms of the power of the output, on the basis that co-creation is a constructivist approach with a reflective paradigm. Therefore, co-creation of knowledge and innovation can be very powerful, but requires an empowered community which, in turn, is shaped by the role of the change agent.

According to (Chesbrough & Bogers, 2014), when two or more partners purposively manage mutual knowledge flow across their organisational boundaries, it is called co-innovation. Thus, a community who connects the external knowledge base (directly from research institutes, online information, or other farmers outside their community) with the internal knowledge base (indigenous knowledge within the community, their own knowledge and experience) and improve the quality and quantity of agricultural production – then this is described as a co-innovator process.

Based on the above literature findings, it can be suggested that, specifically with regard to opportunity created through several government and private digital agricultural projects, rural women, with their skills in use of digital technology, can be regarded as co-innovators. Furthermore, this research explores the following model (Figure 2.1) adopted from Chesbrough and Bogers (2014) within the selected 'farming communities' in rural Western Queensland.

The elements of Figure 2.1 can be regarded as the basis of an open innovation model applicable to typical agrarian communities. Irrelevant knowledge can be understood as the inapplicable knowledge of the selected community, or as knowledge unable to be applied due to economic or social factors. Combined knowledge inflow (filtered, refined and relevant knowledge) is adopted by the community while the combined knowledge outflow is transferred across the boundaries, making it available for use by both other farmers within the community and farmers in other communities.

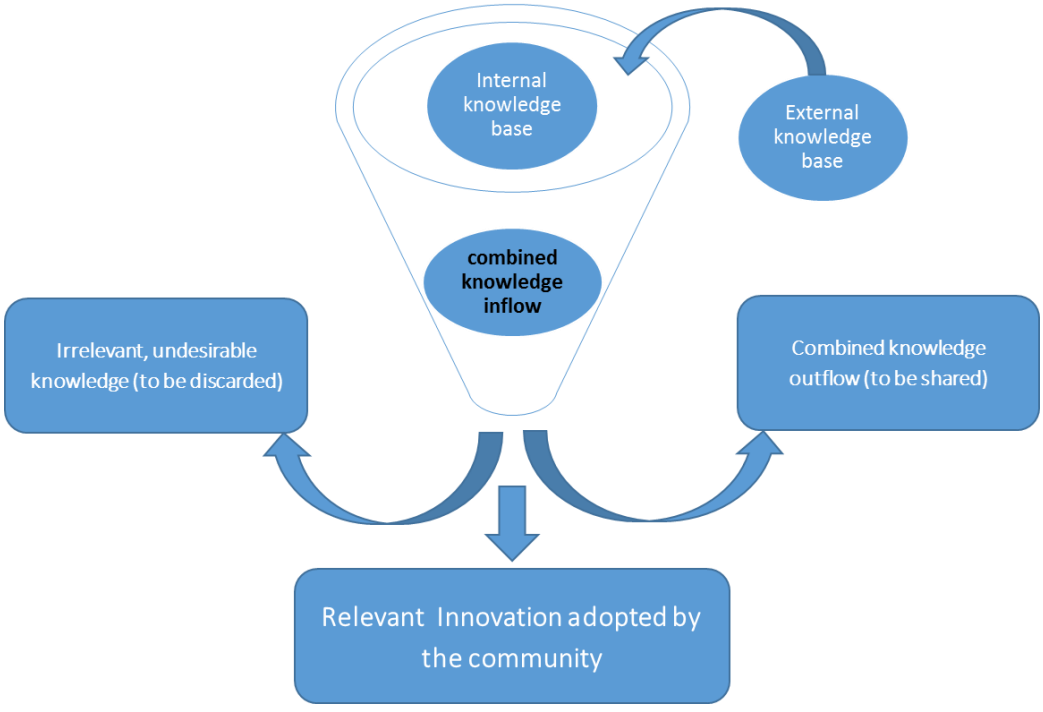

Figure 2.1. The Co-innovation Model in a farming community

Bennett (2015) discusses the 'relevance paradox' where information that is deemed abstract is instantly deemed irrelevant, but at another time, or when seen from a

different perspective, the same information could offer a relevant lateral solution. Within the context of things, we do not know, information is even simpler to discard as irrelevant, as an individual cannot possibly know the information that is required. This is the power of co-creation, as the community provides the extra time resource, the different perspectives, and multiple contexts, which diminish the relevance paradox and the unknown unknowns. This 'combined knowledge outflow' component is, therefore, identified as 'sharing/dissemination of agricultural knowledge' that needs to be promoted, specified and managed in a professional way. On this basis, while technology will have a major role in transitioning farming communities into new production paradigms, the value of the human aspect, on-farm and off-farm, cannot be underestimated. Thus, there is a definite requirement to understand how change agents can empower communities through, and to utilize, digital technology in a useful and trusted manner.

2.5. Summary and the conceptual framework

This chapter has provided an overview of the historical and present situation of Australian agriculture, farm women and digital technology in the context of Australian society. Key assertions are that farm women have been playing an increasingly influential role in rural Australian agriculture, and rural community resilience, while keeping their family unit strong. Their skills in adopting to various changes in family farming from throughout history to the present, and current use of technology as a catalyst for innovative adaptation, is well recognised in the literature. The key insights drawn from the literature review concerning the involvement of farm women in innovative agriculture, through use of digital technology, and their potential to play professional roles as on-farm change agents are identified as:

1). Rural women have been playing significant roles as innovators and change agents in the farming sector and their skills in building relationships and networking knowledge is demonstrated throughout history (Dale-Hallett, 2016; Seuneke & Bock, 2015)

2). Most research has identified rural women's skills in using digital technology in different activities (Hay & Pearce, 2014; Lennie, 2001; Mackrell et al., 2009; McQuillan, 2010), but rarely focused on the use of technology as a catalyst in enhancing their identities as on-farm innovators or change agents. Therefore, this research aims to address this knowledge gap and explore rural women's potential role as on-farm innovators and change agents in their communities.

3). Findings from previous research has confirmed that the existing agricultural extension model has failed to achieve its expected outcome (Hunt et al., 2012; Hunt & Coutts, 2009; Hunt, Vanclay, Birch, Coutts, Flittner, & Williams, 2011).

4). some research has suggested the use of digital extension platforms as an economically and socially sound approach in order to address the failures of current extension models (Bennett, 2015; Kelly et al., 2017). This body of research has discussed the possible characteristics of human actors/integrators of proposed networks, but no further research has been conducted to identify a particular group of actors/integrators in a real-life setting. The need to do this is the starting point of this study which aims to address the knowledge gap by exploring the possibility of the use of rural women as change agents using the proposed digital extension platforms.

Based on this literature review, the basic assumptions that underpin the current study are:

1) Farm women view digital technology positively and they are active users of smart devices and the internet;

2) Exposure to digital technology and understanding their own capacity (knowledge of the self) has created more opportunities and avenues for farm women to construct multiple positive identities, and position themselves well in order to achieve a certain level of satisfaction;

3) Farm women and their multiple identities are social constructs, or inventions, and change with time, space (fluidity), with the changing personal experience of individuals, and with historical and cultural contexts;

4) Women's identities can be constructed as professional co-innovators to fit the national agricultural productivity agenda and to bridge the research extension gap through sharing combined knowledge, thereby suitably fitting into various projects (such as Enabling the Internet of Things for Australia) as an effective human element.

In order to analyse the social process of identity construction, Foucault's theorising on knowledge, power and technologies of the self is proposed in this study.

The next section will elaborate on the conceptual framework based on Foucault's work and will discuss how his work can be useful in understanding the social process of identity construction of rural women in the context of family farming.

Conceptual framework

As Willig (2013) explained, the constructions that are formed as a result of social processes allow or restrict various forms of social actions. As such, if farm women are constructed as an innovative group of people, the social action of the change agent may be available to them by discourses relating to the role of the change agent. Exploring opportunities created through the context of contemporary family farming would identify the resources women are bringing to their lives, family and community. This research explores these resources, and the contribution of digital technology in catalysing the process of transforming these resources into social actions, such as with on-farm change agents. The conceptual model presented below Figure 2. 2 shows the relationships between factors identified, and assumed, in the literature review.

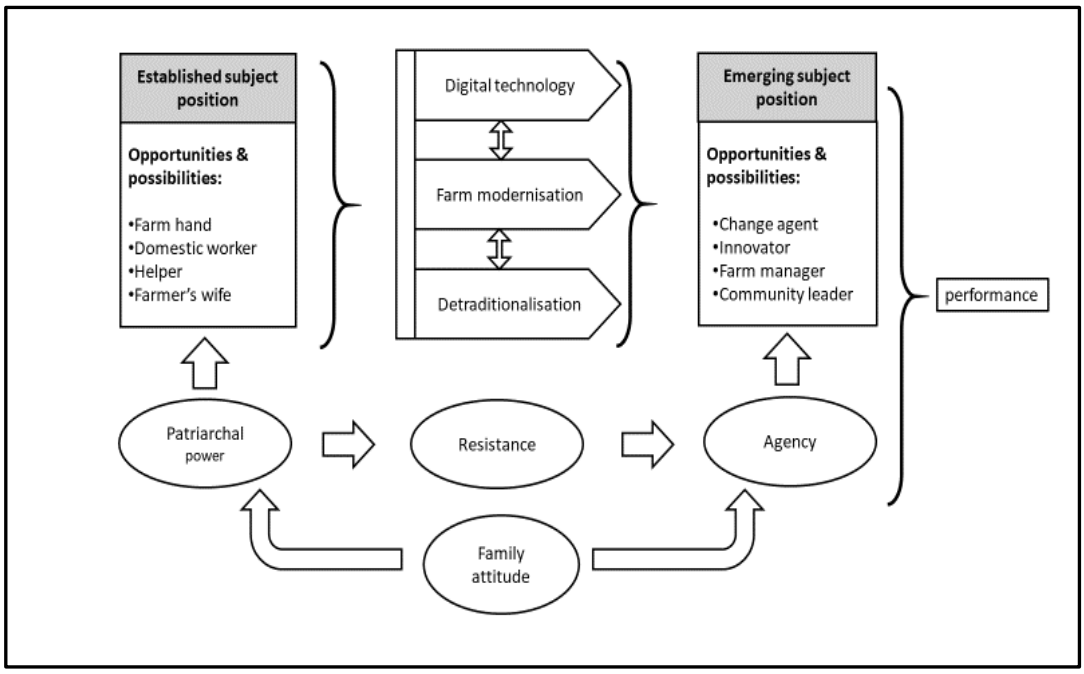

Figure 2. 2. Conceptual model of factors affecting the transformation of rural women

The integrated approach in Figure 2. 2 relates to the literature findings, and underlying assumptions of the study, that the process of transformation of women farmers into positive subjects (change agent, innovator, farm manager, office manager) avoids a dichotomy between participants and the structural environment (society-individual dualism) but allows an understanding of their behaviour in the context of family, farm and community, as a constant interplay.

Foucault's theoretical practices to the investigation of the process of identity construction suggests that there is a constant interplay of constraint, choice and action. The application of Foucault's theorising to the understanding of the process of multiple identity construction by rural women conceptualises such processes that shape and are shaped by networks of knowledge and institutional structures (such as family and community); and they have the capacity to modify constraints and their own behaviour using external (digital technology, family motivation) and internal (ethics) factors.

Having accepted Foucault's approach, this conceptual framework brings an understanding of the way in which the power relations between structural environment shape choices, consequences, and the emergence of agency. Rural

women's power, resistance and agency towards community action and farm performance can be better understood 'within a choice-and-consequence scenario' (Brennan & Israel, 2008). As illustrated in Figure 2. 2, rural women's choice may be the decision to act towards emerging subject positions, or remain inactive and accept the existing subject positions. Their choice – whether to act or stay inactive – may be shaped by environmental factors such as access to resources (internet, computer, machinery etc.), family attitude (supportive or repressive), patriarchal power and government/institutional policy and regulations (farm modernisation and detraditionalization). This setting, digital technology and women's agency (developed through resistance) have the potential to expose new subject positions and contribute to farm performance and change in communities.

CHAPTER 3: ANALYTICAL FRAMEWORK FOR THE RESEARCH AND RESEARCH METHODOLOGY

3.1 Introduction

This research aims to explore rural women's identity construction as change agents in the context of family farming, particularly through access to digital technology. It also identifies how rural women utilise digital technology for on-farm innovation and agricultural information transfer to, from and within their community. The previous chapter (Chapter Two) explored the literature related to the research. The key hypothesis which emerged from Chapter Two was that rural women's positive identities (change agents, on-farm innovators) are social constructions and these identities are constantly reconstructed through space and time.

Based on the literature in Chapter Two, it can be seen that the process of identity construction by rural women is neither emancipation of patriarchal power nor a manifestation of free will, but a constant interplay between the two.

This process of identity construction can be revealed through an inquiry into women's agency and power relations within the structures which enable, shape and constrain the process. Foucault's analyses – based on knowledge construction, power relationships in families, digital technology and the self – support the hypothesis articulated in Chapter 2 because Foucault views human activities as an interplay of dominating structures (such as knowledge/power relations, digital technology) as well as ethics and care of the self, and are revealed through a set of practices. Foucault identified this process as an interplay of two technologies namely:

1). Technologies of power (dominating structure) or structural power; and
2). Technologies of the self (ethics and care of the self) or agency.

This chapter first aims to justify the application of the Foucauldian approach[8] for this particular study, then subsequently discuss the application of the abovementioned technologies in exploring the dynamics of rural women's multiple identities in the context of rural Australian family farming.

Then it describes the research setting, and sampling and methods of data collection. The final section of the chapter explains the Foucauldian informed thematic analysis that has been adopted for analysis and interpretation in this current work.

3.2. Rationale for the methodological approach

The literature review (Chapter 2) provided background, exploring the historical, cultural and political context of Australian agriculture, rural women and family farming. The emerging issues through literature can be summarised as follows:

- Australian agriculture has undergone, and is undergoing, rapid change with the advancement of digital technology and is in a state of transition;
- In order to channel the maximum benefit of technology to the end user (farmers), relevant information has to be channelled in an efficient way and in a timely manner;
- Information channelling cannot be done solely by improving infrastructure without human interaction at the grassroots level; and,
- Rural women are identified as active users of digital technology, as well as possessing clear positive attitudes towards positive change;

Therefore, this research aims to explore how rural women construct their identities as change agents in transferring agricultural knowledge and initiating on-farm innovation within their community, through the use of digital technology.

[8] It is noted that some of Foucault's lectures were originally conducted in French but have been translated into English by several authors. Therefore, when referencing such translations, 'as cited in' is included in the in-text citation.

Unlike corporately controlled commercial farming, family farming exercises different power relations, due to strong attachments and interdependency between family, farm and the community. Therefore, it is important to explore how rural women construct and negotiate their identities as change agents through power relations, and how digital technology, their family member's attitude/support and personal dispositions influence their power. Moreover, rural women's established power relations with the community together with their positive identity provides opportunities for rural women to transfer their agricultural knowledge to, from and within the community. In order to shed more light, this research explores three research questions that are directly relevant to the ultimate research question of this work:

1. How do rural women construct professional identities as change agents?
2. How do rural women use digital technology to transfer agricultural knowledge to their farming community?
3. How are rural women supported by their families and the various communities for the enhancement of their professional, innovative and agentic skills?

The nature of the above research questions, and the literature, support the assumption that the process of changing and constructing identities is a social construct. Therefore, it is important to clarify the research inquiry – the framework for observation and understanding – that shapes both what we see and how we understand or construct the world (Babbie, 2004).The following section outlines how Foucault's analyses of knowledge/power relations and moral practices fit comfortably with research in the context of family, farm and the community.

3.3. Justification and positioning research within Foucault's analyses

The theoretical/ philosophical perspective for research inquiry helps guide the choice of the research approach (Khun, 1962). Therefore, it is important to clarify a framework for observation and understanding that shapes both what we see and how we understand the world (Babbie, 2004). People conduct social research for many reasons. Some want to answer practical questions or to test a hypothesis or confirm or validate findings. Others want to make informed decisions. Still others want to

change society. Finally, those in the scientific community seek to build basic knowledge about society. In order to understand these relationships, the researcher needs to find the answers to the philosophic questions of "what knowledge is?" and from this "what truth is?" and "what is reality?" (Guba & Lincoln, 1994) point out that an inquiry paradigm can no longer be treated as a set of universally applicable rules and various paradigms are beginning to merge. Robson (2002) argues that restricting research on human beings to one paradigm does an injustice to the entire field of study. Therefore, this current research is located in a wide theoretical underpinning introduced by Foucault.

This research is epistemologically positioned with the concept of 'episteme' employed by Foucault. As episteme is described in Foucault (1974), there is only one episteme that defines the conditions of possibility of all knowledge (in theory or practice), within a given culture, and at any given moment. This implies that different periods of history constitute different systems of thoughts (Bibri, 2013) and it can be understood by analysing the discourses through which human beings brought this knowledge into being by assigning meanings.

Furthermore, that knowledge and discourses are constructed representing the conditions of their possibility, co-existence and interaction. Foucault (1980) did not identify knowledge as a universal structure. Foucault (1980) aimed to discover historical principles, as knowledge claims are partial, historically restricted, intertwined with power and therefore the knowledge at any point in time is open to revision (Monatschrift, 1984). Foucault (1984a) historical analysis of different ways humans is constituted as subjects suggests that there is an interplay between constraint, choice and action. Power exists everywhere and is embodied in discourse, knowledge and regimes of truth (Foucault, 1984b). This theorising can be applied to investigate the process of rural women's identity construction in terms of the structural environment (family, farm, community) and agency. Therefore, it is conceptualised that rural women are shaped by networks of knowledge, power, institutional and social structures that may limit or open them for various subject positions; and they have the capacity to modify their own behaviour by pushing the limits

Foucault's archaeological approach to knowledge, its history, genealogy of power, discourses and the subject, technologies of self, ethics and care of the self, led this current research towards exploring:

- How patriarchal power changes over time (discussed in Chapter 2);
- How women farmers negotiate their gender roles;
- How women use resistance and agency;
- How women use digital technology to construct discursive subject positions (as legitimised knowledge), perform multiple gender roles, and create positive social identities;
- How they are supported by the family and their various communities towards their behaviour.
- How women view themselves; and,
- How they care for themselves in the pursuit of freedom in a happier, healthier life.

Foucault's approach was to analyse social processes as a set of discourses and practices within a given historic and cultural context. Particular attention was paid to the influence of a variety of factors established in the actions of society and individuals, through the process of meaning construction. Accordingly, this research aims to conceptualise and deconstruct the relationships, as socially constructed domains, between farm women, family, identity, farming, and change agents. This basis of inquiry aligns with the theoretical foundations of Foucault, making it appropriate philosophical approach. It is noted that poststructuralism, by its very nature, raises the same questions as Foucault's work, but Foucault extends beyond poststructuralism and describes discourses as practices that systematically form the objects of which they speak (Foucault, 1972).

Moreover, Foucault's later work – technologies of self – was highly focused on examining the ways in which individuals engage in ethical and moral practices, which is highly commended in this present moment of qualitative research known as the 'fractured future'. Technologies of self has been clearly described in relation to the qualitative research field by Denzin and Lincoln (2008). According to Denzin (2008) the

field of qualitative research has been crosscut into eight historical moments and now we are in the eighth moment (the 'fractured future') which commenced in the year 2005, and which is associated with moral discourses and shaped by a refusal to privilege any method or theory inviting critical conversations about democracy, gender, race, class, nation-states, globalisation, freedom and community (Denzin, 2008).

As such, Foucault's concept of 'technologies of the self' invite researchers to critically examine the diverse ways in which individuals accept, resist and challenge discourses associated with certain institutions (e.g. family, family farm businesses) and why they take up certain discourses, in preference to others, to attain perfection (Wright, 2003). Aligning with a 'refusal to privilege any method or theory', Foucault described his practices as 'analytical work' rather than theory and the analysis of power as a way of 'theorising practice' (Foucault, 1988b). Using a diverse theoretical base embraces the multiple perspectives founded in a variety of fields of study, rather than relying on a single theory (Hatch, 2018). As such, Foucault's 'toolbox' allows the researcher to apply multiple theoretical perspectives based on power, knowledge and ethics. On the other hand, Foucault rejects labelling the approach into different traditions, as follows:

> *I should be grateful if people would free me from a connection that certainly honour[s] me, but that I have not deserved … There may well be similarities with other works … and [it is] hard to claim that my discourse is independent of conditions and rules of which I am unaware, and which is being done today. But it is easy to avoid the trouble of analysing such work by giving it an impressive, but inaccurate label* (Foucault, 1974).

Foucault has not developed a set of guidelines for his own methodology, as he did not want to have a methodology applied in the same way to different domains. According to Foucault, closed, predefined methodology constrains the breadth and scope of the thinking of the researcher, and undercuts the analytic possibilities of his approach (Nicholls, 2008).

Instead he has advised us:

> *All my books work as little boxes of tools. If you want to open them, use a particular sentence … like a screwdriver or spanner to short-circuit, break up the systems of power, including eventually those from which my books have issued … I write for users, not for readers* (Foucault, cited in Motion & Leitch, 2007; Nicholls, 2008).

Foucault wanted us, as researchers, to use his theories to best suit our own theoretical perspective (McLaren, 2009), in order to achieve the aims of the given research. Accordingly, his work has to be applied appropriately for a particular focus of inquiry, ensuring coherent connection with his theoretical and philosophical approaches (Hook, 2001; Nicholls, 2008). Additionally, it is prudent to follow Nietzsche's notion of philosophy which states that "thinkers are shooting arrows into the air and other thinkers are to pick them up and shoot them in another direction" (Willcocks & Lioliou, 2011, p. 175). Foucault emphasised that his ideas would not fit with conventional categories. As such, he did not align himself with established traditions (Bové, 1988; Crow, 2005). Thus, giving due recognition to Foucault's work, this study uses related guiding principles in exploring the social processes of farm women's changing identities and positive identity construction.

3.4. Guiding principles underlying this research

Even though Foucault's work has shifted over a wide range of historical and thematic choices, some features are consistent in the focus of Foucault's investigation, and also applicable to the present study of women farmers' identity transformation with digital technology in the context of family farming. Those features that are relevant to the present study are summarised as three major guiding principles:

1. Technologies of power (structural power) and technologies of the self (agency)
2. Subject position and subjectification; and,
3. Power relationships in a family and within family farming

3.4.1. Technologies of power and technologies of the self

According to Foucault these two technologies hardly ever function separately (Foucault, 2005), and the social practices of people are an interplay of structural power relations (exercised as knowledge and discipline) and their reaction (agency) to such power relations. Structural power is exercised upon people as networks of knowledge and disciplinary power through government, social and cultural institutions. This power shapes people's lives and sets rules and procedures to be followed (Foucault, 1988d). According to Foucault, technology is used in modern social and political systems to control, supervise and manipulate individuals, in a manner resembling the workings in organised factories, according to the principles of scientific management, or electrical grids (Behrent, 2013; Marx, 2010). Foucault further describes that power exerts its influence in different ways in many directions, creating microscopic relations throughout society. These relations of power are the forces that produce, circulate and operationalise discourses, as well as construct truth (Foucault, 1980, p. 93; 1990a).

Foucault identified 'biopower' as another technology of power, a technology that incorporates certain aspects of disciplinary power in controlling bodies and minds of subjects. The metaphor of the panopticon (a type of institutional building and a system of control) is commonly used by Foucault in order to represent disciplinary power, which he sees as characterised by invisible surveillance. He explains this use of 'panopticon' further by stating that a panopticon, or biopower, shapes individuals through discipline, optimises their capabilities, and integrates them into systems of efficient economic control as docile bodies. On the other hand, he states also that biopower appears also as a bio-politics of population, in disciplining and regulating the health of the body (Foucault, 1990a). However, Webb et al state that both types of biopower (regulatory and disciplinary) cannot control the subject completely because regulation and discipline always produce resistance (Webb, Danaher, & Tony, 2000).

It is also important to note that daily interactions with digital technology alters how people conceive and shape their sense of self (Hernández-Ramírez, 2017). Web 2.0 and 3.0 technologies have created a space for people (regardless of social divisions as

rich/poor, male/female, educated/non educated) to transform themselves in virtual worlds of reading, listening or viewing without apparent limits (Abbas & Dervin, 2009). Thus, it can be seen how the process of identity creation, which cannot be separated from taking care of oneself, is much easier with new communication technologies. This notion can be used to explain participants' performance of multiple subject positions and how digital technology helps in this regard.

Foucault understands the life of the self as a function of creativity, rather than understanding creativity as a particular quality of the self, however this may vary from person to person. His view of where there is power there is resistance (Foucault, 1980; Motion & Leitch, 2007) stresses his acceptance of agency through resistance. This resistance is everywhere and at every level (O'Farrell, 2005) as a field of possible action constituted in the exercise of power (Flohr, 2016). Resistance does not imply rejection or denial of power, but a modification of its contemporary configurations, as resistance through power rather than resistance to power (Flohr, 2016).

Foucault's technologies of the self is understood as being connected to a person's ability to resist structural power or agency which will in turn 'permit them to effect by their own means or with the help of others a certain number of operations on their bodies and souls, thoughts, conduct, and the[ir] way of being so as to transform themselves …' (Foucault, 1988d, p. 18). As such, the use of these two technologies in approaching the dynamics of rural women's multiple identity construction is very useful because it helps view rural women's positioning as embedded in the structural environment (disciplined and manipulated by government agricultural policies, family traditions, community values, farming practices – both traditional and modern – and, use of digital technology). It is further suggested that a rural woman who displays significant individual behaviour can become a potent agent of change within existing structural dynamics.

3.4.2. Subject position and subjectification

Each human being can be seen as a political entity (a person who belongs to the community and its system of government), but also as a specific identity owned by the self. These are subject positions and the process of constructing subject positions is

called subjectification. This process of subjectification categorises individuals by attaching meanings to them. Referring to a farm woman, these meanings shape her individuality, defining her as a particular being in the world. When an individual becomes a subject (as in subjectification) she uses the models proposed, suggested and imposed upon her by her culture and accepted by herself. Subject positions are socially available and can be occupied by participants to allow identities to be formed.

In regard to this process it is also important to consider individual differences of people because subjectification is a complex interplay of choice, action and constraint (O'Farrell, 2005). Foucault's later work on human rights was not focused on the right to be free or the right to be equal, but it was based on what he called a right to be different (Lemm & Vatter, 2014). Foucault's notion that 'everybody both acts and thinks' (Foucault, 1988d, p. 14) allows a person to explore their sense of freedom and find their position in society (Batters, 2011). Therefore, exploration of the subjectification of participants and recognition of their individual differences in this research provides an opportunity to examine the dynamics of identities occupied by participants of a given community.

3.4.3. Power relationships in a family and within family farming

As Foucault explains, 'family' is an institution where sovereign power is exercised (Foucault, 2008). The father, as the original bearer of the family name, exercises power in his name, and this is a more individualised and intense power than the power carried by his wife or children. As well as this, however, there is also a type of bond – a personal and collective commitment, and dependence – as a result of marriage or birth. Therefore, family is identified as an apparatus of sovereignty, but also an increasingly essential component of the disciplinary system. If a family breaks down, a whole series of disciplinary apparatuses are established, marking the start of social assistance – social work – to make up for the family's failure.

These works highlight the importance of a smooth functioning family unit in order to have a smooth functioning society. Based on Foucault's ideas it could be assumed that smooth functioning of the family farm is an interplay between familial sovereignty and disciplinary functioning. This concept is highly relevant to the present study as the

majority of Australian farms are family farms and are operated by members of nuclear or extended families (Falkiner, Steena, Hicks, & Keogh, 2017) whose first consideration is to maintain family harmony. Consideration therefore has to be given to a methodology that recognises and understands the power networks and power dynamics within a family (Duschinsky, Greco, & Solomon, 2015; Röttger-Rössler & Slaby, 2018) in a postmodern world. The above considerations are important as they lead to an exploration of values people develop from family and community relationships, while also respecting individual differences (Maclean, 2005).

The next section describes the process of data collection and the use of Foucauldian tools as a method in organising and analysing data in this study.

3.5. The study

3.5.1. The research setting

Selecting a suitable site has a significant impact on successful research. The qualitative tradition of this research focuses mainly on the activities of participants in their natural setting (Bhattacharya, 2008). According to Hammersley and Atkinson (2007), the researcher has to limit the choice of setting in order to balance the breadth and depth of the investigation. As such, the choice of only a few locations for this study allowed an engagement with participants for an extended period (Schwandt, Lincoln, & Guba, 2007), thus enabling the collection of rich data. The research topic by its nature has pre-set some of the features required of the research location such as rural and family farming community with access to digital technology. Therefore, four regional areas of the Darling Downs region of South West Queensland were selected for this study because these areas:

1). Fulfil the requirements of the research question (rurality, family farming community and access to the internet by participants in selected regional towns).
2). They are easily accessible to the researcher.
3). Have readily available and accessible channels through which to communicate with the research participants online and through community leaders.

Figure 3.3 illustrates the location of the research settings where five focus groups were conducted, namely: (1) Surat; (2) Thallon; and (3) Goondiwindi.

Figure 3.3. Map of the research area. Adapted from http://atn.com.au/qld/south/swqld-map.html

The region, also known as the Darling Downs-Maranoa region, consists of the six local government areas of Balonne, Goondiwindi, Maranoa, Southern Downs, Toowoomba and Western Downs. The gross value of agricultural production in the region was 3.5 billion dollars in 2015-16. This was 26 percent of the total gross value of state production. As the participants were selected from three towns representing four local government areas, the main features of selected towns are summarised in table Table 3.3.

Table 3.3. *Major features of the research locations. Adopted from Australian Bureau of Statistics Retrieved from* www.abs.gov.au

Region	Maranoa regional council area	Balonne shire council area	Goondiwindi regional council area
Town	Surat	Thallon	Goondiwindi
Population	407	257	6355
Male	206	141	3135
female	196	123	3225
Dwelling internet access & % of total population	96 (59.3%)	66 (78.6%)	1664 (75.5%)

Some of the significant features of the three regional towns are stated below:

Surat

Surat is a small rural town situated on the banks of the Balonne River and maintained by the Maranoa Regional Council. It is positioned on the Great Inland Way, approximately 80 km south of Roma on the Carnarvon Highway in South West Queensland. It is nearly 450 km from Brisbane. The minimum farm size is 700 hectares. Agriculture is a thriving industry in Surat, dominated by grain producers and graziers.

Thallon

Thallon is a local community and locality in the Shire of Balonne. Thallon is famous for its large grain silos with murals, recording the second largest grain intake in Queensland in 2012-2013. Wheat, barley, cotton, chickpeas and oats are among the major crops grown in this area and the products are transported to Brisbane for export.

Goondiwindi

Goondiwindi is one of Queensland's fastest growing rural communities and it is a well-established border town. It is situated on the banks of the Macintyre River, which marks the Queensland/NSW border. In addition to the production of wool and beef, major crops grown in this region are, cotton, sorghum, corn, wheat, barley and chickpeas.

3.5.2. Population and Sampling

The population includes all elements that meet certain criteria for inclusion in a study (Burns & Grove, 2010). In this study a sample population is a subset of the population, fairly representative of the purpose of the study, selected to participate in the research. Morgan (1997) suggests that four types of sampling are used in qualitative research: 1) The purposeful sample; 2) The nominated sample; 3) The volunteer sample; and, 4) The complete sample, consisting of the total population. Sandelowski (1995) views all sampling in qualitative research as purposeful sampling. Unlike quantitative research, qualitative research is often concerned with achieving different forms of generalisability or transferability. It does not typically use sampling strategies

aimed at producing statistical representativeness. This study conducted purposive sampling, which is considered as the most important kind of non-probability sampling in identifying primary participants (Welman & Kruger, 1999).

Participants were selected based on personal judgement and the purpose of the research (Babbie & Halley, 1995; Greig, Taylor, & MacKay, 2012; Schwandt, 1997). Once the potential participants were identified through personal contacts, an email was circulated requesting their participation in the study. An invitation including a brief description about the researcher, purpose of the research, focus group session details and the contact details were attached with the email. In order to trace additional participants, snowball sampling was done by requesting initial participants to contact other interested participants who are known to them.

It is important to note that the purpose of this work was not to identify how many change agents exist within agriculture (a qualitative statistical approach), but to understand mechanisms and dynamics. The greatest ability to understand these occurs when the research participants are directly selected for this purpose. While there are no closely defined rules for sample size (Baum, 2002; Patton, 1990) sampling in qualitative research usually relies on small numbers with the aim of studying, in depth, the detail surrounding the purpose of the study (Miles & Huberman, 1994; Patton, 1990). This research was conducted with 42 participants who participated in five focus groups.

3.5.3. Selection criteria and ethical consideration

Consideration is given to each criterion, based on practicality, logistics and relevance to the research question of this study. Focus group discussions were conducted with mixed farming communities in each selected town. These participants consisted of cattle farmers, grain farmers and mixed farmers (grain, and/or cattle, and/or other). The focus group discussions and interviews were predominantly face-to face and held in public places easily accessible to all participants. The majority of the participants were aged between 25 and 50 years, active users of technology, with all identifying as farm women in family farming. Specific characteristics required of the participants

were: (1) female older than 18 years; (2) involved in family farming activities; and, (3) has access to the internet.

An informed consent form was prepared, as per USQ ethics guidelines, in order to gain the informed consent from participants. This form detailed:

- That they are participating in research.
- The purpose of the research (without stating the central research question).
- The procedures of the research.
- The risk and benefits of the research.
- The voluntary nature of research participation.
- The subject's (informant's) right to stop participation in the research at any time.
- The procedures used to protect confidentiality.

3.5.4. Research Techniques

Research technique employed in information gathering in this research was focus groups discussions.

Focus Groups

Focus groups (which are like a type of interview method, but in groups) are the method of data collection in this research. According to Krueger (2014), focus group interviews emerged in the late 1930s by social scientists that had doubts about the accuracy of traditional information gathering methods (Krueger & Casey, 2014). Focus groups are relatively quick, flexible and issues can be explored through personal interaction and discussion (Palomba & Banta, 1999). Focus groups encourage the group to draw upon participants' attitudes, feelings, beliefs, experiences and reactions, as opposed to other field methods, such as one-on-one interviews, surveys and observations (Stahl, Tremblay, & LeRouge, 2011).

Even though research may give consideration to forming a homogenous group in terms of gender, age, experience and occupation, differences among participants still exist. These differences are given importance in a focus group where participants tend to clarify the reasoning behind their thinking and link individual feelings into broader

social experience (Farnsworth & Boon, 2010; Kitzinger, 1994). Moreover, focus groups are successful in connecting with less active participants because group discussions would encourage them to express their experiences in discussion with other participants. Therefore, the focus group method is applicable for this present study as it aims to explore participants' experiences in farming and digital technology.

At the same time, it is also important to consider the downside of such group dynamics because some of the participants' voices may be muted or discouraged due to dominant voices within the group. In such situations, moderation by the facilitator is required in order to encourage all group members to speak (Smithson, 2000), based on the guiding questions.

Considering the above factors, this study employed focus group interviews with six to eight interviewees in each group. The aim of using focus groups for this study was to encourage interactions within the group, rather than using question and answer format of interviews, thereby enhancing participants' reflections. This allowed an understanding of how participants make a collective sense, negotiate meanings and how identities emerged through interaction between participants (Wilkinson, 1999).

Morgan's (1997)view of the focus group – a critical and distinguished method that relies on collaborative construction within a group to inform topics provided by the researcher – is very much aligned to the nature of this current research, remembering that:

(1) This research aims to answer predetermined research questions (not findings emerging through the data).
(2) This research aims to examine participants' construction of identities and practices.
(3) Foucault's critical approach (Stahl et al., 2011) is used as the methodology to analyse data considering social dynamics and the participants' construction of knowledge.

Therefore, the present study pays more attention to the composition of focus groups in relation to the research questions, instead of generalising the effect of groups (Kitzinger, 1994).

3.6 Data collection procedure

Data were collected from five focus groups (6-8 participants in each group, out of a total of 42 participants) through guiding questions and lasted an average of ninety minutes. The participants of this study were sourced through known and active female leaders and their social networks. According to USQ ethical standards, a specific informed consent form was prepared, filled out by participants and collected before commencing each and every focus group discussion.

The guiding questions used in focus groups were related to issues discussed in the literature and designed to encourage verbal reflection on the area of digital technology, information sharing, community engagement, and work satisfaction, as relevant to their family and farming. In addition to the guiding questions, further important questions were asked during the group sessions. These questions allowed the unpacking of important issues that arose in line with the research questions but were not initially directly addressed by the line of questioning.

The basic questions that guided the focus groups are listed below:

1. What do you see as your most important responsibilities and tasks?
2. Can you tell me the things you like most about your work?
    a. Why do you like those?
    b. What important achievements have you accomplished so far?
3 . Do you find something difficult about your work?
    a. What reasons make those difficult for you?
4. Do you feel that you receive encouragement from others?
    a. Who are they?
5. Do you think you have the potential to use your knowledge and expertise to help others in farming communities?
    a. In which areas?
    b. Do you feel you need additional training?
    c. Do you feel you need to use your knowledge and skills more visibly in the community?
    d. Do you feel supported?
6. How do you view community work in your farming community?
7. Any other things you would like share?

All discussions were audio recorded with participants' prior consent and later transcribed using the NVivo version 11.4.3 compatible format. All recordings were subsequently transcribed using a professional transcription service, which provided a further level of bias removal.

3.7 Validity and rigour

The majority of researchers employ multiple methods or triangulation as an alternative to validation aiming to add rigor, breadth, depth, complexity and richness in to their research (Flick, 2002 p. 227, 229). According to (Denzin, 2008), there is no one 'correct' telling of the event as qualitative research reflects a different perspective of the event. As Foucault's work does not represent a single world view denoting particular ontology, epistemology or methodology, this research triangulates the findings through Foucault's 'tool box' of theoretical and practical instruments (discourses; problematisations; practices; subject positions; and technologies of the self) and develop his ideas further, along with other referenced work, during analysis and interpretation.

3.8 Foucauldian informed thematic analysis

As this research was exploratory and sought for rich data, thematic analysis (TA) is a suitable method to deal with that type of rich data. Thematic analysis, by itself, is a theoretically flexible approach in analysing qualitative data (Braun & Clarke, 2006) and it can be applied across a range of theoretical and epistemological approaches (Timberlake, 2015). Figure 3.4 shows the ontological orientation of this research within TA.

Ontology and the research question

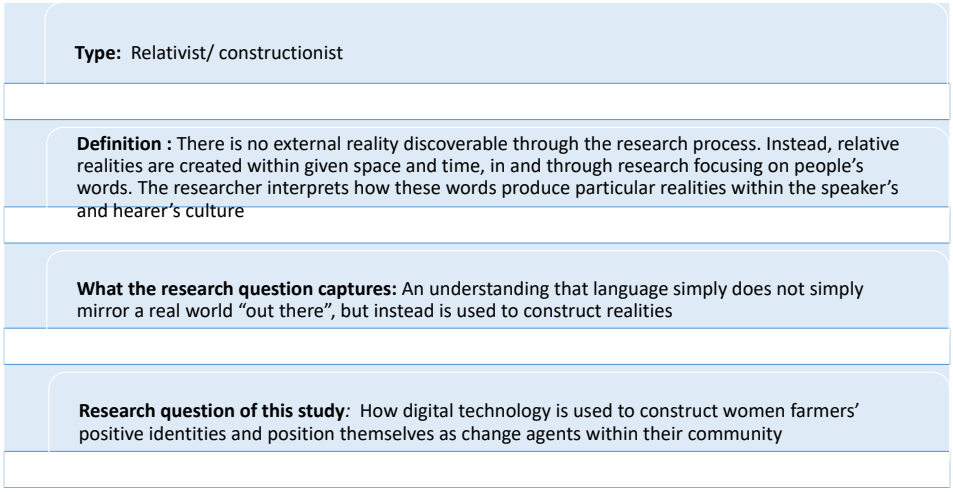

Figure 3.4. Ontology and the research question; adapted from (Willig & Rogers, 2017). The Sage handbook of qualitative research in Psychology

The nature of theoretical flexibility allows TA to be used to analyse a wide range of data types, including focus groups, interviews, discussion forums and other media sources (Willig & Rogers, 2017), which have been used in this research. According to the epistemological base and the nature of research questions, this research has employed a more critical orientation seeking to interrogate dominant patterns of meaning and theoretically understand language as creating, rather than reflecting reality through what participants think, feel and do (Willig & Rogers, 2017).

This research is driven by a theoretical base providing less description of the overall data, and more detailed analysis of some aspects of the data (Braun & Clarke, 2006). Being a positively focused research, Foucauldian informed TA is appropriate as it does not consider essentialist assumptions (Gordon, 2011) of farm women as an oppressed group, nor ending of sexual repression as the key to liberation (Gutting, 2005). Instead Foucault suggests that liberation can be achieved by liberation from one's own thoughts, cultivating certain awareness of oneself and one's surroundings, which is understood as the care of the self (Batters, 2011; Foucault, 1988a). Language is not a reflection, or manifestation, of the person that speaks/writes the language (Foucault in Korsgaard, 2007). Foucauldian analysis is concerned with discourses and how it affects the construction of social and family life. Discourses facilitate and restrict, as well as enable and disable, what can be said, by whom, where and when (Parker, 2014). Therefore, social constructionists see language as performative, not descriptive. Knowledge and truth are produced through the actions of speaking and writing, and influence on action, perceptions and values of human beings (Korsgaard, 2007). As such, this research analyses the discourses used in the focus group transcripts, in order to understand:

- How positive multiple identities are constructed by farm women; and,
- How such constructs position them within the context of family farming.

This research also looks at the contributing factors for identity construction:

- Why they construct and for what; as well as,

- What rules govern the formation of the subject farm women?

The concepts associated with farm women are decisive to the status and value connected to farm women. In order to analyse the materials collected, Foucault's toolbox was used. Therefore, as Ryan and Bernard (2003) described, thematic analysis has been done within the major analytical process of Foucauldian inspired discourse analysis. Foucault's major tools of problematisation, technologies of power, technologies of the self and his philosophy on subject positions and subjectification were used to support the identification of codes and themes during analysis. These provided a rigorous support to explore how farm women create knowledge about themselves and others and how these technologies work when they change or create identities.

3.9 Summary

This chapter has introduced the philosophical underpinning, based on Foucault's analyses, that assists with interpretation and analysis in both the production and representation of knowledge produced in this research. The abovementioned analytical tools examine the relationship between power and knowledge in terms of particular ways beings are made, normalised, accepted and subjectivities offered (Hanna, 2014). However, some scholars suggest that FDA claims resistance, and agency is possible, but it has failed to offer any understanding of how (Arribas-Ayllon & Walkerdine, 2008; Hanna, 2014). Inclusion of Foucault's later work on ethics, technologies of the self and care of self, suggest that human beings adopt and exercise in order to work on themselves, and conduct themselves in order to transform themselves to achieve happiness, purity, wisdom, perfection and immortality (Foucault, 1988a, p. 18).

Therefore, this research offers an understanding of how farm women are subjected to certain rules of conduct, regimes of truth and power relations through which they resist subjectivities, disrupt normalised ways of being and engage in ethical behaviour (Foucault, 1990c) in their relationships with the family, farm, and the community. To sum up, it is important to mention that Foucault's research and teaching were not to develop a theory or to transmit knowledge of philosophy in to academia, but they are

to be practiced by individuals in order to become free of oneself and experience self-transformation. The sequence and the process of these methods are explained in detail in the next chapter, with illustrations and examples extracted from this study.

CHAPTER 4: PRELIMINARY DATA ANALYSIS AND PRESENTATION

4.1. Introduction

This chapter introduces Foucauldian informed thematic analysis (TA) as a methodology in this research, with examples and illustrations. TA is an appropriate and useful methodology for this research. It can be applied to the analysis of knowledge-power relations, as well as to the discursive positioning of individuals within families and society as a single entity by setting aside society-individual dualism (Arribas-Ayllon & Walkerdine, 2008). For Foucault (1984b) knowledge is considered to be constructed through social processes and bound by power relations. The use of Foucault's conceptualisation of knowledge as 'discourse' refers to how an individual (participant) actively constitutes the social domain.

The analytical process should facilitate the distinctive and characteristic features of change agency and professionalism that can be revealing and revealed through the set of practices of participants in the contexts of family, farm and the community. Based on this, the preliminary analysis is oriented towards identifying themes based on Foucauldian informed notations such as how participants construct objects, events and experiences along with discourses; problematisations; practices; subject positions; and technologies of the self. The process is explained in detail in the following sections. Moreover, this chapter aims to arrange raw data into a logical and meaningful sequence so as to make it manageable for further analysis and interpretation. Another aim of this chapter is to present the way in which an inductive approach (data driven) is used in order to allow the emergence of novel themes relevant to the research questions.

Focus group transcripts were examined using NVivo software for organising, coding and exploring texts according to Foucault's analytic tools, namely; (1) identification of objects, events and experiences; (2) problematisations; (3) technologies; (4) subject positions; and (5) subjectification (Arribas-Ayllon & Walkerdine, 2008; Willig & Rogers, 2017). This chapter presents data as open codes, initial codes, categories and themes

combining a description of the methods with initial results in order to explain the procedure of analysis. It also demonstrates its relevance to Foucault's theorising as described in Chapter 3.

4.2. The analytical process

The analytical process was based on Foucauldian informed thematic analysis. While thematic analysis identified recurring patterns within and across the data (Braun & Clarke, 2006), further questions were applied through Foucault's analytical tools in order to identify codes and themes.

4.2.1. Phase 1 – Becoming familiar with the data

Data used for analysis was drawn from focus groups transcripts that were transcribed by a professional transcription service. As the first step of analysis, all transcripts were checked with the audio recordings to confirm each and every word in the recording had been transcribed accurately. Interview transcripts were read several times to develop a thorough understanding of the content and to familiarise the researcher with data. Then transcripts were imported to NVivo software for further analysis of the data. Pseudonyms were used to create anonymity for all participants before importing details to the NVivo software. Memos were used to record ideas and thoughts which emerged during this stage. The memo notes were linked to codes at a later stage. The following screenshot (see Figure 4.5) is an illustration of the memos which were created while the researcher was becoming familiar with the data.

4.2.2. Phase 2 – Generating initial codes

Phase two started with becoming familiar with the data and locating data of interest (Braun & Clarke, 2006). In this phase data were broken down, conceptualized and arranged in new ways (Strauss & Corbin, 1998) by attaching new meanings to segments of data (Charmaz, 2006). This was a significant step in the process of analysis because a node (code) constructs, defines and limits the phenomena that was shown in the transcripts or texts to be analysed.

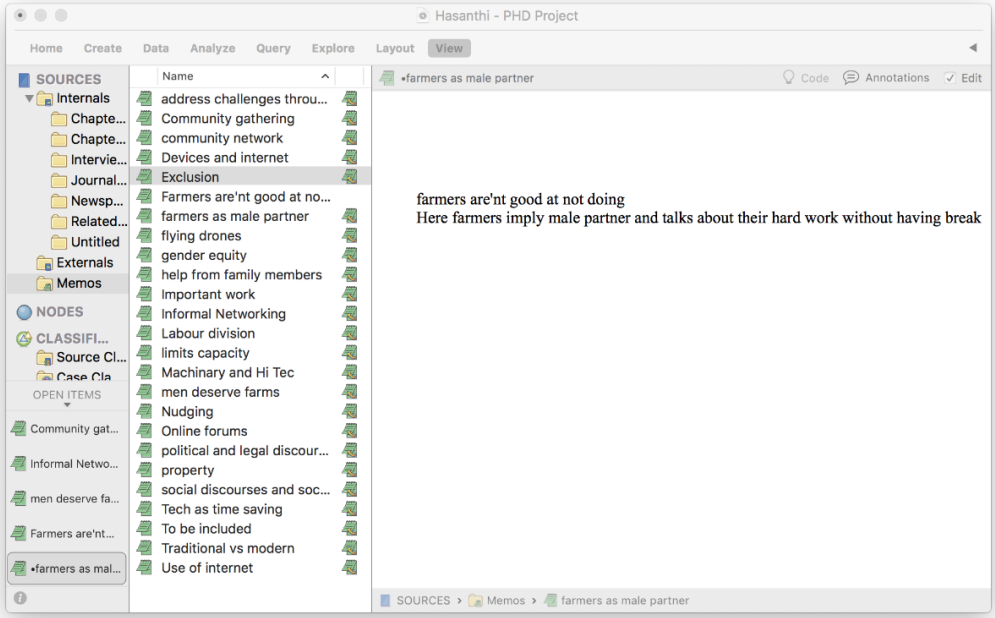

Figure 4.5. Screenshot showing memos

Source: NVivo 2017, personal file

Codes were therefore interesting and meaningful codes were named so as to capture the active purpose of the study being described. Each and every data set was given equal attention (Braun & Clarke, 2006) with memos noted when needed.

Codes reflected the theoretical background and during the second and third reading of data, some of the names of codes were changed, renamed and new codes were created for best fit with theory and data. Thematic coding was conducted within the major analytical process of Foucauldian Discourse Analysis (FDA) as informed by Arribas-Ayllon and Walkerdine (2008) because FDA views reality as something that is created by human beings attaching particular meanings to particular events.. At the beginning of the coding process, initially there were sixty-nine codes identified as open codes and these were further clarified and refined against the theoretical ideas as objects, events and experiences.

Once the list of initial codes was generated, this was then analysed and grouped into categories using NVivo. Some scholars have identified this stage as 'axial coding' where codes are grouped together under a higher order and designated as a category

(Strauss & Corbin, 1998, p. 61). This step required reflection and re-reading of transcripts, rearranging codes and creating memos.

Preliminary analysis (coding, categorizing and organizing data for analysis) was carried out according to the guide for TA informed by Braun and Clarke (2006) and the Foucauldian version of discourse analysis (FDA). Although the following steps of FDA do not constitute a complete analysis in the Foucauldian sense, these steps provide a sufficient process for the analysis of focus group transcripts.

The following steps were undertaken as the process of FDA: (1) identification of objects, events and experiences; (2) problematisations; (3) technologies; (4) subject positions; and (5) subjectification, were conducted for each focus group transcript. This was done by asking several questions as presented in the steps below:

Step 1. Identify objects, events and experiences as discourses

This step involved the identification of objects, events and experiences constructed through participant discussions in relation to digital technology. Several questions were asked in Step 1, these included:" What *was constructed*?" " *How was it constructed?*" "*How was the same object/event/experience constructed differently*?" Some of the examples revealed through this analysis are: participants constructed objects such as family, farm, technology and work; they experienced work as farm work, domestic work, office work, book work or off-farm work; online forums and field days were identified as important events. Different participants constructed farming in different ways, e.g. farming as a business, farming as a lifestyle.

Step 2. Problematisation

This step explored how discursive objects/events/experiences were problematic by participants in their discussions. Foucault's definition of problematisation is "the way of questioning of what is already known, by thinking differently than we think and see" (Foucault, 1990c, p. 8). As such, this step was used to identify objects by giving analytical attention to the action while taking up a critical position (e.g. for gender roles, technology use). This can be achieved through asking questions such as "Who or what is being positioned as problematic?" Issues such as time management,

technology dependency and reliability of politicians were problematised in several occasions throughout this study.

Step 3. Technologies

Focus was given to technologies of power relations and domination, digital technology and technologies of self (ethics and morale) as described in Chapter 3. This study analysed how technologies of power are exercised during interaction between participants themselves, with family, and within the wider community. Also, attention was paid to the way in which digital technologies are influential, in terms of power, on participants' conduct and practices (Arribas-Ayllon & Walkerdine, 2008) and how this power enables or restricts participants' space and agency. Questions posed during Step 3 were:

- What kinds of power relations (visible and hidden) can be identified behind the texts? Who is exercising power?
- Who is using power relations to gain or lose subject positions?
- How do discourses support institutions (family, farm, community) to reproduce power relations through the evaluation of gains and loses?
- What types of morale stances support, attack or undermine these discourses?

Step 4. Subject positions

Discourses construct contradictory subjects that mean different things to different people (Arribas-Ayllon & Walkerdine, 2008, p. 17). This step – Step 4 – gives a closer look at the existing and possible locations for participants (such as family, community, farm) as constructed and performed by themselves (Bamberg, 1994; Davies & Harré, 1999). This all refers to how participants see themselves and others (family members and neighbours) and position themselves as responsible providers caring for the family, active labourers in the farm, active office workers, community leaders etc.

Transcripts were analysed to Identify locations for people within a structure of roles and duties. This was done by asking several questions such as; "What kind of different subject positions dos the discourses offer?" or "What options become available or possible through discourses?" Multiple subject positions were identified as available

for participants through positioning themselves as well as through being positioned by others (family members and community). Some examples of these subject positions are, livestock manager, manager, office manager, glazier, moral keeper, helper, mother and partner. During this phase, in addition to the above theoretical concepts, consideration was given to unspecified discourses, and colourful quotes or adjectives to indicate significant themes, as follows:

> "Keep all the balls up in the air" – Focus group 1.

> "See, because everything nowadays is about producing food; you're so clean and green" – Focus group 1.

> "You're the glue. You've got to- you can't go down" – Focus group 1.

> "We've got all the relations under the sun helping us when there has been physical work going. We call it free labour" – Focus group 4.

Step 5. Subjectification

Subjectification can be described as the process by which a person transforms themselves into a subject (Foucault, 1988d). It is a mode of power that has a possibility of governing action both acting upon others and acting upon the self (Foucault, 1982). Therefore, analysis of participants' subjectification displays the process of forming their behaviour through interrelationships between themselves and their surroundings. It also helps in understanding of how participants regulate their own behaviour and normalise their possible future conduct (Hodges, 2002). In relation to this, the methodology of this research shows how participants demonstrate their behaviour in relation to ethics, agentic actions and professional skills in social actions such as sharing information in the community.

Samples of phase two analysis (*Table 4.4*, *Table 4.5* and *Table 4.6*) demonstrates how codes were generated from the data and how Foucault's theoretical ideas were applied.

Once all data had been initially coded and collated, attention was given to each data node (or data point/piece of data) in order to merge similar nodes into one, or alternately to create child nodes under the same node. All memos created in the first phase were linked to relevant codes. (Please note: in this research a node is a single unit within a code.) More memos were created when needed and these were also linked to the relevant codes. These memos describe differences, similarities and connections between codes and how codes were defined (Johnson, 2017). An example of memos linked to the code '*family'* includes '*help from family members'*.

While assigning transcript selections into codes, some selections were assigned into more than one code. This was done when there was more than one possible meaning in a particular selection. For example, the following selection of a transcript has been assigned with the codes '*area in use of technology'* and '*support from others'*.

> *He orders a lot of farming parts and other bits and pieces now online. He doesn't use the internet so much for information because, as I say, we've got agronomists who provide us with most of our agronomic stuff. But for purchasing, on a need to know basis, as he requires it, he uses the internet a lot – Focus group 5.*

When all the nodes were organized only thirty-three codes) remained for further work. The following Figure 4.6 is an illustration of organized codes.

Table 4.4. Sample of analysed transcript according to Foucauldian Informed Analysis

EXTRACTS FROM TRANSCRIPTS	OBJECTS EVENTS EXPERIENCES (CODES)	DISCOURSES PRACTICES PROBLEMATISATION TECHNOLOGIES (THEORY)	SUBJECT POSITIONS SUBJECTIFICATION (OBSERVATIONS)
Q. What do you see as your most important responsibilities and work?			
A. Managing the livestock just general – mustering them, handling. Which bulls we join, purchasing the bulls, all that. My husband lets me manage all of that.	Normalising farm work as an important responsibility	Absence of patriarchal power. Freedom for choice of work. Work as a practice of managing, handling, and purchasing.	Livestock Manager.
A. Just being available to do all of those things. That's probably my main role, out there. But it has been challenging. I mean, having a young son and then another baby on the way, it is very challenging to be available and then also working part time in town and having your own other life, too, aside from it.	Diversity of work.	Time management is problematised. Busy life is a challenge.	Being available for everything. Mother. Off farm worker. Farm worker.
A. Its farming, where I breed cattle, I feed them through, supply local butchers, grow grain. Try to do everything, and I have four children that come home, not every weekend but most weekends, and catch me up when I'm getting behind. So, important responsibilities, mine's everything from start to finish, housework, office work, outside. It's everything.	Office work. Housework.	Practice of ordering, growing Feeding, supplying Harvesting, catching up with kids	Everything as important. Good mother. Responsible person.
A. So, you try and keep your farm, your family, the farm all together, aren't you? Keep all the balls up in the air. Keeping - being a support there for your husband because they do it fairly tough in drought times. So just being a moral support is very important too as well as keeping the home fires burning. A. I think just keeping up the morale in the home. Like I say, you're the glue. You've got to – you can't go down A. I think my most important one is the bookwork – keeping the finances under control. That's definitely the main thing I do. But I am a labourer as well, whenever they need someone to work.	Book work. Farm. Family.	Practice of bonding farm and family Domination of office work. Work as a responsibility. Making a decision at the right time. Caring for others.	Supporter in tough times. Morale keeper in the house Labourer when in need. Glue that holds everything together.

Table 4.5. *Sample of analysed transcript according to Foucauldian informed Analysis*

EXTRACTS FROM TRANSCRIPTS	OBJECTS EVENTS EXPERIENCES (CODES)	DISCOURSES PRACTICES PROBLEMATOSATION TECHNOLOGIES (THEORY)	SUBJECT POSITIONS SUBJECTIFICATION OBSERVATIONS
Q. Do you use any computers, internet facilities, to improve your business?			
A. I go online and, because we purchase our bulls from Karen's family, and I go online and have a look at their bulls, and research through their website, Facebook page, and then just general things, purchasing things for the farm. Go on – if we can buy it locally we support the local businesses, but if we can't, do a research where we can purchase it from. So, other items.	Use of technology.	Practice of using internet for farm business. Practice of researching.	Moral citizen. Responsible. Community member. Innovative person.
A. I'm very reliant on the internet, because I do a lot of my grain sales on the internet. A day without the internet is like having your arm chopped off.	Technology is experienced as vital.	Technology dependency is problematised. Practice of being reliant.	Dependent on technology.
A. We actually don't get papers and so everything comes via email.	Convenience in technology use.		Ethical person.
A. I don't believe in putting stuff on Facebook. I am in an email group.		Reliability of social media is problematised.	Self-caring.
A. So, the waybill, instead of you having the physical one in the book that you can actually keep track of, it's actually in this Cloud system and when you hit send or submit it sends the waybill to the truck driver's email, the buyer's email and your own email and the sale yards or wherever, and that's really good. But it comes at a cost.	Comments about technology as useful.	Cost of technology is problematised.	Tech savvy person.
A. But the mobile phone set-up out here is so appalling that if we had a good mobile phone set-up out here that would be a good thing, that would be a big leap forward for the primary producers I reckon around.	Network reception.	Reliability of internet service is problematised.	
A. But a lot of the politicians will say, oh yes, there's mobile reception there and there, but that's not right. You'll hear them saying they've got mobile here and mobile there. But actually, that is a lie.	Politicians.	Trust of politicians problematised.	Distrusted politicians.
We have a lot of information, like I've asked one of my neighbours to help before with the submissions and stuff, because she's a lot more au fait with some …	Information as available within the community.	Practice of sharing knowledge.	Skilled neighbours.

Table 4.6. *Sample of analysed transcript according to Foucauldian Informed Analysis*

EXTRACTS FROM TRANSCRIPTS	OBJECTS EVENTS EXPERIENCES (CODES)	DISCOURSES PRACTICES PROBLEMATISATION TECHNOLOGIES (THEORY)	SUBJECT POSITIONS SUBJECTIFICATION OBSERVATIONS
Q. Do you share agricultural knowledge with your community?			
I'm enjoying community group stuff too and the fact that technology enables us to communicate makes all that so much easier and quicker.	Community work. Technology experience as easier and quicker.	Practice of efficient communicating. Practice of using technology.	Impressed person by technology.
A. There's sort of groups that are associated with where you get chemicals from. So, there's some communication within the area.	Communication groups.	Practice of communicating with others.	Information seeker/sharer.
A. I'm on a few online forums, so we have, like – we do a lot of discussions online about treatment and whatever. So, it's an integrated group like that. We do a lot of research for livestock management.	Online forums Research.	Practice of sharing knowledge.	Innovative person.
A. I belong to an email group. That started when we did the farm-wide testing for rural areas back in the nineties and we had a group of primary producers that came together through that and we all meet up now and again and that has expanded to some overseas as well. It's been quite interesting.	Email group. Group of primary producers.	Practice of information sharing. Practice of continuing and expanding.	Interested person. Devoted person.
A. Sometimes just at a social gathering. If you go to a bull fight or something and you get talking. I think a lot of things get discussed without having a meeting.	Informal social gathering.	Practice of discussing.	Social being.
A. So a lot of working with farmers and with agriculture. Which is good, because that's the economic driver in our community. So, I've got that benefit, I suppose. But yeah, most of my work is working with other farmers.	Described importance of agriculture.	Economic discourse. Practice of driving economy.	Proud citizen. Being helpful to other farmers.

Table 4.7. *Multifaceted identities of farm women emerging from data*

Type of identity	Discursive constructions of identities by participants
Social identities	Neighbour, friend, member of community/social groups, information seeker, information sharer
Domestic identities	Mother, wife, partner, moral keeper, house keeper
Agrarian identities	Grazier, CEO, farm manager, farm planner, researcher, breeder, office manager, book keeper, helper, supporter,
Technical identities	Active user, tech savvy,
National identities	Drivers of national economy, food producers, clean and green

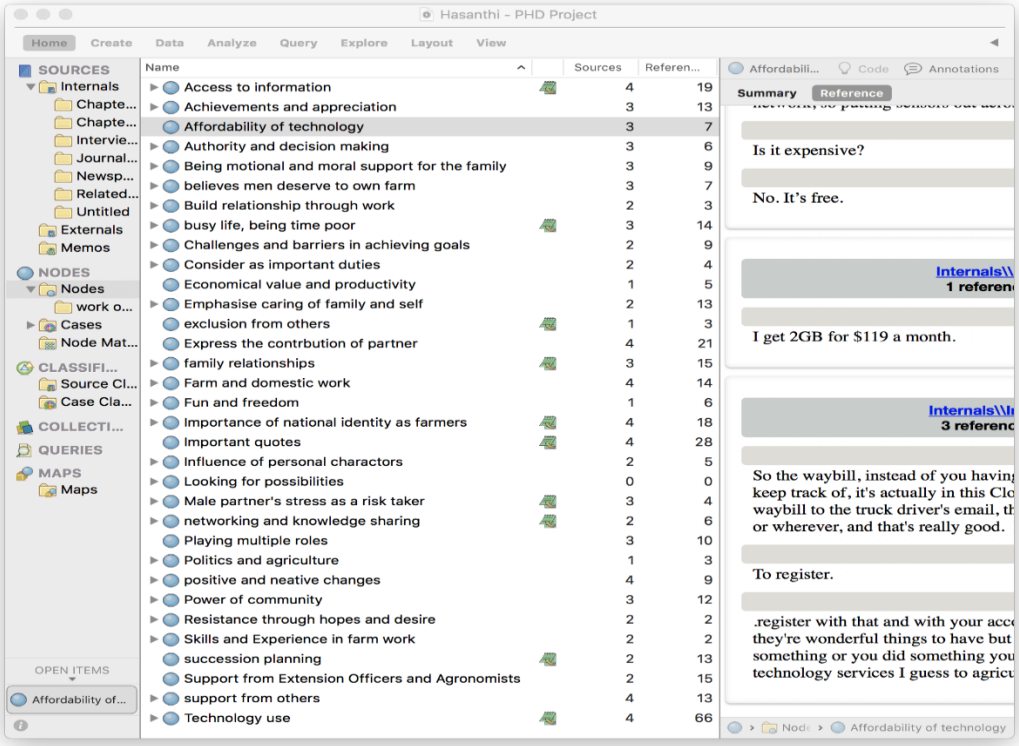

Figure 4.6. Screenshot showing organised codes

Source: NVivo 2017, personal file

The coding frame was then reread and organised in order to ensure relevance and appropriateness for addressing the research questions (Ussher, Perz, Metusela, Hawkey, Morrow, Narchal, & Estoesta, 2017). All extracts under each code were re-read for their relevance to the code.

4.2.3. Phase three – Searching for themes

For this study, theme selection was done paying attention to the theory and research questions. As the analysis was focused on Foucauldian work, consideration was given to discourses such as the responsibility of farm women, and the effects on them of digital technology, as well as various constraints and barriers. As well as this, also considered was participants' resistance, ethics, morality, care of self and practice, how farm women position themselves and how their partners position them.

The process of identification of emerging themes is the next step once all data were initially coded and collated. At this phase, codes are sorted into potential themes (Braun & Clarke, 2006). Some of the themes emerged within the data while others emerged from the researcher's prior theoretical understanding of the research problem (Ryan & Bernard, 2003). The second type of themes are known as priori themes that arise from factors such as the nature of the research problem, the theoretical orientation, the researcher's values, professional definitions found in literature, questions used in the focus group protocol and personal experience (Ryan & Bernard, 2003).

Table 4.8. *Categories and sub categories*

Categories	Sub categories
Describe experience in use of technology	Areas of use of technology Affordability of technology Limited infrastructure
Availability and Reliability of Information	Information as available Information as problematic
Act as a responsible community member	Networking and knowledge sharing Power of community
Challenges and barriers in achieving goals	Busy life, being time poor Exclusion from others Playing multiple roles
Opportunities and support available	Looking for possibilities Support from other Valuing skills of each other
Identify changes	Positive changes Negative changes
Scepticism and confusion	Politics and agriculture Succession planning
Beliefs	Believes men deserve to own farm Important quotes

Family and morale	Emphasize caring of family and self Contribution of male partner Value family relationships
Describes with pleasure	Achievements and appreciation Fun and freedom Importance of National identity as farmers
Work as responsibility	Build relationships through work Farm and domestic work Skills and experience in farm work Authority and decision making

Using NVivo, codes were sorted into potential categories (themes) by revisiting initial codes and focus group transcripts. Once all codes were sorted into themes, they were again refined and categorised to avoid overlapping themes as much as possible. At the end of this phase, a collection of significant individual themes and sub themes emerged. Finally, eleven categories (themes) were identified with twenty-eight sub categories (sub themes) as shown in Table 4.8.

The above categories represent the more complex discourses relating to the research questions of this study. Each of the categories identified describes different areas of interest related to the main research question.

4.2.4. Phase four – Reviewing themes

This phase involves refining themes by either collapsing them into each other, or simply by breaking them down further into separate themes so as to maintain internal and external heterogeneity (Patton, 1990). Although there is no single set of themes waiting to be discovered and there are many ways of perceiving the data, the analytic results yielded from the themes will be useful (Day, 1993 cited in Ryan & Bernard, 2003) and contribute toward answering the research questions.

Even though themes were refined and revised in phase three, a certain level of overlapping and contradictions were still seen. Therefore, the above categories were further subjected to a process of refining to see whether each category described different values, assumptions and actions, as well as to see if they framed the data in

relation to research questions. The process of reviewing themes was finalised once the distinguished themes had emerged.

As the next step of this phase, themes were organised into three groups based on the relevance to each research question. According to Gibson and Brown (2009) this is one of the organising principles of analysis of data and helps to produce a very clear narrative. This suggested that the research questions of this study could be answered by analysing and interpreting the following sub themes under each main them. Table 4.9,Table 4.10 and Table 4.11 present the main themes and sub themes identified in relation to research question 1, 2and 3 respectively.

4.2.5. Phase five – Defining and naming themes

In this phase, final refinements of the themes are done by defining the aspects of the data each theme captures (Braun & Clarke, 2006). When the scope and the content of each theme can be described in one or two sentences, further refinement may not be needed and the researcher can move to phase six. The definitions of each theme will be given in the next three chapters – the analysis chapters.

4.2.6. Phase six – Producing the report

Analysis is the means of transforming data into findings by giving meanings to large volumes of data (Patton & Cochran, 2002). This phase involves the final analysis and writing up the report/dissertation in order to tell the story of the data in a way that help reader to come to the same conclusion as the researcher. This analysis was provided with a coherent and logical account of story within and across themes, supplying evidence of data extracts followed by analytic narrative.

Chapters 5,6,and 7 present a detailed analysis of the themes and sub themes illustrated in Table 4.9,Table 4.10 and Table 4.11 respectively.

Table 4.9. *Finalised themes relating to research question 1*

Main themes	Sub themes
1. Diversity of work	Playing multiple roles Being resourceful and negotiation Identify role models Pride and happiness Facing change Flexibility Pluriactivity and diversification
2. Access to digital technology	Space-time management Knowledge and skills Identify barriers and distrust areas Self-control
3. Community work and Socialisation	Community work and socialisation
4. Personal dispositions and ethics	Maintain morale of the family Take care of the self and others Psychological Resilience

Table 4.10. *Finalised themes relating to research question 2*

Main themes	Sub themes
Information	Availability of information Local knowledge
Sharing information	Field days and community gathering Online Off-farm work and businesses
Barriers and scepticism	Availability and reliability of infrastructure Privacy and Security

Table 4.11. *Finalised themes relating to research question 3*

Main themes	Sub themes
1.Division of work	Valuing skills, knowledge and abilities (KSA) Creating space
2.Motivation	Supportive attitude of family partners

Throughout the next three chapters, participant accounts are presented under each theme identified from the initial analysis of focus group transcripts. Only the relevant extracts are included under each theme. Each extract has been identified by the focus group number (G) and the participant number (P), such as G1P1, G2P2, G3P5, G4P6 and G5P1 and so on. Some sections of participants' accounts are omitted so as to present only the data relating to each theme. By doing so, it was intended to maintain the internal homogeneity and the external heterogeneity of each theme, and to prevent repetition. When the same piece excerpt needs to be used in multiple places, it is notified as 'mentioned elsewhere' in this thesis.

4.3. Summary

This chapter contributed to organising a large volume of data into meaningful headings in relation to research questions by using Foucauldian Informed thematic analysis. This chapter examined how this was done through a series of steps: becoming familiar with the data; generating initial codes identifying objects, events, experiences, problematisations, technologies and subject positions; refining these initial codes into meaningful categories; and then further refining the codes into distinguished and meaningful themes relevant to the three research questions. The preliminary analysis of data consumed much time and several stages of refinements.

It is also important to remember that not all the data on the transcripts were represented in the final themes. The themes illustrated in Table 4.9, Table 4.10 and Table 4.11 are analysed and interpreted in the following three chapters in order to answer the three research questions guiding this study.

CHAPTER 5: HOW DO RURAL WOMEN CONSTRUCT PROFESSIONAL IDENTITIES AS CHANGE AGENTS?

5.1. Introduction

The emergence of the concept of smart farming, where farmers use modern technology to increase quantity and quality of agricultural products (Schuttelaar & Schein, 2017), has marked a paradigm shift in agriculture. The new paradigm of agriculture gives more attention to building relationships and networks at the local community level (Robins, 2007) as well as in online communities in order to enhance human-human interactivity, enabling the use of the local knowledge base (Kelly et al., 2017). Therefore it is evident that smart farming requires a sound knowledge of digital technology and the professional skills of farmers rather than physical labour.

Mainstream discourses that were used to describe the traditional farmer are no longer applicable in the context of smart farming. Instead, new professional identity related discourses are emerging based on expertise and skills in legal, economic, accounting and data analysis (Schuttelaar & Farming", 2017) in relation to farming. Digital technology not only allows individuals to create multiple personas, it also transforms how individuals present themselves to themselves and to the world, and the way they develop personal identities (Hernández-Ramírez, 2017). Therefore, it is important to understand the process of identity construction and the characteristics associated with identities of participants.

5.1.1 Women's identity construction in family farming

The family farms this study is based on are places where family (personal) and the farm (organisation) are intertwined and work together. This raises an argument that the boundaries between personal and professional identities of women who are involved in family farming are blurred and intertwined.

This argument is supported by the work of Legault (2003) and Bulei and Dinu (2013) which states that the professional identity together with organisational identity forms the institutional identity. The institutional identity then interacts with the personal and social identity to form identity constructs as illustrated in Figure 5. 7.

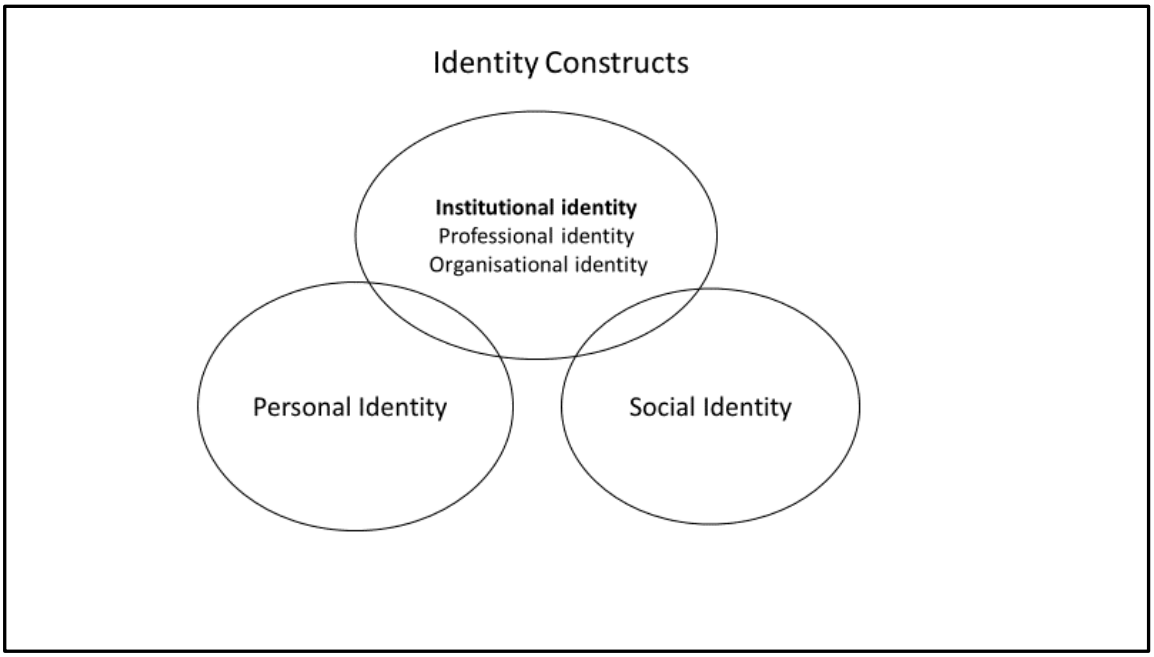

Figure 5. 7. Identity construction of women in family farming business: Adapted from (Bulei & Dinu, 2013) and (Legault, 2003)

Therefore, this chapter aims to explore rural women's identity construction as change agents in the context of family farming in rural Australia. It aims to explore the processes by which rural women construct identities through negotiated experience, community membership and their learning trajectory (Wenger, 1998) and through interaction with digital technology, society and the self within the institutions of farm, family and the community. The process of identity construction is discussed under themes and sub themes (see Table 5.12) and applied to the qualitative data. The characteristics farm women displayed during this process are compared with the mainstream positive identity exemplars and characteristics of change agents illustrated in Table 2.1 and Table 2.2

respectively. The concepts and theories used in revealing the process of identity construction are also discussed in this chapter.

As the study of professional identity construction is embedded in the study of personal identity construction, it is important to examine how an individual views herself and how others view her. Developing an understanding of the process of individuals' identity construction is complex because 'the identity' itself is a complex subject (Ninkhate, 2015). There are a number of identity theories and relevant concepts available in literature based on different perspectives such as social perspective, functional perspective and through socialization as discussed in Chapter 3. Among those identity theorists, Foucault, Butler and Giddens have been identified as the theorists who introduced creative methods which can be used to explore identities in unconventional ways (Gauntlett, 2008).

This study is based on the theoretical practices of Foucault due to its close relevance to this study. In Foucault's work, one's identity is associated with the subject; an individual is subjugated to various power and knowledge dynamics and becomes a subject. The subject constructs subject positions thus. The subject is not a fixed entity even when it is attached to the same person. Rather, it is constantly faded and reproduced in different positionings along with other forms of social practices and knowledge (Foucault cited in O'Farrell, 2005, p. 113). Similarly, with the changes of knowledge and social practices due to globalisation, modernisation and digital technology, the constitution of self-identity (individual identity) of rural women has been shifting, and discourses of power and knowledge are acquiring new meaning.

The central theme in Foucault's analysis is that an individual, as subject to various power/knowledge dynamics influencing the creation of their specific identities (Batters, 2011), constructs themselves in an infinite, multiple series of different subjectivities that never ends (Bess, 1988). Thus, one's freedom can be achieved through conducting a 'moral and ethical order' in one's life, namely: refusal of the current situation, curiosity

regarding other possibilities and innovation regarding how to achieve these possibilities (Bess, 1988).

Refusal refers to rejection of the culture, social arrangements and experience as being fixed or definitive. Curiosity refers to looking differently at everything that surrounds you, disregard traditional divisions between what is considered as important knowledge and trivial knowledge. Innovation refers to continually pursuing new knowledge and new ways (O'Farrell, 2005).

Cultivation of this moral order of Foucault's can be done by taking care of oneself as a practice of lifelong work on one's body, mind and soul in order to achieve better relationships with others and the self. Similarly, the rural woman, in creating her self-identity in her own actions, uses models (mother, wife, daughter, change agent, member of an organisation) that are available in her culture, her society or her social group (Foucault, 1984a; O'Farrell, 2005). Therefore, the form and the existence of her self-identity entirely depends on her interactions with culture, history and others.

Digital technology (such as smart farming and web 2.0 technologies) has created an open environment where individuals interactively and interdependently influence each other (Barnes, 2002; McLuhan, 1964). The highly flexible nature of this environment allows individuals to create multiple identities that influence and are influenced by others (Bozkurt & Tu, 2016). It is assumed that the acquisition of new identities offered by digital technology requires a certain level of change in attitudes, behaviour as well as professional skills related to each type of identity. Therefore, it is evident that an individual's change agent characteristics and professional development can be revealed by exploring the process of new identity construction. Based on this assumption, this study is focused on the analysis of how participants' characteristics emerged through the process of performing multiple identities, and how those characteristics are aligned with popular discourses surrounding change agency and professional development, such as flexibility, creativity and openness to new ideas. Some of the models (possible identities)

available in the rural farming community for women and how they reflexively relate to self, knowledge acquisition through digital technology, and social practices (performed within the family, farm and the community) will be discovered during this analysis.

This chapter presents four main themes and fifteen sub themes (identified in chapter 4) in relation to sub question one, and these are restated below in Table 5.12

Table 5.12. Main themes and sub themes

Main themes	Sub themes
1.Diversity of work	1. Playing multiple roles 2. Being resourceful and negotiation 3. Identify role models 4. Pride and happiness 5. Facing change 6. Flexibility 7. Pluriactivity and diversification
2. Access to digital technology	1. Space-time management 2. Knowledge and skills 3. Identify barriers and distrust areas 4. Responsible behaviour
3. Community work and socialisation	1. Community work and socialisation
4. Personal dispositions and ethics	1. Maintaining family morale, ethics and harmony 2. Take care of the self and others 3. Psychological resilience

Each theme highlights how language is used differently and creates different effects showing binaries, perceptions and power relations (Carabine, 2001). The effects and use of language in multiple identity construction and representation of farm work, digital technology, socialisation and personal ethics as a body of knowledge (or as a way of constructing knowledge) and as practices (Parker & Shotter, 2015) are examined under each theme. During interpretation, literature is revisited to incorporate a certain level of historical dimension of related theories. This is an important way of showing how some

objects/events and experiences have been spoken about differently in the past (Arribas-Ayllon & Walkerdine, 2008).

5.2. Diversity of work

According to Schumacher and Gillingham (1979), work was initially seen as a way of providing us with three basic essentials: material goods and services; opportunities for use of talents and abilities; and as a way to overcome our natural egocentricity by working as part of a team with others. In later periods, researchers turned their focus away from seeing work as 'helping themselves' (Field, 2000) and concentrated on how formation and transformation of the self-appeared as an interplay of work, self and knowledge, for and through work in the changing world (Billett & Somerville, 2004; Fenwick, 1998; Fenwick, 2002; Giddens, 1991). According to Foucault, an individual is subjected to the social world through discourses and discursive practices (Foucault, 1977). Therefore, analysis of social discourses taken up by participants during focus groups enables exploration of how participants construct identities in the workplace (Billett & Somerville, 2004).

5.2.1. Playing multiple roles

Participants described their work across the family, farm and community through describing typical characteristics of these work contexts, suggesting that participants have a great variety of roles to carry out. The majority of participants are responsible for a large proportion of office work in farms such as paying bills and invoices, preparation of statements, purchasing animals, tools and machinery spare parts, ordering chemicals, selling grains and cattle, banking, working on tax, preparing workers' salaries, and documentation of workplace health and safety. For example,

> *I suppose, probably my main tasks though, are obviously the bookwork and paying all of the bills. So, my role, particularly [is in] in the office work – G1P2.*

I think my most important one is the bookwork – keeping the finances under control. That's definitely the main thing I do – G1P3.

Although most office related work is seen as traditional gendered work, a majority of participants reported the use of computers and the internet for accounting and bookkeeping purposes.

Just what everybody else has said, really. I think women are the most important people in the household. Without us, I don't think it would operate, because we do all the computer work. Obviously, everybody's the same. We're doing all the work on the computer, looking after most of the financial stuff, which is very important. So, I think our roles are all-rounder - G4P5

Amongst traditional office work, a new role of 'computer work' has emerged and it is constructed as 'very important'. And the use of the term 'all-rounders' describes persons who possess many skills and perform a range of work suggesting their ability to work in a flexible environment.

Multiple women reported that their computer work is not limited to simple data entry and documentation, but they also demonstrated their skills and experience in the use of computers, smart devices and the internet for modern agriculture related research, market research, online purchasing and selling of their products. A majority of women highlighted their skills and achievements in doing Business Activity Statements (BAS), Meat Standards Australia (MSA) grading and the use of different accounting/bookkeeping software online on a regular basis.

I do BAS statements and all that sort of thing online – G1P2.

I use the internet to purchase grain, find out the grain prices when I run out. I do market research. I do my MSA, to look at my scores from my cattle, my sales. As I'm the MSA producer for 2017 this year, just won an award – G1P4.

I go online and have a look at their bulls, and research through their website, Facebook page, and then just general things, purchasing things for the farm – G1P3.

Participants reported that that they do most of the research component necessary for the running of their family farms. They perform new roles that have emerged as a result of digital technology. Participants further identified that it is these new roles that have made them visible, valued and well recognised in the community as well as nationally. Winning an award as the MSA Producer of the Year 2017 shows a farming woman's strong skill set and individual commitment to achieving targets. It also indicates that her contribution is valued, recognised and made visible.

It is also important to note that an increasing proportion of participants enjoyed machinery work which used to be considered as masculine work. The majority of fieldwork is done by farm owned machinery or hired machinery, most of which are computerised and easy to operate.

Stock work, mostly. But I do drive the tractor and things as well. I'm there, obviously, to help shift machinery and fill things up and all of those things where it's the same – G1P6.

I selectively go on the tractor these days when it suits me – G4P4.

Driving a tractor (or farm machinery) in a farm is considered as a symbol of masculine identity in mainstream discourses (Brandth, 1995). With the advancement of digital technology, farm machinery has been computerised, reducing dependence on hard physical work. This challenges the feminine-masculine dualism in farm work – the 'gendering of farm work' – within contemporary modern farming. Butler (2011) also problematised this gendered division and explained that masculinity/femininity should not be constructed as stable differences. Gender exists only when it is being performed

but changes with time and space (Butler, 1988, 1990). Therefore, women are capable of performing multiple tasks including machinery work facilitated through digital technology.

During their everyday work on farms, the use of the internet for women was of high importance. What they implied was that the internet serves as a mode of knowledge acquisition during work and this knowledge is used for farm decision making. This follows the notion that the processes of thinking, acting and learning at work are simultaneous (Lave, 2009; Rogoff, 2008) and continuous professional development happens while working. This was further explained by Billett (2001) who states that in industries where no formal professional development exists, workers demonstrate their ability to learn skilful work through everyday work activities. Additionally, this study evidenced that the internet facilitates and catalyses the process of conscious engagement with knowledge and practice which in turn shapes participants' agentic actions.

5.2.2. Being resourceful in negotiation

This theme aims to understand the professional and change agent characteristics of participants which emerged through engagement with new, difficult and conflicting situations in everyday life. The theme relates to various practices that participants perform when there is a disagreement, and how they take up or resist particular subject positions. Certain types of power relations are visible in disagreements and the negotiation of ideas so that different strategies may be taken to express power (Rees-Miller, 2000). In Foucault's view, everyone is in a position of undergoing and exercising power simultaneously Foucault (1980). Therefore, the analysis of power helps identify how power is exercised to produce a particular effect on a particular target and how power is resisted (Chiang, 2013) or negotiated. Therefore, this section analyses the discourses that support how participants describe their knowledge, skills and professional development (continuous learning in their area of expertise) and how it is utilised in order to negotiate or resist certain power relations.

5.2.2.1. Being resourceful

Participants use various discourses to position themselves at the farm management level. They reported their progressive development over time by describing a sense of positive change in their identities. Multiple respondents reported that their positions had stepped up after taking over the business from their parents.

> *Probably the last two years it's … so my role has really stepped up, particularly in the office work. I call myself the CEO, though I'm more – he is absolutely hopeless at bookwork and organising and those type of things, so I more do all of the coordination and he's more just the hands on, operating and those things – G5P4*.

Such skills in coordinating and organising farm work suggest emerging subject positions where they have autonomy or more space in farm work, in which they present themselves as having a sense of self-transformation.

Some participants displayed their interest and willingness to be resourceful in field work. They frequently acknowledged their interest in on-farm training with partners and self-learning.

> *He is training me in my spare time, because it will end up just being me and him being that it's just a small father and son operation – G4P3.*

> Although a considerable number of participants entered into the farming business through marriage, they described their willingness to reconstruct their identities and transformed themselves in order to fit into the new environment.

> *I love dealing with that kind of stuff. Whereas, it's a bit impersonal. But I guess my favourite thing is, every Sunday when we first started dating - so we'd do the big drive and see each other every day and on Sundays we'd do crop tours and we'd go through the crops and I'd learn about how to look for disease and*

how to do things and every Sunday for the last three or four years has added up and I now have a bit of knowledge. Knowing what he does, because obviously I think he's better than me at growing. That's probably my favourite – G4P5.

Such guided learning displays of sharing an understanding between a more experienced and less experienced social partner (Billett & Somerville, 2004) is common in family businesses. In addition to traditional/modern farming practices practices, this type of learning gives an understanding about social norms and practices prevalent in the family and the farm. Furthermore, many participants who reported their interest in self-learning were aiming at a particular skill or business goal.

I'm terrible at bookkeeping and I'd love to get better, so that's something I'd like to further – G4P1.

From a cognitive perspective, engagement in goal-directed activities is identified by not only achieving goals but also by a change in individuals themselves who are shaped by this experience (Anzai & Simon, 1979; Billett & Somerville, 2004; Newell & Simon, 1972). In Foucault's view, individuals engage in certain modes of training and modification of the self, not only in the obvious sense of acquiring skills, but also in the sense of acquiring certain attitudes (Foucault, 1988d) where this process is both shaped by, and in turn shapes, the individual identities (Billett & Somerville, 2004) of participants.

5.2.2.2. Conflicting identities and negotiation

Family farming is considered as a family business that is controlled by family members. The roles of family and business can be mutually supportive but sometimes conflicts may arise when the demands of one role make it difficult to satisfy the expectations of other roles (Shepherd & Haynie, 2009). Conflict situations between roles may arise as disagreements over growth targets, succession, product offerings or hours of operation (Shepherd & Haynie, 2009). Identity conflicts may occur at the intersection of the family

identity and business identity (Shepherd & Haynie, 2009) where both identities are activated together. Therefore, it is evident that when women are involved in family farming, they may face identity conflicts between their family identity and business identity, whether to be a good mother/wife or a successful businesswoman. Some of the participants did acknowledge conflict or challenging situations in balancing farm work and family work.

> *I, personally, don't do the books, and we are equal, together. When we would come back to the house I'd do the housework and my husband would do the bookwork and that's how he became more into the bookwork side. And I didn't actually do a lot of that bookwork because I've been busy trying to do educating the kids, cleaning the house and that sort of things. I just said to him, you can't expect me to be in the paddock with you as well as do the books at that stage. I was – I got a bit left behind, too – P1G5.*

> *We're quite a small [farm so] – that we can't employ a full-time worker, we more just get contractors in as needed and employ people at the busy times. But it's in those non-busy times, just being available to do all of those things … But it has been challenging. I mean, having a young son and then another baby on the way, it is very challenging to be available and then also working part-time in town and having your own other life, too, aside from it – G4P3.*

As identity is defined as behavioural expectations associated with a socially accepted role (Stryker & Burke, 2000), family identity can be defined as the set of behavioural expectations associated with the family role (Shepherd & Haynie, 2009) focussing on nurturing, caregiving and protection of family members. Unlike in non-family businesses, it is difficult to set physical or temporal boundaries to manage these competing identities, as family and farming are intertwined. The family business crosses the boundaries in that it incorporates both identities. As a consequence of this, the need arises for negotiating, modifying, developing and shaping expectations through interaction (Burke, 2003). As

such, participants acknowledged their capacity to negotiate the competing tension created by their multiple roles, and their need to balance being a good mother, caring partner and good worker, that demonstrates their positive identity characteristics.

All focus groups agreed that the relationships between family members are configured in order to meet the requirements of the farm and minimise conflicts in work areas.

> *We do some contracting work, so, me and my husband … in the times that we're not busy - because we pay spray contractors, which is quite a big thing to bring them in, we do contract planting and harvesting, and I do all of the invoicing for that and all of that. Kind of we always joke that he's the numbers man and I am the wordsmith. He's helped me a lot because I had zero business skills – like, zero business skills. He's helped me with all of that and I helped him with everything … I grew up on a stock farm. Grain, there's a lot more bookwork that goes with it. My husband really – he's very thorough. He's the person picking after the planter to make sure the seeds have gone in evenly and he's very good at marketing the grain – G5P1.*

It is also important to note that women participants were aware of each other's skills and weaknesses. This awareness helped to minimise conflict situations. According to (Bandura, 2000), individuals do not live with autonomy, but many things are achievable through interdependent effort; pooling knowledge, skills and resources; and act together with others to shape the future. As such, mutual understanding of each other's skills and helping each other encourage a view of family farming as an arrangement of relations and interdependencies. Following Contzen and Forney (2017) this can be described as a negotiation of interests within a set of interdependencies through individual actions and reactions. The ability to identify one's team members' skills is also regarded as one of the characteristics of a successful change agent. Based on the literature review in chapter 3, characteristics such as competency at work, diversified knowledge, and skills in negotiation are recognised as some of the characteristics of a successful change agent.

Relationships and arrangements in relation to farm work are constructed as mutually beneficial and mutually agreed arrangements which in turn creates a receptive environment for agentive actions.

5.2.3. Identify role models

Role models set examples by their values, attitudes and behaviours, inspiring others toward meaningful lives and acting as external facilitators of motivation (Davidsson & Honig, 2003). According to Ibarra (1999) people observe how role models use a range of elements and thereby build tacit knowledge, attitudes and routines that they can use in adapting to new roles. The majority of research participants admired their mothers and other women who were mums whose behaviour they wanted to copy if not now then in the future. Although only two groups out of five identified their mothers as role models, data suggested an initiation of possible positive change in family farming industry.

> *My number one thing I'm constantly thinking of – how do Mums do it? If I barely manage to take care of our family and run my business and run that business, obviously I'll have a bit more practice by the time a baby comes along, but I'm still – I'm just totally in awe of Mums, all the time – G2P1.*

> *My mum only just changed that in the last few years. She's like, you come out and you do the same work as everyone else, but you don't get paid anything because you're a female. She goes, well that's unfair. So, when they had a really good year, they actually back-paid me for everything – G4P2.*

> *My father is like, don't do courses, that's when women start – he was joking – I was like, that's when women start to think for themselves, isn't it Dad? But, yeah, that's what he's like. He just wants them to just stay in their little box. I think that possibly could be – but I'm just looking at my life – all of my life. It's the way it's come down through their families, too – G4P3.*

It's a generational thing. We were three girls and two boys, but we all worked as hard and had a say and recognition and also, monetary wise, we all – as we divided up places and things, there was no differential between boys and girls. I hope that is one part of the rural industry that does change, it gives rural industry a bad name. It's not a generational [thing] – in the city, that sort of thing. Because we mightn't have the muscle, but we've got just as much to contribute … We always laugh and say; we think Mum was probably the originator of the succession … the succession plan – G4P6.

Participants showed their willingness to adjust their role performance by observing how others performed. This type of identity construction can be described through Butler (1988) performativity theory which states that identity is performatively constituted at particular times depending on the situation, rather than it being a universal entity. Similarly, Foucault (1978) emphasised that identity is a shifting and temporary construction of individuals. Valuing their mothers' action against social inequalities positions participants themselves as persons who have a willingness to work for social justice and treat each other equally, women who 'do the same work as everyone else'. As Gauntlett (2008) described, the women participants are encouraged to reflect on themselves through setting role models that undoubtedly influence their view of lives and possible selves in the future or at the present moment.

Unlike mothers, fathers were positioned differently, suggesting their unequal treatment of sons and daughters. Although it seems that the respondents problematised the practices of traditional norms and patriarchal power, highlighting discrimination based on gender. The use of language – 'he just wants them to just stay in their little box' – gives a sense of a father's responsibility of providing love, warmth and protection, especially for daughters who were considered as more vulnerable than sons. Similarly,(Foucault, 2008) has written that the sovereign power of a father and husband over the sexuality of his children and wife is subject to disciplinary intervention. This is similar to Foucault (2008) further description that both mothers and fathers exercise power in different ways and at

different levels, with fathers expected to exercise power in their name, and in a more individualised and intense way.

Despite the prevalence of this pattern of power relations within the family as a generational thing, participants were inspired by the behaviour of mothers; not only because mums set an example of how to change the traditional gendered property division, but also because they showed it was attainable and desirable (Morgenroth, Ryan, & Peters, 2015) within the current context. Similarly Asgari, Dasgupta, and Stout (2012) found that exposure to these role models change self-stereotyping and increase agentic traits such as being a leader. Data also suggested that participants voiced against unequal division of property based on gender. Yet their attitude based on 'work hard and have a say and get recognition' suggested participants' sense of fair-mindedness and trustworthiness that a successful change agent may demonstrate when handling such situations.

5.2.4. Pride and happiness

People use subjective thoughts such as satisfaction or happiness, to evaluate their lives in relation to things that are happening to them at the moment or over time (Christiansen, 2000). According to Christiansen (2000) life satisfaction represents a global assessment of one's life and it includes work satisfaction, having positive or negative emotions and moods. Christiansen's studies have revealed a crucial link between everyday goal-directed actions and identity development because together they influence one's choice of goals and self-evaluation of their progress towards the achievement of these. Similarly, this theme looks at how participants choose their own goals, and how they use language to describe their actions towards their accomplishment. The following are the relevant excerpts of focus group discussions to demonstrate participants' voices about pride, happiness and life satisfaction gained through work.

I enjoy working with the stock. I like being outside. I think that's what it is. A bit more freedom than being tied to the desk and inside. But you also like to see, when you're doing your breeding and things like that, the different strains coming through. Like when you're working on … you can see the difference in your herd and things. That's quite enjoyable – G1P2.

Yeah, and that's a – you can't not milk the cow because it's interesting though. There's [nothing] nicer than having that fresh milk though and if you wanted you could make butter – G3P2.

Seeing that you've cropped something or those, I guess the best thing I like about coming from where I've come from to now is the cattle. Our herd of cows are quite well-known. They're sought after when we sell our young cattle as vealers and we're proud of how we can turn them off – the standard we can turn them off. But there's so many things. You get pleasure out of rejuvenating your pastures, all of those things. *You get – you either like it or get out – G1P5.*

Well, I actually quite enjoy… taking over the office work and getting it all done – G3P7.

The above quotes recognise the work as office work and fieldwork in relation to farming. Working in the field is constructed as a way of escaping from a trap and having freedom in connecting with the natural environment, animals and plants. For a farm woman it also indicates her link to and being part of nature and her sensitivity to living things. While some participants showed resistance to the physical confinement of office work due to feelings of been tied to the desk and to being inside, some participants enjoyed office work.

The data gathered further demonstrates that most of the participants goals are structured around a sense of achievement in the context of business development, marketing and

the progress of the business. Participants described their sense of achievement around their routine work on the farms:

> *I think it's nice if you've sold a truck or half a truck full of young cattle when they're all in good order and away they go somewhere. I think that's a bit of a sense of achievement, or if it's a nice mob of sheep, fat sheep – G3P4.*

> *I think business development has been a big thing for us, because we're only – we've only been farming officially for five years. Where we've gone, and what we're doing, and the direction that we're headed in, like, we're – yeah, progress – G1P7.*

> *Yeah, probably developing our business, and developing our farming and cultivation, and accessing better markets, and each year trying to improve on what we're doing, and feeling like we're getting somewhere, like feeling like we're progressing – G1P2.*

Participants demonstrated their happiness in relation to different goals and achievements:

> *I never understood that until I'm living out there and you watch them in the ground and it's like watching your future in the ground. Crops are so much more … Crops are like gambling – G4P3.*

> *Even having goals and actually achieving them. So, wanting certain things, and saying, oh, you know, turning your 60 per cent pregnancy rate into an 80 per cent pregnancy rate makes you feel really good about your choices in life. And grain, like growing more tonnes, or better-quality grain. I mean, that's obviously seasonal as well, but it's to do with how you manage your country as well – G3P6.*

The above excerpts show self-related dimensions of goals set by participants and how self is expressed in terms of happiness. The state of happiness of the above participants has been constructed in several ways. As Ventegodt and Merrick (2009) stated, it is difficult to feel happy when you do not really feel committed to your work. Similarly, the above participants' commitment to work seems to bring success and happiness as well as a stronger and resilient family business. This also shows how they perform certain types of work by focussing on set goals. According to the theory of Locke and Latham (1990), goal setting is a way of trying to improve their skills; gain a sense of achievement; and prove themselves that they are competent (Earley, 1993). Participant's goal setting in measurable terms makes the goal action oriented, more meaningful and valuable to them (Earley, 1993). At the same time, the practice of setting measurable goals may position themselves as persons with self-efficacy and expectations. Their confidence of actually achieving the goals provides them with a sense of purpose, direction and clarity (Babbie, 1995; Bandura, 1986) which can be aligned with agentic behaviour.

Respondents also show pride in contributing to the national economy and the productivity of the community. Participants felt that being a farmer gives them a sense of pride and happiness because their work contributes to shape the country's positive image of being a 'clean and green' producer.

> *Everything nowadays is with producing food; you're so clean and green. We pride ourselves in Australia that we're clean and green and that makes extra work for people out growing whatever … because we have to take extreme care with drenches and … just the whole bit. People do take pride in their work I think – G3P2.*

According to Westheimer and Kahne (2004) responsible citizens have knowledge about their communities, their country and their world, participate in activities that make their world a better place and are change agents that act out against social, economic and environmental injustice. Similarly, the participants in this study constructed themselves

as trustworthy and accountable persons in producing clean and green food incorporating their national identity (Australian citizen) into their personal identity farmer/food producer) by adopting values (economic/clean and green) which align with national identity (Bar-Tal & Staub, 1997).

This can be interpreted using Foucault's conceptualisation of biopower which is defined as the disciplining and transforming of one's practices in order to fulfil the state's economic goals (Foucault, 2008; Makarychev & Yatsyk, 2017) towards better productivity of human capital. Therefore, biopower is not only a technique of governing farmers' practices through government economic policies, but it also builds pride and happiness through innovative and creative agentic actions leading to specific roles such as organic farming or clean and green farming. Happiness is not produced through the goal itself, but an interplay of one's emotions, identity and a positive relationship with the self (Ott, 2017). According to (Foucault, 1990b) pleasure/happiness is associated with one's prudence, reflection, and calculation in the way one distributes and control their acts. Based on this view, it seems that happiness is something to be gained or achieved by someone. It is also suggested that happiness is a unique feeling and each participant experienced happiness differently.

5.2.5. Facing change

The key trends in Australian agriculture are marked by changes in consumer demands, government policies, technological advances and emerging environmental concerns (AustralianProductivityCommision, 2005). In response to these changes, farmers change their agricultural activities, production and marketing strategies. With the transformation of their work roles, it is evident that the identity of farmers (both men and women) have been transformed. Therefore, it is important to understand the changes in social structures and relations at the farm in order to get an understanding of the changing nature of identities around farming.

This theme aims to analyse how participants described changes that affected them and how they negotiated their identities as a way of facing changes more confidently. Participants' accounts demonstrated that they have understood the changing nature of work and responsibilities with time and the need for acquiring relevant knowledge to be competent in different work areas. This understanding in turn allows them to exercise more power in choosing preferred areas of work and perform within a broad range of contexts in a more competent way.

> *A lot of that has gone by the wayside because the numbers in the community have dropped and where there used to be tennis during the week, now the tennis club has closed there's just not enough people and that's always good socialising. A lot of the things that were active, like drama and all that sort of stuff has all gone by the wayside because the numbers have dropped – G2P1.*

> *In the olden days people had staff to help, whereas now some young women could have three or four little kids and they have to go to school and the mother has to help the father with the station duties – G2P5.*

> *I think the way farms are being structured are [as] a business now, they are not just a way of life … they used to be a lifestyle, wasn't it? So, I've trained myself to really get all of the bookwork up to scratch and make it a lot more financially viable for the business, for me to do a lot of that myself – G1P3.*

The rural life has undergone rapid social and economic change largely influenced by globalisation, technological advancement, and neo-liberal government policies (Trussell & Shaw, 2009). These changes in social structure seem to have altered the family leisure opportunities that used to be a medium to remain connected to the rural life (Trussell & Shaw, 2009). Farming is considered as a business and most of the work has to be done by busy women who struggle with time. The realistic understanding of their surroundings led them to train themselves to get all of the work up and make it financially viable for the

business. Participants' willingness to introduce themselves to new activities, ideas and challenges throughout life while keeping external and internal awareness intact, can be seen as taking care of the self (Foucault & Faubion, 2000). Taking care of the self allows the participants to look at the 'change' positively, turn the gaze upon themselves, identify the capacities of the selves and develop the skills to meet the changing requirements. The new sets of skills and knowledge may create more space and agency, proving Giddens (1984) idea that agency must include not only the capacity to resist or act otherwise, but also the possibility of making a difference.

5.2.6. Flexibility

One of the factors involved in the persistence of family farming is considered to be the flexibility of family labour and work arrangements among family members (Calus & Van Huylenbroeck, 2010). On the other hand, the flexibility of work arrangements and family labour are self-directed and often no supervision or monitoring is involved (Corsi, 2004). Family farms offer a range of work, thus women's personality characteristics and openness to a range of work experience are related to identity flexibility (Grote & Raeder, 2009).

> *It's more viable to have my help than a worker, because you don't need a full-time workman, but you just need someone to help you move around machinery and be able to fill you up when you're spraying and those sort of things – G4P2.*

> *So, at harvest time I do all our grain marketing, and I help him with the purchasing and all that sort of thing – G1P7.*

> *We have to worry about everything else that's going on, and help when needed, drop everything. You're just there – G3P6.*

Participants reported their flexibility and self-directedness of family labour within a range of practices within the farm. According to Machum (2005), the use of family labour is an advantage because it can be adjusted according to the demand resulting from seasonal changes in production. This flexibility provides an essential buffering system that is not seen in non-family farming (Calus & Van Huylenbroeck, 2010; Machum, 2005). In return, participants gained knowledge (power), experience and, as Hall and Chandler (2005) explained, psychological success due to their internal locus of control with the belief that they can influence the success of the farm. Similarly, Foucault's concept of technologies of the self[9] as used by Fejes and Nicoll (2008) explained that an organisationally desirable, flexible working environment (for improved efficiency and maximised profit) is considered as personally desirable because it exhibits the qualities of a change agent such as autonomy, self-management, personal responsibility and reflectiveness of the self as reported by the participants in this study.

5.2.7. Pluriactivity and diversification

Diversification and pluriactivity were reported in scientific literature with great interest because those practices are considered essential for improving rural economic growth and employment (Brandth & Haugen, 2011; Hansson, Ferguson, Olofsson, & Rantamäki-Lahtinen, 2013). On the other hand, it is also important to understand some other practices or activities carried out by farmers because they may influence their identity (Brandth & Haugen, 2011). These practices may shift or change the meaning of farm identities towards new identities and multiplicity of identities as they relate to various social interactions and settings (Brandth & Haugen, 2011). Although pluriactivity was initially defined as a strategy of securing farm income associated with marginality and inadequate coping with poverty, it is now defined as a natural part of agriculture, even in developed countries such as the United States (Bessant, 2006; Błąd, 2010). According to

[9] "Technologies of the self, permit individuals to affect by their own means or with the help of others a certain number of operations on their own bodies and souls, thoughts, conduct, and way of being, so as to transform themselves in order to attain a certain state of happiness, purity, wisdom, perfection, or immortality" (Foucault, 1988d, p. 18).

Bessant, pluriactivity is defined as a concept associated with adaptive strategies, diversification and resilience (Bessant, 2006) of farming and the community. While these practices are basically considered as an adjustment strategy for financial security, they also enable farmers to enjoy a rural lifestyle and socialise with others (Błąd, 2010; Hansson et al., 2013). This study found that the majority of participants were directly or indirectly engaged in off-farm and on-farm activities related to diversification.

> *I run a little magazine called Border Living from the farm … my graphic designer is in Brisbane and my publishing place is in Toowoomba and all of my contributors are all over Queensland and New South Wales., One of my friends is also a photographer and she and I were out there, and I was working on the magazine and she was uploading – she's a wedding photographer.. Farming has to come first, because that's our home and where we live, and that's our income. But the magazine is also a bit of income – not a lot – but it has a lot of people who need it to feel valued and that's a constant thing in a lot of places … – G4P1.*

> *Hard work is just not enough anymore, you have to be smart and you have to have a mind in the market, and you have to be … Yes, you've got to be watching the markets, you've got to be looking off farm … looking off farm for off farm investments is very important. I wouldn't like to not have off farm investments – G4P2.*

> *I operate a paddock to plate business – G1P3.*

> *Yeah, we're predominantly grain too. Have a little bit of sheep, cattle and things like that and just a bit of diversity and income there – G1P5.*

When participants play different roles external to the farm in their field of interest, they enter into different social collectives and develop several identities with overlapping and intersecting relationships (Brandth & Haugen, 2011) through a complex interplay of

choice, action and constraint (Foucault, 1997). They explained the identities as a performance that is delivered to others in order to present their skills, make an impression, maintain positive social interactions and a sense of making a lot of people feel valued. Women look for new knowledge and come up with new business ideas by analysing market trends. This is similar to Foucault's view of curiosity and innovation (Foucault, 1988, cited in Bess, 1988). Curiosity is the acute interest in looking at surroundings in a different way, thinking about new things, never being satisfied with the existing knowledge and seeking to discover new knowledge (O'Farrell, 2005) which supplies a grounds for possible positive characteristics of an innovative change agent. An analysis of respondents' voices indicates that their underlying motives of pluriactivity and diversification stem from socialisation, expressing inherent skills, and extra investment for sustainability.

5.3. Access to digital technology

Smart devices with mobile connectivity, and access to cloud based data and applications, brings innovative knowledge based services to rural communities (Maru, Bourgeois, & Mayer, 1994) while introducing the subject farmers to new challenges. The use of digital technology for farming promises improved productivity, efficient resource use, time efficiency, forecasting and marketing with an improved access to information, knowledge, skills and machinery (Maru et al., 1994). Digital technology not only has transformed farming, but also the lives (Hernández-Ramírez, 2017) of farmers themselves. According to (Dahlberg, 2000) the use of the internet has raised challenging questions about personal identity, and created new forms of community and new possibilities of democratic participation. The new contexts and practices (smart farming) introduced by digital technology enable farmers to shape their personal identities and the way they relate to the community, societies, cultures and environments (Floridi, 2011, 2014). Due to these human-technology relations, the analysis of human beings and technological systems independently has become challenging. Therefore, new research is more focused on a contemporary humanistic critique of how technologies are shaping one's

technologies of self (see: Footnote 9) through the application of theories such as Actor-Network-Theory (ANT) introduced by (Callon, Courtial, & Laville, 1991; Latour, 1996; Law, 1992). According to Callon et al. (1991), ANT is basically concerned with the techniques of power relations between a network of heterogenous actors, where actors constitute people, organisations, technologies, nature, politics and social order. Foucault identified that none of the above actors could actually be found working in isolation. Accordingly, the interactions within this contemporary living web, which constitutes the internet and all the technologies attached to it (Abbas & Dervin, 2009) along with technologies of self[9] enable individuals to transform themselves into a certain state of being. As such, the themes which emerged in this research in relation to digital technology help us to understand how participants are affected and transformed through access to digital technology.

Except for only two participants in focus group three, all other participants became actively involved in talking about how they view digital technology through their experience in relation to being time efficient (5.2.1); knowledge and skills (5.2.2), identifying barriers and distrust areas (5.2.3) and being a responsible citizen (5.2.4).

5.3.1. Space-time management

Time and space are described as intrinsically inseparable elements as time engages space and space requires time (Tsatsou, 2009). Space becomes a geographically located place when it requires symbolic meaning (e.g. office, home) and a concrete definition marking the identity and the sense of belonging (Tsatsou, 2009). The advancement of the digital communication infrastructure has blurred the boundaries of physical and digital space (Jordan, 2009). Online transactions, remote controllers, sensors, smart devices, social networking such as Facebook, YouTube, Skype and Viber, allow collaboration and communication across distance without the requirement of physical co-presence in a particular location (Abbas & Dervin, 2009; Jordan, 2009). This, in turn, may remove the temporal boundaries of the actual world.

The literature of spatial and temporal dynamics is profoundly influenced by Foucault's concept of 'heterotopia' which is defined as a space that disrupts the continuity and normality of common everyday places because this space breaks down boundaries within and between places into spaces of otherness by both representing and at the same time, inverting or distorting them (Foucault, 1967 cited in Rymarczuk & Derksen, 2014). As such, participants reported how space-time is affected from work life into personal lives due to technology-induced and technology-mediated fusions while reshaping cultural practices and their lifestyles.

> *When you're selling livestock, you use waybills and you've got to do biosecurity and animal health forms and so forth. But there's a new program out now that all your waybills, all your feedback forms, everything can go through this system relating to your property number and you can take like an iPad out to the paddock and a truck driver can – you can find his business name and you can add it into a section and then he can sign. So the waybill, instead of you having the physical one in the book that you can actually keep track of, it's actually in this Cloud system and when you hit send or submit it sends the waybill to the truck driver's email, the buyer's email and your own email and the sale yards or wherever, and that's really good – G1P6.*

> *My partner is a very techno person and he's more inclined to order parts online now. He'll go on the internet – if we've got a broken-down tractor and he needs a bearing for a blah blah, he'll go onto the John Deere website and he'll get the blow up of the whatever it is, and he can see that he needs part 3294. So, he orders the parts online, he orders a lot of farming parts and other bits and pieces now online – G4P2.*

> *We actually don't get papers and so everything comes via email – G3P8*

Getting Xero on the iPad was just about the best thing we've ever done, because he can sit there … Sit down and do it, yeah – G5P2.

Getting spray recs and things through that. You can look at them directly in the app or they come through as an email. Agworld, it's called – G4P2.

I'm very reliant on the internet, because I do a lot of my grain sales on the internet. Yeah, and all our bills are on the internet, our accounting program is completely online. I do everything on the internet. A day without the internet is like having your arm chopped off. Our business couldn't run without internet. Just couldn't run. Everything is done on the internet. Everything is done via the internet – G1P5.

An automated farm can be considered as a better solution for staff shortage, one of the biggest problems in Australian rural industries. Having a more reliable automated farm means less dependence on *human* staff.

There's an interesting one that monitors the individual animals and where they walk, so you can determine water points and different cattle, some have got much better weight gain because they don't walk as much. They just sit there and eat. When you go back from there, you start to realise why wouldn't we want to be doing all that? Why wouldn't you just drive down there? You can't get staff. It is difficult to get staff. So, the more reliably automated you can become, the less dependent you are on staff – G5P2

Zuboff (1985) asserts from his research analysis that technology is providing a new infrastructure that intervenes in many of the productive and communicative activities central to organisational life. As such, the participants reported that technology has restructured the farm, reducing skill and labour requirements through automation. When the participants sell livestock or buy spare parts or work with software, the spaces of farm field, farm office, marketplace and bank, they enter into a relationship with attributes

entirely their own. With a single touch, all the details are emailed to all parties involved in the process and stored in a Cloud system as a digital memory, where people meet and create knowledge and knowledge structures (Rymarczuk & Derksen, 2014). This idea is similar to one of Foucault's statements that the heterotopia is capable of juxtaposing in a single real place several spaces, several sites, that are in themselves incompatible, thereby merging certain spaces, like private space and public space, family space and social space, space for leisure and space for work into spaces of otherness (Foucault, 1967 cited in Rymarczuk & Derksen, 2014). In summery, the above participants views suggest that the use of digital technology by participants is time efficient in managing their busy lifestyle.

However, few participants indicated that they were highly dependent on digital technology. Gualeni (2015) stated that humans are artificial by nature and he regards technologies as a powerful factor in cultural change due to their inherent capacity to extend perceptual, intellectual and operational abilities. Together, these results suggest that there are time constraints which limit participants' capacities to work, and the level of digital technology used by individuals appears to have saved them time by making work much easier and quicker than before. Conversely, a few women were alarmed at the state of being technology dependent, reminiscent of Foucault's view that technology is not bad but it may be dangerous (Foucault, 1983a) if not handled carefully. Therefore, a careful social and psychological analysis of technology may be required to prevent the technology dependency that is possibly the biggest non-drug addiction of the 21st century (Hussung, 2015).

5.3.2. Knowledge and skills

Technologies of the internet such as the World Wide Web (WWW), as well as some educational institutions, are more often that previously thought possible offering flexible learning environments for people to acquire knowledge and skills (Collis & Moonen, 2012). Foucault's technology referred to an applied knowledge that implies a mode of self-transformation (Siles, 2012). Drawing on Foucault's conception of power, knowledge

and discipline, lifelong learning is seen as a disguise for the exercise of power (Wilson, 1999). The majority of respondents agreed that learning new things and gaining more knowledge is important.

> *It's always – yeah, I always think it's good to learn new things, I guess. Yeah, there's always room for more knowledge, learning things – G1P1.*

> *I think if you continue to learn it's a good thing, like if there's something there to be … I'm actually doing a Cert III in business administration, so I can learn how things are done in Word and Excel now to get a business sense and actually I'm a bit surprised at how much I'm learning. It's not actually online. I've got the course on a USB stick and then I have a conversation once a week to go through what I should be doing. There's a lot of scheduling with the calendars. I haven't quite got it happening on my phone. I've got a schedule on my computer – G2P5.*

> *I like manipulating the data to work out where there's loopholes that I need to fix, or where I need to improve productivity – G5P3.*

> *I think there's just so much out there though, too, and it's about knowing which parts of the internet and things to access – G5P3.*

> *We go to a few of the training and workshops and that, that are fine. Some of their – even their online thing – they put out a lot of just information sheets on different ideas and suggestions. Yeah Grain Growers is another good one that we utilise – G1P.7.*

> *Because you can spend a lot of time on the internet, you can research all of these different things yourself, but I think you need that practical input as to what works and what doesn't work – G5P3.*

Respondents viewed that the internet offers a vast amount of information in order to gain knowledge on certain things, but knowledge itself is not enough to make the decision in choosing and purchasing the right thing. They viewed online interactions such as online forums, product reviews and ratings (online platforms) as necessary as they provide spaces for consumers to comment and rate products which can be a better support for new customers. On the other hand, participants frequently acknowledged that acquiring business skills is important because farming is a family business rather than a lifestyle, thus suggesting their professionalism. Despite poor connectivity, participants reported self-direction and self-motivation in transforming themselves towards farm business and broadening power relations within the farming structure. Knowledge and power are intertwined in a correlative relationship. Thus, for power to operate it needs to be grounded in knowledge and power defines which knowledge is legitimate (Fejes, 2008).

Therefore, it is evident that improved knowledge and skills in farming creates more space and agency for women within the industry. With the advancement of digital technology, especially with the sophistication of the ICT sector, accessing, creating and sharing of knowledge via online platforms such as via mobile phones and emails has become more economical and accessible (Milligan, 2006). Therefore, farm women who have access to the internet are capable of acquiring knowledge through flexible learning and making their own choices. It is also important to note that digital technology brings more flexibility and more independence in choosing what knowledge to acquire. At the same time, users need to be self-directed and self-motivated (Collis & Moonen, 2012) towards a positive transformation of the self or the construction of positive identities.

5.3.3. Identify barriers and sceptical areas

Effective use of digital technology, mainly ICT, can positively influence farmers competitiveness because ICT can provide them with valuable information, increase knowledge, improve relationships with customers and suppliers, increase efficient collaboration with other institutes, reduce the cost of production and better target

customers (Braunerhjelm, Ylinenpää, Johansson, & Parida, 2013). Despite this, Australian farmers are concerned about the constraints of accessing digital technology (Ag tech), mainly due to high cost, their lack of understanding, and poor connectivity (Heard, 2017).

> *I don't think we're short of technology. It's just that we can't access this technology – G1P6.*

> *I have a really poor internet connection, really poor. If I get too many emails, I have to go to the library and unload them – G2P.2.*

> *That's obviously where the technology is a big issue for us, out there. We didn't even have mobile service out where we are, and we're 10 kilometres from town, so that is challenging – G1P4.*

Participants reported that their main concerns about the use of technology are in terms of availability, accessibility, affordability and trustworthiness. Some participants agreed that the technology is available, but they have not been able to access the technology they required. While there are ample 'amounts' of technologies, it is at times constrained by poor internet connection despite farms not being too far from towns. As their main mode of communication with buyers, suppliers, agronomists, other producers and information sharing happening via emails, poor connectivity seems to be a massive obstacle in successfully integrating primary industries and technology.

> *I'd probably use internet more if I could download stuff, but I can't download it because I don't have the capacity, and I have no mobile service – G1P2.*

> *We couldn't use it until we got satellite, at all. Like, it just… It's dreadful. Satellite's not the greatest either, but I get 2GB for $119 a month. And they can't guarantee if I spend $2,000 on another aerial – G5P2.*

We had trouble with ours, that firstly they had the wrong … they did something with the modem. Second time, the dish wasn't actually facing the right direction – G5P3.

We're alright now. It's just – it's intermittent with its downloads, but we're paying $60 for 40GB or something, and high speed. It's a higher plan than that, but you've got to be up between midnight and 6:00AM or whatever it is to utilise the other half. I set my alarm, got up at 1:00AM, and it failed for about half an hour, and I gave up and went back to sleep. Forget it. That was my effort at doing the off-peak data – G5P5.

The above participants appeared to spend a larger amount of money on internet services but still an uninterrupted service is not guaranteed by the service providers. Participants referred to connectivity through social, economic and technical perspectives. As such, communication in farm business activities, entertainment/leisure and finances were seeming to be constructed as major areas of concern. It is also important to note that the present existence of market power in the provision of telecommunications to customers is undeniable. Such situation in the rural sector inevitably affect the growth and development of rural industries.

Basically, everyone has Telstra because you can't get anything except but Telstra. Energy-wise, you can only use Ergon. Like, we don't have the option to chop and change – G5P4.

Stuff out of our control. Something that – if we had really good internet, that would improve our business… that we are limited in our capability – G4P1.

I think the bush is getting left behind, because I think there is so much growth potential that just isn't happening because we don't have the basic connectivity – G5P4.

All this stuff [software] is out there, but still it's not commercially available. Like, the walk-over weighing is brilliant, but it's still not commercially available – G4P2.

Few respondents problematised the monopoly of certain service providers and frustration for not having any other option available within the community. They seemed to be unhappy about the internet and the energy market structure that was characterised by a single seller, Telstra (Australia's largest telecommunications company) as the sole internet provider, and Ergon (a government-owned electricity distributor and retailer across regional Queensland) as the sole energy provider. This resembles a 'monopoly market' characterised by the single seller both as the market controller and price maker without leaving customers an option to 'chop and change'. Despite so much growth potential, the bush has been left behind by government policies and prioritisation. Therefore, it is suggested that direct government intervention in developing rural telecommunication infrastructure as well as regulation of market power would be a timely act in order to harness the potential of rural industries.

Although the involvement of state power and politics is considered as essential in supplying an uninterrupted connectivity to the rural sector, it is easy to be somewhat sceptical about the promises that politicians bring to people.

If we had a good mobile phone set-up out here that would be a good thing, that would be a big leap forward for the primary producers I reckon around. It's just that you can't rely on it, and we're just half an hour out of town, so it was just a low effort. But a lot of the politicians will say, oh yes, there's mobile reception there and there, but that's not right. You'll hear them saying they've got mobile here and mobile there. But actually, that is a lie. They don't come out and try themselves, do they? – G5P5.

Participants were not only sceptical about the connectivity but also the trustworthiness of politicians towards their burning issues. In relation to politicians' speaking the truth, Foucault introduced the concept of *parrhesia* which is defined as having the courage in the face of all immediate risks and opposition, to tell lay people in the community the truth about what has to be done. But the participants in this study, based on their experience, do not view politicians as *parrhesiastes,* or one who speaks the truth to power. Instead, as Foucault argued, there is an irreducible duality of leadership and lay-membership inside any political system, network, domain or field, involving differentials of power, freedom and knowledge (cited in, Bang, 2016) as reported through the above participant's extract. This, in turn, has developed positive agentic actions among participants because they have considered … "having community-owned infrastructure funded by the community members" … as mentioned in elsewhere in this thesis. This further suggests a level of resistance and agency shown by lay members of the community who are capable of innovating their conduct through various practices of freedom. As Zuboff (1985) noted, organisational (on-farm) innovations are necessary to support technological innovations of the firm (farm) to fully benefit from the information process. Therefore, organisation members (farm women) have developed the required skills, articulate roles and functions, and design systems and structures that support and reward (appreciate) their contribution.

It was also evident that both automation and information technologies had been able to catalyse the process of professional identity construction of participants providing them with an opportunity for a new kind of farmer who cannot be fitted with traditional stereotypes. They have demonstrated their strong desire and confidence in integrating digital technology with most of the farming and non-farming activities, but poor connectivity, high costs and unavailability of some useful software in the market, have been major barriers for successful integration of technology and the primary industries. A few participants acknowledged that they were not competent technology users, but they

displayed their commitment in innovating or acquiring skills and knowledge through continuous learning.

5.3.4. Responsible behaviour

The use of digital technology, especially ICT, is significantly connected with online interactions with online communities allowing various power relationships (negative or positive) among its users. Therefore users' actions, reactions and behaviours have become a deciding factor in users' online identities (Turculeţ, 2014). In order to maintain a positive online identity, one has to take care of their ethical thoughts and behaviours. Unlike physical relationships, if the online relationships are not healthy for people, they can easily get rid of them by using some *reversible tactics* such as *blocking, disconnecting* or *unfriending.* Foucault highlighted *potential reversible relationships* as 'points of resistance to the prevailing mechanisms of power' (Foucault, 2005, p. 252) and as a tactical disciplinary technique upon which alternative forms of active ethical identities can develop (Munro, 2014). Foucault explained this further by using an ancient word – *asceticism* – and defined *ascetism* as a tactical element, an element of reversal, used against the structures of power. It is not a sort of antagonistic but a reversed obedience that has become egoistic self-mastery. The concept of ethical asceticism is therefore central to understanding Foucault's conception of resistance (Munro, 2014) in relation to participants' ethical practices in using new external power relations such as social networking or online interactions. This can be seen as an important behaviour in maintaining quality and reliability and relevance of information in the process of agricultural information sharing. These ethical practices or ethical ascetism (*ethical askesis*) offer possibilities for micro-emancipation (Munro, 2014) a type of freedom from external power relations such as misuse of online platforms for business promotions. Some examples are shown below:

I don't believe in putting stuff on Facebook. I am in an email group – G3P3.

The doctors all say you shouldn't use the medical stuff. Two doctors have said to me, don't take much notice of the stuff you read on the internet. That's for humans, not horses or animals. But for humans, be very, very wary of some of the stuff. That's what they both said, which is interesting – G3P1.

Technology, it's kind of like a vexed question. Well that might make it more attractive. Yeah. But, by the same token, you'll probably need them less. They don't want to sit in an office. That's part of the reason they have farms. It's important though, just to look out and see alive things – G21P4.

A majority of respondents acknowledged their ability to analyse information and make reasoned judgements regarding the applicability of digital technology depending on the situation. Especially dealing with online information, they showed their concern about online security and privacy. If the interactions were not favourable for them, they demonstrated a sense of reversal or resistance. Participants demonstrated a sense of scepticism against mass social media such as Facebook for sharing their information, but they recognised email groups as a safer means of online communication. This is seen as an indication of their ability to evaluate the available mode of social networks/interactions and choose what offers the best for their needs. When using critical information such as medical diagnoses, they listened to the opinions of doctors who were socially considered as medical professionals. In regard to the knowledge and skills they acquire through digital technology, participants identified the difference between gaining knowledge – *just want to know a bit about you look it up* – and putting knowledge into practice – *don't take much notice of medical stuff on internet.* They identified the boundaries of being 'digital' and enjoying 'true green farming life'. Being responsibly conducted, self-controlled people who maintain a healthy balance is seen as an essential professional characteristic, especially when they are open to various changes.

5.4. Community work and socialisation

Community provides a space for communication and socialisation in interactive situations. This type of socialisation enables individuals to identify and reflect on their personal needs (Dobrowsky, 2012) and they can work on their identities in the process of interaction. Foucault emphasised the importance of socialisation (interrelationships) in constructing positive subjectivities because his notion of power is engendered in the discourses, practices and procedures of everyday life and it is visible when it is exercised in interrelationships (Danaher, Schirato, & Webb, 2000; Foucault, 1980, 1984b). Therefore, it is important to examine how participants construct identities while working with the community and what the practices are which they perform within the community.

> *When you do community stuff you know that you're actually doing something that's good for society – G1P4.*

> *I think [socialisation is] terribly important. Like Moonie, they used to – the men used to, oh not only men, men and – ladies and men, on a Wednesday night, when we first went there over 10 years ago, every Wednesday night the men would go to the sports club, or we, we would go the sports club. You might have a wine, or you might have several wines, but you were just chatting and now that's not happening – G2P5.*

> *Like we haven't had Wednesday nights for a long time. They're trying to have a 'jag the joker' thing on a Friday once a month and get a few people back. That's changed in the last year-and-a-half. Every Friday everyone in Croppa Creek went to the club. The kids would fall asleep in beanbags in the corner … and they'd actually done this incredible kids' room up in the corner with their own TV, their own playroom and sort of glass walls so the parents can see through – G2P4.*

> *Like I'll look for a bit of information on [the] internet and try and get, I guess, a bit more of an understanding myself about different things. But at the end of the day, I really want a person I can go to to talk to about things. So, it might start on the internet, but for me it's really who are the contacts? Who are the people I can actually ring up and go and talk to more? – G5P2.*

The majority of participants agreed that participating in community activities was beneficial for both society and themselves. They enjoyed taking part in community gatherings because that was the only place where they would meet each other away from the farm. They considered that socialisation was *terribly important* especially with all family members.

Increased interpersonal interactions and socialisation through community work leads participants to construct collective identities (Dobrowsky, 2012). Data revealed that participants enjoyed community work and considered it as a way of building relationships, sharing information and having fun. But they identified 'finding time' as one of the major barriers to being physically present in the social space. As mentioned elsewhere, they acknowledge the use of smart devices and digital technology in maintaining relationships – *caching up with besties* and *joining email groups with friends* around the world. This also indicated that participants meaningfully and visibly engaged with the community and public sphere both online and offline. Further, this can be extended to indicate that online socialisation would be more and more significant in the future due to the women's busy farming life, but physically present social gathering may also continue to take place simultaneously.

As mentioned previously, some participants identified themselves as members of community groups such as the Country Women's Association (CWA), sports clubs, children's/mums' play groups and more spontaneous social groups such as *kindy drop-offs*. There are some participants who identified themselves as members of professional level community groups such as the Mental Advocacy Group, Regional Landcare program,

media representatives, and women's business networking events. Community gatherings and community organisations have been used as a forum for participants to express their creativity and hidden talents such as journal writing, photography, as well as their professional knowledge. The participants described their active involvement in business groups and they learnt business networking through social media, further highlighting that they have participated in meeting community needs through their active involvement in community for a long time.

5.5. Personal dispositions and ethics

Family farming is typically a business that has been owned, managed and sustained by members of a family across a number of generations (Shepherd & Haynie, 2009). Therefore the majority of the labour is provided by the family and the managing principals are related by kinship or marriage (Calus & Van Huylenbroeck, 2010). The interaction in farming of business from an economic perspective and family from a social perspective involves viewing family farming as a professional occupation, but also as a reflection of the lifestyle, beliefs and traditions of family members (Calus & Van Huylenbroeck, 2010). Based on this view, the concept of family farming blurs the separation of market and family and places the 'family' at the heart (Hamilton, 2006). Therefore, personal dispositions and ethics of family members may directly affect the success of family farming. Thus, it is important to understand how rural women position themselves at this intersection of the family and the business, and reflect on the subject positions they occupied during this process.

5.5.1. Maintaining family morale, ethics and harmony

The data revealed that the primary goal of a woman in family farming is not only profit maximisation, but also maintaining relationships and keeping family together. By maintaining stronger bonds among the family and the community, they nurture stronger communities while adapting to family dynamics.

When you try to get into a meaty conversation that you're enjoying, it goes nowhere, because there's an interruption … Just in life. Someone turns up, kids fall over, someone wants food, something else. Yeah, those are the family … Distractions, yeah. Sew up a dog – G1P5.

Keeping everything together, keep your farm, your family, the farm all together, aren't you? Keep all the balls up in the air – G3P8.

So just being a moral support is very important too as well as keeping the home fires burning. Keeping – being a support there for your husband – G3P6.

I think just keeping up the morale in the home. Like I say, you're the glue. You've got to – you can't go down – G3P4.

Yeah, I just love being able to give them a hand. Just, really, to appreciate all of the other things that they give you as part of being on the farm. Just to be able to help in some way – G1P1.

Yeah, I'm probably about the same. Probably getting out and about and actually feeling like you are helping and achieving something there. Definitely being out and helping where you can, I think you feel more accomplished doing that, if that makes sense – G2P4.

Keeping-up morale was a dominant discourse presented by participants for questions relating to their family and relationships. Almost all respondents strongly identified family as the centre pole that all other strings were tied to. Participants' perceptions towards family members suggest their ethical action of *being supportive* as a token of *thanking* for what they receive from their partners or the family. This leads to the happiness, harmony and satisfaction of all members of the family. This also demonstrates their ability to maintain power relationships through support and kindness within the domestic sphere so that morale and stability is maintained.

Power relationships among family members serve as a technology in the administration of the family as a unit. Technologies of ethics, self and care for others regulate this power in order to keep peace and morale among family members. Peaceful family life is important for the psychological health of family members and the respondents felt it was their responsibility to create and maintain this as part of their caring for the family. Family is constructed as a place that is a collection of harmony, caring, love, creativity, leisure and relaxation, as well as a place full of interruptions and distractions. The term *sews up a dog* demonstrates their skills of catering for the complex demands of family life and establishing and managing the farm business. The state of their busy lives and their attitude in catering for the complex demand on them can be seen as a motivation for innovation and seeking out methods of timesaving. According to Spellman (2010) innovation in itself is not always an economic driver, but it usually is a determinant in encouraging someone to do things differently and creatively in order to achieve a positive outcome. As such, participants' complex family and work environments can be regarded as a potential motivative factor for innovation.

5.5.2. Taking care of self and others

The National Centre for Farmer Health in Australia revealed that farmers are always happy to help others, but they are often less willing to ask for help themselves. When they do not talk about their problems or ask for support, things can become desperate (NCFH, 2015). Foucault's concept of the care of the self focuses on practices of freedom through the practices of self-creation and governmentation (disciplining) of the self (Foucault, 1988a). Foucault further stated that the cultivation of the self is evident in one's clothing, appearance, gait and (when translating his concept into the world of women farmers) it can be seen through the calmness with which she responds to everything happening in her world. The contemporary farming life always introduces new things to farming and therefore farmers are actively engaged with external projects, and typically allocating less time to look after themselves. Foucault emphasised the importance of both the internal

(the self) and the external (work), awareness while introducing oneself to new activities, and ideas and challenges throughout life (Foucault, 1988 cited in Batters, 2011).

> *I think one of the biggest things in our rural industry – or no, it's everywhere. It's everywhere, but particularly in the rural industry. You have to look after yourself too. You have to take the time for yourself – G4P5.*

> *Just even if it's when you're in town, have a cup of coffee. Even if you're daydreaming and you have a cup of coffee or … you must look after yourself. You must … This is my husband yesterday, when I wanted to have a cup of tea in town …. and it was taking too long. You know that face, not happy. God, he regulates my tea pot size – G5P3.*

> *My Mum runs a very stressful school and … she's always led with the … if you don't take care of yourself, you can't take care of anybody else. But I've had to introduce them out there too, if I need a nap with my Labrador, that has to be okay. But if I have a nap, he thinks I'm sick, so he comes in and checks on me because it's such a … they don't stop. From start to finish. I was so happy they both [her husband and father-in-law] took that sample in today. Farmers aren't good at not doing, but men need to learn to look after themselves, too – G4P2.*

> *If my partner asked me to move a vehicle and he says, do you have 15 minutes, he means three hours. Like Lucy said, can I borrow you for an hour or two and this is at 9am and you might get home at 8:30pm in the evening by the time you're done. They haven't packed any lunch or anything but, I always have snacks – G4P4.*

> *Oh, the hardest was the first year we were together. My husband got Shingles. He was that stressed and taking that bad care of himself. So, I had to actually take time off work and take him to the hospital and take care of him. [I]*

remember how skinny he got that first [time], whereas he doesn't get skinny in harvest anymore – G5P3.

A number of respondents found that *taking care of self* was as important as other *work* even though it was difficult to find a time for it. They appeared to construct men as hard workers who have not cultivated the habit of taking care of themselves. Some participants acknowledged their influence in changing habits of others by setting examples, as well as taking care of others (in the family or neighbours) when they get sick.

The word *farmers* seem to suggest male partners who spend almost all of their time in farm related work. Yet a risk taking attitude associated with a socially imposed masculine identity makes men vulnerable through unsafe work behaviours (Billett & Somerville, 2004). Moreover, stress associated with farming in difficult times can impact on the wellbeing of farming families and also it adversely affects farm business decision making. Therefore, taking care of the self and others can be considered as an important personal disposition of respondents who are responsible in almost everything within the farm, family and the community.

5.5.3. Psychological resilience

In the literature, psychological resilience has been defined as a developmental and psychosocial process through which people exposed to adverse events experience positive psychological adaptation over time (Graber, Pichon, & Carabine, 2015). A person's ability to overcome the traumatic events is considered as the ability of a person to present a positive identity despite adversity (Rodrigues, Stobäus, & Mosquera, 2016). Therefore, the theme of psychological resilience aims to examine how participants construct the characteristics of positive identities in terms of resilience.

There's lots of things I enjoy but it doesn't always happen, if you know what I mean, naturally, on the land – G1P3.

Actually, have to – and it becomes hard when you know - I'm a very strong-minded person and I know it – G4P1.

Yes, it has become hard, but I want to succeed, so I'm trying to do I" – G5P2.

Participants acknowledged that they were less stressed when things got tough. They also reported their ability to accept negative results when things became difficult, and a willingness to be supportive of partners during tough times. They showed their ability to maintain their perspective and not become overwhelmed. The above excerpts appear to confirm participants' psychological resilience towards negative outcomes that usually happen in the farming industry. These women recognised the benefits of being supportive of each other when things got tough. Overall, the majority of participants viewed the family unit as a place where flexibility, adaptability and innovation prevailed.

5.6. Critical evaluation of the findings

5.6.1. Positive identities and professionalism

According to participants' accounts, professionalism is constructed in association with personal and moral commitment. Some participants identified tensions between personal and working ethics. Some references are indicative of their understanding of how to perform professionalism in certain ways in certain occasions. Participants used discourses such as *business administration, research, coordination, quality* and *outcome* in describing their work. Thereby they attach professional value to their work.

The findings of the study indicate that the majority of family farms are solely or largely dependent on digital technology. At the same time, these farms seemed to have positioned digital technology as a catalyst for change in relation to work, responsibilities, knowledge, skills and personal ethics. However, there were a few participants who highlighted sceptical and suspicion in regard to using digital technologies. The high cost

of software and poor infrastructure were problematised as issues of accessibility and affordability, and these issues need to be addressed.

Previous studies suggested there is no single method for reliable and valid evaluation of professional characteristics. However, in regard to a positive identity characteristic (illustrated in

Table 2.1 and Table 2.2 Chapter 2), Table 5.13 shows thirteen popular attributes reported by participants in relation to *positive identity*.

These findings reveal that the participants have been using digital technology in order to perform multiple identities, including professional identities, in an efficient manner. Thereby the dynamics of identities are accelerated by digital technology.

5.6.2. Change agency

There are number of definitions for the term 'change agent' to be found in the literature. Similarly, many personality traits in relation to a change agent can also be found in Table 2.2 in Chapter 2. Based on the analysis of participants' experiences, beliefs and perceptions, ten characteristics (existing and possible) were revealed as significantly aligned with the attributes mentioned in Table 2.2 in Chapter 2.

Table 5.13. Discourses showing positive identity attributes of participants

Professional attribute	Examples
Specialised skills and knowledge	*we mightn't have the muscle, but we've got just as much to contribute, women.* *I feel quite competent doing the office work in a sense, so that's probably why I probably would say I like that the most, because I feel I'm the most competent*
Continuous improvement	*It's always – yeah, I always think it's good to learn new things, I guess. Yeah, there's always room for more knowledge, learning things.* *I've trained myself to really get all of the bookwork up to scratch and make it a lot more financially viable for the business*
Reliability	*We have to worry about everything else that's going on, and help when needed, be on call, drop everything. You're just there.*
Accountability	*We pride ourselves in Australia that we're clean and green and that makes extra work for people out growing whatever … because we have to take extreme care with drenches and … just the whole bit*
Being positive (Self- efficacy)	*I'm a very strong-minded person and I know it.* *I feel quite competent doing the office work in a sense*
Supporting others	*He's helped me a lot. He's helped me with all of that and I helped him with everything* *I just love being able to give them a hand*
Time management	*The other day I was leaving the office thinking, that desk is clean. I'm all set to come back on Friday night. I'm enjoying community group stuff too and the fact that technology enables us to communicate all that so much easier and quicker*
Corporate goals	*Yeah, probably developing our business, and developing our farming and cultivation, and accessing better markets*
Commitment	*Yes, it has become hard, but I want to succeed, so I'm trying to do it.*
Teamwork	*I more do all of the coordination and he's more just the hands on, operating and those things*
Adherence to social norms	*I guess it's not just the business that is getting handed over, or there's a transition. It's your home. It's your lifestyle.*
Ethical behaviour	*Yeah, I just love being able to give them a hand. Just, really, to appreciate all of the other things that they give you as part of being on the farm.* *I feel guilty all the time. Farming has to come first, because that's our home and where we live and that's our income. But the magazine is also a bit of income – not a lot – but it has a lot of people who need it to feel valued and that's a constant thing in a lot of places and I kind of have had to say*
Active engagement in decision making	*For the business, every decision we make together, whether that's the variety of grain that goes in or what we're going to do with the workmen or – all of our day is making decisions about the farm and what's going to happen.*

Table 5.14 illustrates these ten characteristics and how participants aligned themselves using their own terms as derived from transcripts.

Table 5.14. *Discourses showing active agentic behaviour and professionalism of participants*

Agentic characteristics	Examples
Be responsible	*We pride ourselves in Australia that we're clean and green and that makes extra work for people out growing whatever … because we have to take extreme care with drenches and … just the whole bit. People do take pride in their work I think* *It's very difficult to get away when you're responsible, just about, for everything that operates on the farm.*
Diversified knowledge	*We're doing all the work on the computer, looking after most of the financial stuff, which is very important. So, I think our roles are all-rounders* *I do. I use the internet to purchase grain, find out the grain prices when I run out. I do market research. I do my MSA, to look at my scores from my cattle, my sales.* *I do stock work, mostly. But I do drive the tractor and things as well if they need help there.*
Flexibility	*just being available to do all of those things* *mine's everything from start to finish, housework, office work, outside. It's everything*
Result oriented	*Even having goals and actually achieving them* *And grain, like growing more tonnes, or better-quality grain.*
Empathy	*being a support there for your husband because they do it fairly tough in drought times* *I just love being able to give them a hand*
Confident	*I feel quite competent doing the office work in a sense* *Because we mightn't have the muscle, but we've got just as much to contribute, women.*
Self-motivated	*well, I've trained myself to really get all of the bookwork up to scratch and make it a lot more financially viable for the business, for me to do a lot of that myself*
Optimistic towards new technology	*Our business couldn't run without internet. Just couldn't run. Everything is done on the internet. Everything is done via the internet* *Getting Xero on the iPad was just about the best thing we've ever done, because he can sit there … Sit down and do it, yeah.* *we have to upgrade. We can't stay back in the '80s.*
Understands others' skills	*My husband really – he's very thorough he's very good at marketing the grain.* *He's very good with cattle in his own sense* *You actually have to listen to the generation taking over*
Be innovative	*He does more of the physical work, but I would do a lot more of the research component behind it.* *I like manipulating the data to work out where there's loopholes that I need to fix, or where I need to improve productivity.* *So, I want to develop some kind of program, help them learn how to tell their story, and how to shape their brand and things rurally.*

Typically, innovators and change agents have personal traits such as open thinking, receptivity to the constructive ideas of others, being good at problem solving and the ability to initiate change (Spellman, 2010). These traits involve an incorporation of the roles of mentor, motivator and companion.

Participants have reported their skills in: (1) mentoring fellow farmers or neighbours in community gatherings; (2) motivating/encouraging their kids, partners to contribute skills to the family farm business; and (3) accompanying the family in an empathetic relationship for succession. As discussed in Section 5.2, participants' experiences in the use of digital technology provide a catalyst in enhancing the characteristics of change agency and professionalism. Participants' excerpts in Chapter 5.2 demonstrated that digital technology has helped deepen their agricultural knowledge (accessing online information), facilitated constructivist learning strategies (to construct their own knowledge), and supported the development of critical thinking skills through interaction with the content (Webb & Cox, 2004; Windschitl, 2002).

Drawing attention to sections 5.2, 5.3 and 5.4 it is evident that participants inherently possess a certain level of agentic behaviour and it is motivating through socialisation. Digital technology acts as an external catalyst that enables participants to enhance their agentic behaviour. Based on this synthesis, it can be extrapolated that the participants' change agency is an interplay of their internal motivation, beliefs, social dynamics and an external catalyst of digital technology.

5.7. Summary of the synthesis

This chapter investigated farm women's sense of self, and different ways of constructing and negotiating the identity of the self, through acquiring skills and knowledge in digital technology as well as through balancing identities as a way of achieving a certain level of satisfaction. It was found that construction of identities is complex and multifaceted. The use of gender for a sense of self was less central and less significant to self-identity for each participant. Although there was no clear division of labour based on gender, there was evidence for division of labour based on the participants' knowledge, skills and preferences.

The analysis of data revealed that digital technology has a strong influence on shifting the boundaries of work roles as well as creating new subject positions for participants. The new positions that were made available for participants require new skill development, behavioural and attitudinal changes, and changes in relationships with the self and with others. Professional identity construction is influenced by the views of self and how others view them. These views are shaped by socialization, career transition, and work experience. The participants demonstrated their ability and willingness to negotiate the type of work they do to keep the farm functioning. They utilised their range of skills in performing different and multiple roles according to the need of the farm, and also based on personal interest. Furthermore, participants viewed that they are not confined to a certain type of work. Rather, they have the ability to gain diversified knowledge and skills through performing multifaceted roles in a wider space.

Computerised machinery has made farming less dependent on physical labour than in the past. Digital technology has transformed the nature of skill sets needed by farmers and different skills are needed such as working with software instead of traditional paper-based bookkeeping. Depending on the circumstances surrounding the participants, their identities and positions within society have changed. With the rapid changes that are being introduced by digital technology to family farms, in relation to information and automation, women's identities will continue to evolve, adapt and grow. The ethical codes of the family and the self, in combination with knowledge, power and digital technology, enable the fashioning of self-identity.

Participants' traits such as openness to changes, socialisation, interest towards community work and flexibility to adjust for non-traditional farming roles, can be regarded as some of the positive qualities of a successful change agent in sharing agricultural knowledge within the community. This will be further explored in the next chapter under Research Question 2 of this study.

CHAPTER 6: HOW DO FARM WOMEN USE DIGITAL TECHNOLOGY TO TRANSFER AGRICULTURAL KNOWLEDGE TO THEIR FARMING COMMUNITY?

6.1. Introduction

Communication and agricultural knowledge transfer are fundamental in agriculture and most agricultural related activities. Therefore, information and communication technologies (ICTs) which falls under the umbrella of digital technology are providing common means of information sharing among agricultural rural communities. ICTs are expanding all the time due to their ability to collect, store and share information linking to other sources such as television, radio, books, cameras, players and projectors (Michiels & Van Crowder, 2001). In Zuboff (1985) writings, she has highlighted a manufacturing plant manager's question to his leadership group in conceptualising technology deployment: "Are we going to be working for a smart machine? Or will we have smart people around the machine?". This question later has been used as the keystone in creating strategies for developing technology applications. Through this example, Zuboff aimed to convey that 'smart people' are organisational members who can contribute to and learn from the system through which they perform their tasks (1985, p.12).

Individuals' knowledge and understanding – intellectual skill – can turn information into an opportunity (practice) for development of their farm, community and the self. Therefore, an understanding of how rural women use their intellectual skills in agricultural knowledge sharing provides a link between the level of the knowledge worker (rural women) where knowledge resides, and the level of the institution (farms/community), where knowledge attains its productivity (Hendriks, 1999). According to Foucault (1980), knowledge and power are interdependent. Thus, knowledge is an exercise of power and power is a function of knowledge. Foucault further explained that power is exercised as a

network of power relations and conveyed by various techniques of communication aiming at economic production or social regulation (Monatschrift, 1984).

Based on this, ICT (techniques of communication) can be regarded as one of the technologies that intensify power relations exercised by an individual. According to Tampoe (1993), information systems, more particularly Information and Communications Technology, motivate individuals by providing the tools to support and encourage their knowledge sharing skills. Tampoe's research has further revealed that this motivated energy is directed to professional and personal achievement of individuals by ensuring that they have a clear purpose and are sustained by access to information (Tampoe, 1993).

Although the process of knowledge transfer is related to communication, it is different from information distribution (Hendriks, 1999; Nelson & Cooprider, 1996). Unlike the act of passing an object to someone, knowledge cannot be transferred freely. The act of knowledge transfer is a combined knowledge flow that involves the process of reconstruction by combining internal knowledge and external knowledge (Chesbrough & Bogers, 2014). According to Treakle and Krell (2014), knowledge can be defined as the accumulated awareness of facts, processes and their interactive dynamics as well as the users' understanding and ability to apply that knowledge. Knowledge is available in communities as different knowledge systems such as local knowledge and science-based knowledge. According to Treakle and Krell (2014) a knowledge system can be defined as an interactive process of different facets of knowledge, knowledge holders' inherent intelligence and awareness, their technologies and institutions. Treakle and Krell further emphasised the importance of integrating local/indigenous knowledge systems and science-based knowledge systems in community-based knowledge transfer. It is also evident that a successful knowledge transfer happens when the barriers between two parties (knowledge owner and knowledge receiver) such as space, time, social distance, culture, language and conceptual frames, are minimised (Vriens, 1998 cited in Hendriks,

1999). As (Ruggles, 1997) suggested, ICT can be considered as an effective tool in lowering barriers involved in knowledge sharing.

With the above theoretical background in mind, this chapter analyses the data relating to Research Question 2, rural women's knowledge and actions in transferring agricultural knowledge to their community and how they use digital technology in this regard. This also aims to identify the existing strategies used by rural women for community-based agricultural knowledge transfer and exchange. The presentation of the findings is based on the three themes that were identified during thematic analysis. These themes capture how participants are positioned and how they position themselves in relation to their experience and perceptions. Table 6.15. illustrates the themes and sub themes identified for Research Question 2.

Table 6.15. *Themes and sub themes for Research Question 2*

Main themes	Sub themes
Sources of Information	1. Local information 2. External information
Sharing information	1. Informal community gatherings 2. Field days 3. Farm visits 4. Online 5. Off-farm work and businesses
Barriers and scepticism	1. Availability and reliability of services 2. Data management 3. Privacy and Security

Some of the sub themes which emerged under the main themes provided a deeper understanding of the discursive construction of information, knowledge and diffusion in the context of selected communities.

6.2 Sources of Information

People use information in their daily interactions in order to make sense of the world and make informed decisions (Adami, 2016). Information plays a vital role in the processes of decision making, learning and innovation in personal, social and organisational domains (Rowley & Hartley, 2017). Provision of relevant and accurate agricultural information is one of the fundamental and essential aspects in agricultural development. Rowley and Hartley further stated that information can be described in different perspectives: as subjective knowledge, as useful data, as a resource, as a commodity, and as a constitutive force in society. An understanding of the relationships of these perspectives in relation to the sources of agricultural information helps in promoting effective information management in the rural sector.

6.2.1. Local information

Although there is no accurate definition for local 'information', in relation to rural farming communities it can be defined as an accumulated knowledge, practice and belief that has evolved and been transferred through generations and used by the local community (Warren & Mundial, 1991). Although there are a number of ways available for farmers to acquire knowledge in the contemporary farming setting, local knowledge is still considered vital for sustainable farming because it is locally focused, experiential, practical and socially constructed (Ellen & Harris, 1997). Moreover, local knowledge can be easily applied across the farming communities because many farming related issues are more or less the same within communities.

> *I guess in my role it has been about working with producers to see what information and resources they're needing and looking for and trying to connect them to that. I guess trying to get neighbours working together on different issues. Usually issues don't start and stop at boundaries; they're across a landscape – G5P3.*

Participants further asserted that local knowledge is not recognised or effectively utilised in the present context.

> *I think it's always easy to think that there are experts somewhere else out there that you need to bring in for the information. I definitely know around Goondiwindi there's a lot of local knowledge and innovative resources within the farming community that I don't think people necessarily recognise within themselves. Until you go and talk to them and ask them and say well would you be interested in me having a look at your farm and talking about what you're doing here, that they really recognise and value their own information skills that they've got – G5P1.*

Participants valued local knowledge and innovative skills found within the farming community. Their perception of sharing local knowledge instead of bringing agricultural experts from outside for community workshops suggests that the local knowledge is more *relevant* and *practical* than the knowledge from outside. This type of local knowledge needs to be shared among other communities, researchers and scientific communities for recognition, and for its usefulness to others. However, local knowledge in one community may not be understood by external people because it is usually expressed in social terms that can be understood and translated only by certain people within the same community (Ross, Sherman, Snodgrass, Delcore, & Sherman, 2016). Therefore, the ability of local women to recognise local knowledge and innovative skills can be used in translating or conveying local information among others.

6.2.2. External information

Present day farmers are more open to a wide range of external information sources than before. While ICT has been recognised as an essential mechanism for transferring agricultural knowledge in modern farming, farmers still rely on the information received by paid professional advisory services. A favourable attitude of farmers towards external

information sources may lead to efficient and effective information management within farming communities.

Although the majority of respondents reported that they lack easy access to advanced information technologies, they acknowledged that information is available via multiple sources.

> *I'm sure, the information is available, it's just how accessible it is to us. Is your connection poor, Lisa? – G4P2.*

> *Just trouble accessing it – G4P3.*

While the above participants problematised poor internet connections, some other participants discussed issues such as limited data and the high cost of data, as the main issues in accessing online information.

> *Kids don't understand we've got limited [data] so you really need to be able to have a switch and turn it off and say, that's mine, it's for the business – that sort of thing – G5P4.*

> *I get 2GB for $119 a month – G1P2.*

> *I mean we've got a booster in our house that we bought from Goondiwindi Communications, which cost us $800 when we bought it and they're now $2300 – G1P4.*

> *My husband changed the password. He's got younger sisters who are 16 and 21. They went to the thing, found it and put it on and now he's covered that up with tape and changed it so that they can't get on, because we just can't afford to … to not have your maximum data – G5P3.*

In the above extracts, internet data has been constructed as an economic resource which is limited and valuable. The responding participants are unable to afford to lose data for unproductive purposes. According to Hornik (1993) farmers are willing to invest time or money or both in obtaining information because the return is high. This suggests that participants perceived that online information is necessary for improving their businesses but poor connectivity and high costs are limiting factors when accessing information. Therefore they take control of the ability of family members to access the internet in order to preserve downloading for business purposes.

Another source of information available for participants is through 'field days' held by private and public agricultural advisory service providers.

> *I think there's a lot around, like a lot of days on grains, and pulses, and cattle, and things that we should be accessing for our business, but it's actually taking that time out of your business to do those things – G1P6.*

> *A lot of the information has now swung around to technology. So, we're into drones, and we're into driverless tractors, and we're into GPS. Less sort of soil and earth – we're into the results of technology on the soil and the earth, rather than actually what's going on there – G5P2.*

Respondents appeared to understand that field days are useful sources of information but lack of time was identified as a limiting factor in attending and accessing such knowledge.

Another source of information available for farmers is the private fee-for-service advisory service. Although this service demands a cost for farmers, a majority of participants identified 'the agronomist' as one of the main sources of information

> *Yeah. The other thing is that a lot of farming families like us use agronomists. They come out twice or three times a week and they say do this, plant at this rate, spray that, harvest in a week, spray this out, do whatever. So then on top*

of the data that you're acquiring in either your livestock or your grain, you've then got them coming in over the top saying use this, spray at that rate, do something else, do something else now or later, or whatever. So, there's just swamps of data and information coming in, and you've got to sort of pick what you … of course, we pay the agronomist, so we actually use their advice, because we're paying for it – G5P2.

Data also revealed that some agronomists were employed by chemical companies and a lot of farming families used their service to improve productivity. Despite the availability of information through agronomists, *the cost of information* and *information overload* were also highlighted by participants. The participants viewed information as available but in an unorganised manner. They found it difficult to sort, digest and apply to their farm fields. According to Keogh, Heath, Henry, and Darragh (2017), although the development of fee-for-service consultancies provides a productive advantage for farmers, it has reduced the transfer of new knowledge within the community. As such, participants also asserted that they receive data and information such as fertiliser/chemical spray recommendations and planting/harvesting time suggestions etc., but the diffusion of knowledge was not evident.

Many women provided more negative experiences about the unavailability of private extension services on time.

Big contract farmers, like 50 per cent of their crop or something got eaten by grubs and the agronomist missed it. Because they came in instead of [spraying] it out for it to be harvested – G4P5.

It was also important to notice that participants problematised the private extension service as agronomists not being on time when they are needed. As a result of this, some farmers lost half of their crops and were left desperate and frustrated.

In summery, the above participants identified information as useful when it is relevant to them and available at the right time. They have access to information through the internet, field days, agronomists and from fellow farmers (local knowledge). Table 6.2 shows how participants described these sources of information available to them.

Table 6.16. *Advantages and disadvantages of information sources as perceived by participants.*

Information Source	Advantages	Disadvantages
Online	Freely available Not affected by time and space	Bombarded with rubbish Poor connectivity Cost of service and data
Local knowledge	Freely available Higher relevancy of information Comes with skills and innovation	Not fully recognised
Field days	Can get first-hand experience Physically involved More effective in practical applications	Not freely available Affected by time and space Lack of DPI involvement Busy life
Agronomists	Available within the community	High cost Information overload Not available on time

Despite a large quantity of information being available via the internet, access to this information is limited due to poor connections and the cost of service. There are a number of field days that provide valuable information, but farmers do not have time to physically attend these due to their busy lives.

Another way of accessing information is via agronomists but they are expensive, potentially disorganised and their untimely provision of information have created some challenges in practical application. Participants' overall descriptions lead to a further interpretation that they are aware of different sources of information and knowledge available for them. Although there are some barriers to accessing this information, women have skills in avoiding some of the barriers to get the cumulative effect of all, but

yet some barriers (see disadvantages in Table 6.2) have to be addressed through external intervention.

6.3 Sharing information

6.3.1. Informal community gathering

Agricultural development is becoming highly dependent on how successfully knowledge is generated, shared and applied (Spielman & Birner, 2008) within communities. In order to better understand the behaviour of information sharing and seeking within a community, it is also important to identify the community structure and the social dynamics (Webb, 1989). According to the participants' accounts, they reported knowledge and information sharing at different types of social events.

> *I think that information sharing doesn't happen as much as it used to. But they're always pretty successful. I mean even your cluster fencing days – everyone wants to have a 'sticky beak' at what the neighbours are doing. Always. If you can time it appropriately so it's not the middle of harvest or planting – work your timetable out correctly and have some interesting speakers, and something interesting to look at – they're pretty successful. A lot of good, valuable information sharing happens – G5P3.*

> *So again it's not outside speakers or anyone giving that information. It's people catching up and, you know – what are you guys doing? How's that working for you? We've done this; this didn't work this year. So that's invaluable – G 5P5.*

> *Sometimes just at a social gathering. I think a lot of things get discussed without having a meeting. Like you say, once it's finished, people usually hang around, and that's where a lot of that networking, talking and sharing happens – G1P6.*

It's the catching up with people and finding out what's going on - how much rain did you have? Did you do this? How deep did you plant your Sorghum? It's that. Because over the years, that used to happen at the pub. Of course, because of the drink driving laws, that can't happen anymore the way it used to. So, men don't get together anymore. But they do at clearing sales and they do at field days – G5P6.

The data further explained that the information sharing is structured around cooperative group work such as 'cluster fencing' (fencing around a group of properties to protect from wild animals using shared labour) or other types of social gatherings where information is shared in an informal way. Participants perceived that information sharing within their community takes place in different ways and it has been changing with time. They also viewed the practice of information sharing as important and people should have a choice as to whether to pick up the relevant information according to their needs. More participants added their views regarding changes that happened to the way they shared information in relation to space and time.

6.3.2. Field days

Field days have been used as an effective tool in educating and transferring new practices and technologies to farmers as an implicit part of agricultural extension (Heiniger, Havlin, Crouse, Kvien, & Knowles, 2002). Although the conventional type of field days are not very common today due to several factors such as high cost, lack of time for farmers to attend, and advances in ICTs, they are still considered as a highly effective tool in practice change as though involve technology in action (Heiniger et al., 2002). As such, participants also agreed that traditional field days are effective in improving their farming operations despite any lack of time to schedule or attend these types of events.

They have a lot of things on in Roma and everything, don't they? If you wish to go to it. It depends on the person, I think, if they want to go … They had a

Nutrition day the other day, a course, and a bunch of people went, and then there was a part of that [which] was a free follow-up, and only two people turned up to it. So, I mean… my other half went, and he said he gained a lot from it, but no one else even utilised the free follow-up that said, like, you've now had three months utilising what we've taught you. What have you … what questions have you got? They sort of – no one went – G1P2.

I think there's a lot around, like a lot of days on grains, and pulses, and cattle, and things that we should be accessing for our business, but it's actually taking that time out of your business to do those things – G1P3.

I remember we used to have soil field days and we used to get diggers in, and they'd dig a big soil profile, and the men would hop down in – they'd be seven feet down in the ground showing us all the profiles of calcium and whatever in the soil. But that's all sort of been done, and we know a lot of that information now – G4P3.

Even though new technology has enabled them to get 'all the information' about the soil and earth. By the same token, technology has distanced them from being practically involved in the field and the experience of what is actually going on with the soil. This explanation pinpointed the gap between information and knowledge. As (Nguyen & Alexander, 1996) argued, valid knowledge is inescapably human because it resides tacitly and actually in bodies but the machine-readable information is technical.(Nguyen & Alexander, 1996) further explained that technology removes people from their existence as physical beings in the world, thus ignoring experience that leads to knowledge. Drawing on Foucault's theorising practice of knowledge and power (Foucault, 1980), having just information and data replaces an individual's power with a series of technical activities and operations, thereby dissolving the polity (Nguyen & Alexander, 1996) – the capacity to exercise power in mobilising resources as an organised unit.

6.3.3. Farm visits

Another interesting perception of participants that emerged from the data is that they had a preference for physical visits to farms and face-to-face discussions in information sharing rather than having just discussions over the phone or internet.

> *I think sometimes you get on farm and you do see other things that people are doing, that you wouldn't necessarily think to ask about or go and look at, or that you don't think is actually that special. But when you mention it in front of other producers they're like, 'Oh my God, that's really good; can we go and have a look?' I think getting on the farm, for most people, and face to face dealing, is what works best, that I've found – G5P3.*

> *Well, even now we have these wonderful share farmers, the farm next to us. We had corn in and they came past and they're like, oh they are planting corn, I'm going to plant corn. Then they actually came and asked us to plant it, so we planted it for them – P5P1.*

Participants discussed the benefits of visiting farms physically as it creates more opportunities for identifying unacknowledged practices which can be followed by other farmers if they are shared. Therefore individual farm visits can be identified as an effective way of knowledge and information sharing within the communities of this study.

6.3.4. Online sharing

Online networked technologies enable individuals to share information among a large number of people (Bakshy, Rosenn, Marlow, & Adamic, 2012) or among closed groups. While these networks efficiently share information among targeted groups or people, they also facilitate propagation of new information or knowledge construction. Similarly,

the participants of this study reported a plethora of evidence of sharing and generating new knowledge.

> *I work as a veterinarian, and I'm on a few online forums, so we have, like, we do a lot of discussions online about treatment and whatever. So, it's an integrated group like that. We do a lot of genetic research for livestock management – G1P7.*

> *I am in an email group. That started when we did the farm-wide testing for rural areas back in the nineties and we had a group of primary producers that came together through that and we all meet up now and again, and that has expanded to some overseas as well … It's been quite interesting – G3P4.*

> *Talking to them about experiences and what works for them and what doesn't and really using some of that networking side of things makes a big difference. Because you can spend a lot of time on the internet, you can research all of these different things yourself, but I think you need that practical input as to what works and what doesn't for it to make sense, too – G4P1.*

> *I think that our generation or everybody now that's farming is so much more communicative. When I grew up, if you were good at something, I feel like they didn't share what their secret was or what was good and now there really is a big sharing environment, they talk about what they use, what chemical they're using, what direction the wind's going, what they think their yield is, like they share. Sharing yield and things would have been unheard of 10 years ago, they just didn't. That wasn't a big thing. But they are the community, the farming community are more forthright in helping each other all advance. Having mobile phones lets them do that as well – G5P2.*

Many participants highlighted the importance of the *interactive* nature and *networking* ability associated with online sharing. It is also worth mentioning that the majority of

participants were not only family farmers, but work also in other related professional fields as revealed through focus group discussions. Some of the positions were as veterinarians, teachers, nurses, businesswomen, graphic designers, artists and magazine writers. It is also noted that they reported their contribution to the community in numerous ways as indicated in quotes.

Other participants indicated how they use different software for different work while highlighting the use of online forums to get feedback/information from other users. They broadly discussed how online forums/interactions are useful in choosing a more suitable and cheaper product for particular work.

> *We have two different programs for Border Living and for … so we use Xero for the farm monies, QuickBooks for me. That was the same thing, networking. Talking to people – G1P4.*

> *This is the best thing for you, and that's why I had to ask people. I asked everyone – G4P5.*

> *We go to a few of the training and workshops and that that are fine. Some of their – even their online thing – they put out a lot of just information sheets on different ideas and suggestions. Yeah and GrainGrowers is another good one that we utilise – G5P3.*

The commercially available accounting software websites such as 'Xero' and 'QuickBooks' facilitated networking and talking to people by maintaining online forums for customer reviews. As mentioned elsewhere, these software websites have discussion forums for users to share their comments, experience, ratings and troubleshooting with others. Participants considered these online forums more useful than information sheets that displayed on the websites. The analysis of the above excerpts indicated that participants preferred to know how other users experienced the product and what works for them and what doesn't. The 'use of

some of that networking side of things makes a big difference' because people's interactions such as online forums and information sharing effect their decision-making process, especially when choosing the right software for a particular purpose. It is also evident that the exercise of power over other decisions may happen without physical presence or indirect interaction (Abbas & Dervin, 2009), but in a more powerful, much easier and quicker way.

6.3.5. Off-farm work

The participants in this study are a representation of typical rural women in regional Queensland who use the internet for most farm related work. As mentioned previously, most rural women use digital technology for off-farm work that they identified as one of the ways of socialisation, as well as a source of income. Analysis of data in this particular study revealed that off-farm work is constructed not only as an income generating activity but also as a way of creating an identity in the community (analysed in detail in Chapter 5). Volunteering as a responsible citizen and being engaged with work other than farming are activities undertaken by these groups of women. Data also revealed that significant amounts of information sharing happened through off-farm work as most opportunities for this type of work were based on online spaces as well as physical interaction within the community.

A participant described her involvement in community networking events emphasising what she receives and what she gives to others. She is noted how networking of multiple events occurs, events such as promoting business, learning Instagram, writing magazines and advertising.

> *Women business networking events, they do a lot of. Like I've learnt a lot about Instagram, I'm going to actually talk to a lot of people [who] come to me because I was originally at the papers, so I wrote for Rural Women and Queensland Country Life and before that in [other] media. People come to me*

to help them with their events and I go out and I take photos of them and I do all that stuff and I can't do it for everyone anymore, so I want to develop some kind of program to help them learn how to tell their story and how to shape their brand and things rurally. Because you can gear it [so that it is] actually resourceful to whatever, like we were … you can tailor it to what you want really – G4P3.

In the above extract, first the participant focused on business networking events where most women are involved in discussing their businesses. But she further positioned this group and identified additional practices within it. The event of 'community gathering' appeared to create conditions for the community to connect for various types of information sharing. It also appeared to shape a stronger community with a sense of the availability of its own resources that could be shared among its members. While discussing her contribution as being one of sharing with others event information through different media, she can't do it for everyone anymore due to the high demand and her limited time. So she was going to develop a 'kind of program' that efficiently caters to more people. It is apparent that her knowledge on digital technology (use of Instagram) is going to be used to help them tell their stories and shape their brands as this technology can be 'geared in a resourceful way' and tailored according to need. Therefore, technologies have the potential to reveal specific forms of self-reflection and self-discovery (Gualeni, 2015) This was identified by Foucault as 'technologies of the self'. This can be further extended as a certain level of psychological and behavioural changes towards self-transformation occurs. Similarly, Foucault's concept of technologies of the self is demonstrated by participants by through transformative practices and transformative experience (Hernández-Ramírez, 2017) such as 'innovating a kind of program' to transform themselves, eventually leading to transform others.

The discussion of participants' off-farm work progressed through the questions posed by the participants themselves. It was interesting to see that the majority of respondents

were enthusiastic about this topic and actively contributed. A participant who was well-known as a community leader, explained her involvement as follows:

> *My other main interests have been resource management work with Landcare over 25 years. Which is on the farm. I mean it's how you look after the land, so it's agriculturally related. A lot of trials have come to our farm because of my work with Landcare and government. Then in the last – up until 2005, I was involved in a lot of regional resource management stuff. I was involved with the regional catchment group for 15 years – chaired the regional catchment group. Then more recently I got out of all that, and then I've been doing mental health advocacy work for the last 10 years. There's been a lot of things in our area for years, I've been involved with local government and with Condamine-Balonne Water Catchment things and through those days, we had a lot of, what do you call them … Naturally Resourceful Women? – G5P1.*
>
> *So, she is kind of a regional star and leader in the mental health field – G5P3.*

She counted her involvement with 'Landcare' (a movement dedicated to managing environmental issues in local communities across Australia) as 'on the farm' and 'agriculturally related' showing her commitment to agriculture and farming. Her 'work with Landcare over 25 years' showed her commitment to community work and stability as a community leader. Her 15-year contribution to the regional catchment group as the chairman indicated her progression in community leadership and changed her power relationships with the community. Also, her work with Landcare and government implies a network of power relations between the government, social organisations and the community in decision making, especially regarding regional natural resources management.

According to Foucault, this can be extended as surveillance through political technology (political power) (Foucault, 1984c, p. 256) because, in addition to funding purposes, the

presence of political power/state intervention in social organisations appears to govern, discipline and correct the behaviour of society because the social organisations are subjected to state policies and regulations. On one hand, state intervention may be able to add to social organisation a sort of recognition, on the other hand, members of society are subjected to a certain level of control and hierarchical observation without being aware that they are being watched (Foucault, 1977). This analysis of state intervention can be taken as meaning that government intervention and regulation may be possible in future women's community programs in knowledge transfer so that information sharing may be monitored and regulated.

The respondent further described her more recent transition from physical resource management (land and water) towards mental health advocacy. This could be an indication of her choice of field depending on what she intended to communicate to the community or her communicative preference (Gualeni, 2015). According to Foucault, the presence of 'mental advocacy' programs within the community can be a reflection of the function of disciplining societies promoting a decent and moral family life (Foucault, 1984c).

6.4. Barriers and scepticism

6.4.1. Availability and reliability of services

According to (Graham & Logan, 2004), successful knowledge transfer requires resources that are available for potential adopters. A lack of infrastructure and necessary resources is one of the barriers in the innovation process. Individuals who act as change agents or facilitators of change must have skills not only in identifying possible supports and facilitators but also in barriers assessment in order to identify issues that could negatively impact on the innovation/knowledge transfer process. Successful change agents are capable of targeting barriers and finding ways to tactfully overcome such negative impacts (Graham & Logan, 2004). Therefore, this theme identifies how the participants

demonstrate their abovementioned skills against barriers and scepticism they encounter in the community.

In five focus group discussions, internet service was constructed as unreliable and unavailable, based on poor technology infrastructure, the high cost of service, politics and lack of government intervention. The following discussion explained how these issues were discursively constructed by the participants in Focus Group fFive.

> *Something that – if we had really good internet, that would improve our business – G1P6.*

> *Oh, yeah, because then we'd be accessing the technologies you want at the time you wanted, not having to wait until the next day because you couldn't get through that day, and you couldn't – sometimes you ring people and they can't hear you, and you try and run around the house and get better service, and no one can hear you. You're trying to pay employees, and three days later you're paying them. People ring because they haven't got their money hasn't come through – G1P4.*

> *Connectivity is a massive barrier out here. It really should be considered as basic infrastructure. I think the bush is getting left behind, because I think there is so much growth potential that just isn't happening because we don't have the basic connectivity – G5P4.*

> *We had a booster installed when we had the Queensland Country Life field day. Because they wanted to do a Facebook live cross. Well it didn't work. I don't remember what the reason was, but the Facebook live, we put the tower in, put the antenna on the roof for them, and got the box for $2300, and it never happened – G5P2.*

But I think it also costs – it's like $1.2 million per black spot tower. We could do a lot of other stuff with some of this point to point wireless I think out here. Which then I think the new smartphones, you can actually start making your phone calls over wireless internet. I think that's where we need to be looking. I'm sick of waiting for the government to do it, and I'm sick of waiting for Telstra. They will never do it – G4P3.

I mean the NBN is so fraught with … I mean it was fraught no matter which way they went. Whether it's the Turnbull method or the Kevin Rudd method, it was always going to be fraught, and it is. I mean there are people in Toowoomba on the NBN that can't get the internet. They're on the NBN. I think part of it will have to be privately funded by the community members, as well as if we can get some public money through some of these grants to do it. I think most people, particularly around Toobeah, Talwood do understand for their business the dollar benefit if we can get this basic infrastructure in. So, it's not like it's a charity; put the money in to help the community out – G5P4.

Participants viewed 'connectivity' as basic infrastructure, but it is still a massive barrier for them in achieving their full potential. Also, they pointed out the urban-remote area dichotomy (or differences) in explaining that 'bush' (rural areas) are getting left behind with connectivity. This is problematic in the context of social inequality which may suggest that growth opportunities hinge on the improvement of connectivity. They also described some issues they faced when conducting information sharing programs such as Facebook Live Cross (involving live video streaming) that required more advanced techniques than basic connectivity would allow.

Many participants also identified the high cost of infrastructure as an issue. They further stressed their scepticism towards the government and their current service provider, Telstra (Australia's largest telecommunications company), who has not intervened in the issue. They also suggested that the provision of basic connectivity is one of the

government's responsibilities because it really should be considered as basic infrastructure. They inferred that the internet is constructed as a 'basic need' similar to networks of roads, and therefore it should be normalised and established as a necessary component of society. On the other hand, respondents suggested 'point to point wireless' as an alternative for high cost 'black spot towers' which would allow the use of smart phones for their work.

Participants also suggested the creation of privately funded infrastructure controlled by community members due its *dollar value* to their business – not as an act of charity, but as a way of putting the money into helping the community out. This suggests participants' efforts in 'tactical reversal' which is defined as seeking an alternative way of resistance (Foucault, 1990a) that is fundamental to the creative possibilities for resistance within power. Foucault considered *tactical reversal* as a positive means of resistance which does not devolve to reaction or negation but rather a strategic action. This can be a kind of adoption of change according to the needs of a community. Adoption is much easier when potential adopters are optimistic and enthusiastic about digital technology/change. When the participants' level of involvement in new programs is significant, the resistance to change will be decreased (National Research NRC, 2006).

The findings therefore suggest that participants believe digital technology will significantly increase the productivity and efficiency of their business if barriers such as poor connectivity are removed. These excerpts suggest that the participants are optimistic about the positive changes that digital technology promises to bring to their lives, and they are sceptical about the quality and quantity of the service they are currently receiving. They acknowledged important factors that need to be addressed for a better integration of digital technology and primary industries in order to move towards a successful future in farming, as well as for an effective information sharing.

Some of the participants clearly displayed their interest and hope for future technology development projects that were supposed to already have been established in their communities.

> *Yeah. But I think there's another mob … ISP. I think they're looking to start what RedWiFi are doing … putting [in] some wireless connections. Instead of getting towers, they were doing wireless. So hopefully that's still on the board. But also … keen to try and see if we can get some, because obviously that optic fibre is going straight down the highway I think out to St George. So, looking at how we might be able to get some funding to put in some towers … to start connecting to the NBN, and then using point-to-point wireless to get it out to people – G5P2.*

> *I can't see the government seriously providing this kind of infrastructure for us in a timely manner. I think it's just something we're going to have to do as a community ourselves – G5P5.*

The above extracts demonstrate the community's desire to obtain better infrastructure. This also shows that even though they experience difficulties in accessing reliable internet connection throughout the day, there seems to be a huge growth potential associated with infrastructure in the near future in regard to the introduction of a Long-range Wide Area Network and the efforts of private internet service providers such as RedWiFi. Therefore, it can be assumed that the community will be more reliant and dependent on the internet in sharing technology in the future, but will still seek means for practical eye-witness sharing of knowledge such as in 'field days' before such implementation. This suggests the need for an integration of 'online-offline' – or using together both virtual field days and interactive space such as Facebook and online forums in future knowledge transfer programs.

6.4.2. Data management

Some participants acknowledged that data management systems are not transparent enough. The following excerpts demonstrate that farm information in the form of data is collected from various sources exponentially, but farmers do not receive anything in return to use as a basis for decision making.

> *I think that's where there's been a lot of people collecting the data, but there hasn't actually been something at the other end with the software, to actually analyse it and give you useful information back that you can base your decisions on – G3P6.*

> *To the point of inputting all the data into it and getting something effective out of the end product – G4P3.*

Respondents are aware that information flow should be a two-way process so that farmers are entitled to receive feedback from the other end in order to make the data useful. But the above excerpts seem to suggest that data collected from farms is most likely to flow only toward the data gatherers such as government and industry. This can be explained through the concept of *information panopticon* which is a kind of digital surveillance or centralised power that uses information as an observational tool and a control mechanism (Foucault, 1977; Zuboff, 1985). This can also be interpreted in relation to economic and political discourses as explained by Trindall, Rainbow, and Leonard (2018) in the context of Australian agriculture. According to them, many Australian producers and agricultural stakeholders lack trust in data management systems as they are unable to model the potential economic benefits and make recommendations to improve on-farm profitability. In order to realise the full economic potential of data, it is vital to establish data management policy that enhances producer control and data utilisation while privacy is adequately protected.

6.4.3. Privacy and security

Most importantly, participants acknowledged their perception of quality and the trustworthiness of internet information and ethics in sharing and using information. They indicated their understanding and ability to maintain a professional and healthy identity in participating in both online and physical meetings. Their identities as responsible citizens is well demonstrated, as in the words of the following participants from Group 3 when discussing their perceptions:

> *What annoys me about our emails … is where others get your address from [them] and you get bombarded with rubbish, spam – G1P2*

> *If you hear something that you just want to know a bit about you look it up. But if you're looking for treatments I don't think you should do it. Yeah, it's a bit of a worry. But if you want to know a disease or something and how it affects you or something – G3P6*

> *Yeah, I don't think you should do anything – G3P5*

The participants problematised the privacy of personal information because others get their email addresses and flood them with unwanted emails and spam. They displayed a certain level of discipline over the use of internet information. They used the internet for information but felt they used self-control in putting that information into practice. Following Foucault's understanding of ethical norms – a persons' relations to disciplinary practices and their capacity for self-determination (Heyes, 2007) justifies their choices and engagement in social relations. The above data excerpt indicates the participants' potential to act ethically and achieve their freedom of choice in sorting and sharing information in a more responsible and accountable manner.

6.5. Summary of synthesis

The majority of participants became more enthusiastic about questions and topics related to Research Question 2 as the discussion progressed. They related the way in which they share agriculture-related and non-related experiences, opinions, attitudes and perceptions in different community gatherings such as political meetings, while playing tennis, during kids' school drop offs and pick ups and sometimes just at social gatherings.

The findings confirmed that participants were able to sort information, absorb and digest it, and become enriched through their experiences of sharing information about both their own as well as their neighbours' farms. Data also revealed that women use networking technologies for professional discussions on topics such as genetic research, and for community/international level agricultural knowledge transfer among closed groups which facilitates the creation and channelling of new knowledge.

Unlike traditional information dissemination, digital data can also be effectively generated, stored and analysed (Zhang, Wang, & Duan, 2016). Participants also indicated their willingness and openness to share successes and failures with others because peer-to peer networking is an important innovation of women farmers (Helmer, 2016; Sachs, Barbercheck, Braiser, Kiernan, & Terman, 2016). Creating business models such as farm-to -plate business and organic farming can be regarded as innovative strategies used by participants to combine farming and community needs, as well as ways of opening up opportunities for the farm. It is also interesting to see that participants' have an interest in multiple factors such as food, nutrition, arts, business and the media through their off-farm work. As (Sachs et al., 2016) stated, this is how the farm is connected to the community and the community is connected to the farm.

Fraser, Smith, Judd, Humphreys, Fragar, and Henderson (2005) have found that there is growing evidence that farmers in Western society are at high risk of developing mental health issues. It is also evident that farming is associated with characteristics that affect

their mental health (Fraser et al., 2005) such as adverse weather conditions and pest attack causing yield loss. Socialising and spending time with neighbours is a way of maintaining success and stability of family farms especially when they undergo hard times (Neth, 1995). Therefore, social connections and participation help farms as a group to resist adverse conditions or situations.

Another important finding in this chapter is the presence of different types of knowledge systems that have the potential to stimulate successful community engagement. According to Aslin and Brown (2004), a knowledge system is a combination of knowledge, experience and expectations. Such a system can be categorised as : (1) local knowledge, (2) specialised knowledge, (3) strategic knowledge, (4) or integrative knowledge.

The sub theme of local knowledge refers to the availability of local knowledge and the potential inclusiveness by participants in their community engagements. Specialised knowledge refers to a range of sources including experts such as agronomists, DPIs, extension officers as well as software developers' forums – such as *field days* and *online sharing*. Strategic knowledge is the tactical positioning of people and resources for future action within given political and administrative systems (Aslin & Brown, 2004). Participants have demonstrated their positioning as a positive resistance to poor governmental intervention in relation to issues with connectivity and infrastructure, thus displaying their critical thinking and innovative skills. They have shown their integrated knowledge through active use of networked technologies in generating new knowledge.

Participants identified traditional field days as effective because during such days they can see how technologies can be applied on a practical level. Some participants were concerned that technology could distance them from actual farms. As Floridi (2014) explained using her term 'infosphere' (the space of information), information is changing the environment and we are all becoming connected as 'inforgs' (informational organisms) who spends more time online than in the field. Distancing farmers from the

field and confining them to the office or infosphere is seen as dangerous because the participants believed that practical knowledge is invaluable, and not just information.

Accordingly, drawing on Foucault, everything that technology brings to us is not bad. Instead, everything is dangerous. This is not the same as 'bad' but indicates that everything has the potential to be bad. If everything is dangerous, then we always have something to do (Galliers & Currie, 2011). As such, the participants demonstrated their potential ability to critically evaluate the applications of ICT and its appropriateness to their needs. Thus the appropriation of ICT can be seen as an important professional attribute when dealing with information sharing, especially in rural communities where area specific information is required.

CHAPTER 7: HOW ARE RURAL WOMEN SUPPORTED BY THEIR FAMILIES AND THEIR VARIOUS COMMUNITIES FOR THE ENHANCEMENT OF THEIR PROFESSIONAL, INNOVATIVE AND AGENTIC SKILLS

7.1. Introduction

Despite the fact that the farming family has been impacted by new technologies of power (digital technology), the sovereign power of the family continues to play a crucial and collaborative role within a disciplinary society (Taylor, 2012). As Baumeister (1997) stated, an individual's identity is a collection of schemas about the self, and these self-schemas are formed through interactions with others and through the recognition of the identity by others.

The concept of identity construction through Interaction recognises that identity does not only affect one's own self, but also the relationships and shared activities with the lives and identities of others (Bruner, 1990). The interactions between members of the family farm unit which is run as a family business has to be studied from the perspective of putting the family at the heart of the research (Hamilton, 2006). It is also important to consider the strong link between the dynamics of the family and the workplace (farm), as the these two are inseparably intertwined (Fletcher, 2006; Oughton, Wheelock, & Baines, 2003). Hence, there is a requirement to understand the synergies, and inextricable linkages, between the family farming unit and the family farm, as influencing the stakeholder's perception.

Some scholars describe a family business as a place where family members have a shared ownership, commitment, and responsibility (Barnett & Barnett, 1988), therefore making all family members stakeholders in the business. Some scholars such as Oughton et al. (2003) and Marshack (1994) have investigated the concept of family business and

specifically identified that women typically remain invisible within the family business. Thus they conclude that a family business is a 'closed system' where women play both a role in the family and a role in the workplace (farms).

In contrast to the abovementioned approach, Poza and Messer (2001) conducted research to identify the role of women in farming succession and continuity, based on the 'appreciative inquiry method' where women's perspectives and experiences were acknowledged. They concluded that the invisibility of women is not certain, as long as "the agenda is about love and continuity, not [patriarchal] power" (Poza & Messer, 2001). Their notion of 'love and continuity' is not different from Foucault's view, whereby "a type of bond, commitment and dependence in the form of marriage and birth" continues to exist within the family. Through this bond, family farm succession is postulated to continue over several generations, during which responsibility, ownership and labour input shifts from the retiring farmer to the successor (Joosse & Grubbström, 2017).

In family farming, new successors, whether daughters, daughters-in-law, sons or sons-in-laws, generally bring change and innovation to the farms. According to Joosse and Grubbström (2017), some of the benefits they bring to the agricultural sector can be listed as:

- New knowledge or skills;
- New business models;
- The development of more sustainable farming systems;
- The development of more ICT based organizational models; and,
- Increasing relationships between farming and the local community.

As per the findings in Chapter 5, women have displayed their skills in bringing the abovementioned benefits to the farm. In general, women have also demonstrated a desire and gravity towards continuous professional development, with specific recognition of digital technology and its potential to play a vital role in this regard.

However, it is also important to understand how family structure dynamics, and family attitude, create possibilities and obstacles for women's agentive actions, and professional development. In understanding this, the identification of the benefits of family farming as a strong business model can be investigated more thoroughly.

Recent statistics have shown that family farms have generated, on average, higher returns than the corporate sector in the Australian farm sector. Furthermore, family farms are considered to perform better than the corporate sector of farming in Australia (Schneider, 2016). One of the key factors behind this success is generational succession planning (Gray, 2000), presumably because there is a human sentimental connection between the farming business and the family unit. In support of Australian family farming business strength, Schneider (2016) further asserts that family farming has been recognized as a strong business model, and that it is not expected to be challenged by the corporate sector soon. This suggests that the family bond, and strong relationships of family members by birth and marriage, is one of the factors behind the success and continuity of family farming. Importantly, in family farming businesses, trust and communication are considered as important in ensuring long-term success of both the farming business and the family (Gill, 2017). While other businesses have a clearly defined structural set up in terms of responsibility, command, decision making and risk management, family faming businesses are more dynamic, complex and challenging, due to the nature of family values and emotions (Gill, 2017). On this basis, family farming success is contingent on a dynamic construction of human relationships and trust-based networks.

It can, therefore, be argued that the contribution of women to the success and continuity of family farming is likely to be reflected through the way these women are perceived and positioned by family members. Literature suggests that some of the indicators in identifying the perceptions of family members are the 'respect' and 'support' they demonstrate for other family members (Burton, 2004; Joosse & Grubbström, 2017; Kuehne, 2013). Respect is considered as due regard for the feelings, or achievements, of another person via recognition of their knowledge and skills. Subsequently, support can

be described as agreeing with, providing backing to, or giving encouragement to, an individual, or individuals, within the family unit, that results in motivation for a particular action (Wayne, Randel, & Stevens, 2006). Hence, rural women's professional development and innovation skills are affected by the way they are respected and supported by their family members, and *vice versa*. Therefore, this chapter aims to determine how family members recognise, respect, support and motivate women towards professional development and innovation, while simultaneously considering how women shape the family unit they exist within. The analysis of themes that emerged from thematic analysis are stated in Table 7.17 below:

Table 7.17. *Themes and sub themes related to Research Question 3*

Main themes	Sub themes
1 Respect and freedom	1. Women as contributors to agriculture within a power structures 2. Women as innovators
2. Support	1. Supportive attitudes of family members
3. Motivation and appreciation	1. Motivation and appreciation

Initial analysis of focus group data identified two main themes and three sub themes, as presented in Table 7.17 above. The following sections describe how the analysis of the focus group data informed each theme identified under Research Question 3.

7.2. Respect and freedom

Showing respect to an individual, as well as granting the individual freedom in management using her areas of expertise creates more space for the individual, allowing them implement their skill set and grow (Lange, Johnson, Hudson, Johnson, & Gustafson, 2011). It is also suggested that the possession of a diverse knowledge and skills is a powerful predictor of creativity and innovation. Within family farming, the capacity to acknowledge such skills, innovation, and provision of space for implementation, helps individuals in mobilising their psychological potential towards improved farm

performance. This theme therefore aims to identify the mechanisms by which the function of the family unit serves the purpose of innovation, as well as 'respect' and 'freedom', in relation to agriculture in this context. This section also focuses on the way participants discursively construct the dynamics of respect (valuing knowledge, skills and abilities) and freedom (provision of space) within their families.

7.2.1. Women as contributors to agriculture within a power structure

This theme describes participants' knowledge, experience and skills in farming before and after marriage. Focus groups consisted of both types of participants and their accounts provided evidence of labour division.

Labour division was apparently based upon an individual's areas of expertise (whether they are male or female), resulting in the sharing of responsibilities between husband and wife. This circumstance and phenomena is well described by Foucauldian theory within the context of familial power (Foucault, 2008). Within the context of agriculture and power, according to the participants' accounts, both parties (husband and wife, male and female) play a significant role in influencing farm performance through negotiating work between them, based on their skills, knowledge and abilities. Some participants perceived that they have a mutual understanding about this division of labour and they understand their responsibilities in that particular work area.

While multiple women reported that there is a division of labour within the family farming unit, there was a strong tendency for women to be involved with the making of business decisions on-farm. While women were involved more with the *organising and coordination* (G4P3) of farm work, men were involved with *operating and those things* (G4P3). The division of labour was generally described as men undertaking machinery based and physical labour, while women more frequently reported undertaking market research (G1P5), online research (G4F2), genetic research, finance and general office work

on farms. More importantly, women indicated that they undertook research into practices to improve on- farm management and production.

> *We've got the grain component, but my other half looks after that because that's not my forte. I don't, yeah, I'm not the grain part of it. So, I stay right out of that area. We've got trucks and that side of things, so that's my partner's part that he's involved heavily with that stuff, and I'm much more the livestock side. He does more of the physical work, but I would do a lot more of the research component behind it – G1P2.*

Such division of labour appears to have supported hegemonic masculine work practices (Billett & Somerville, 2004), whereby men's work is positioned and restricted to heavy labour work. Women's work is not much associated with heavy physical work. However, involvement within research across all farming aspects suggests an integrated and strategic division of labour where the stronger skill sets of individuals are applied to the respective tasks they support. Furthermore, the fact that many women reported partnerships in business decisions suggests that a hegemonic interpretation of the division of labour is not correct.

> *For the business, every decision we make together, whether that's the variety of grain that goes in, or what we're going to do with the workmen. All of our day is making decisions about the farm and what's going to happen – G4P4.*

Participants also reported the division of labour in the next generation.

> *My son does his share. He does the website, and the advertising. My daughter-in-law does the accounts. So, they share the work – G1P6.*

The division of labour in this strategic fashion, with involvement in decision making, supports the Foucauldian concept of networked power relationships where everyone exercises power over others in different ways (Foucault, 1980, 1984b). According to

Rosenfeld (1986) decision making is a more fundamental and important aspect of farm operation than physical labour. On the other hand, Francis (1994) stated that family farming has a very adaptive way of organising labour, and these adaptive capacities are related to flexibility in the usage of family labour. Similar to this view, it can be considered that this division of labour is a strategic labour division according to their choice, preference and areas of expertise. Such strategic division allows each family member to develop particular skills and knowledge in their individual area which, in turn, allows for innovation through research.

Some participants suggested that they themselves have created space for desires and choice in farm work.

> *My husband is very good with cattle in his own sense, He comes from a very strong cattle family, but he knows that we enjoy it. We enjoy the cattle more. We do enjoy it. But I do all of the cattle work. I – probably my daughter and I do the cattle work, more than my husband. We're the cattle people – G4P1.*

Participants mentioned a sense of interest in a particular area of work. They used skills to create space for that area of work and other family members willingly stepped back from that area of work in order to create space for the participants. While this suggest women are skilled in shaping their positions within the structure of a family business, it can also be viewed as an interplay of the ethics of caring for others and a unified family strategy for the survival of farm (Foucault, 1988a; Gorman, 2006). This also demonstrates the productive power relationships within the family rather than patriarchal familism, and inclusion of cohesive and altruistic qualities (Fahey, 1998) of the family as a unit.

There was a one exception to women as being integral to operation of the farming business. Interestingly, the following participant's account states that she was not involved in the farming business, due to it being a *male dominant farm*, as well as

expressing her lack of interest in farming, identifying herself *as [having been] a city girl* prior to marriage.

> *We have a very male dominant farm, and always have had. We've always had staff. I don't do any outside work at all. We have employees, and my husband and my son. Then we get contractors in from time to time, like for harvest. So, I do no field work at all. I do some office work, but my work in the office is limited, I would say. I don't do all of it. I do none of the finance. I don't talk to the bank. I do some data entry, sometimes. But not much of it. I often code things incorrectly, because I do it infrequently. So, I get in trouble. So basically I'm not heavily involved in the business. I came from the city, so when I first married – I mean I wasn't a bush girl. I mean we have no chooks, horses, cows or anything. Cattle, but not milking cows or anything. So, we're a little bit of a different family unit, from that point of view. In that I wasn't brought up in the country, so I was never really expected by my husband to go out and do stuff. I would have if I needed to, but I've never sort of had to. I found other community things to do, to keep me busy … as my main interests … looking after the land, so it's agriculturally related – G4P1.*

In this participant's circumstances, she has constructed the farm as male dominant. However, her later statement of "… I would have if I needed to …" gives a sense of understanding that the above notion of "… very male dominant…" does not necessarily imply a presence of repressive patriarchal power. Conversely, it can be interpreted that this is her freedom of choice, to do less farm work and focus more on community work. This further can be interpreted using Foucault's idea that individuals are no longer simply subjugated, but rather they have their "… own means to act upon themselves and others to transform themselves to achieve a certain state of happiness, purity, wisdom and immorality" (Foucault, 1988d, p. 18). This power analysis and her choice of off-farm work with her interest seem to have paved her pathway towards her professional development. This can be well explained using Foucault's explanation – power functions by structuring

a field of action of a fundamentally free subject, but always with the possibility that the individual can traverse the field in new and creative ways (Hartmann, 2003). So her choice of action- community work is seen as not controlled or affected by male dominancy as she has been working as a regional star and leader for more than 25 years as mentioned elsewhere in this thesis. Instead, this suggested her lifelong professional development in community work and agentic action in using different approaches (resource management, mental advocacy) for the betterment of the community.

7.2.2. Women as innovators

The range of experiences and activities that participants described in relation to family farming businesses and local communities, suggested that their personal career-related experiences were used to develop positive initiatives to benefit farm performance. Although the types of initiatives varied across all five participating focus groups, almost all groups found their change initiatives very useful. Participants considered that family farming is "obviously done very different nowadays and it is very much more a business now than before" (G4P3). Although they perceived this change as challenging, they frequently acknowledged that they have changed themselves and the farming practices to make the business more financially viable in more innovative ways. The following account shows how another participant viewed/ valued her daughter-in-law's innovation and professional development in relation to her farm activities.

> *Our daughter- in-law is a vet – a postgraduate vet. She does a lot of cattle work. She manages the herd the way it needs to be managed, according to the crosses. This year she actually ear-tagged the new-born calves, as you would on a stud, while they were still almost wet. She rode them ['rode' meaning inspected via riding a motorbike] every day, which we've never done. I mean we just don't do that in a livestock herd that isn't a stud. But she spent the time and went up and made the effort to actually tag each calf. I think there were two she couldn't get at because the cows were angry. But she'd just go up on*

the quad and sit there quietly until the cow calmed down, and then she'd just walk up and tag the calf – G5P2.

It is evident that the participant's daughter-in-law's contribution to their family farm is highly appreciated by the above participant. This also describes her skills in introducing more valued products to the farm indicating a sense of higher productivity. Her daughter-in-law's identity as a postgraduate Veterinarian seems to have given her due recognition and trust among her family members. The description of the activities introduced by her suggests her innovativeness, use of tactics and strategies for improving farm performance. This further suggests her professional traits as a co-innovator who integrated existing knowledge and new knowledge into practice. The following participants also reported that new knowledge has helped their children expand their roles in the family business, as well as the family creating space for innovation introduced by their daughters, daughters-in-law and sons.

My son and his wife are doing as increasing amount of all that work now. He's 37 and he's just come into family partnership. He's got GPS tracked data for every possible parameter, and then he's just awash in it. So, he and his wife are actually doing more, and we are doing less. We'll retire off the farm within the next 12 months – G4P2.

I know with our daughter coming home, with her and her discussion with her father as to, okay, well this is the program I would like to use, and he was saying, "I've been using this other program and it hasn't been bad." She said, "But this other one offers more." You actually have to listen to the generation taking over, yeah. I'm not saying they're perfect – G4P3.

Yeah, and our daughter is very, very wedded to livestock. To cows. We have a lot of calving problems, I've noticed. So, she's used to pulling calves. It's just

what she was brought up with. Very different to what we do. So she's initiated new practices, which we are actually accepting – G4P5.

The above voices have described the new technologies and practices that their children brought into the family farm when they came into family partnerships. Most of the new practices such as GPS tracked data and programs that offer more, were technology related and directly aimed at improving farm efficiency. The older generation is stepping away by creating more space for innovative and agentic successors, and now both sons and daughters are taking over. This can be regarded as an indication of the positive attitude of the family towards innovative skills and agentic actions of children regardless of gender. This gives the opportunity for everyone to be recognised through their performance of individual expertise. This can be seen as a way of identifying and encouraging their strengths to provide a significant contribution to the farm. According to (Dirks & Ferrin, 2001), trust is significantly and positively associated with innovation. As such, the acceptance of new practices that are "very different" to what they do, is associated with trust and mutual understanding.

Through examination of the collected data, it is revealed that strategic choices have been made in order to harness the potential of the family labour force. This in turn, gives recognition to women's skills, knowledge and abilities valuing individual differences and individual preferences. This also suggests the productive power relationships within the family rather than patriarchal familism, and the inclusion of the cohesive and altruistic qualities (Fahey, 1998) of the family as a unit. Moreover, new knowledge that they bring to their farming culture in turn brings them power and space, particularly when their new practices are accepted by everyone. Foucault also suggests that power is productive, and it operates by producing knowledge and desire. This knowledge is not neutral or objective; it represents particular perspectives, conventions and motivations (Foucault, 1982). As such, participants' quotes suggest that their children's professional knowledge gave them the authority to create a new practice. In turn, the family provided appreciation and motivation for them to externalise new practices to the field. This can be further

interpreted as the establishment of a successful on-farm innovation in family farming being an interplay between the innovator's professionalism and agentic actions and the family attitude towards the innovator.

7.3. Supportive attitude of family members

According to (Joosse & Grubbström, 2017) support is considered as one of the main attributes that influences farming practices. Support may be received as free labour that is readily available or as a process of socialisation and learning about the farm and farming. This theme looks at how participants are supported, appreciated and motivated by their family members in different ways on different occasions. The majority of respondents acknowledged that they receive support and motivation from their family members in different ways.

> *I think it's about the tie of the family farm keeping it in, but then there's just so much more value in it these days. We've been… my husband's dad spends, probably, three months of the year out with us, he just loves being involved in the farm and we run it together. He always jokes that we're Mr and Mrs Boss and he asks us before he does anything. He's the nicest man on the planet. Oh, he is just – he's so supportive and he sees how we run everything together – G5P5.*

> *… My husband and I basically are running the property we've got at the moment. We recently purchased it off his parents, so he's fourth generation on that property now. His parents are still there and still involved, if you want to put it that way, but meant to be retired and so on, but can't quite that step away – G4P2.*

While the participants were encouraged by both the moral and the physical support they received from their extended family members, some respondents tended to describe the support received from their partners.

My husband helps me with all of that and I help him with everything. We always joke that he is the numbers man and I am the wordsmith – G5P6.

The above excerpts describe the involvement of the participants, their partners and extended family in farming business. Older generation seemed not only to be supportive of their children (successors) but also they enjoyed looking at how they were running the business together. Using Foucault's writings on family, there is an entanglement of contractual bonds, property bonds, and of personal and collective commitments (heterotopic relationships) which are a reminder of the power of sovereignty, rather than monotony and isotopy, as an increasingly essential component of the disciplinary system (Foucault, 2008, p. 80). This is evident in participant quotes such as *he always jokes that we're Mr and Mrs Boss* and *he asks us before he does anything*. As participants explained, parents step away from business in creating space for their children as they are doing an increasing amount of work now using new advanced technology such as GPS, so parents are retiring off the farm, thus giving due space for the next generation. These explanations clearly show the acceptance of 'morale principles' within the 'institution of family' and the respect and support given to each other by all family members (Foucault, 2008). This can be further extrapolated that everyone in the family has a role to play so that everyone may exercise power in relation to their role. Farm is seen as the 'common goal' or 'belongs to the family' because they love being involved in the farm and run it together. The members of the farm family make decisions together and help each other with everything.

They further indicated that decision making is vital in each and every step of farming as all day there are decisions to be made. Involvement of the husband and wife equally in decision making was an indication that both were recognised as 'farmers' and they worked as a unit valuing family harmony and cooperation. This is also an indication of respecting the woman partner's contribution of knowledge and ideas in managing farms. Literature also indicated that women in Western society are more likely to identify as professional farmers (Sachs et al., 2016; Sachs, Nonoyama, & Trauger, 2002) due to

changing identities associated with greater participation in decision making, especially in modern sustainable agriculture as opposed to conventional farming.

7.4. Motivation and appreciation

Motivation is defined as an internal process that activates, guides and maintains the personal and organisational goal directed behaviour of an individual (Baron, 1991). Motivated employees are more productive, but what motivates employees' changes constantly (Bowen & Radhakrishna, 1991; Derrida & Kamuf, 1991) in the context of organisational behaviour. In family farming businesses participants felt that motivation and appreciation generally built a positive environment for work.

> *I think they appreciate our work, because they tell you enough that – don't go away, don't do this, I couldn't do it without you. Could be their way of telling us, you know, well, I'll butter her up, she might stay. No, I think we are appreciated, that sort of appreciation – G1P1.*

> *By appreciating what you do, and showing that, it tends to breed loyalty. We hope [so]. It usually works – G1P5.*

Participants have positive attitudes towards the ways they are appreciated and they believe that this tends to breed loyalty. The majority of participants felt that they were appreciated for what they do for the family and the farm. In positive psychology research, it is found that gratitude and appreciation is strongly and consistently associated with happiness, which in turn leads to positive emotions, improved health and the building of strong relationships (Perch, 2011). It was further revealed that appreciation makes people motivated to work harder.

> *If it wasn't for my daughter and my Mum and a few people who are beautiful, it wouldn't happen. Because it's very easy when you're isolated to feel so overwhelmed and just not do it – G1P6*

The above excerpt describes the involvement of participants, their partners, children, and parents in providing assistance within the family and the farming business. Participants' explanations suggest that families bond through the respect and support that is given to each other from father, mother, wife, husband, son, and in-laws as bearers of names who exercise power in their names (Foucault, 2008). The farm is seen as the 'common goal' because family members love being involved in the farm and run it together. Involvement of all family members in farm work and decision making emphasises the importance that the family work as a unit while also valuing family harmony and cooperation.

Moreover, appreciation and recognition of women suggests a sense of respect for their contribution of knowledge and effort in shaping the family and the business. Foucault recognised this as 'esteem' – admiration or respect, a product of both individual and social activities – that may lead to individual agency and disciplinary practices (Foucault, 1977; Greer, 2003). It also can be seen as a form of moral conduct grounded in the awareness of our responsibility and relationship to each other. As Greer (2003 p. 9) described, feeling good is "fitting in, being accepted, feeling validated and feeling disciplined". As such, participants felt that their contributions as on-farm change agents are recognised and valued by the family members.

Also, women seem to have created a space for their professional development and their acceptance as being valuable for farm productivity and continuity. Literature also indicates that women in Western society are more likely to identify as professional farmers (Sachs et al., 2016; Sachs et al., 2002) due to changing identities associated with greater participation in decision making, especially in modern sustainable agriculture.

7.5 Summary of synthesis

The participants have shared the new skills and knowledge they have brought to their farm and to the communities. They have acknowledged that they have received due recognition and visibility from their families in several ways, such as through valuing their

knowledge, skills and attitudes; through active involvement in decision making; through broadening spaces for their innovations and changes to be put into practice; through physical and psychological support; and through motivation. With the exception of two participants in Focus Group 3, all participants agreed that the initiation of new practices and the addition of new knowledge to the farm business is vital, and it is recognised as one of their responsibilities. They further acknowledged that the process of internalisation of new knowledge as a set practice within the family business is affected by other family members' attitudes and motivations.

As discussed elsewhere, some participants had not been involved in farming until they were married to a farmer. They did not have a farming background before marriage, but they demonstrated their willingness in acquiring farming knowledge and reconstructing their identities so as to fit into farming life. Welcoming a new woman to the family and social inclusiveness is demonstrated through the participants' language. It is also evident that they have been continuously encouraged in new knowledge acquisition by their partners and other family members. This sets a reasonable example of family motivation towards their professional development which in turn is a benefit to the farm.

It is also important to note that the majority of participants reported their skills in creating space within the family farm and that they received receive due recognition from others. Although they described that they receive gifts, holiday tours, promotions and money as a token of gratitude for their exceptional contribution, they also valued verbal appreciation and thanking. The can be due to their feeling of belongingness to the family and the business. This can be explained by Oakley (2005) notion of women's work as 'home for love' not for money. Therefore, due recognition of both disciplinary power and sovereign power in relation to the stability of the family as a unit, explores women's expanding, creative, annexing and innovative (Foucault, 1978) skills that they bring to the family business.

Respondents' professional compliance with community expectations was also reported as occurring in their roles as community leaders and community advocates. Recognition of participants both within the family unit and the community can be viewed as stemming from their skills in bringing positive change to their family business and to the community. Recognition and trust, in turn, can be considered as a motivating factor for their continuous professional development. This type of motivation can be explained as having the desire and being willing to do something such as reaching for a long-term goal as a form of professional development. According to the literature, motivation does not involve personality or emotion, rather it is a kind of initiation, direction, intensity and persistence of behaviour (Geen, 1995). Based on the findings, a conclusion to this chapter is that the level and types of recognition may differ among families and communities based on some characteristics that are out of the scope of this study. However, it is evident that the majority of participants demonstrated that they were appreciated and recognised as valued contributors in shaping the family, the farm and the community.

CHAPTER 8: GENERAL DISCUSSION, CONCLUSIONS AND FUTURE WORK

8.1. Introduction

This chapter discusses the significant components of the study by moving throughout the literature, theoretical framework and findings to provide a synthesis for the entire study. The first section identifies the outcomes of this study in relation to the data and research questions. It also describes how the overarching aim of this study is achieved in relation to the findings. The next section discusses the existing model and proposes a new strategic model drawing on the new knowledge that has emerged from this study. The remaining sections present the limitations of the study that may affect its validity, followed by a discussion of the practical implications of the study and then recommendations for further research. This chapter and the thesis conclude with reflections on the study.

With the broad purpose of this research being to explore the concept of rural women as on-farm change agents through their access to digital technology, three main aims were investigated:

- To investigate how rural women, construct their identity that may lead to the enhancement of their professional, innovative and agentic skills, in the context of exploiting digital technology.
- To identify how rural women can be more effective as change agents in the agricultural industry and in their communities in organising and filtering agricultural knowledge to enhance farm performance in their farms and to their communities; and,
- To evaluate how rural women are motivated/supported by their interpersonal relationships towards their capacity to create and leverage a more resilient social

and economic environment for the farming family and their various communities.

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Therefore, the main research question is:

How is digital technology utilized within the construction of rural women's identity as change agents within their various communities?

The theoretical perspective chosen for this research needs to be understood in two different ways. At first, identity construction cannot be understood as a 'mere' effect of digital technology but as an interplay of digital technology, power relations and ethics of the self (Foucault, 1988d). Hence the identity construction should to be understood in the context of relationships associated with farm work, family, community and the self. Foucault sees 'the family' as an apparatus of sovereignty, it can also be seen as an increasingly essential component of the disciplinary system. This is of particular relevance to this study in the context of family farming. Therefore, Foucauldian informed discourse analysis (FDA) was used as the theoretical framework of this research considering power relations and discursive positioning of subjects that fitted well with the main research question of this study. The detailed explanation of theoretical framework can be found in chapter two of this thesis.

The research was guided through the following three sub questions:

- How do rural women construct professional identities as change agents?
- How do rural women use digital technology to transfer agricultural knowledge to their farming community?
- How are rural women supported by their families and the various communities for the enhancement of their professional, innovative and agentic skills?

Throughout the chapters of this research the construction of the identities of five groups of rural women farmers in South-Western Queensland, Australia, was explored and

detailed. And this construction was found to be a positive one. The women were identified as potentially being effective change agents, particularly with the use of Information and Communication Technology (ICT). And in using such technology, these women were also identified as having the capacity to leverage on-farm innovation to create a more resilient social and economic environment for the farming family.

The entire process of the problematisation and identification of the main research question are provided in Chapter 2. The theoretical perspective chosen for this research explained that identity construction of an individual is an interplay of a network of power relations and technologies of the self (Foucault, 1988d). Hence the identity construction has to be understood in the context of relationships associated with farm work, family, community and the self.

The research questions (see Chapter 1) were explored through five focus group discussions with rural women who are actively involved in family farming as well as through the study of relevant literature. A detailed description of analytical tools and procedures can be found in Chapter 4. Details of the analysis of transcripts, interpretations and findings to the above three sub questions are included in Chapters 5, 6 and 7 respectively.

8.2. Combined synthesis

Themes identified in the process of data analysis provided information about the diversity of participants. The wide range of experience reported by participants allowed the positioning of participants within three levels in relation to their main roles performed and their main focus within the business. These positionings are in fact the results of participants' own personal experiences, goals and expectations, as reported by them. Considering Robbins, Judge, and Hasham (2012) a model of family business development, the three positionings of participants are:

1. Entrepreneurs – who develop the business focusing on personal and family goals and consider the owner or successor as the leader. Participants reported activities such as problem solving, ad hoc planning of work, informal work arrangements, and other overlapping responsibilities depending on everyone's workload (such as during harvesting time and times of staff shortages).
2. Managers – who develop the business in a more organised and coordinated manner. Participants reported management-type activities such as self-learning, acquiring expertise, financial discipline, structural changes in positions and being responsible for their performance within the business.
3. Professionals – who develop the business by setting specific measurable goals which are best for the business? Participants reported activities such as self-learning, systematic learning, acquiring professional skills based on defined roles and responsibilities within the business, doing market research and on-farm research before decision making, making changes to keep growing the business with innovative ideas and agentic actions.

Based on the findings, it is evident that women's capacities to evolve from the entrepreneurial level to the professional level are determined and enhanced by both socio-cultural factors and individuals' traits, both of which lead women to accept a certain position rather than another. These factors are summarised as follows:

1. Individual potential and how it is best realised by individuals.
2. External catalysts such as digital technology, training and education, motivation and appreciation of the environment.
3. Internal catalysts such as space for innovation, recognition, and appreciation from within the family and the community.

The majority of the participants in the five focus groups confined their use of digital technology to farm work (in the areas of both information and automation), social networking, as well as for entertainment purposes. Of these participants, professional

level women reported innovative-oriented activities as well as the use of digital technologies and new approaches for farm related work, especially in improving the quality of livestock, financial planning, agricultural information sharing (both sending farm produced data and receiving external knowledge) and organising education programs (such as 'hackathons' and live farmer field days) for children and other farmers in the community. Although the relationship between community and family business is not straightforward, according to Robbins et al. (2012) family businesses maintain a strong commitment to community welfare by contributing more effectively to the development of the community, as reported by participants. Therefore, it is evident that while the farm business and family unit are highly interdependent and without defined boundaries, the community is less co-dependent with family businesses (business level, family level or individual level) and is best described as having a relationship with permeable boundaries.

Considering conceptual framework developed in chapter two and summaries of the synthesis of the three research questions, this particular study identified four major interrelated elements – farm, family, community and self – which cannot exist individually in the context of family farming in rural regions, as illustrated in Figure 8.8. Application of Foucault's theories revealed how participants construct (view) themselves as subjects (identities) and position themselves within family, farm and the community through discourses in terms of interaction between:

1. The structural setting of family, farm and the community,
2. Digital technology (automation and information),
3. Technologies of self (ethics and care of self), and
4. National agricultural policies (state power).

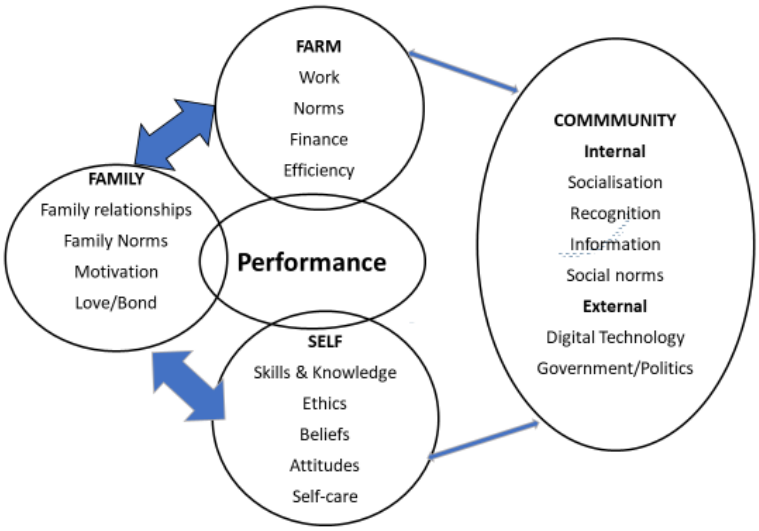

Figure 8.8. Configuration of interrelated factors constructed by participants as parts of the process of performance enhancement in the context of family farm organisation. Structural components of family, fam and the self, are shown to have blurred boundaries and overlap with the performance while the components of the community are indirectly affected on the farm performance.

As seen in Figure 8.8, it can be explained that the structural components of the farm, family, self with the community, empowers, shapes and limits their overall performance (of farm, family and the self). However, the influence of the community on overall performance is less evident compared to the strong influence between the other three components. The term 'performance' encompasses both economic the outcome of the farm and behavioural outcomes (identities) of individuals. In order to establish, improve and maintain the overall performance of farming organisations (FOs), it is necessary to discover functional gaps within the system through an effective feedback flow between components (Langdon, 1997, 2010).

Based on the findings, this study suggests that the family farming business can be regarded as a farm organisation where the interface between the human behaviour (rural

women's agentic, professional and innovative behaviour) and the structural setting (of the family, farm and community) with a constant information flow. Thus, an effective integration of all the above-mentioned components of farm organisation (FO) and application of information (feedback, motivation etc.,) received from family members, neighbours, farm workers, external organisations and the self, helps to create more productive, safe and effective FOs. In order to demonstrate how the structure of the FO can influence performance, a model is proposed, based on the *Organisational Behaviour Model* (Robbins, Judge, Millett, & Boyle, 2013). This system-based model of performance helps link both how performance is defined at each level (individual level, FO level and community level) and how it is achieved.

8.3. Model introduction

Organisational performance is understood as an achievement in relation to a set goal. Although the performance of farm organisations is generally increased or remains steady when changes are minimal, resistance can be built up when a change is introduced or encountered. Therefore, organisational performance has a non-linear relationship with time and how best the change is realised by the organisation, as illustrated in the diagram on the left of Figure 8.9. In this section of Figure 8.9, the curving lines attached to FO_1 and FO_n (FO_n simply demonstrating the n^{th} FO in the full set of FOs that may exist) represent fluctuating performance of the organisations that can be thought of as moving through time – potentially with FO_1 through FO_n at different points in time as the FO existed – with different levels of performance at any point in time. It is important to note that performance, as a metric, could potentially even be a different metric depending on the inherent values of the FO; i.e. "profit" could be one FO performance metric, while another could consider "family/business satisfaction" as the key performance indicator. While this is not meant to be a quantitative means to compare farms, it provides a useful method of evaluating farm performance through time in response to subject creation and subject position, as well as the factors that shape this.

Furthermore, a family farm can be generally understood as a family owned farm organisation where family is responsible for the management decisions. Although family farm organisations also encounter or introduce change, their performance is managed and maintained in an equilibrium between the family unit, farm business and the community, as illustrated in the second part of the diagram in Figure 8.9.

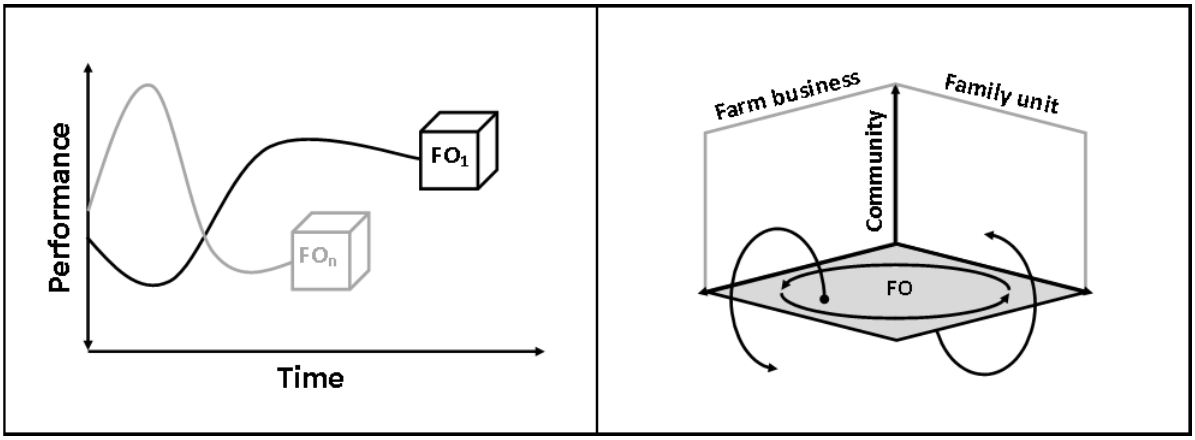

Figure 8.9. Graphical presentation of the effect of change on ongoing performance of the farm organisation (left) and the constitution of the FO, demonstrated as a 2-dimensional function of the farm business and family unit, with consideration of community input providing the third, but less influential 3rd dimension (right,). FO, farm organisation; FO_1 refers to the consideration of a particular farming organisation, while FO_n suggests that all FO could be plotted at any instance in time. Arrows (right) represent system loops that feedwithin (on FO plane), feedback (top to bottom of FO plane) and feedforward (bottom to top of FO plane).

In this case the influence of the dimensions of the cube are determined by the FO values and the norms at individual, farming organisation and community levels; it should note that these can of course be different if comparing FOs, which could be thought of as changing the size and shape of the cubes to be rectangular prisms. Again, the point is not to quantify direct comparison, but to provide a means to depict how norms can shape the FO and its relation to any particular community.

The farm organisation (FO) is therefore a system which consists of a set of components that interact with each other in equilibrium to accomplish a common goal(s). In a family farming business, the foremost goals are business profitability, positive image and stability

of the family unit. The main components of the farming organisation include, inputs, transformation, outputs, boundaries, and the environment and feed processes.

Inputs include, but are not limited to, staff (both family and non-family members), knowledge and skills of staff, raw materials (fertilisers, chemicals, machinery, advisory services etc) and rules and policy regulations that must be followed by the staff.

Transformation is the process that converts the FO inputs into outputs through physical, cognitive or behavioural activities (field work, office work, researching, managing, decision making, and planning etc).

Outputs are the performance indicators or the changes in profit, quality of farm produce, personal identities etc.

The *boundaries* of the farm include spatial (farm office, field, stores etc), temporal and process boundaries (land preparation, planting, harvesting, marketing etc). The boundaries of the FO cannot be clearly defined because the family, the farm and the community overlap and are interrelated.

The *environment* can be defined as anything external to the farm and depends on the boundaries defined at a particular point in time.

The *feed process* is the flow of strategic information about the FO performance. The feed process can refer to the process of performance improvement in a dynamic environment such as an FO. According to Bogart (1980) the feed processes are enabled and directed by intelligent mechanisms, and there are three types of feed processes, which are:

1. Feedback – is the information about the FO output or performance which is relayed back to the FO. This can be explained by interpersonal feedback in relation to identity construction by participants in this study. Enacting particular identities (see Chapter 5) in multiple times and on regular basis by participants suggests that more salient characteristics are attached to theses identities (Table 5.13). These

identities are maintained by a feedback process generated through the community and behavioural and identity standards are adjusted when needed (Stets & Burke, 2003). Different forms that feedback can take include: motivation, appreciation, and recognition or evaluation of participants' performance. Feedback has the potential to directing participants towards positive behavioural changes, such as being innovative and agentic, especially when the feedback is facilitated by digital technology. Therefore, it is understood that, in order to verify these positive behavioural changes as identity standards of participants, constructive feedback is necessary.

2. Feedforward – is the information about input (performance) or the nature of the environment which is fed forward into a system. It can also be considered as a kind of cognitive mapping of forecasted behaviour of the FO. For instance, when participants predict that there are not enough staff to perform the extra work during the harvesting season, they arrange Skype meetings to recruit new staff. This always begins with an action or process in the environment and it helps FOs to avoid mistakes and adverse effects before they occur, as a way of forecasting. Feedforward can be information, knowledge about something farmers use to make a decision, and a resource used in deciding whether to accept a change or reject it.
3. Feed within – is the Information about the flow of information or resources between the sections of the system (throughput). It is the internal intelligence or information about the internal dynamics of the FO produced in interaction with the outer environment. An example set by this study was the preparation of the annual budget for each section of the farm business. Each section receives this information and prepares an annual expenditure plan according to budget provisions. Based on this information, the FO assesses the internal states and their interaction with the environment. This mechanism enables the FO to be aware of internal conditions and coordinate internal action in potentially adaptive ways.

Following from the above information, the organisational behaviour of the family farm organisation can be constructed as illustrated in Figure 8.10. Although its conceptual framing is somewhat different from Robbins et al. (2013) organisation behaviour (OB) model, many of the variables within Figure 8.10 are consistent with his OB model.

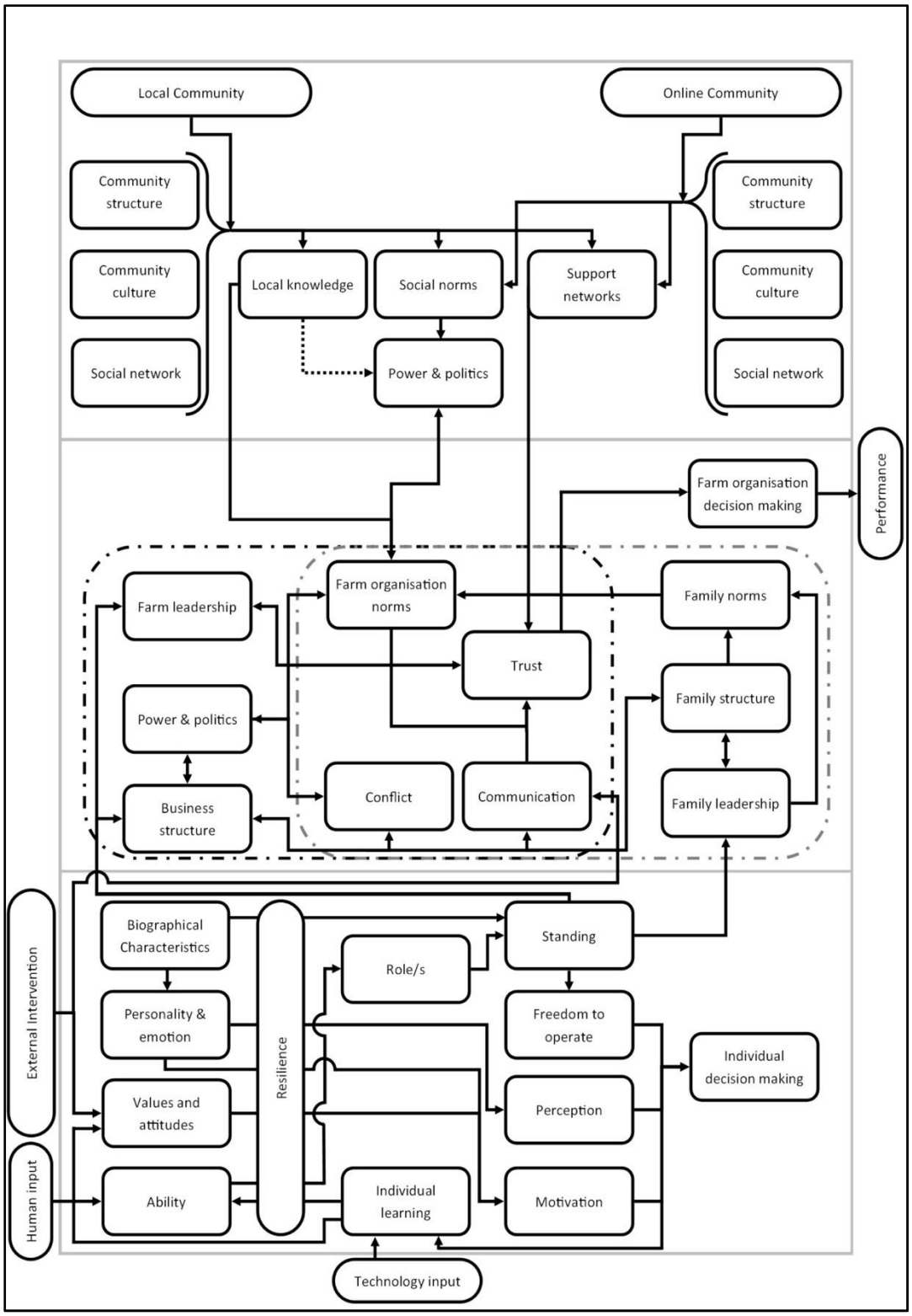

Figure 8.10: System based structure of the farming organisation, as a function of the individual, family unit, farm business, and community, in relation to external intervention and its effect on performance outcomes

In Figure 8.10, the overall performance of the FO is dependent on the dependent variables of the individual (self), farm, family and the community. The variables that are perceived as unique to farming organisations, in reference to (Robbins et al., 2013) organisation behaviour model, have been added and are defined below in greater detail.

8.4. Introduction to terms (variables)

1. External interventions include outside institutions or forces such as suppliers, customers, competitors and government regulatory agencies that may directly or indirectly affect performance because of their influence (Robbins et al., 2013, p. 412).
2. Performance is the actual output of an organisation as measured against objectives and goals. Productivity, positive image and satisfaction are some of the indicators of the FO performance (Robbins et al., 2013, p. 19).
3. Human input is the people who enter FO with characteristics that influence their behaviour at work (Robbins et al., 2013, p. 22)
4. Technology input is the technology that an individual acquire from outside in order to influence their skill set. This could be all, or a specific component, of a technology. For example, when an individual need to learn to use a spreadsheet to easily collate the information and automate detection of trends etc., she may simply learn the input aspects of Excel and learn to save the data, then transferring it to a third party for process, or could learn the full processing approaches.
5. Role is a set of expected behaviour patterns attributed to someone occupying a given position in a social unit (Robbins et al., 2013. p, 486).
6. Standing is an individual's position or image in an area of activity within the FO. A positive standing in an area of expertise may be highly influential.
7. Freedom to operate is the democratic decision and/or authority to use an individual's own expertise, knowledge and skills to introduce a change to research and innovate within the FO.

8. Biographical characteristics are personal characteristics (such as age, gender, race and length of service) that are objective (Robbins et al., 2013, p. 481).
9. Ability is an individual's capacity to perform the various tasks in a job (Robbins et al., 2013, p. 481).
10. Values are basic convictions that a specific mode of conduct or end-state of existence is personally or socially preferable to an opposite or converse mode of conduct or end-state of existence (Robbins et al., 2013, p. 487).
11. Attitudes, evaluative statements or judgements concerning objects, people or events (Robbins et al., 2013, p. 481).
12. Perception refers to a process by which individuals organise and interpret their sensory impressions in order to give meaning to their environment (Robbins et al., 2013, p. 485).
13. Emotions refers to intense feelings that are directed at someone or something (Robbins et al., 2013, p. 483).
14. Personality refers to the sum total of ways an individual interacts with others (Robbins et al., 2013, p. 485).
15. Motivation is the processes that accounts for an individual's intensity, direction and persistence of effort towards attaining a goal (Robbins et al., 2013, p. 485).
16. Communication is the transference and understanding of meaning (Robbins et al., 2013, p. 482).
17. Conflict is a process that begins when one party perceives that another party has negatively affected, or is about to negatively affect, something that the first party cares about (Robbins et al., 2013, p. 482).
18. Trust is a positive expectation that another will not act opportunistically (Robbins et al., 2013, p. 487).
19. Family leadership is the process by which family members relate to and interact with each other. As the family is considered as the central disciplinary institution of humans, effective leadership within the family is essential in producing strong,

resilient, ethically behaved and trustful human input to the FO (Robbins et al., 2012).

20. Family structure. A typical family is structured through marriage and birth by a type of bond involving a personal and collective commitment and dependence which is created between family members. Unlike in other organisations, the positioning of members within a family is permanent and protected by family norms and traditions. The structure of most Australian farming families is an integration of nuclear and extended families due to the continuity of occupation from father/mother to son/daughter (Bott & Spillius, 2014).
21. Family norms are a set of acceptable standards of behaviour within a family that are shared by the family members (Bott & Spillius, 2014, p. 485).
22. Farm leadership refers to the process of developing a vision for the future and leading farm staff in that direction. The skills of a good farm leader include, but are not limited to, skills in business, finance and communication. And a farm leader is willingness to improve their skills.
23. Farm organisation norms are a set of unwritten rules used to describe human behaviour in the FO. Some of the norms such as gendered division of labour and gendered bias in selection of the successor may affect farm performance because they disable the use of the expertise and skills of disadvantaged family members (Stamper, Liu, Hafkamp, & Ades, 2000).
24. Business structure is a legally recognised organisational framework such as a sole-proprietorship, partnership, and corporation, used for conducting commercial activities (Business Dictionary, 2019).
25. Online community is a group of people who use a particular internet service or belong to a particular group on the internet (Business Dictionary, 2018).
26. Social norms are a set of unwritten rules of behaviour that are considered acceptable in a social group or in society (Cambridge Dictionary, 2018).

27. Social network is a website or computer program that allows people to communicate and share information on the internet using a computer or mobile phone (Cambridge Dictionary, 2018).
28. Community culture is a system of shared meaning held by community members that distinguishes the community from other communities (Cambridge Dictionary, 2018).
29. Community structure refers to the relationships among people, missions and goals, management, activities and outcomes involved in a community (Liu & D'Andrea, 2011).
30. Support networks are traditional networks of local communities and government agricultural programs contributing to agricultural knowledge transfer (getting advice and sharing experience). This includes a range of people such as farmer leaders, agricultural professionals and change agents within the community (Queensland QueenslandGovernment, 2018).
31. Local knowledge is the experienced-based knowledge that people in a community have developed over time and continue to develop. Local knowledge is generated, stored, applied and transmitted to others (Forsyth, 2004; Warburton & Martin, 1999).
32. Local community is a group of individuals that interact within their immediate surroundings. Their interactions can include the sharing of resources and information, and providing assistance (Business Dictionary, 2019).

The above system-based conceptual framework is targeted at both social aspects (knowledge and skills of individuals) and technical aspects (technology, tools and procedures) of working together effectively. In order to maximise performance, it is necessary to identify and apply information about input (individual behaviour, abilities, and limitations), transformation (technology, techniques, and procedures), output (performance, identities) and the external environment (consumers, policies and other institutional effects). Such information flow within the system can be facilitated by

designing an effective feed process within the FO system and developing solutions for achieving a strong standing at an individual level. At this juncture, it is important to note that while pathways of influence have been included, the full extent of feedback, feedforward and feedwithin linkages could not possibly be depicted, especially as many of these will be FO dependent. Instead, the linkages considered to be common amongst all FOs, the common organisational behaviours and flows, have been constructed to consider how the FO is influenced from an external intervention to a decision that may affect performance. This provides a means of rationalising the potential impact of an external intervention, allowing a certain level of theoretical prediction to be made, given the internal dynamics of the FO and the external influence of the community; in essence, the model provides a network of influence.

8.5 Achieving standing at the individual level

Achieving standing or positions in an organisation constitutes a complex process where power and identity overlap. Therefore, achieving standing within the farm business suggests a positive image and strong networks of power. Structural components such as *biographical characteristics, personality, emotion, values, attitudes* and *ability* of an individual, limit or enable in one's achievement of standing. According to Austin (1975), a person who wishes to achieve a position of standing (meaning 'good' standing) is essentially performative. As such, this study has revealed participants' willingness in enhancing certain structural components such as *technology input* and *individual learning* that enable them to achieve a better standing more easily. In addition to this, women acknowledged volunteering in professional organisations in community programs as a way of networking with the environment. This can also be considered as an approach in achieving standing within the community. Within Figure 8.10 it is important to note that the detail of communities has been avoided, as it was well beyond the scope of the thesis, and is postulated to be highly specific to regions. This presents an interesting concept for further study, in considering the dynamics of the community and how they shape, and are shaped, byt the FO as described in this work.

8.6. Technology input, individual learning and ability feedback

With reference to the components of Figure 8.10, this study revealed women's interest in the use of digital technology, both for information and automation, in order to improve the efficiency of farm work as well as their own personal skills. However, it is noted that these are not mutually exclusive. Asynchronous networked learning (Kelly et al., 2017) would provide both a means to learn in/ at one's own time/ pace, while still being able to benefit from group discussion and a Constructivist paradigm (Allen, 2005). This highlights an important point for extension within agriculture that may provide significant advances in demonstrating/ enhancing the value of online learning.

Although some women were interested in formal qualifications such as a Certificate IV in Business Administration, the majority of women were interested in lifelong learning within the workplace. Although lifelong learning within the workplace does not give them formal qualifications, in the workplace they are able to acquire new skills and refresh existing skills. They also stated that learning is important in expanding their knowledge and skills in areas that are critical to farm business. They conducted self-evaluation, identified the areas they needed to do further learning in, such as business administration and financial management. This is indicative of their self-motivated individual learning behaviour at the workplace. In terms of Figure 8.10, this describes a displayed tendency to look outside the FO in order to gain the skills, provided there is clear indication that they would be useful on-farm, or that on-farm work has directly identified the requirement for these skill sets. This suggest that rural women are making time for professional development and innovation, valuing this, although whether or not this is valued as more than an extracurricular activity (Bennett & Rose, 2014) at the FO level is not as clear.

The women also reported their growing interest in rapidly changing technologies and researching unpredictable market information. This exemplifies their skills in receiving feedback (living or non-living) from within their environment, making the most suitable decisions, and taking action to operate systems at their optimum levels. This reflects the women's abilities, competencies and skills in critical decision making in managing FO change. Effective decision making and implementation depend on interpersonal trust and that trust in turn influences organisational change and learning. Farm operation FO standings are solidified through trust, which is a primary attribute associated with decision making.

It is important to note that, trust as being essential for understanding interpersonal behaviour, managerial effectiveness, marketing, and social or political stability. Numerous economists claim that trust is a public good which is necessary in exchanging goods. If trust is destroyed, the performance of the organisation is adversely affected (Bok, 1978; Hosmer, 1995; Weber, 2013). Some of the themes identified in this study are aligned with the three characteristics of trustworthiness which are integrity, benevolence and ability. The consequences of trust are the positive employment outcomes listed in Table 8.18.

Table 8.18. *The nature of trust within a Farm Organisation. Adapted from (Robbins et al., 2013)*

Characteristics of trustworthiness	Themes emerged from data	Outcome
Integrity	Honesty and truthfulness	Risk-taking
Benevolence	Caring and supportive behaviour	Information sharing Group effectiveness
Ability	Technical and interpersonal knowledge and skills	Productivity

The data suggests that participants are able to develop trust not only within the family and business but also within the community through information sharing. Such information sharing requires the women to be embedded into the social fabric, as a social being representing the family, or as a professional mediator representing the FO, or as both. Not surprisingly, but of great importance, decision making by the FO is brokered by trust, which suggests that social capital is effectively the currency of the Australian

agricultural industry, irrespective of whether or not this directly recognised by that industry.

8.7. The relationship between family, farm organisation, and social norms

The territorial and social aspects of family farm organisation are strongly anchored in particular communities (Toulmin & Gueye, 2003) through a network of relationships sharing the social values and norms of that particular community. On the other hand, in the rural remote communities where this study was conducted, most of the socio-cultural events in communities such as farmers' markets, fresh food stalls and cultural events are organised by members of family farms. Therefore, it can be seen that the community and the FO are mutually dependent to a certain extent.

Women who entered into family farming through marriage reported a reconstruction of their identities in order to fit into the social norms and practices prevalent in the family, farm and the community. It is noted that the social norms relating to local knowledge transfer are shared between the family and farm organisation. Although many of the social norms and local knowledge seem to be recognised and valued as a factor of economic success of the FOs, the current extension model in Australia is highly unlikely to include this information in the circulating knowledge system. However, if farmers do not receive relevant knowledge of scientific and technological innovations, the intended practice change may not happen (Bennett, 2015). Therefore, it is important to build a productive partnership between farmers and technology suppliers via supporting networks (such as networked learning or traditional local community support networks) initiated by local community leaders who possess local knowledge and have access to improved technologies. These networks also facilitate the feed process through changing unknown (not known by many) to known knowledge (Bennett, 2015) leading to improved practice change and improved overall performance. As such, the feed process is a potentially helpful process because it:

1. Enables individuals and FOs to develop and maintain a positive image;

2. Identifies pitfalls and regulates and controls the activities within the FO; and

3. Forecasts the adverse effects of external interventions and increases proactivity.

As discussed in the above sections, women are capable of deciding on and changing most of the variables seen in the FO behavioural model. Based on the evidence of this study, it can be suggested that *individual learning* and *trust*, together with an effective feed mechanism, can be extended to the concept of *networked learning* as conceptualised by Kelly et al. (2017) and traditional local community support networks. It is important to conceptualise the feed process and the components of the loop between the external environment, community and support networks (traditional or digital) based on the evidence supplied by this present study. The following diagram (Figure 8.11) illustrates the proposed feed process between the community and the environment and how it is mediated by the networked learning platforms or community support networks.

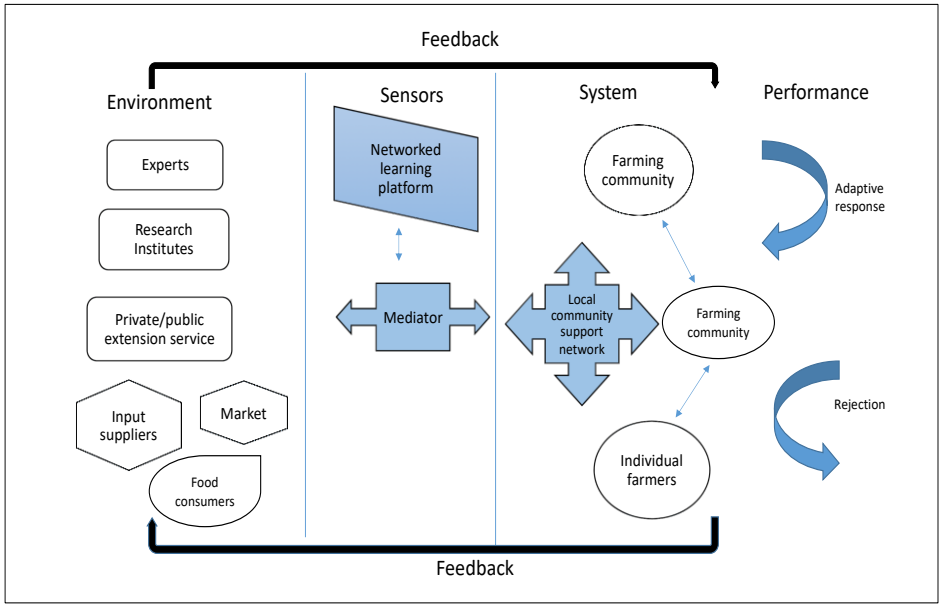

Figure 8.11: Conceptualised feedback mechanism between the external factors and the community

Feedback is the most common tool that is used for performance evaluation in learning and in work processes. A combination of feedwithin, feedback and feedforward is shown to be a very effective in supporting the work process (Locke & Latham, 2006) in an organisation. Unlike one-way feedback, a feedback loop between a system (or community) and the environment (external factors) as shown in Figure 8.11, enables farmers to receive information and knowledge about the scientific outcomes, consumer behaviour, low-cost farm inputs etc., and, at the same time, information about the system (community) can be forwarded to the environment. Some information can be used within the system in order to forecast and readjust decisions for an improved performance, while other information may be rejected. Rejection of information can be both incorrectly and correctly rejected; within incorrect rejection usually being motivated by lack of time to synthesise the information that is either apparently abstract, or not easily understood (Bennett, 2015) explains that abstract information can hold very important value in terms of innovation, but requires significantly more time, and a dedicated pursuit of innovation. It is postulated that rural women will be the change agents responsible for realising a dedicated approach to on-farm innovation as work, rather than an extracurricular activity.

Feedback loops are proposed to be effectively facilitated and managed by designing a sensing mechanism, such as a networked learning platform, or a local community support network, in between the environment and the system. However, in order to make this design effective, productive and useful for everyone, it is necessary to identify mediators and facilitators (sensors) within each community and they should be agentic, innovative and knowledgeable. The proposed system-based model in Figure 8.10 identifies such individuals within the family, FO and the community, and this is discussed in detail in the next section.

8.8. Representation of agency within the model

Improving individuals' agency is crucial not only for their own well-being, but it also it influences development outcomes such as agricultural productivity as documented in the

literature (Donald, Koolwal, Annan, Falb, & Goldstein, 2017; Quisumbing & Smith, 2012). According to the literature, an individual's agency is often termed interchangeably with autonomy or empowerment and broadly defined as the ability to define one's goals and the freedom to reach for them (Donald et al., 2017; Kabeer, 1999). While agency is commonly operationalised as decision making, it goes further and takes the forms of negotiation, manipulation, and resistance through economic, political and social actions (Kabeer, 1999) varying across individuals, households and communities. As such, this study documented several themes that emerged from data, identifying participants' agency in terms of *negotiation, creating space, authority and standing in the FO and the community, making financial decisions and decisions related to the setup of farm structures, individual learning of their choice, research and innovation in areas of interest, self-control,* and *taking care of the self*. The emergent themes were condensed and included as variables within the model. These themes are *freedom to operate, individual learning, individual decision making, standing* and *leadership positions* (at family, farm and community levels). Therefore, this model adequately serves the purpose of identifying individuals' agency across spatial and temporal dynamics.

8.9. Women as change agents

A change agent plays a significant role in initiating, managing or implementing change in an organisation (Caldwell, 2003). Although this study empirically revealed a list of participants' agentic behavioural traits (see Table 5.2), Caldwell (2001)'s fourfold classification of change agency model for organisational development (see Figure 8.2) provides a theoretical base for identifying how their change agency can be better used in different structural settings such as the family, farm or community. Therefore, Table 8.2 classifies the participants' agentic behavioural traits emerged against four skills, namely: 1) leadership; 2) management; 3) consultancy; and 4) team.

Table.8.2. *Classification of participants' identities emerged from initial synthesis of data*

Leadership	Management	Consultancy	Team
Innovator	CEO	Counsellor	Business network
On-farm researcher	Managing Director	Hackathon facilitator	Email groups
Breeder	Coordinator	Field day organiser	Organiser
	Office manager	Ag-Tech advisor for Neighbours	

According to table 8.2, the identities of the consultancy model suggest participants' possible potential change agency in proposed networked learning and extension models, or traditional support networks, as mediators and facilitators. It is also important to note that participants' agentic behaviour shown within the family and the farm may not be the same within the community because the interdependence of individual goals and structural change shape and reflect their social positioning. Then, it is important to evaluate the practical implication of the proposed concept in the real setting and evaluate the performance for future development.

8.10. Practical implications for ongoing agricultural innovation and professional development

One of the important implications of this research is the potential role of rural women as the human element in ongoing and future digital agricultural projects designed to improve engagement between the product and the user. As Kelly et al. (2017) have identified, there are three major issues that have to be addressed in order to make agricultural extension more effective; 1) One-way (top-down) information dissemination; 2) lack of locally relevant content; and 3) lack of quality human intermediation. This research has shifted a few stones in making a pathway to address the above issues through identifying rural women (who use digital technology) as potential 'quality human intermediation'. It also encourages and shows opportunities for government and non-government agricultural related institutions to include rural women as a human resource in their future digital projects and programs, such as *Big Data* and *The Internet of Things*. This can

be aligned with the participants' construction of national identity – we pride ourselves in Australia that we produce clean and green food, as demonstrated in Chapter Five in relation to the identity of Australian agriculture in terms of quality and quantity. As such the farming rural farming women construct national identities and position themselves as drivers of national economy and productivity in trying to align their vision with the national agricultural goals.

This study also revealed that locally relevant content (local knowledge) is available but people do not recognise it when it is within themselves (tacit knowledge). Participants demonstrated their skills in recognising locally available knowledge so that they could play a role in networking knowledge systems as explained in Chapter Six. It was also noted that one-way information dissemination has been problematised by the participants of this study. This issue is well interpreted in Chapter Six with reference to *information panopticon* (Foucault, 1977; Zuboff, 1985) and studies on *enabling digital technology use in agriculture in Australia* (Trindall et al., 2018). Therefore, this study recommends developing a data and information management policy that promises producer (farmer) involvement, enhanced data and information utilisation, and privacy and protection.

This research has revealed some of the issues identified by participants such as telecommunications connectivity shortfalls, the high cost of service, distrust of politicians and inadequacy of supportive services. These have all been identified as having a direct negative impact on women's motivation in being involved in agricultural information sharing in a professional way. Trust is defined as a confident positive expectation regarding another's conduct (Lewicki, McAllister, & Bies, 1998). Trust is positioned as a variable that has direct effect on the performance of information sharing where multiple relationships are involved. Moreover, without a reliable connectivity, online information sharing is obviously impossible. Therefore, it is suggested that the inclusion of the provision of internet connectivity to rural primary industry is one of the priority areas in governmental and non-governmental development projects. Moreover, government

intervention is necessary to create a competitive market for internet service providers to use to break the monopolies in the present rural context.

As this study identified, rural women have been playing certain roles defined by the concept of being a change agent. But this is not sufficient to meet the future requirement of support needed in implementing large scale digital agricultural projects in Australian farms such as IOT and Big Data. This research emphasises that there is a clear need to convince farm women that they are capable of supporting change at the grassroots farm level through active participation in information sharing. Furthermore, it suggests the inclusion of the professional development of rural women in every digital agricultural project (private and government) could have significant merit in its success. Additionally, they would be provided with a role description as change agents, as well as the empowerment to realise themselves within this role.

It is suggested that an officially formulated role description based on agricultural policies provides a legitimate base for rural women's acts of knowledge transfer. This role description could also suggest agricultural knowledge sharing as a career option for rural women in the future. Legitimising rural women's knowledge transfer could be added to the recommendations made by the authorities such as The Commonwealth Senate Standing Committee on Education, Employment and Workplace Relations Inquiry into *Higher education and skills training to support agriculture and agribusiness in Australia in 2012* (NFF, 2014). Two of the existing recommendations relevant to this study are improving knowledge transfer in agricultural research and consideration of declined extension services. The findings of this study coupled with a detailed quantitative analysis done by ABARES may provide a base for a regulatory policy setting relating to a selected human resource pool constituted of rural women, agricultural technology transfer and declined extension services.

In contrast to the economic and social benefits that digital technology brings to rural women, family and farming, this study has identified (detailed in Chapter 5) the negative

effects that technology brings to the community. Drawing on participants' constructions, technology is a vexed question. As Foucault stated "not everything is bad, but everything is dangerous, if everything is dangerous, we always have something to do" (Foucault, 1983b). As this study revealed (Chapter 5) respondents acknowledged the risk of disconnecting farmers from the field due to the automation of farm work and the remoteness of management. Thus, according to one respondent, "Technology might be more attractive, but, by the same token, you will probably need them less. We don't want to sit in an office. That's part of the reason we have farms." On the other hand, information technology is capable of displacing human effort and other human skills in decision making processes through the potential control of intelligent technology (Zuboff, 1985). This implies that there is a need for an integrated socio-technical systems approach to identifying underlying dynamics currently hidden below the surface (Trist & Bamforth, 2000). A socio-analysis (Long, 2013) coupled with psychoanalysis will be needed when highly interconnected applications such as the *Internet of Things* come to farming life.

Based on the data, this thesis has demonstrated the influence of individual differences and preferences on the construction of participants' identities. Therefore, these factors play an important role in selecting participants to become engaged with such projects. Usually a 'community' implies all the people living in a specific area, but when designing and implementing programs or projects based on digital technology, this thesis suggests including women as members of 'communities of interest' where members of this community may not live near each other, but they work towards a common interest.

8.11. Concluding remarks

This section identifies some of the findings that are important to consider, but not directly related to, the aim of this present study. The findings to be briefly discussed are as follows:

1. Ethical citizenship behaviour
2. Government policies

3. Digital technology – the good, the bad, the ugly and the beautiful

8.11.1. Ethical citizenship behaviour

Although participants tended to be affiliated with positions which related to their personal experience, some participants showed ethical citizenship behaviour. Thereby, participants position themselves as Australians who belong to Australia and it is this belonging which gives them pride and national identity as *clean and green Australian farmers*. This behaviour is very similar to organisational citizen behaviour which is not part of employee's job requirements, but it effectively promotes the effective functioning of the organisation (Robbins et al., 2013). Therefore, it can be regarded as a catalyst for FO's positive standing.

8.11.2. Government policies

Participants have criticised current government policies for not focusing more on the technology needs of the rural agriculture sector – *the bush*. They are aware that the innovations are available, but they do not receive them due to lack of policy support. This issue is supported by the Submission Report prepared by Jehne (2016), the director of Healthy Soils Australia. He also highlighted significant barriers to successful extension and commercialisation of agricultural innovations where policy support is needed. He further asserted that despite such low-cost innovations being confirmed by leading farmers, wider dissemination and adoption is limited by *gatekeepers* such as current industry suppliers and agencies. In order to overcome such barriers and ensure dissemination of information to farm fields to enable innovation, government intervention and policy action are still needed (Jehne, 2016).

8.11.3. Digital technology – the good, the bad, the ugly and the beautiful

Although women reported agentic and professional behaviour within the family, farm and the community, the findings show that there are some constraints and barriers such as

unreliable politicians and poor infrastructure. This in turn may lead them to perceive future projects as less productive despite their capacity and willingness to work as agents for change both in their own farm and in the community. It is also evident that participants' agentic characteristics have been developed over time with their skills and knowledge gained through a diversity of experience in the family, farm and public spheres and through their continuous learning of new things. This process is facilitated and accelerated through the use of digital technology and maintained over time in a professional and ethical manner.

Rural women who come from families having patriarchal traditions successfully carry out leading farm roles and community work. It is also seen that participants accept a certain level of dependency through family relationships. This can be reflected as a way of avoiding the risk of being independent and avoiding the risk of negative consequences of self-decisions. Technology advancement, detraditionalization and modernisation offer the rural farm women certain kinds of freedom to choose and discover their own solutions. This freedom is an advantage on one hand but on the other hand it involves a risk as there is no culture, traditions or someone to guide them except their own ethics and morality (technologies of the self). This is where ethics and care of the self, play an important role, especially in communicating (sharing and acquiring knowledge) through social media and the internet (Giddens, 1991).

Freedom is always associated with risk where an individual has to be fully responsible for their actions (Giddens, 1991). This is one of technology's cultural implications. Technological advancement, detraditionalisation and modernisation created more space and agency for women to make choices freely and thus have more freedom. However, at the same time this makes them more responsible for their decisions and actions. Moreover, French sociologist Raymond Aron has denounced the risk of technical civilisation despite the vast amount of benefits that people receive (Behrent, 2013).

Foucault argued that in the practices of technologies of power and knowledge and technologies of self, the human being is the object (as he is subject to norms, regulating movements and surveillance). While human beings make themselves objects of their own practices, technologies of power and the self, overlap and support one another (Foucault, cited in Behrent, 2013). Therefore, it can be suggested that although digital technology has some negative impact on human lives, these can be overcome by the technologies of self by keeping balance, making right decisions, and caring for self and others for the betterment of the world.

8.12. Original contribution to knowledge

The thesis examined the construction of positive identities by rural women as change agents, the role of rural women as change agents, and the potential for digital technology to enable women to drive change in the context of family farming in rural Australia. The findings of the research will contribute to identification of the formation of self and actualisation of roles and identities by women involved in family farming businesses - both in Australia and internationally - where 90 percent of the farms are owned and operated by families. The exploration of the process of rural women's identity construction as change agents through Foucault's writings on power and technologies of the self, identified a range of factors which contributed to the process of identity construction by rural women in the context of family farming business in rural Australia. The conceptual framework showing configuration of interrelated technologies as part of the process of identity construction has been refined for application.

The study has made a methodological contribution by providing an effective methodological framework for coding, based on Foucault's different theorising practices; mainly power and technologies of the self. The basic concept of identity construction as an interplay of the structural setting of the environment and agency of individuals, enables us to view the process as an integration of multiple contributions over spatial and temporal dynamics. The issues related to infrastructure, policy setting, the role of women within the family, farm business as well as within the community, all seem to be in a

complex power relationship with each other. Thus, it is expected that, this critical insight and the effective methodological framework conceptualised through this research will serve as a useful tool for future researchers who are interested in using a holistic approach to examine identity construction in any field.

8.13 Directions for future research

This research identifies the use of digital technology as a catalyst in transferring agricultural knowledge within farming communities. Based on this, it is suggested that rural women can be better mediators in digitally supported networked extension. However, there are some issues to be addressed in leveraging this to a professional level. While some issues such as skills and attitudes may be addressed at a grassroots level, some issues such as government policies regarding infrastructure development, the inclusion of the primary industry sector as a priority' and legitimisation of the knowledge base, will require government intervention. Therefore, more research is needed in the area of government policies and legislation.

This research also suggests future researchers may want to consider individual differences instead of gender differences as a way of understanding women's (or men's) experiences with digital technology and the socio-cultural context of technology use. It has been shown in this research that gender roles are determined by individuals' physical, biological and emotional capacities. When women are labelled as weak and feminine and prone to making emotional decisions, they are considered more suitable for looking after children and keeping the family happy and comfortable. Today, women's skills and their numerous roles they take on are not considered as a product of femininity or of being women. These skills are now considered as stemming simply from their personal failures, successes and experiences. Therefore, it is important to look at women's capacities and actions, not as an aberration to the gender-based approach, but as a method that evaluates individual preferences and individual differences of women who live in a 21st century digital world.

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