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NOT SO 'INVISIBLE': A QUALITATIVE CASE STUDY EXPLORING GENDER RELATIONS AND FARM MANAGEMENT SOFTWARE

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ABSTRACT

This paper reports on a qualitative case study which explored farm management practices by women cotton growers who used computer-based information systems, most particularly the agricultural farm management software, *CottonLOGIC*, within the Australian cotton industry. The study found that, although gender differences and inequalities persist, the agency of women cotton growers ensures not only a sustainable future for themselves and their families, but also for the cotton industry as a whole. The study was informed by Connell's theoretical framework of gender relations (2002). The findings suggested that, women's active participation in family farm partnerships and their acquisition of technological skills through the use of farm management software like *CottonLOGIC*, mean that all cotton growers benefit through the feminizing of specific farm management practices in family farm enterprises. This, therefore, has significant implications for developing the cotton industry into a truly sustainable entity.

INTRODUCTION

The study aims to understand how the use of farm management software, namely the agricultural decision support system (DSS), *CottonLOGIC*, affects the decision making roles of women as farm partners within the Australian cotton industry. In simple terms, a DSS may be identified as a computer-based information system that supports decision makers. The extensive use of computers has become essential for farm decision makers, not only for communication, and information acquisition and transfer, but also for farm management (Hearn & Bange, 2002). Although recent research indicates that farm women have become the primary users of computers, they are hesitant to use computers for farm management and hence, their decision-making roles on family farms are unclear (Bryant, 1999; James, 1990; Stewart, 2004). This paper aims to provide clarification with regards to the influence of the gendering of farm management software usage and the potential impact this may have on farm partnerships within the regional cotton industry.

This study is theoretically informed by Connell's theory of gender relations (2002) which provides a framework for analysing the gendering of cotton farm decision-making roles. Hence, the key question we seek to answer here is: 'How does farm management software impact on gendered relationship between farm partners on family cotton farms?'

Women and Farm Management

Australian rural social researchers are concerned about the limited qualitative data available on the roles of Australian farm women. Alston (1995; 2000; 2003) found that the participation of women in agriculture is 'invisible' with a persistent and regrettable absence of women from positions of authority and power. Board (1997) recognized that harnessing the expertise and diverse skills of rural women leads invariably to better decisions. Nevertheless, the focus of government, agribusiness, and even the rural community itself, still rests with male primary producers as the main recipients and users of information and services related to primary production (Stewart, 2004).

Studies have indicated that farm women lead busy lives, and time is a major constraint in the performance of their many functions. Their multiple roles range from farm manager and office worker right through to tractor/header driver and farm animal carer, in addition to traditional caring roles for children and elders (Board, 1997; James, 1989). Despite some evidence that male farmers are making a greater contribution to domestic tasks and childcare to compensate for the increased involvement of women in the running of the farm business (Kilpatrick, Johns, Murray-Prior & Hart, 1999), women on farms are still required to do the bulk of domestic work (James, 1989; Schaffer, 1988). Many Australian rural women bring to farming communities a myriad of non-agricultural skills such as teaching, nursing, retail, administrative and clerical. Furthermore, 65 percent of farm women who work off-farm have been tertiary educated (Alston, 2003; Kilpatrick et al, 1999). Even though women may have higher formal educational levels than their male counterparts, they are less likely to have undertaken formal studies and employment in rural-based scientific and technical areas (Board, 1997). This is due, in part, to a generational effect, since, prior to the 1970s, women were forbidden from gaining college degrees in Australia in the fields of agronomy, horticulture, agricultural economics, and animal science (Alston, 2000; 2003).

Indeed, prior to the mid-1990s, little data was gathered on Australian women working in agriculture. This omission stemmed from a sense of shame that a developing nation such as Australia had women working out in the fields (Broad, 1997). Yet by the mid-1990s, there was evidence of changing gender identities, in that 70,000 women defined themselves as farmers or farm managers rather than as farmers' wives (Alston, 2003). Several reasons are given for this change of designation. When economic conditions in the rural sector deteriorated and structural adjustments were an imperative, farm women provided vital labour to replace more costly hired farm labour on the family farm. This was especially evident on smaller family farms. As a consequence, women's work has been crucial for the survival of the family in farming. Furthermore, some farm women have chosen or were forced to pursue careers outside of farming to generate additional income for the family when long term viability of the farm business was doubtful (Alston, 1995; Bamberry, Dunn & Kilpatrick et al., 1999; James, 1989; Lamont, 1997; Poiner, 1990).

The family farm mode of ownership remains dominant with over ninety percent of Australian farms being family-owned despite various recent rural adjustment schemes to facilitate the exit of small farmers and the consequent consolidation of small family farms into larger holdings (Alston, 2000). Furthermore, there has been an increase in farming partnerships, most of which are between husband and wife (James, 1990). With the gaining of legal partnership status, it appears that farm women are moving away from predominantly supportive roles to become more involved with the business side of the family farm enterprise (Fisher & Hutchison, 1997). All the same, James (1989; 1990) claimed

that the role of women in decision making on the family farm is often overlooked and the scope of the contribution by women to family farm management remains vague.

The theme of the 'invisibility' of women farmers emanated from North American research, especially by Sachs (1983) and resonated through feminist studies of Australian rural women. It is well documented that farm women's subordinate social position has been imposed by the patriarchal social relations of family farming which rendered women and their work 'invisible' (James, 1989; Poiner, 1990; Schaffer, 1988). For example, Poiner's (1990) explanation of farm women's lack of visibility was the 'pervading male hegemony' of a conservative rural society.

Alston (2000) argued that an inferior role for women has been facilitated by patrilineal inheritance practices in agriculture where only five percent of farms are inherited by daughters. She contended that farm roles have developed based on gender stereotypes, that male farmers are participants in the 'more important' public sphere of outdoor work while farm women have become associated with the less visible private sphere of housework and children (Alston, 1995). Alston (1995) claimed that domestic work is often devalued since it is unpaid and perceived as not contributing directly to agricultural production and the marketplace.

Paradoxically, farm women are perceived to cling strongly to their farm roles defined by gender. Bamberry et al. (1997) stressed that farm women have a strong commitment to their farming lifestyles, to the viability of the family farming operation, to the nurturing of their family, and to the community which supports them. Evidence indicates that farm women tend to be suspicious of feminism as constructed by the media and are more likely to view it as a threat to their solidarity with their male partners (Alston, 1995; Board, 1997; James, 1989; Poiner, 1990; Rowe, 1997).

In brief, an overview of the literature suggests that farm women are, to some extent, an underappreciated and underutilized resource with a commitment to maintaining traditional family ideologies on family farms. Nevertheless, their identities are fluid in the context of emerging social trends. Joint legal ownership of family farms is becoming a reality. Many farm women have tertiary educational qualifications and a broad range of skills and experiences derived from both within and outside the farming sector. Therefore, structural changes are underway and farm women are poised to become a more creditable and visible force.

WOMEN AND COMPUTERS FOR FARM MANAGEMENT

Several studies from both industry and academia have explored women's use of computers for farm management in Australia (Mackrell, von Hellens & Nielsen, 2009). In her account, Bryant (1999) reported that the use of software reflects the traditional gender divisions of labour on farming properties in that farm women are associated with financial data entry and record keeping, while male farmers provide the input data, analyse, and plan the farm business. Bryant (1999) contended that while many rural women are increasingly aware of the decision making and farm management possibilities of computer programs, there is still a high level of dependence upon the male farmer, with his more detailed day-to-day outdoor farm knowledge.

Stewart's (2004) study of gender, technology and cotton farming in the late 1990s found that ideologies of family farming, like technology, are socially shaped as a male domain. That is, both farm roles and technology are gendered according to whether or not they are predominantly indoor or outdoor activities or skills. Male farmers are more likely than farm women to make sophisticated use of computers for the purposes of farm decision making and management with farm women almost invariably recognized as lesser status, data entry operators. Stewart (2004) argued that this resulted in a lack of confidence amongst women as controllers of data, which sometimes led to avoidance of responsibility for developing information systems for decision-making purposes.

Bellamy, Webb, Mayocchi and Leitch (2002), in their report of a more recent cross-industry study of the use of technologies for natural resource management, identified an improved adaptive ability in farm management by farm women through increased use of computer-based decision support tools. Bellamy et al. (2002) found that seventy to eighty percent of women in rural industries self-reported as being jointly involved in major (strategic) decision making with their farm partner / spouse and / or other family members, while women in the beef industry self-reported a contribution to all farm decisions. In addition, they were the greatest users of technology. This confirmed the findings of an earlier study by Lewis (1998) of a strong association between innovative decision making by farmers and being better informed through the use of computer-based management information systems.

In essence, a review of the literature indicates that cooperation in the use of the farm office computer by both farm partners (generally husband and wife) is critical for a more effective outcome. Collaborating is an opportunity for the male farmer, who frequently works outside in the paddock, to combine his skills with his women farm partner, who frequently works in the farm office. The study in this paper extends knowledge from earlier studies temporally and theoretically as explained in the following section.

THEORETICAL FRAMEWORK: CONNELL'S THEORY OF GENDER RELATIONS

In this paper, we use Connell's (2002) theory of gender relations as an analytical framework. In theorising gender relations, Connell (1987) established several units of analysis, namely gender orders and gender regimes. The wider social sphere, represented by patterns in gender arrangements of social institutions such as 'the state', 'the church', and 'the military', contains a structure which Connell calls the gender order of society. Within gender orders are gender regimes which are established in smaller social settings such as families, neighbourhoods, schools, clubs, organizations, and workplaces. Within these social domains, Connell identified three main social structures: the division of labour; the exercise of power; and 'cathexis' which encompasses the domain of sexual social relationships (Connell, 1987; Stewart, 2004).

Connell (2002) revised his original theory of gender relations (1987) to include a fourth social dimension. Thus, his 2002 theory of gender relations encompasses four main dimensions of gender: production, emotion, symbolism and power relations. *Production* relations apply to the gender divisions of labour both at home and in occupational employment. *Emotional* relations are particularly applicable for emotional attachments, for example, marriage commitments. *Symbolic* relations refer to gender symbolism in life and in marketing, language, fashion, film, and even architecture. *Power* in the form of oppression operates through institutions where patriarchal dominance exists. Connell (2002: 68) explained that while these four components are analytically separate, in practice they constantly intermingle.

Connell's (1987) original gender relations model was used recently by Alston (2000; 2003) with research into Australian rural women for analysing the construction of gendered power relations within agriculture. Additionally, Stewart (2004) used Connell's theory of gender relations (1987) with its social structures of labour, power and cathexis. The contemporary theory of gender relations (Connell, 2002) is more recent and its use to date has been less extensive.

RESEARCH CONTEXT, DESIGN AND METHODOLOGY

The management of cotton growing in Australia has become increasingly complex with the need to sustain reliable crop production while making the best use of limited water and soil resources, to utilize effective pest and weed management, and to limit detrimental environmental impacts (The

Australian Cottongrower, 2006). A study by Hearn and Bange (2002) found that innovative farm management technologies such as the agricultural decision support system, *CottonLOGIC*, are considered keys to the adoption of sustainable farming systems.

Research Context

CottonLOGIC is an advanced farm management suite of software programs to aid the management of cotton production. The software was developed in Australia in the late 1990s by the Australian Commonwealth Scientific and Industrial Research Organization (CSIRO) and the Australian Cotton Cooperative Research Centre (CRC), with support from the Australian Cotton Research and Development Corporation (CRDC). *CottonLOGIC* consists of record-keeping and decision support modules to assist cotton growers and their advisors in the management of cotton pests, soil nutrition, and farming operations. Mackrell (2005) found that the design of *CottonLOGIC* into record-keeping and decision support modules contributed to adoption and implementation success with cotton growers being more likely to use the record-keeping modules for recording and reporting crop inputs and yields while cotton industry professionals are more inclined to use the relatively complex decision support modules for predictive purposes.

Design and Methodology

The empirical work was carried out by the first author and was based on a qualitative case study covering areas in south-east Queensland and northern New South Wales, in Australia. The rationale for a qualitative study was that an in-depth study of a situated experience was expected to provide deeper understanding than gathering standardised quantitative data from a large sample of the population. The study was steeped in an interpretive paradigm, and as such, themes emerged from the interview data rather than being pre-determined beforehand as for a survey (Patton, 2002). The unit of analysis was at the individual level, predominantly the Australian women cotton grower in her role on the family cotton farm.

Participants were either cotton growers or cotton industry professionals and were selected according to a purposeful sampling strategy. The cotton growers were selected based on the following criteria: 1) farmed in the Australian eastern states of Queensland or northern New South Wales; 2) were responsible for, that is, owned and/or managed family farms irrespective of size (as distinct from farms owned by large corporations); 3) indicated an awareness of environmentally sustainable and high-technology farming practices; and 4) were registered on a *CottonLOGIC* and/or Wincott (*Women in Cotton Industry Network*) database. The cotton industry professionals were cotton agronomists and consultants, rural extension officers, researchers and educators, rural experimental scientists, and *CottonLOGIC* developers, located in Queensland or northern New South Wales. These participants were required to have some knowledge of agricultural DSS either through development, usage, research or teaching, and, to some extent, were observers and/or advisors of cotton growers.

Data gathering took place during three field studies and one telephone study with 32 participants over three years. Further details can be obtained from the first author. An interview guide was prepared to steer the interviews which were conducted at locations selected by participants, with each interview lasting at least an hour, and recorded on audio tape with permission. Interviews varied between semi-structured and conversational depending on circumstance: semi-structured when the interviewee needed considerable guidance, and conversational when that was not the case. Notes on each interview were recorded daily in an activity log and interviews were transcribed from audio tape into Microsoft Word as soon as possible.

Analysis was manual rather than computer-assisted since the number of interview transcripts was workable and the obligation to stay closely connected with the data was fundamental. Codes used in analysis were based on concepts or themes drawn from both the literature and theoretical framework.

In short, this study of cotton growers using farm management software in the Australian cotton industry was an interpretive single case using ideographic methods. It allowed a first-hand investigation, involving several field trips to study participants in their natural setting, taking place over an extended period of time, and producing a textual analysis of rich insights after a period of reflection.

DATA ANALYSIS

This section reports the analysis of gender relations in the context of farm management on the Australian family cotton farm using, as a conceptual lens, Connell's (2002) theory of gender relations with its four social structures of gender: production, power, emotional, and symbolic relations. The following analysis commenced with production relationships. This is justified because the family farm as a commercial enterprise is production centric. That is, if production ceases so eventually will the farm as a business unit.

Production Relationships

According to Connell (2002), production relationships pertain to the gender divisions of labour both at home and in occupational employment. The Australian rural literature indicates that women's roles extend from household worker/manager to farm worker/manager as well as to the carer of children and the elderly (Board, 1997; James, 1989). Men's roles are traditionally associated with the production and marketing aspects of farming with the majority of time spent outside (Alston, 2000).

It was evident that some women growers were becoming more involved in marketing, selling and buying, as well as investment decisions on family farms, tasks which have traditionally been in the male domain. Selma, a cotton grower, explained her roles:

I'll deal with interest rates. I'll sell cotton. I'll make decisions about options, and things like that. He'll [farm partner] have no hassles with that. He's a fair bit more liberal than the traditional guys.

We work as a team really. I'm more focussed on the administration side of things. Bill [farm partner] is more focussed on the day-to-day running, and keeping out of the office which he shouldn't do. He needs to be more involved.

In the above scenario, Selma takes on the marketing, selling, and investment tasks that expose her to financial risks. In the recent past, this function would probably have been the domain of the male farmer or farm manager, and, women operating outside conventional rural gender norms would have been treated with suspicion (Alston, 2003). However, as disclosed later, Selma's farm partner husband, Bill, would rather be out in the fields and not in the office.

Beyond the farm gate, Selma is involved in local grower associations. Her industry knowledge means that her role on the farm extends beyond bookkeeping and human resources towards strategic production decisions. She has very firm views on the running of a successful cotton and cattle property, and the importance of good management. Therefore, it was Selma not Bill, who noted that he should have more involvement in farm management with a reduced emphasis on outdoor work. Selma and Bill's comments implied a reversal of the commonly accepted attitude that inside office work (unlike outside physical work) is not considered to be real work.

Therefore, for this family farming team, this is a win-win situation where tasks, strategic and operational, are allocated according to skills and preferences rather than gender. The notion of being part of a family farm management team was reiterated by several women growers in relation to a

husband and wife joint partnership. Meg, a grower, explained that her role on the 'team' was as the farm bookkeeper:

You were asking about women's roles but in the cotton industry, it's more of a team. The bookkeeping is the biggest factor [of my role]. We use the computer for that. I do all the bookkeeping.

Despite a growing recognition of changing responsibilities in the context of cotton growing, commonly the woman farm partner performed tasks in the conventional mould such as doing the farm accounts while the male farm partner worked outside in the fields. However, traditional gender divisions of labour did not diminish the importance of the task or a partner's appreciation of the other's contribution to the team effort. Brad (Meg's farm partner) recognized Meg's valuable contribution to production when he expressed his relief and appreciation of her willingness to help reduce the management burden. Brad was grateful that decision making in farm management could be shared with someone having the same goals. Furthermore, Brad acknowledged the importance of office work and his conviction that the inside / outside balance should shift so that less time was spent outside:

Meg does all the stuff inside here and I basically do most of the stuff outside. I'll tell you what I find. There are so many decisions that you have to make and so many things in the modern agricultural world, or certainly on cotton farms, it's a big load for any one particular person, and I just reckon that it really improves the efficiency of the whole thing. I can just rely on Meg to look after all the accounts, all the human resources sort of stuff. I don't have to worry about them... we should be working more on the business and be less hands-on.

Both Meg and Selma did not limit their involvement to the farm office and both women worked willingly alongside their male farm partners when circumstances dictated the need for their labour out in the paddocks:

Meg: *And it really is a team. I actually drive out and I work with Brad. We do irrigating together*

And

Selma: *If they need an extra hand, I'm down there or if cultivating and trying to get around something, I'll jump on the cultivator*

Despite the evidence of traditional gender divisions of labour in the home and outside, there was a demonstrated softening of role distinctions. As more women were shouldering the administration tasks of the farm business, some men were more willing to help out in the house:

Interviewer: *And does he ever help you in the house?*

Julia (grower): *Yes things are pretty good actually. Most men won't even make a cup of tea let alone cook a meal, whereas if I'm busy doing paper work and he's not busy, it's not this thing where a lot of men will ask ... what are we having for lunch? But he will go ahead and make it.*

Several industry professionals such as Reese and Kylie recognized the husband and wife partnership style of farm management as becoming a norm across smaller family farms.

Reese: *I think that is a pattern across the industry. The smaller growers, the family farms, their children including the girls go out and work in the fields.*

The benefits to the farm enterprise in combining limited human resources were identified.

Kylie: *They [women] are very much a partner in the business and unless you have both the financial and production sides of things working very well, you're not going to make money today because farming's a business ... if you didn't have a wife to do it, you'd have to pay somebody else and nine*

times out of ten, they [the women] know the business so well that they are really adding value with what they are doing.

There is a growing expectation that women's roles will be more varied as youth become adults in rural society with the prospect of fewer gendered boundaries. Toni, a grower with two young daughters, explained:

Interviewer: *You're saying that the girls work outside. Do you think that is an indication of things changing?*

Toni (grower): *Yes definitely. I see no problem with that. My mum never did anything and I probably do a bit more than her.*

The loosening of gender-based restrictions was evident to Reese in her work for a cotton agribusiness. Since Australian agricultural colleges opened enrolment to women in the 1970s (Alston, 2000; 2003), working in the rural sector became a career choice for an increasing number of women.

... but I think there are more women becoming involved in the industry as a whole, from being agronomist or growers though to the chemical companies and sales people and even out in the field, there are a few. Maybe not near as much as what males are but I think they are becoming more involved in the office side of things.

Within this section, gender divisions of labour in production units on family cotton farms have been explored revealing adjustments to established societal norms and notions of teamwork. It is clear that some behavioural changes are generational with many farm women unwilling to accept codes of behaviour from previous generations which were unfavourable towards them. As women adopt new responsibilities, such as preparing financial budgets, and marketing and selling cotton, it is expected that, over time, these roles become sanctioned as normal codes of behaviour.

Power Relationships

Connell (2002) stated that power relationships in the form of oppression operate through institutions where patriarchal dominance exist. Foucault, cited in Connell (2002: 58-59), proposed another form of power where 'power is widely dispersed, and operates intimately and diffusely. Especially it operates discursively, through the ways we talk, write and conceptualise'. This power is less authoritative, oppressive and confrontational. Both institutional and discursive power are used as analytical concepts to facilitate an understanding of gender in relationships of authority.

In the context of the cotton industry, institutional patriarchal power could be identified as existing within an older generational pattern. For example:

Helena (grower): *With women, some husbands stop them going into the fields. They are not allowed to make decisions, but I think women's input is just as important as the men's.*

And

Selma (grower): *I think Bill's a bit different to most of the farm blokes around. I know blokes who don't let their wives get mail from the post office.*

Interviewer: *Is that your age group?*

Selma (grower): *No, I'm talking another ten years older. Oh, yeah, twenty years older.*

Discursive power was more in evidence in this study. Sigrid, an experimental scientist, explained how the financial knowledge which the women acquired as they prepared the farm accounts provided some women with the means to challenge existing farming operational decisions.

Whereas a consultant might tell a [male] grower to spray such-and-such, they might not even question how much that will cost or if there is an alternative. Whereas the women, because they know how much it was, and they put it in [the budget], they are possibly more challenging to their consultant.

Several of the decisions were of strategic importance to the farm business, thereby providing the farm women with a greater measure of control. This supported the findings by Bryant (1999) that some women are using data from record keeping to participate in and influence decisions about farm management. Sigrid exemplified the point through the light-hearted banter between her parents regarding the purchase of machinery, generally an expensive capital investment.

Women seem to get their power and ability to make decisions on the farm because they know exactly what the budget was, because they've done the budget. A lot of the men wouldn't have a clue. What Dad often says is 'I think I'm going to buy a round-bale machine'? Mum's like 'Yeah right, no, it's not in the budget. We can't. But we can put it in next year'.

Elle, a grower, illustrated a structured decision-making process whereby the four partners jointly decided on the more significant strategic management issues while the two male partners together made the operational decisions.

Any decision that we make regarding management decisions, there are four of us in our partnership, we have a meeting and the four of us make the decision. If it's a big management decision then the four of us must agree. The two men make the decisions on the day-to-day running of the farm, this is what we plant, and this is where we're going to plant it and all that sort of thing.

Certainly, many of the women cotton growers, although claiming to be part of the family farm management team left the day-to-day decisions connected with production - as applied to crop planting, spraying, or harvesting - to the men. Reese, a cotton professional, explained that women on family farms are not so involved in operational decisions on production but more with record keeping for budget reasons. George, an independent consultant, confirmed the lesser impact of women on the operational day-to-day decisions.

Reese: But I think for a lot of growers: the males take on the decision making themselves in conjunction perhaps with their agronomist. I think that women are taking more of a role in the record keeping though.

And

George: Women on the farms always have had a strong orientation to the strategic positions, not the day-to-day decisions.

Diane, a service manager for an agribusiness, explained that in order for the women to participate in operational level decisions, there was the necessity to be acquainted with chemicals, product costings, as well as the science of crop and soil management.

... but as far as the actual agronomic side of things, most of them [the women] don't have that background to be able to discuss it with them [male partners].

This was an important remark. Notwithstanding, Reese, a consultant, explained that the farm woman is often well-positioned to offer an alternative perspective.

That's right and there are also things that women will see in management that a man can't see. Like a man is looking at the things all the time whereas a fresh face, not necessarily the wife or the women involved, but any fresh face but it's normally the woman ...

Several times during interviews, it was implied that management dynamics had changed once extended family, such as brothers and brothers-in-law, had left the farm partnership and the controlling entity had reverted to the male farmer and his wife:

Toni (grower): ... *now that the boys [farm partner and his brother] have split their partnership and we're working separately, and now the girls are old enough to help, they drive the tractors, move the irrigators*

Alston (1995: 63) claimed that if a farm is owned in partnership by a male farmer and his family, the farm woman remain marginalised from the farm business. She described the male-oriented culture in farming as follows:

The structure of the farm family shapes the very nature of the farm woman's life. If the farm is owned by her father-in-law or in partnership with her husband's brothers, she will remain marginalised within the family and the business for much of her life.

As stated in the literature review, there has been an increase in farming partnerships, most of which are between husband and wife. Australian rural women now make up forty percent of all farm partners (James, 1989; 1990) with farm women moving away from a predominantly supportive role to become more involved with the business side of the family farm enterprise (Fisher & Hutchison, 1997). The mobilization towards legal partnership has given the farm woman the opportunity to assume a greater role in strategic decisions of farm management. This was illustrated by Sarah as she justified her increased participation in marketing decisions since her brother-in-law had exited the partnership:

My husband is not chauvinistic. We work collaboratively. With regards to decision making, we know we will grow cotton. I have input into every bale sold and I'm involved in marketing. But that didn't happen when we were with Gordon's brother. Now we are out on our own. This year is the first crop in our partnership without my brother-in-law.

In this section, while there was little verification of institutional power, except by hearsay, discursive power was in evidence and usually it was wielded by the women who were familiar with the financial circumstance of the farming business. The situation of farm women varied immensely. Factors affecting their participation in farm management included age, skills and talents, educational background, the presence of relatives in the partnership, and the employment of agronomists or consultants. Nevertheless, the women interviewees were strongly aware of their rights as farm partners and disapproved of patriarchal and patronising attitudes.

Emotional Relationships

Emotional relationships apply when attachments are based on emotions (Connell, 2002), as in family commitments, and in business and lifestyle choices such as the running of the family farm. In the example below, Selma expressed the strength of the attachment to the farm:

We have to work as a team. We've had to fight a lot of hard battles to have what we've got. We're determined to stay viable and on the land. We have to take an active role.

Three of the farm women explained that historically women have not always been so connected, nor have they participated by sharing the farm management load. This was described by Julia, a grower.

I suppose my mother was never really involved in any of the farm stuff but it was more the point of view that if they [husbands] know you can do it then they get you to do it ... and she's often said to me don't always say you can do everything (because) then you will have to do it.

Julia's mother appeared to lack emotional dedication to the farm. Julia, however, had adopted a greater sense of loyalty represented by willing and active participation in farm management decisions.

This situation aligned with many of the interviewees who expressed strong emotional commitment to the family, farm, business, community and lifestyle, despite challenging times in rural Australia.

Symbolic Relationships

Symbolic relationships in gender relations refer to gender symbolism in many spheres such as language, fashion, film, marketing and architecture, and its contribution to the construction of identities (Connell, 2002). Connell (2002: 73) stated that 'patriarchy has long been legitimated by belief systems which picture gender as a timeless unchanging division ... over the last century and a half, social and intellectual movements have chipped away at these assumptions'.

Diane, a woman cotton agribusiness manager, opined that the marketing of the farm management software *CottonLOGIC* was directed mainly to men in the cotton industry:

The thing that I see why CottonLOGIC, ... and those sorts of things, haven't been picked up, the marketing of the extension of those programs has been directed towards men and not so much the women. One of the reasons, and it's just a theory, it's safer and easier [to direct towards the men]

....

As discussed, Stewart (2004) found that rural services such the marketing and extension of agricultural products had been traditionally focussed towards the male farmer. Diane perceived this was also the case with *CottonLOGIC*. Paradoxically, the *CottonLOGIC* courses were run by a woman, Sigrid, an experimental scientist, and much of the material promoting *CottonLOGIC* showed women as cotton scouts. All the same, George, an independent consultant, observed that in many cases, the perception of farm women is still unflattering:

The women are starting way behind the eight ball. Even if they are intellectually far ahead of the farmer, they are perceived as way behind the eight ball.

There is evidence that this practice is changing to become more family focussed with the entire family invited to participate in field days. According to Naomi, a cotton extension coordinator, this encourages the women to be involved and not left behind at home caring for children:

But certainly if you're running field days, mostly men attend. We're really trying to encourage – same with our IPM [Integrated Pest Management] courses (and) we make provisions for the family to come at a discounted rate. We're really trying to encourage as a choice, decision making and learning.

As stated earlier, recent studies have found that farm women are defining themselves as farmers or farm managers rather than simply as 'farmers' wives' (Alston 2003). This study has disclosed that the involvement of women cotton growers in a diverse range of farm related activities justifies their self-styled description of themselves as cotton growers rather than simply cotton growers' wives.

In summary, relationships of production, power, emotions and symbolism from Connell's (2002) theory of gender relations illuminated that teamwork was highly valued by farm partners, especially by the women themselves. The women cotton growers were confident of the value of their labours in the farm office and paddocks. They were committed to their way of life, and aware of their identity as cotton growers not just as wives, important as that function was. While women's tasks on farms generally fell within traditional gender norms being inside work, the blending of male and female roles through necessity meant that gender distinctions were becoming blurred. Even so, farm women's participation in decision making associated with the production aspects of farming was low.

DISCUSSION

The social dimensions of gender relations as defined by Connell (2002), namely, production, power, emotion and symbolism, are highly relevant in the context of the study. Combined together, these concepts signified the relations between farm partners, usually husband and wife, as together they managed the family farm as a small business enterprise. Relations were productive because the farm partners laboured together to sustain the family farm as an economically viable business entity. Power was characterised by the allocation of decision-making roles. The bonds of the farm partners were emotional because of marital responsibilities and all that family life on a farm entailed. Symbolism had an important association with marketing and influenced perceptions within and outside of the cotton industry.

The analysis of the data elicited some interesting findings such as the prevalence of teamwork in the farm partnership, the conviction of the women regarding the value of their roles as farm managers, and the changing focus of marketing towards women and families in the industry. These are discussed further below.

Multidisciplinary Teams in Farm Management

Few studies have investigated multidisciplinary teamwork in the rural sector. Studies into multidisciplinary teamwork in health care highlight the value of diversity, as well as the obstacles when health care professionals have differing attitudes towards the outcome. Cott (1998), in a study of multidisciplinary teamwork in the Canadian health care system, claims that definitions of teamwork emphasise some of the basic assumptions of multidisciplinary teams. These are that team members should have a shared understanding of roles, norms, and values so that the team functions in a cooperative, egalitarian but interdependent manner, and that cooperative decision making should benefit the purpose (or patient) rather than the individual team member. In brief, while a group works together to achieve a certain outcome, a multidisciplinary team is a group of people with different training and experience working together with a common purpose. Therefore the tasks they perform as team members may not be the same but instead are related to their expertise in benefiting the collective outcome.

For this study, the concept of multidisciplinary teams essentially describes partnerships on family cotton farms in the Australian cotton sector. The evidence suggests that teamwork on the family farm is of a collaborative but interdependent nature. Moreover, since roles may overlap, there is certain flexibility about which tasks are to be performed, when and by whom, in order to achieve a viable and sustainable family farm business. It was apparent that the women had no hesitation in regarding themselves as team members in the family farm business. All the same, in a few cases, the women astutely declared that the functioning of the team would improve with greater cooperation of farm partner husbands.

Women as Decision Makers in Farm Partnerships

Like most rural sectors, the cotton industry is subject to volatility, as in the weather, market supply and demand, global costs and prices, legislative compliance, environmental policies, and community expectations. It is essential for women as farm partners to have the resourcefulness to respond to these fluctuations. The knowledge and skills that women bring to the workplace are diverse, enrich rural society, and enable them to adapt and cope. Women's roles on farms vary from farm to farm, and from season to season, with on-farm and off-farm work placing full demands on their times. Certainly, for most farm women, their time is in short supply due to the extensive and varied roles they assume. Some women, especially when children are young, assume traditional roles inside the home while others spend more time on outside duties.

Several women growers recognized that the use of financial software, along with knowledge of the farm budget, influenced their farm management roles, notably for strategic decisions. However on the production side of the farming operation, the women were consulted less. For them, there were numerous constraints. Aside from lacking confidence in their agronomic knowledge, the main one was that the male grower and the farm agronomist/consultant made decisions frequently and in haste in the fields based on their experience and intuition. This was to the disadvantage of many of the women partners who were often not present. Bellamy et al. (2002) found that only ten percent of cotton women participated in joint decisions at an operational level compared with those in other rural industries such as beef and grains where sixty percent of women self-reported as contributing to production decisions (Bellamy et al., 2002). This meant that the women in the cotton industry are considerably less involved in the day-to-day decisions associated with production or marketing than in other rural industries. This situation highlighted the fact that technology courses (such as for *CottonLOGIC*) for women farm partners may need to include an agronomy component to supplement software training. This would enable the women to be better informed and, if they aspire to it, to participate more usefully in farm decision making on a day-to-day (operational) level.

In the literature on women on farms in Australia, personal conflicts between self fulfilment and farm wifely duties have been recurrently recorded (Allan, 2005; Alston, 1995; James, 1989; Sachs, 1983; Stewart, 2004). Nevertheless for the women in this study, the sense of isolation, unhappiness and despair regularly documented could not be substantiated. The recent establishment of Wincott (*Women in Cotton Industry Network*) as a resource and self-support organization by the women of the industry denotes a recognition of their self-identity, their agency, their achievements, as well as constraints in accessing knowledge. Wincott encourages members to ask question and seek answers without embarrassment. It is a source of motivation and confidence for many of its women members despite some initial resistance from men in the industry.

There are claims in the literature that farm women are an underutilized resource. However, their changing status as legal farm partners has given them the opportunity to assume a greater role in farm management (Alston, 1995; 2000). Two women growers hinted at discordant relations in farm partnerships when extended families were involved. For these women, the position improved when, with their farm partners, they became the controlling entity and dominant decisions makers after extended family such as brothers and brothers-in-law left the farm partnership. This confirmed the findings by Stewart (2004) that farm women were able to build more equal partnerships with their farmer husbands when other males were not involved in the farm partnership.

Gender Stereotypes in Marketing Symbolism

The perception of the supremacy of masculine discourse in rural services, such as rural extension and marketing, may be partly responsible for farm women's reluctance to utilize computers for production decision making. Stewart (1997) provided numerous instances where 'hegemonic masculinity' was represented in advertisements in specialist farm literature by depicting older, weathered male farmers and heavy, powerful machinery. Conversely, emphasised femininity was symbolized in industry journals by young models on the catwalk wearing fashionable cotton garments. Rarely was the reverse seen where women were depicted driving heavy machinery or men modelled cotton garb. Within the ideologies of farming, the symbolism of hegemonic masculinity versus emphasized femininity is associated with Connell's notion of power relations. Nonetheless, the rural sector is being transformed, as in the latest 'Cotton Yearbook' (2006) by the Australian Cottongrower. Images of wholesome family scenes are becoming more common. This atmosphere is less threatening to women as it encourages their involvement alongside that of their farm partner husbands.

CONCLUSION

In this section, the response to the research problem is discussed as well as the contributions of the paper to theory and practice. The research problem was identified as: 'How does farm management software impact on gendered relationship between farm partners on family cotton farms?'. While results of past studies were conflicting (Bellamy et al, 2002; Stewart, 1997; 2004), this study found that women cotton growers, alongside women in other rural industries, were willing participants in most long-term and strategic decisions on the family farm, although their involvement in day-to-day production and operational decisions was generally less. The study also found that many women cotton growers were motivated to increase their contribution, and that agricultural DSS usage was expected to assist in providing improved reflexivity in their farm decision-making roles. The findings also suggested that women cotton growers were no longer 'invisible'. While reluctant to challenge traditional notions of identity, farm women were not immune to social trends with generational change taking place on family cotton farms. With their diversity of skills and experiences, women were becoming valued and 'visible' members of family farm management teams. Ever since farm women took over the bookkeeping roles on family farms, the knowledge acquired had assisted them in influencing financial decisions at every management levels.

Implications for Theory

Distinct from the representativeness of findings (external validity) in quantitative studies, generalisability in a single interpretive case study such as this, involves generalising from empirical, rich descriptions to theoretical statements (Walsham, 1995). For this study, the outcome is rich insights as theory rather than the generation or testing of theories. As explained earlier, this paper extends extant scholarly literature in the research domain of the study, namely gender, farm management software, and farming, certainly within the context of Australian cotton. Furthermore, Connell's (2002) gender relations theory as a conceptual lens has provided novel views of the social world of women cotton growers. These are the theoretical contributions of the paper.

Implications for Practice

The practical implications through capturing the increased decision choices of women cotton growers are innumerable. As acknowledged farm management team members, farm women need to be considered when rural goods and services are promoted; when positions for farm managers on rural properties are advertised; and when government policy affecting the rural sector is being prepared. It is possible that greater skills in the use of farm management software may be a means of improving the self-confidence of farm women as decision makers, and that involving farm women in decision making may help in finding sustainable farming solutions outside those in existing practice.

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