Identifying and utilising a farmer typology for targeted practice change programs: A case study of changing water supply in the Wimmera Mallee

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Abstract. Farmer typology research has become a popular tool for designing farm extension programs and targeting key messages to particular farmer groups or segments. This approach was used to assist in a practice change program to encourage farmers to capture the benefits and new enterprise opportunities arising from conversion to the more efficient piped water supply delivered by the Wimmera Mallee pipeline in Victoria. In particular, the paper outlines how this typology research refocused the activities undertaken to achieve adoption of new farming enterprises and changes in water use on farms in the region. The paper concludes that farmer typologies can provide valuable information for focusing practice change programs to cater for different farming styles with different motivations for modifying farming practice.

Keywords: farmer typologies, water infrastructure, extension, Wimmera Mallee

Introduction

Farmer typology research has become popular as a way of segmenting farmers into groups to assist in developing targeted farm extension programs. This paper describes how a farmer typology approach was applied in an extension program implemented by the Victorian Department of Primary Industries (DPI). The extension program sought to assist broadacre dryland farmers in the Wimmera Mallee region of Victoria to optimise the benefits from conversion of water delivery from an open channel/dam system to a piped system. It was expected that the conversion to a piped water supply would deliver a number of key benefits to farming in the Wimmera Mallee region. These benefits included better quality water, a more secure water supply, opportunities to develop other enterprises, access to growth water; all of which would result from the construction of the Wimmera Mallee pipeline (WM pipeline) (GWMWater 2003). It was assumed that these benefits and opportunities would be obvious to, and therefore readily adopted by, farmers connecting to the pipeline.

Construction of the WM pipeline, a significant water reform, was expected to occur over a 10 year time frame and impact positively on agricultural practices in the Wimmera Mallee. Replacement of an open earthen channel/dam system with an in ground pipeline is designed to introduce efficiency in water delivery across a large part of the Wimmera Mallee (3,000,000 Ha) (see Figure 1). This water efficiency project, which is still under construction in 2009, is estimated to result in significant water savings in the stock and domestic supply system by reducing seepage and evaporation from earthen channels and dams. It was estimated these savings would return 80,000ML to environmental flows and a further 20,000ML for growth water. Growth water is water available for purchase by agriculture and other sectors annually to take up regional development and farm diversification opportunities, as the initial allowance/allocation would not be sufficient to operate these enterprises (GWMWater 2008). While significant water savings will be achieved through the pipeline, the severity of current drought conditions and the expected impacts of climate change were not factored into initial projections. Drought conditions have also resulted in the pipeline construction being fast tracked and it is now expected to be completed in five years (by 2010).

To assist farmers redesign on-farm water infrastructure and resources, and in particular to recognise and exploit opportunities arising from the expected increased water security and supply, DPI Horsham began to implement extension programs and initiatives as part of the Sustainable Agribusiness Opportunities from the Wimmera Mallee Pipeline Project (SAOW). This project, funded through the Department of Innovation, Industry and Regional Development, Victoria aimed to provide farmers with information and advice to allow piped water to be used to best advantage and to identify opportunities to diversify agricultural enterprises. The SAOW project team wanted to ensure that DPI extension activities would be targeted to the needs of farmers. To do this they sought to identify the different factors which motivate farmers to respond to changes in their water supply, their expectations for their faming enterprises and their propensity to adopt new enterprises or change practices as a result of the WM pipeline. This information was to assist DPI in delivering their extension activities.

Figure 1. Area covered by the Wimmera Mallee pipeline.

Source: GWMWater n.d.

In the past, extension activities have made limited use of farmer typology research, particularly the importance of socio-cultural diversity (Howden et al. 1998; Vanclay et al. 1998). More recent work however recognises that different farming styles will identify different propensities to adopt new farming practices or participate in industry developments (Emtage et al. 2001; Kaine et al. 2005; Mesiti and Vanclay 2006; Thomson 2002). The study forming the basis for this paper (WIDCORP 2007) used a farming typology approach in which farming objectives, attitudes, knowledge, concern and expectations informed different farming styles to enable a more targeted approach to DPI extension activities.

This paper provides an overview of farmer typology and extension literature, describes the WM pipeline case study and the farmer typology methodology used, and discusses the results and their application in the development and implementation of an extension program. The paper concludes with an assessment of the effectiveness of farmer typologies in on-ground extension activities in the Wimmera Mallee and comments on the role that typology research can play in agricultural extension programs.

Farmer typology and extension literature

Market segmentation has become a popular method for the design of extension programs and in formulating key messages, particularly with regard to the adoption of innovation, for target audiences (Emtage et al. 2006; Kaine et al. 2005; Mesiti and Vanclay 2006). Farmer typology research is a form of market segmentation, which takes into account the social values of farmers and their approach to farming, together with the usual structural and demographic variables of traditional market segmentation. The farmer typology approach used in this study draws upon the well documented theory of farming styles (Howden et al. 1998; Mesiti and Vanclay 1997, 2006; Thomson 2001a, 2001b; van der Ploeg 1994; Vanclay et al. 1998; Vanclay and Lawrence 1995). Faming styles theory aims to identify groups of farmers according to their common worldviews and/or management practices (Vanclay et al. 1998).

One of the methodological difficulties of this approach is that attitudinal and behavioural differences between styles are difficult to quantify. For example, Vanclay et al. (1998) developed styles through ethnographic assessment, and farmers were classified into the pre-determined styles. Such previous methods have been limited in that emerging styles are viewed as socially constructed or 'mythical' (Vanclay et al. 1998) rather than real, tangible and discretely identifiable representations of farmers (van der Ploeg 1994).

Thomson (2001a), however, has developed a quantitative method of grouping farmers based on their 'patterns of beliefs and attitudes about farming' (or personal constructs) (Thomson 2002 p. 281). In this approach, survey data from farmers is collected and then clustered statistically from the data upwards to develop styles. The strength of Thomson's method is two-fold. Firstly, behavioural differences between groups are measured through K-means cluster analysis, and secondly, emerging styles are grounded in the data rather than attempting to classify cases (farmers) into predetermined classes as with Vanclay et al. (1998). Thomson's theoretical approach to farming styles examines farmers from a holistic viewpoint including the need to understand and measure differences in farmer attitudes and behaviour between the styles (Thomson 2002). These differences can impact upon the uptake of different farming practices, future innovations and their adoption, and can be used to target communication more effectively (Thomson 2001b).

This research followed Thomson's approach to identify farming styles as they relate to the specific issue of a change in water supply and delivery. As with industry specific studies, issue and industry specific typologies provide the opportunity to generate sufficient detail about industry practices so as to better understand landholder's needs and learning styles and their willingness to adopt certain management practices and to improve the efficiency of specific extension programs (Emtage et al. 2006). Using this approach farming styles are created from issue-specific statements in a survey. This means styles are sensitive to the attitudes, knowledge and concern of farmers towards new water infrastructure reform, their level of interest in uptake of new opportunities, and more general variables to do with farming which include risk/planning, farming practice, knowledge, labour issues, finance, technology and innovation (Thomson 2001a).

A second aspect of this research is to better understand the propensity for farmers to adopt innovation. Having developed a farmer typology and gained a perspective of different farmers' propensity to change, the next stage was to understand the reasons why farmers were interested in adoption or non-adoption of new opportunities from the WM pipeline. In the adoption of innovation literature, a number of drivers and barriers to the uptake of innovation have been identified (Pannell et al. 2006; Rogers 2003; Vanclay and Lawrence 1995; Yapa and Mayfield 1978). The literature reports that there is some debate about the value of typology studies that use the adoption of innovation theory as the basis for identifying farming typologies (Emtage et al. 2007). With this limitation in mind, this study supplemented its typology research with qualitative interviews of farmers regarding their propensity to adopt innovations and the drivers and barriers that influence this.

Drivers and barriers to innovation include the ability to obtain accurate knowledge from knowing the innovation exists, knowing how to use it correctly and applying it to their own situation; to knowing how the innovation functions (Pannell et al. 2006; Rogers 2003; Yapa and Mayfield 1978). Barriers provide insight into strategies for improving uptake (Pannell et al. 2006). While there is considerable literature about the adoption of innovation in many sectors, there is limited research about how changes and improvement to water infrastructure influence the adoption of innovation in dryland agriculture (Emtage et al. 2006). More recently, typology research has been applied to understand how farmers respond to policy change in irrigated agriculture (Kuehne et al. 2007). However, the lack of understanding of grower motivation, with regard to the management of irrigation, still limits the effectiveness of extension programs in adoption of innovation in irrigated agriculture (Kaine et al. 2005).

Problems with adoption arise if new enterprises or innovations 'are complex, are perceived as being risky, do not fit with existing enterprises or conflict with existing social norms' (Curtis and Byron 2002 p. 13, following Cary et al. 2001; Curtis and Race 1996; Vanclay 1992). Evidence suggests that growth water enterprises such as horticulture, intensive livestock production or farm forestry may pose these problems for broad acre farmers. Curtis and Byron (2002) suggest that these non-traditional farming enterprises are unlikely to generate substantial income for many dryland farmers such as those in the Wimmera Mallee. Whilst non-adopters have been referred to as laggards by Rogers (2003) and others, Vanclay and Lawrence (1995) note that often farmers will not adopt an innovation for very pragmatic reasons that are not based on economics alone, but take into account the suitability of the new environment, or the

social context. According to Emtage et al. (2006) it is important in this study to understand the context in which change occurs across the region's broad acre farms with the introduction of the WM pipeline. In particular, to understand how the drivers and barriers to change shape farmers propensity to adopt or not adopt.

Whilst there is limited evaluation of the effectiveness of extension activities using farmer typologies, from previous research it appears to be useful in developing a more sophisticated approach to targeting messages that address farmers' motivations for change. There has been an increased focus on tailoring extension activities to meet the needs of farmers. In DPI, this is incorporated in the recent 'Better Services to Farmers' service delivery strategy which will deliver tailored services to farm businesses (DPI 2009). By identifying farming styles in the context of change brought about by the WM pipeline, these typologies can inform extension activities developed by DPI to aid in maximising the benefits that can be derived from the pipeline. A longitudinal study underway (WIDCORP 2007; WIDCORP 2008a, 2008b; WIDCORP forthcoming) will evaluate the effectiveness of this issue-specific farming styles approach to meeting the changing needs of farmers.

Methodology

Two data collection and analysis methods were used in this case study research. These were a quantitative survey followed by qualitative in-depth interviews. The quantitative survey phase involved a multi-mode questionnaire (telephone and online) developed by an expert panel, then tested and completed by a random sample of Wimmera Mallee farmers sourced from a public telephone directory. In total 527 surveys were completed and analysed (a response rate of 20% with a margin of error of ± 4.27%). This represents approximately 21% of farmers in the study area. The survey was conducted over a three week period from April to May 2007. It provided a representative sample across a range of variables including farmer demographics and farm characteristics (location, size, main production activity, and equity) when compared with statistics from other regional surveys (ABS 2001, 2005a, 2005b; Barr 2005; Curtis and Bryon 2002) of the Wimmera Mallee farming population.

The survey was organised into five sections similar to those used by Thomson (2001a) in his farming styles research. The following table characterises the structure of the survey (Table 1).

Table 1. Structure of the survey

Section	Category	Types of questions
Part 1	Structural characteristics of the farm	Ownership, farm size and on-farm residential status, and main agricultural practices
Part 2	Attitudinal statements about farming	Finance, farming practice as a business, farming practice as a tradition, labour, planning/risk, technology/innovation
Part 3	Water management issues	Water sources and uses, knowledge, attitude, concerns and aspirations with respect to the WM Pipeline, and new growth water enterprises explored
Part 4	Future plans	Long-term farm plan, succession
Part 5	Demographic information	Age, gender, income (on and off farm), equity

This survey data provided the basis for the farming styles analysis. As previously indicated, the methodological approach used to identify farming styles is principally informed by Thompson (2001a) and used K-means clustering to group cases of farmers into farming styles.

K-means clustering is appropriate for this research as it classifies respondents into subgroups with no pre-determined assumption about the number of groups within the data set – thus an inductive approach is used to develop the groups. Due to the high number of variables in the data (attitudinal statements), a factor analysis was performed to reduce the number of variables. The variables in the factor analysis included 37 attitudinal questions contained in the survey: 19 attitudinal statements about farming, together with other statements about attitude (1), knowledge (3), aspirations (9) and concerns (5) towards the WM pipeline. From the factor analysis, nine underlying factors were found and used for modelling cases into clusters (i.e. farming styles). The cluster analysis performed on the nine factors was run a number of times; splitting the data by specifying two, three, four and five cluster solutions and extracting a solution which obtained maximum variation between clusters and the minimum variation within a cluster. A three-cluster solution provided the most meaningful results, representing three distinct groups or farming styles; Style W, Style M and Style P. Descriptive names were not appointed to these styles to avoid value-judgements being made about each emergent style.

The qualitative data collection phase used an in-depth focused interviewing approach to identify the key issues influencing the adoption of innovation and new enterprises. Focused interviews assume a conversational style and are guided by a specific set of questions (Merton et al. 1990). These interviews were conducted during August 2007 with fifteen randomly selected participants who participated in the quantitative survey; five farmers from each farming style identified. Patton (1990) and others emphasise that small samples are acceptable in qualitative inquiry as the main aim is to understand rather than measure the particular phenomena under study. Recorded interviews were transcribed and loaded onto QSR Nvivo. Data underwent thematic analysis, and results were triangulated by a second researcher. Finally, coded research data was comparatively analysed against the 'influences of adoption' as defined by Vanclay and Lawrence (1995).

Results and Discussion

Farming styles

The three farming styles identified in this study; Style W, Style M, and Style P are described in terms of farmer perspectives and aspirations with regards to the WM pipeline and their attitudinal and structural characteristics. The following characteristics of each of the three styles summarised in Table 2 have been identified using statistically significant factor differences, as well as structural and demographic differences between the farming styles (WIDCORP 2007).

Table 2. Characteristics of the 3 farming styles for broadacre systems in the WM Pipeline zone

Characteristic	Style W	Style M	Style P
Farm size	Larger	Smaller	Smaller
Main farm activity	Cereal/oilseed & pulse	Non traditional	Mixed farming
Income trajectory	Higher income	Off-farm income	Lower income
Adoption-innovation propensity	Innovative	Experimental	Traditional
Farming approach	Business-minded, long-term investment, farming background	Less business-minded, farming background unlikely	Business minded, long-term investment, farming background
Attitude towards WM Pipeline	Very positive	Positive	Positive
Knowledge about WM Pipeline	Highest	Middle range	Lowest
Concerns about WMP Pipeline	Least	Middle range	Most
Explored opportunities	Middle range	Highest	Lowest

Style W represented 44% of those broad acre farmers surveyed within the Wimmera Mallee pipeline study area. These farmers, when compared to others surveyed, are characterised by being cereal/oilseed and pulse producers, having larger farms and higher returns. They have a very positive attitude, a higher level of knowledge and least concerns about the WM pipeline. Style W farmers are innovative, seek-out new knowledge and ideas and are business minded. They see important attributes of the pipeline as increased flexibility in water management, increased effectiveness of fertiliser/pesticide application, and improved quality of life.

Style M represented 23% of those surveyed. Characteristics depicting these farmers include having smaller farms, being experimental and more likely to have off-farm income. They have a non-traditional approach to farming, are less business-minded and are less reliant on the outgoing channel system as a main source of water. Style M farmers have a positive attitude toward the pipeline, but have less knowledge and more concerns than Style W. Increased horticultural opportunities and improved quality of life as a result of the pipeline are seen as important outcomes.

Style P represented 33% of the farmers surveyed. These farmers have smaller farms than Style W and a mixed farming enterprise (cropping and livestock). They are also business minded, value the tradition of farming and see it as a long-term investment. Style P farmers have a positive attitude toward the pipeline but have less knowledge and more concerns, than either Style W and M famers.

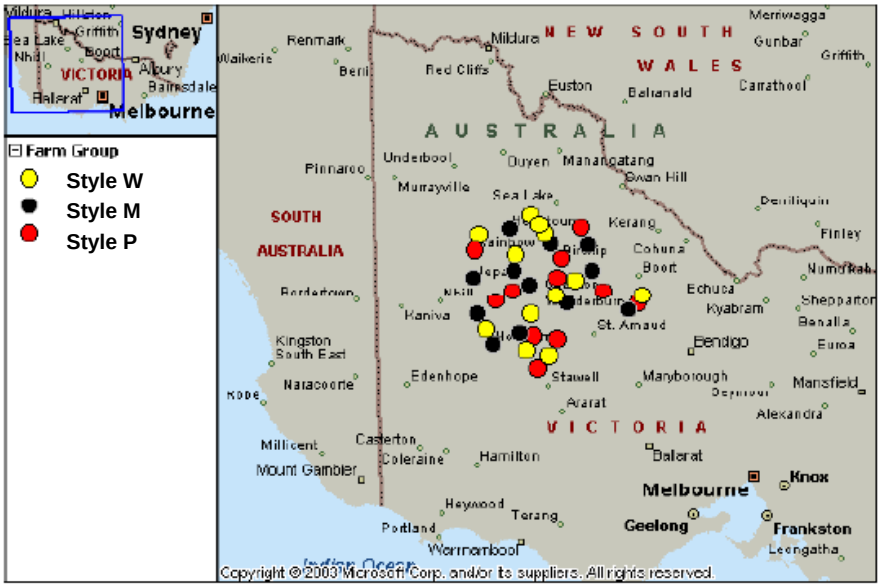
The three farming styles were represented across the study area (Figure 2).

The survey also identified if farmers had or had not explored new opportunities as a result of the WM pipeline. Findings revealed that less than one quarter of respondents had explored new opportunities. It also showed that Style W and M farmers were more likely than Style P farmers

to have investigated new opportunities (Table 3). This reflects the more innovative and experimental attributes of Styles W and M respectively when compared to the more traditional Style P farmer.

Follow-up interviews further explored drivers and barriers to innovation and/or adoption of new opportunities. These interviews revealed that most farmers had adopted new practices and innovations over the past 10 years, such as planting different crops, new water infrastructure, new technology, livestock and management innovations. Farmers were also asked how innovative these new ideas were in relation to adoption by other farmers in the region. Analysis

Figure 2. Distribution of farming styles across the study area.



Source: Insightrix, 2007

Table 3. New enterprise opportunities arising from conversion to a more efficient piped water supply

Opportunities explored regarding the WM pipeline	Farming Styles							
	Style W		Style M		Style P		Overall total	
	Count	N %	Count	N %	Count	N %	Count	N %
Yes	56	24.2	40	32.5[P]	29	16.8	125	23.7
No	175	75.8	83	67.5	144	83.2[M]	402	76.3

Note: For each significant pair ($p<0.05$), the letter of the Style with the smaller percentage appears under the Style with the larger percentage.

of these interviews revealed that there was little variation in the number of innovations mentioned by each farmer across the three farming styles. The innovations mentioned, however by Styles W and M were adopted earlier than for Style P. In addition, Style W and M farmers were also more likely to expend time and money on education, advice and experimenting. Therefore, Style W and M farmers appeared to have a greater propensity to innovate than Style P farmers, supporting the typology findings. This information becomes important in planning extension activities to encourage uptake of new farm enterprises, practices or technologies.

Further analysis of interview data identified perceived barriers and drivers to adoption of new enterprises or practices as a result of the pipeline. The barriers and drivers identified were experienced by each of the styles and did not appear to be style-specific. They have been coalesced into the following factors that influence a farmer's decisions to take-up new opportunities from the pipeline:

Security of supply: Uncertain about the security, reliability and cost of water supply, particularly given the current drought.

Risk and uncertainty: Uncertainty about the operating conditions, risks and performance characteristics of the WM pipeline, and also uncertainty about future climatic conditions, and

farm economics. Some farmers indicated a preference for time and observation to assist in realising potential opportunities, if any, as the pipeline rolls-out.

Congruence: Compatibility of new opportunities with current farm priorities or personal objectives. Farmers may be reaching retirement age, lack succession, or may not have sufficient interest or willingness to change to 'stand alone businesses' which do not match with current farming enterprises.

Resource economics: Limited time, labour and money to take-up new opportunities due in part to drought conditions and farmers in 'survival mode'. For resource economics to be a driver to adoption, farmers need to have access to available resources and see return on investment.

Physical infrastructure: Limited regional resources and infrastructure to support diversified enterprises (intensive livestock, horticultural activities). Farmers may be unlikely to adopt new enterprises unless appropriate infrastructure exists.

The typology research described above identified farming styles and various drivers and barriers to adoption of new opportunities from the WM pipeline. This information was used by DPI to guide their extension programs to be more cognisant of different farmer styles, expectations, aspirations and behaviours. The following section describes how this knowledge influenced the development and conduct of the DPI extension program.

Applying farmer typologies in extension activities

The development of the underlying framework of the Farming with Pipes extension program occurred prior to the finalisation of the farmer typologies research. Although initial research findings were being fed into the development process, the framework initially drew upon the experience and some general assumptions of DPI and was based on the principles of practice change. Using this approach the following four extension activities were developed and implemented between 2007 and 2009.

The Farming with Pipes Expo ran in 2007 and 2008. It provided information on operating conditions and performance characteristics of the WM pipeline. With involvement from the water authority, GWMWater, the Expo outlined the practicalities of piping water.

The *Study Tours* encompassed an operational view of a small number of reticulated properties with mixed and crop farming systems. It included at least one property that had utilised a piped water supply to introduce a new diversification option to the property.

The *Information Sessions* provided a mixture of practical and strategic information relating to the design and implementation of water infrastructure. The information sessions made use of a rural plumber to answer specific reticulation questions.

The farm planning component, *Farm Management System* (FMS), utilised a whole of farming system approach to infrastructure change to plan for sustainable and profitable production systems.

Although the initial extension framework was developed without reference to the farmer typology research, within the framework there was considerable refocussing and targeting of messages to address the farming styles identified as the program was implemented. Of particular significance to the development of the extension program was an understanding of the characteristics of each farming style and the distribution of the three typologies across the pipeline footprint (see Figure 2). The three farming styles were relatively evenly distributed across the region. However, the apparent concentration of Style M to the west of Horsham allowed DPI to refine its activities to ensure that information relevant to smaller, less traditional and more experimental farming styles was provided. In addition, the identified barriers and drivers highlighted that the promotion of diversification, or new opportunities from the WM pipeline, would need to be preceded by a program that addressed and overcame these barriers.

Initially, the Expo was planned as a workshop to outline feed-lotting and other intensive livestock opportunities within the region. Significant barriers identified in the research were in relation to uncertainty and a lack of knowledge surrounding the risks and performance of a piped water delivery system. These barriers together with the feedback from the Expo helped DPI to refocus some of its information and increase its emphasis to on-ground planning associated with preparing farms for a piped water supply rather than on new enterprises.

Study Tours underwent some re-focussing to better cater for farmers in Styles W and P and the key barriers and drivers identified. The major objective for the study tours was to provide an activity with greater emphasis on the adult learning requirements for 'pragmatist' landholders (Honey and Mumford 2006).

Information Sessions addressed some specific findings of the typology research. As a result, these sessions focussed on key characteristics of Style P and W. The components that were included to target Style P were to: increase their pipeline knowledge; provide reticulation information specific to mixed farming systems; and, discuss water security, reliability and operating conditions to address concerns about the WM pipeline. Information specific to Style W included: outlining diversification options and possible changes to farming systems; how piped water systems could be used to manage business risk and changes in market and climate conditions; and, highlight further products and services to assist with the economic analysis of diversification options.

Finally, a revised Information Session was developed to target the requirements of Style M and included: evening information sessions held to increase accessibility for people with higher levels of off-farm income; reticulation information tailored for smaller landholdings; and, outlining diversification options more relevant to smaller landholdings with limited available labour.

The FMS farm planning course was targeted at the specific needs of farmers identified as Style W. FMS targeted innovative landholders. It used a farming system approach to infrastructure change, making use of global information system (GIS) data and planning a reticulation system that would enable future business production systems and diversification opportunities within the farm landscape. FMS was designed to encourage landholders to actively plan their farming system for optimising a piped water supply, including the impact of land classing, biodiversity and future diversification and system changes.

The Farming with Pipes program is still being delivered to farmers. There appears to be limited research into the effectiveness of utilising farmer typologies in developing and implementing a practice change program. It is the intention of this program to begin to address this gap with follow-up research being conducted in late 2009.

Conclusion

One of the key learnings of utilising farming typology research in a practice change program has been the importance of ensuring that marketing reflects the profiles of the farming styles. In other words, ensure the 'audience' are able to identify with the products and services that are being offered. This can avoid a mismatch between farmer expectations and delivery of the extension activity content.

The increased understanding gained through farming styles enabled DPI to feel more confident in meeting farmer expectations. It also alerted them to key issues that indicated why farmers may or may not take up new opportunities. However, changes in funding sources and program management can lead to a lack of continuity. In this particular case the ongoing extension program has now adopted an approach that is less targeted towards farming styles. This new approach aimed to sign up a maximum number of participants rather than targeting those who fall into a specific farming style. Anecdotal evidence suggests that the participant group is now predominantly Style M and P rather than the original targeted Style W (more innovative farmers). This may reflect the difficulty expressed in the literature with the implementation and evaluation of farming typology research in agricultural extension.

The approach taken in this research, in particular our use of both quantitative and qualitative methods to derive farming styles and to understand the barriers and drivers for change, provided a context and depth of understanding to assist these extension activities. Emtage et al. (2007) argue the value of both quantitative and qualitative research in describing typologies and furthermore highlight the potential to develop a core set of typologies with similarities across regions. The approach taken in this research provides some insight into the value of such an approach.

The need to assess the rigour of these typologies is recognised. Ongoing assessment of the typologies will provide insight into whether typologies remain valid over time. We are currently conducting follow-up research to track farmer practice and behaviour changes. This will provide an opportunity to evaluate if the typologies identified remain applicable in guiding ongoing extension activities. It will also provide some evidence if they indeed did assist in facilitating the development and uptake of new opportunities arising from a more reliable water supply delivered through the Wimmera Mallee Pipeline. This research will contribute to the debate on the value of typology research in extension activities, and whether issue-specific typologies have a wider application.

In summary, the key findings of this research include: the identified farmer typologies created a need to modify and expand the original practice change program and to re-assess the

timeframes for change; and, the identified drivers and barriers of change enabled practice change programs to be more targeted. This resulted in extension programs adapting their approach and target groups however the retrospective nature of these changes and their lack of continuity may limit the benefit of the typology work in this case. The paper concludes that farmer typologies can provide valuable information for focusing practice change programs to cater for different farming styles with different motivations for modifying farming practice.

Acknowledgements

The authors would like to thank the following organisations: Department of Primary Industries, Insightrix, GWMWater and those people from the Wimmera Mallee region who participated in this research.

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