

# **DISCOVERING THE CRITICAL FACTORS THAT INFLUENCE QUEENSLAND FARMERS' EFFECTIVE USE OF INTERNET BASED EXTENSION TOOLS**

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## **Abstract**

Farmers need accurate, timely and relevant information to resolve critical issues and in general to manage and adapt their farming processes in order to remain viable and competitive. Farmers commonly seek this agricultural information through extension agents and programs and more recently through the Internet. While many farmers have access to various Internet based extension tools using rural focused websites and Web 2.0 technologies, not enough is known about the uptake and effectiveness of these tools. This paper describes a preliminary investigation into discovering the critical factors that influence Queensland farmers' effective use of Internet based extension tools. The research has the potential to improve decision-making in agricultural enterprises by assessing the usability and effectiveness of existing tools and providing guidelines for the development of new tools based on Web 2.0 technologies.

**Keywords:** agriculture, extension tools, Internet, Web 2.0, Australian farming

## **1. Introduction**

Global, economic and technological changes have had a significant impact on Australia's rural community. Consequently, Queensland farmers are under increasing pressure to adapt their farm management processes in order to remain viable and competitive in an increasingly complex environment of rapid change and development. Extension delivery methods and content must also adapt to this changing environment and the more specialised needs of farmers.

Farmers commonly seek agricultural information through extension agents and programs, which are more recently complemented through using the Internet. While there is no shortage of agricultural information on the Internet, the challenge is to pinpoint the relevant, useful and important information (Fountas et al. 2006). Using the Internet to disseminate information to farmers is a fast and cost-effective extension method that could be used to enhance or compliment the usual face-to-face interactions and distribution of printed materials.

Farmers need tools to enable them to make informed decisions that are vital to the overall operations, management, marketing and sustainability of farms. This is emphasised by Rivera (2000, p. 33) who claims that 'knowledge is the power to greater profits and larger markets'. Furthermore, Marsh and Pannell (2000, p. 606) suggest that farmers require 'more sophisticated and individually-tailored technical, management and marketing information'. The ability to easily acquire current information, to create, store, exchange and use

information in order to improve farming outcomes can be achieved through the use of extension programs or tools.

Agricultural extension agents ‘present information about industry advances that may positively impact local farmers and livestock producers’ (Kramer n.d.). Extension agents realise the potential benefits of the Internet and are keen to utilise this technology to inform farmers about pertinent rural issues and alternative management practices (Hall et al. 2003; Howell & Habron 2004). There are various ways in which the Internet is currently used to disseminate agricultural information. Making information available to farmers on websites is the obvious application; as is using links to other websites or information repositories (e.g. newsletters, alerts, services, current media releases and research reports); and emailing the relevant information to farmers is also an effective option.

But the Internet not only has the potential to further expand the range of information delivered to farmers. It also provides the platform for the development and widespread use of Internet Based Extension (IBE) tools, again providing further opportunity for farmers to manage their farm businesses more efficiently and effectively, and enabling extension agents to provide a better service to their clients. For example, a set of IBE tools called “Agbiz: Queensland agribusiness decision toolkit” is accessible via the Queensland Government Department of Agriculture, Fisheries and Forestry (DAFF) website (DAFF 2012). The IBE tools available from this website offer a range of cropping and livestock tools, as well as generic financial and farm management tools available via downloadable spreadsheets. For example, the spotted gum productivity assessment tool enables farmers to estimate timber and grazing productivity and also the carbon stored in their spotted gum forests.

IBE tools have the potential to facilitate decision-making and provide the opportunity for new ways of interacting, engagement and collaboration. James (2009) suggests that information sharing and collaboration will grow as awareness and availability of IBE tools increases. Furthermore, James (2009) also suggests that as extension agents expand their use of IBE tools, they will be better equipped to support their clients, thus leading to better outcomes for Australian agriculture. Nonetheless, there is still a valid place for traditional extension methods and therefore, IBE tools should be adopted as complimentary extension methods. This is emphasised by James (2009) who advises that IBE tools be combined with an existing extension strategy aimed at increasing engagement and collaboration.

The sharing of knowledge and giving advice by farmers is as old as the industry itself. This sharing can be continued and enhanced through the use of Web 2.0 technologies as they have the potential to further expand IBE tools. Web 2.0 technologies are not a new version of the Internet or the World Wide Web; rather, they extend the functionality and usability of the Internet beyond that of a static webpage by fostering group interaction, sharing and collaboration in a dynamic environment focused on users. A particularly attractive feature of Web 2.0 technologies is that of encouraging human interaction, thereby promoting a greater sense of community in an otherwise cold social environment (Kamel Boulos 2007).

Increasingly popular Web 2.0 technologies include wikis, blogs, social networking and podcasts, RSS feeds, audio and video conferencing; and there are many more emerging such as, social bookmarking (also known as folksonomies and tagging), crowdsourcing, mashups, and virtual worlds.

Clearly, the Internet and Web 2.0 technologies provide a platform to deliver IBE tools for extension agents and farming communities. Using these technologies to collaborate and communicate, and to generate and share information may foster a collective intelligence and may also provide a cost-effective method for increasing productivity and ultimately competitive advantage.

The Beatsheet blog (<http://thebeatsheet.com.au/>) is an example how Web 2.0 technologies are currently being used as a communication tool by the Queensland entomology team at DAFF to address pest management issues. Charleston, Miles and McLennan (2009) indicate the Beatsheet blog was selected as a fast, readily accessible method available globally but targeted at northern New South Wales and Queensland field crop producers, consultants and researchers. Whenever there is a posting to the blog, a link is sent to all subscribers via email notification. Prior to launching this blog in July 2007, fortnightly newsletters and grower meetings were the main form of communication but for communication of urgent issues farmers were notified by phone, email or media releases (Charleston, Miles & McLennan 2009). These methods were inadequate in crisis situations where notification and advice about pest issues was critical to sustainable production.

While IBE tools have the potential to effectively support farm management, the right tools must be designed and developed around farmers' information needs and their skills. This is supported by Easdown and Starasts (2004) claiming that the value of information acquired from the Internet by farmers is conditional on its local contextualisation and the development of interactive capabilities. Clearly, if the tools are not right for the job at hand then they will not be used, regardless of their source.

## **2. The Research problem**

Despite Queensland farmers having access to various IBE tools in the form of rural focused websites and Web 2.0 technologies, not enough is known about the uptake and effectiveness of these tools. Factors affecting adoption and effective use of IBE tools, as well as the overall perceived usefulness of various rural focused websites will be used as guiding elements in the proposed research project. The points shown below indicate questions that will be investigated in this research project.

- Is access to the Internet simple, fast, reliable and affordable?
- What are farmers' perceptions about the skills needed to effectively use rural focused websites and IBE tools; do farmers believe they have the necessary skills?
- What IBE tools are being used and for what purpose?
- What rural focused websites are commonly used and why are these used as opposed to others that offer a similar service?
- How are these websites and IBE tools perceived in terms of their ease of use and their usefulness?
- How could these websites and IBE tools be improved?
- How could access be improved?
- Are there information requirements not addressed by rural focused websites or IBE tools?
- What would farmers like to access or more easily access on the Internet to assist them in improving their farming practice?

Questions and elements of this nature form the fundamental basis for this research project with the overall goal of better understanding the factors that influence Queensland farmers' use of the Internet and IBE tools. Hence, factors that affect the adoption of these tools and the effective use of these tools need to be ascertained.

Therefore the objectives of this research study are based on the following research questions:

- i. What are the critical factors that influence Queensland farmers' effective use of IBE tools?
- ii. How do Queensland farmers perceive IBE tools?
- iii. What factors need to be considered to enable Queensland farmers to more readily adopt IBE tools?
- iv. What guidelines can be established for the development of IBE tools used by Queensland farmers?

### **3. Research design**

The research investigation lends itself to qualitative research, thus enabling a better understanding of people and the social and cultural contexts in which they interact (Myers & Avison 2002). Consequently, the research is planned to explore how these social and cultural contexts may influence the perception, decisions and needs of Queensland farmers in relation to their use of rural focused websites and IBE tools. By interviewing Queensland farmers, the researcher endeavours to understand the thoughts and perceptions of these farmers and explain their actions and decisions in relation to their use of these tools.

In 2013 the researcher will gather data from farmers attending pre-arranged industry group meetings and workshops organised by extension agents from DAFF. During these meetings volunteer participants will complete a short electronic questionnaire; being short, the questionnaire will not interfere with the primary purpose of the meetings. Hence the data collection at this preliminary stage will be of an introductory nature but will provide fundamental input to the rest of the research. It is anticipated that this data will establish a background analysis of the problem and provide insight to the main concerns, attitudes and opinions of Queensland farmers in their use of the Internet and IBE tools.

While it is becoming increasingly common for questionnaires to be completed via the Internet, this option would exclude a vital part of the population that needs to be targeted by this research i.e. those farmers that do not use the Internet regularly. Moreover, once a farmer has already made the commitment to attend the DAFF meeting, only a short amount of time will be required to complete the survey and it will not interfere with their daily farm routine.

The questionnaire will consist mainly of structured questions that will require respondents to choose answers from a range of options or to use a rating scale. It will take the form of an electronic survey using TurningPoint software to display a set of polling slides within a PowerPoint presentation. Throughout the presentation, the participants will use hand-held devices commonly called 'clickers' to lodge their responses to the questions. The software captures the results and can immediately display the results graphically. This provides a fun



and engaging atmosphere with immediate feedback not only to the researcher but also to the participants. The researcher also hopes that the presentation will inform the participants of the significance and relevance of the research to the extent that some of these farmers will volunteer to be interviewed individually.

The data collected will be used to inform the development of questions to be used in semi-structured interviews with individual Queensland farmers. These interviews may also include a practical segment where farmers could demonstrate their use of rural focused websites and IBE tools thus allowing more directed and in-depth questions to be addressed. The flexible and dynamic style of these interviews is particularly suited to developing an understanding of the individual perspectives of farmers, thus providing data to be further explored and analysed.

#### **4. Analysis**

The diffusion of innovations (DOI) theory (Rogers 1983) will form the basis of analysis and categorisation of farmer acceptance of IBE tools. Rogers outlines the five components of innovation and these are shown in table 1.

<b>Factor</b>	<b>Description (based on Rogers 1983)</b>
Relative Advantage	This relates to how much better the innovation is over what was previously offered.
Compatibility	How compatible is the innovation with respect to the individual's

	mind set and lifestyle.
Complexity or Simplicity	Is the innovation perceived to be complicated or difficult to use? If so then the rate of adoption will be lower.
Trialability	This relates to how easy it is for the user to trial the product. If it is easy to experiment with, then adoption will be quicker.
Observability	This relates to how easily the innovation is noticed by others. The higher the visibility of the innovation, the more communication one would expect and this will result in comments in favour or against the innovation.

Table 1 – Parameters associated with the Diffusion of Innovations theory (Rogers 1983)

Of the parameters outlined in table 1, it is expected that compatibility, complexity and trialability will be most important for this study as anecdotal evidence indicates a perception that the Internet is hard to use and complex, thus making trialability difficult for farmers. This evidence is based on the second author's experience as an extension officer for the Queensland Department of Primary Industries although this may have changed in recent years.

The analysis will use both qualitative and quantitative approaches with identification of major themes being undertaken with the qualitative data. The themes will be based on DOI (Rogers 1983) with the interview transcripts expected to fall into the major themes of relative advantage, compatibility, complexity, trialability and observability. Further quantitative analysis will also be undertaken using structural equation modelling (SEM) or partial least squares (PLS) modelling of the quantitative data obtained from the Likert scores and the

clicker data obtained at the DAFF meetings. The choice of SEM or PLS will depend on the number of responses obtained as PLS is not as sensitive to smaller sample sizes as is the case with SEM.

## **5. Discussion**

The Internet provides the ideal medium for farmers to harness knowledge and information from various sources locally and globally and this can lead to the types of improvements associated with greater profits and larger markets through the effective use of individually tailored information (Marsh & Pannell 2000; Rivera 2000). Using these tools has the potential to improve farm management and productivity and enable extension agents to provide a better service to their clients thus leading to better outcomes for agricultural enterprises in Australia. The research will develop guidelines to inform and enable better adoption of rural focused websites and IBE tools through the analysis of existing DAFF websites to determine their effectiveness in disseminating relevant economic decision tools and associated information to Queensland farmers. From this analysis, we expect to be able to identify opportunities and implications for future development and delivery of appropriate services and tools for farmers. It is expected that these tools will be interactive and use Web 2.0 technologies, thus overcoming the present system of downloading a spreadsheet and running it on each individual's personal computer. Through the use of interactive processes, we would expect to be able to develop a database of instances of farmers using the decision tools and this can be used to enhance the extension effort for DAFF through a more thorough knowledge of the problems that farmers face and how they are trying to solve these problems. This may provide a basis of sharing and collaboration as outlined as being desirable by James (2009) and these potential improvements will grow as the use of IBE tools increases over time.

## **6. Conclusions**

This research has the potential to improve decision-making in agricultural enterprises by assessing the usability and effectiveness of existing tools and providing guidelines for the development of new tools based on Web 2.0 technologies and has the potential of providing contextually relevant decision tools to farmers in a private, Internet based setting. The recommendations from this research could lead to further development of IBE tools which may have a more widespread market. Additionally, through the sharing of knowledge and the creation of a corresponding knowledge base, a repository of instances where farmers have used the tools and the results regarding their impact on farming practices or management could be established. If this is achieved, it could lead to more targeted and informed extension efforts by DAFF through a more intimate knowledge of what farmers' problems are and the data they have for solving these problems.

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