

E-business adoption in Australian wineries: DOI perspectives

Barbara Roberts & Mark Toleman
University of Southern Queensland, Toowoomba, QLD, Australia
Barbara.Roberts@usq.edu.au

Abstract

Rogers' Diffusion of Innovation (DOI) theory identifies characteristics of the innovation and organisation as the two major sources of influence on innovative behaviour. However, the external environment represents a major potential source of influential factors on e-business adoption because e-business is naturally affected by corresponding internet activity. This exploratory study, with DOI as its starting point, used interviews to collect qualitative data to determine which external factors influence e-business adoption by Australian wineries. Nine wineries participated in the study. The empirical data demonstrates that influence from external organisations such as supply chain stakeholders and government play a crucial role in determining e-business adoption behaviour and strategy by wineries. This paper reports the evidence and findings, and proposes a modified framework, based on DOI, that includes influential factors from external characteristics in order to provide a better framework for understanding e-business adoption by organisations.

Keywords

e-business, organisational adoption of innovations, network externalities, e-Government, wineries

INTRODUCTION

The purpose of this paper is to report on exploratory research into the role of major factors from external sources that influence e-business adoption levels by Australian wineries, and consequent theoretical implications. For the purpose of this research, e-business is defined as use of intranets, extranets, and the internet for publishing information and performing different types of exchanges or transactions. E-business may occur within organisations, or between them, or involve individual customers. Australian wineries are suitable as the unit of analysis for research into e-business adoption within Australia for a number of reasons. The first reason is that wineries are a rich subject for research because they have a very diverse range of business processes that span the agricultural (primary), manufacturing (secondary) and marketing (tertiary) sectors. Wineries usually have a high level of involvement in all three areas (ACIL 2002). Further, the wineries also have to comply with a wide range of legislative requirements. The second reason is that the wine industry is increasingly important to the Australian economy as the industry continues to expand, largely due to exponential growth in export sales (Anderson 2000; Anderson 2001).

Wineries vary greatly in size and resource capacity, which also contributes to their richness as a research subject. In 2003 there were more than 1600 wineries in Australia. Of these wineries, almost one third of them are in the micro-size category that process less than 20 tonnes of grapes each year. At the other end of the size spectrum the top 22 wine companies account for about 90% of the annual national crush, and for 96% of all sales of branded wine (Winetitles 2003). So while there are many wineries in Australia, only the very large wineries contribute significantly as individuals to the Australian wine economy. For this exploratory stage of the research, preference is given to seeking information from the large and very large wineries as they are more likely to have a wider range of e-business activity within their business processes than small wineries, making them a richer source of the qualitative information needed at this stage. However some interviews were conducted in smaller wineries to help balance the information and provide additional perspectives.

Background literature is reviewed next, followed by information on the interview methodology used and analysis of the empirical data. The findings from this stage of the research are then discussed in relation to future research directions and possible theoretical implications.

BACKGROUND LITERATURE REVIEW

The main literature areas of interest to this research concern prior studies into the factors which affect the adoption by organisations of: innovations in general, information technology in general and e-business in particular. A major theory, first published in 1962, on the adoption of innovations and the rate at which subsequent usage diffuses through the population of potential users is the Diffusion of Innovations (DOI) theory by Rogers' (1995). The DOI theory posits that the factors (independent variables) influencing adoption rates by

organisations are drawn from two major sources: 1) characteristics of the innovation itself; and 2) characteristics of the adopting organisation. The influences of managerial championship and opinion leaders acting as agents of change are recognised as an accelerating force affecting the potential adopters. Five innovation characteristics are singled out as independent variables that influence adoption rates, and relate to perceptions of: 1) relative advantage over alternatives, involving a range of social, technical and economic benefits; 2) compatibility with existing values, experiences and needs; 3) the complexity, 4) trialability and 5) observability of the innovation. As might be expected, the degree of perceived relative advantage, encompassing the full range of possible benefits, is found to be one of the best predictors of an innovation's rate of adoption by diffusion scholars (Rogers 1995, p. 216).

Many factors relating to characteristics of the adopting organisation are also identified in DOI theory. Rogers claims, however, that the results from several hundred studies show only low correlations between the identified factors and organisation innovativeness (Rogers 1995, p. 381). Factors such as the degree of organizational slack and size positively influence innovativeness, as does the degree of complexity of knowledge and expertise present among the staff and the degree of interconnectedness that exists between the staff. However some factors have a negative influence – the higher the centralization of power and formalization of rules within the organisation, the lower the innovativeness displayed. The boundaries between some factors are recognised by Rogers as indistinct, emphasising the difficulties of attempting to isolate single variables in systems that are complex in nature with many interdependencies between characteristics. For example, the factor of organisation size is likely to influence the degree of organisational slack and to mask other aspects such as technical expertise and available resources. In general, it appears that of all the organisation characteristics, size/resource capacity shows the clearest positive relationship with organisational innovativeness (Rogers 1995).

With regard to information technology innovations, the literature review confirmed the external environment to be an additional major source of influential factors. This is particularly so for complex information technologies such as e-business, due to high user interdependencies, potential to transform strategy and processes (Chau & Turner 2001), and the potential to deliver organisation-wide business impact (Swanson 1994). Environmental factors come from wide range of sources and, for example, include characteristics related to industry, marketplace, culture, and government and industry regulatory conditions (Chengalur-Smith & Duchessi 1999; Kwon & Zmud 1987; Swanson 1994; Yang et al. 2004). Factors related to national characteristics including culture, government and legal regulations, and government policy initiatives all appear to have strong explanatory power in improving understanding of e-business adoption and diffusion behaviours (Chen 2003; Gibbs, Kraemer & Dedrick 2003; Palacios 2003; Wong 2003). Policy support and leadership from government are recognised as being necessary and important enabling factors in providing an environment conducive for e-business adoption, while the provision of e-government services and online transaction options positively drive e-business adoption (Wong 2003). Other critical enablers include: pressure from multinational corporations; liberalisation of trade and telecommunications policies; improvement of telecommunications infrastructure; adequate legislation to manage risk; and the emergence of e-banking (Palacios 2003). Physical, social and economic conditions are important because they combine to provide structural conditions within which an organisation operates, and thus influence organisational behaviour (Markus & Soh 2002).

Influence from the competitive marketplace environment is acknowledged as important. Customer power is singled out as having particular influence (Christensen & Bower 1996; Wu, Mahajan & Balasubramanian 2003). Large significant customers have the power to pressure adoption of e-business practices by their suppliers in order to streamline processes, reduce transaction costs, and improve efficiency through online communication and order taking (Wu, Mahajan & Balasubramanian 2003). Research into e-business adoption in Taiwan, for example, found competitive pressure from other companies was a very significant influential factor on adoption (Chen 2003). A cross-country study involving ten countries which investigated the environment and policy factors shaping global e-business diffusion found that B2B activity was large driven by global competitive forces and the actions of multi-national corporations forcing local businesses to adopt e-business processes in order to stay competitive (Chen 2003; Gibbs, Kraemer & Dedrick 2003). B2C activity appears to be largely driven by local consumer markets, with national and regional differences in markets and distribution systems resulting in considerable diversity of outcomes (Chen 2003; Gibbs, Kraemer & Dedrick 2003). These findings support the notion that the behaviour of other firms in an organisation's supply chain actively influence e-business adoption, and that different levels of influence are felt in different areas of e-business operation.

Adoption can also depend on the community-wide level of adoption and whether or not sufficient critical mass has been established due to *network externalities* (Katz 1986). Network externalities apply to information technologies when those technologies rely on corresponding usage by others to be effective, or when '*one person's utility for a good depends on the number of other people who consume this good*' (Varian 1999). Network externalities apply to many e-business processes such as e-mail and use of web sites. For example, the lack of readiness of customers and suppliers was identified as a key barrier to e-business adoption by researchers

from the 'Center for Research into Electronic Commerce' at the University of Texas as a result of a survey of 4500 US business organisations (Barua et al. 2000).

Research questions

While DOI theory identifies a number of innovation and organisation characteristics that influence the innovative adoption process, the literature review clearly illustrates that a wide range of external factors can potentially influence the adoption of e-business. Given that e-business has multiple forms, can occur at different levels ranging from shallow to deep, is used for multiple purposes, and can potentially support a wide range of processes related to internal business processes as well as for B2B, B2C and B2G reasons (Wu, Mahajan & Balasubramanian 2003), research into e-business must take account of this complexity with empirical evidence collected at a detailed level on as many different e-business processes as possible and relevant. Thus the research questions for this exploratory pilot study stage are:

- What is the nature and extent of internet-enabled e-business adoption in Australian wineries?
- Which factors, particularly from external sources, are commonly cited by winery representatives as having influence on their e-business strategy decisions and behaviour, and why?

Interviews with knowledgeable winery representatives were conducted in order to explore these exploratory research questions. The purpose of the pilot study was to provide direction for a subsequent research stage involving a national census survey of wineries.

METHOD

Interviews, recommended as a suitable technique for exploring issues and gathering rich empirical data (Sekaran 2003; Yin 1994; Zikmund 2000), were conducted with representatives from nine different wineries in mid-2003. All nine respondents were volunteered by their company as knowledgeable informants, and all were confident in their ability to portray the e-business activities of their own winery with a high degree of accuracy. The nine wineries represent a broad range of company structure, size and position within the industry. Using the ranges published in the 2003 ANZ Wine Directory (Winetitles 2003) of annual tonnages processed, one winery fits into the 100-249 range, one is in the 2,500 – 4,999 range, another in the 5,000 – 9,999 range, three in the 10,000 – 19,999 range, and the remaining three in the largest size category that process over 20,000 tonnes each year. All nine wineries are engaged in export of wine, and all are using the internet in some capacity in the running of their business. The wineries cover both private and public companies. Employee numbers range from 12 to over 2000, illustrating a huge variance in size and internal capacity. Five of the nine wineries are consistently listed in Australia's top 20 wine companies, and two of those five are listed in the top five companies.

The interviews were conducted in a semi-structured way to make sure that each major e-business process domain was covered. General background questions were followed by more specific questions covering the winery's use of internet technologies and related strategies. The extent of e-mail use was covered, as well as the range of web sites, both external sites and sites belonging to the winery, that each winery used and for what purpose: in B2B - with suppliers, trading partners and business customers such as distributors and retailers; in B2C – public websites and mailing lists; and in B2G – using Government sites as an information source and for online compliance purposes. The respondents also provided information on the benefits and degree of relative advantage perceived to be delivered by the various e-business processes, and also on the factors that acted as facilitators or barriers to further adoption in each area. The interviews were recorded and later transcribed. Each interview was considered both separately and in relation to the other cases. The cross-case analysis of the interview data helped to identify the major themes. For this stage much of the interview data was copied and organised in a matrix-like structure to aid the comparison of thematic responses from the various wineries. Some themes appeared to be independent of the winery size, such as influence from e-government; while other themes appeared to be linked to size and market position.

DATA ANALYSIS AND DISCUSSION

While the interview data provided rich and widespread information on many aspects of e-business behaviour, this paper reports on the empirical data related to two dominant external environment factors which appear to be having significant influence on certain aspects of e-business behaviour in most or all of the interviewed wineries. The first factor concerns actions of supply chain organisations, while the second factor concerns influence from government activity.

Supply chain influence

Several interviewees reported that aspects of their e-business behaviour and adoption levels occurred in response to activity and pressure from others in their supply chain and regulatory environment. The following comment

from one respondent demonstrates that wineries take account of their external environment when formulating their e-business strategy: *"We cannot make decisions on how to use e-business in isolation - it depends on what others are willing or capable of doing as well."*

In particular, pressure from the major retail customers was commonly cited as influencing winery e-business activity. The following comment illustrates the perception of power that Coles and Woolworths in particular are felt to wield over their suppliers: *"The big supermarket chains, Coles and Woolies of course drive e-business, they dictate everything. So they are driving from their areas for just the scale of economy through the electronic medium."* Both Coles and Woolworths are sometimes referred to as 'giants' in the retail trade and their large size relative to most suppliers provides them with a position of dominance over most of their product suppliers. This power is not necessarily a negative thing for wineries, as the following comment illustrates: *"When Coles comes along and say "We want to do e-business" then we say "You're a major player, we feel comfortable in that you're going to survive this, and its good for both of us." But if you talk to some small obscure little company that's hoping to make it big time then no, we are not interested in that. In fact that actually tarnishes your brands and your reputation."*

Of course, only those wineries who supply to the large supermarkets are directly affected by this pressure. A respondent from a mid-size winery that does not sell directly to the large supermarkets made this point: *"If for instance we were going to have to supply domestically to Coles or Woolies then we wouldn't have a choice of how we use e-business, so maybe the bigger boys in town have to do business with them, but we aren't in that situation"*. Thus the pressure coming from Coles and Woolworths exists, but only for those wineries large enough to produce sufficient wine to be able to supply to the national supermarket chains. Customer power, along with customer type (private versus business) varies for different size wineries operating in different tiers of the market. Interview information indicates that customer power tends to increase with winery size. Concerns related to the increasing power of Coles and Woolworths with regard to the Australian wine market have been raised (Needham 2003; Sexton 2003), and also in relation to supermarket power in key markets overseas (Milne 2003).

One of the major reasons that Coles and Woolworths are dictating the adoption of e-business processes is to reduce costs and streamline their own supply chain activities as the following comment illustrates: *"Coles & Woolies would all like to be doing everything electronically...they want to be able to centralise their ordering in a way, I think they want their stores to be able to order from their distribution, their DC's (Distribution Centres), and they want their DC's to be able to order electronically to try and reduce the amount of paper."* Improvements to the supply chain process of the national supermarket chains do not necessarily translate into savings for their suppliers, who are generally operating on very different economies of scale, as the following comment from one of the very large winery respondents illustrates: *"The push is normally from the (business) customers, somebody like Coles, ... the paperwork is once off for us, so it's not a big deal for us. The cost benefit is with them, so as far as us making the push to use e-business more and more, we probably wouldn't push for it as much as they would...There are not going to be many examples where it would be beneficial for us to spend a lot of money putting in e-business systems."*

One of the specific e-business activities being pushed by both Coles and Woolworths is the adoption of EANnet by wineries. EANnet is an electronic, internet-based catalogue used to supply reliable and standardised product information and images between suppliers and customers (EANnet 2001). Many of the larger Australian wineries now supply their wine product data to Coles and Woolworths via EANnet, with no real advantage accruing to them except for the maintenance of their position as a supplier to the national supermarket chains. The following comment from one respondent illustrates: *"Developing the software - there is a lot of time in that, the other place you get caught out is like with the EANnet we are required to use some type of system to give EANnet the data, and we have like a minimum \$15,000 purchase, anywhere up to \$30,000, if we want it to be useful, so every time something like that comes along we have to make a capital purchase just to make it work, and for no real benefit for us."* This comment illustrates that the driving factor for this aspect of e-business adoption by wineries is not related to the perceived degree of associated relative advantage, but in response to pressure from powerful organisations within their supply chain.

As well as influencing some of the B2B e-business behaviour by wineries, pressure from powerful customers can also affect a winery's online B2C strategy. Some interview respondents reported that they deliberately do not offer online sales of wine to individual consumers due to the conflict this would create with existing business sales channels. For example, the respondent from one of the largest wineries reported that *"We very specifically shy away from online ordering. We believe selling online creates dangerous conflicts with our key trading partners, so our position is one of no direct sales other than through cellar doors"*. Other comments illustrating this theme include the following: *"We've got to take retail investments in us seriously, and if direct sales we made become anything high, or more importantly, noticeable, then retailers will bypass us. So that forms our position I guess of not selling online."* This factor helps to explain the apparent lack of innovativeness and lack of online ordering facilities displayed in many of the public web sites of the large wineries, and demonstrates that the actions of supply chain organisations influences e-business strategy and consequent behaviour.

Government influence

All interviewees identified the Australian Government as being one of the drivers of their winery's e-business behaviour. Examples are now provided. One winery respondent reported that they use the Internet for access to government areas that are crucial in supporting their business processes: *"We do actually do some compliance via the Internet such as Work Cover, and our tax. We do lodge our returns electronically, we do actually have occupation health and safety, and we have to keep abreast of the appropriate Australian standards on how things are done, and what plant materials you are supposed to use, so we do actually utilize that quite a bit to make sure we are meeting our requirements there so we do have people who are trained on the Internet constantly checking to see that what we are doing is correct."* Another respondent cited the following as another example of B2G communication within their business: *"The EPA for example, or Environmental Protection Authority - legislation and reporting due to them is all electronic now. So that saves a lot of paperwork, postage and what not. You just update your records, your last results, and e-mail it, and the whole history is emailed together, and it just a continuing spreadsheet type of format."*

Many wineries now also process their Wine Export Approvals (WEAs) online. The option for gaining approvals using a web-based process has been available for the last couple of years via the Australian Wine and Brandy Corporation web site at <http://www.awbc.com.au/>. The following comment from the small winery respondent illustrates the benefit of online WEAs and government sites in general: *"wine export approvals – my brother now uses the Internet to do all that. There are all the application forms on the Internet, so he can do all of that via the net, so he doesn't have to talk to anybody and he gets the results back over the internet or by email...we are just about to put in some workplace agreements, so I have been to the web-sites to check that out...and we have to find the current wages for all the wages people, so we use those web-sites to access that. We use the liquor licensing, we get all the permits and stuff for that...that's really good – there are lots of government web-sites that we use."*

Exporting wineries, along with all Australian exporting companies, are facing additional e-business process adoption for legislative compliance purposes as a result of Australia's largest ever public sector e-business project, the Cargo Management Re-engineering project (Australian Customs Service 2004). Several online systems will eventuate from this project, the first being the Integrated Cargo System (ICS) for the export process, designed to improve security and efficiency. Future use of the online interface to the Integrated Cargo System (ICS), while not actually mandatory, will be strongly encouraged with a cost burden imposed for exporters choosing to use a manual process available through selected Australia Post Offices. Awareness of the impending change to Customs' clearances among the interview respondents was variable, with those from the larger companies raising it as an issue, while those from the mid-size or small wineries seemed unaware of changes in this area. The timeframe for the change over to ICS has been delayed several times since the interviews took place, and the scheduled cutover date is now October 2004.

The following excerpt from one respondent illustrates what, at the time of the interview, was thought to be the mandatory nature of the change: *"Customs...have brought in an edict that you will have to talk to them electronically by the end of September or you don't export. This is our internal distribution. To ship our goods overseas we have to talk to Customs, the Australian Customs Service electronically or we won't be able to ship. We have got to do that by the end of September."* Note that the reference to September 2003 is now out of date, and manual alternative processes will be available with an associated cost burden. Another comment related to the impending change in gaining Customs clearance follows: *"we use a package called Trident – the Trident system interfaces directly with Customs in what is called an Exit One package. Now that's about to undergo a very, very significant change, and the actual way in which Customs handles the export of wines is about to undergo a fundamental change... We came out of that with the instruction from Customs to apply for a digital certificate, so we need to get these processes in place."* The need for exporting wineries (and all other exporting companies) to purchase digital certificates for evidence of identity purposes related to the new ICS may prove to have several beneficial consequences with regard to further e-business adoption, as it will enable winery participation in other e-business processes requiring proof of identity.

MODIFIED DOI FRAMEWORK

The major theoretical implications from this study into e-business adoption by Australian wineries with regard to the DOI theory follow from the evidence that the activities of supply chain organisations and e-government have an important level of influence and therefore need to be taken into account for the case of e-business adoption. Also, the network externality characteristic of e-business links benefit levels with adopter numbers, and evidence exists to suggest that powerful groups pressure adoption of e-business processes to increase their own benefits through the mechanism of increasing user numbers. In this study, powerful business customers (for example, EANnet) and the Australian Government (the forthcoming ICS for exports) both demonstrate a willingness to pressure less powerful groups to adopt e-business processes.

Taking the interview findings into account, a suggested modified framework for e-business adoption, based on DOI theory, is provided in Figure 1 as a useful reference point for further research into factors influencing e-business behaviour. The three additional factors identified above are displayed in italics.

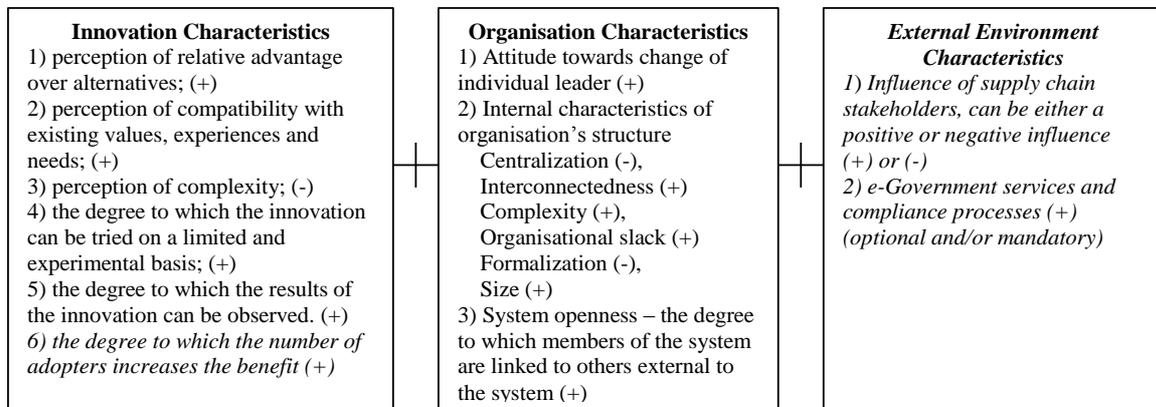


Figure 1

Modified set of influential factors for e-business adoption, based on DOI theory (Rogers 1995), with additions shown in italics

CONCLUSION

This paper reports on the results of an exploratory study that used face to face interviews with winery representatives in order to collect qualitative empirical data on the nature and extent of e-business use in Australian wineries, the factors that influence that behaviour, and associated reasons. Two external environment factors were found to have important explanatory power in understanding the e-business activity. In particular, powerful business customers put pressure on their large winery customers to: 1) supply product information via EANnet, an online product catalogue; and 2) not to offer online sales to avoid conflicts of interest. The Australian Government, by offering a wide range of information, services and compliance processes online, also encourages increasing adoption of e-business practices. The empirical data suggests that powerful stakeholders in a supply chain utilise the network externality characteristic of e-business to increase their own benefit. This is accomplished by pressuring less powerful groups to adopt e-business processes and thus increase the number of users. Further research involving a national survey of Australian wineries has been undertaken to test aspects of the modified framework. The results will be published in a future paper.

REFERENCES

- ACIL 2002, *Pathways to profitability for Small and Medium Wineries*, ACIL Consulting Report for Commonwealth of Australia, Canberra
- Anderson, D 2000, "Creating and nurturing a premier e-business", *Journal of Interactive Marketing*, vol. 14, no. 3, pp. 67-73.
- Anderson, K 2001, "Prospects ahead for the wine industry", *The Australian Grapegrower and Winemaker*, 448: 67-74, May 2001.
- Australian Customs Service 2004, *Cargo management re-engineering*, Australian Customs Service, viewed 18/02/04, <http://www.customs.gov.au/site/page.cfm?area_id=7&nav_id=1051>.
- Barua, A, Konana, P, Whinston, A & Yin, F 2000, "Making E-Business Pay: Eight Key Drivers for Operational Success", *IEEE IT Professional*, vol. 2, no. 6, pp. 2-10.
- Chau, SB & Turner, P 2001, "A Four Phase Model of EC Business Transformation amongst Small to Medium Sized Enterprises: Preliminary Findings from 34 Australian Case Studies", paper presented to Twelfth Australasian Conference on Information Systems, Coffs Harbour, NSW, Australia, 5-7 Dec 2001.
- Chen, T-J 2003, "The Diffusion and Impacts of the Internet and E-Commerce in Taiwan." *I-Ways*, vol. 26, no. 4, pp. 185-93.

- Chengalur-Smith, I & Duchessi, P 1999, "The initiation and adoption of client-server technology in organizations", *Information & Management*, vol. 35, no. 2, pp. 77-88.
- Christensen, C & Bower, J 1996, "Customer power, strategic investment, and the failure of the leading firms", *Strategic Management Journal*, vol. 17, pp. 197-218.
- EANnet 2001, *Coles Supermarkets EANnet Supplier Information*, EANnet Australasia, viewed 5/8/2003, <http://www.ean.com.au/media/FILES/web_site/EANnet/Coles%20Announcement.pdf>.
- Gibbs, J, Kraemer, KL & Dedrick, J 2003, "Environment and Policy Factors Shaping Global E-Commerce Diffusion: A Cross-Country Comparison." *Information Society*, vol. 19, no. 1, pp. 5-18.
- Katz, MLS, Carl 1986, "Technology Adoption in the Presence of Network Externalities." *Journal of Political Economy*, vol. 94, no. 4, pp. 822-42.
- Kwon, TH & Zmud, RW 1987, "Unifying the fragmented models of information systems implementation", in RJ Boland & RA Hirschheim (eds), *Critical Issues in Information Systems Research*, John Wiley, New York, pp. 227-51.
- Markus, ML & Soh, C 2002, "Structural Influences on Global E-Commerce Activity", *Journal of Global Information Management*, vol. 10, no. 1, pp. 5-12.
- Milne, C 2003, "Wine: many a slip twixt home and overseas", *Australian Financial Review*, 04/10/2003,
- Needham, K 2003, "Battle of the Bottle Shops", *Sydney Morning Herald*, 30/04/2003, Sydney.
- Palacios, JJ 2003, "Globalization and E-Commerce: Diffusion and Impacts in Mexico." *I-Ways*, vol. 26, no. 4, pp. 195-205.
- Rogers, EM 1995, *Diffusion of Innovations*, 4th edn, The Free Press, New York.
- Sekaran, U 2003, *Research Methods for Business, A Skill Building Approach*, 4th edn, John Wiley & Sons Inc, New York.
- Sexton, M 2003, *Selling Wine: Interview on ABC's 7:30 Report*, 02/12/03, ABC Online, viewed 03/02/2004, <<http://www.abc.net.au/7.30/content/2003/s842759.htm>>.
- Swanson, EB 1994, "Information Systems Innovation Among Organizations", *Management Science*, vol. 40, no. 9, pp. 1069-92.
- Varian, HR 1999, *Intermediate Microeconomics*, W.W. Norton & Company, New York.
- Winetitles 2003a, *The Australian and New Zealand Wine Industry Directory*, 21st edn, Winetitles, Adelaide.
- 2003b, *Australian Wine Industry Overview*, viewed 2/2/03, <<http://www.winetitles.com.au/awol/overview/wineries.asp>>.
- Wong, P-K 2003, 'Global and National Factors Affecting E-Commerce Diffusion in Singapore.' *Information Society*, vol. 19, no. 1, pp. 19-32.
- Wu, F, Mahajan, V & Balasubramanian, S 2003, "An analysis of e-business adoption and its impacts on business performance", *Journal of the Academy of Marketing Science*, vol. 31, no. 4, pp. 425-47.
- Yang, H, Yoo, Y, Lyytinen, K & Ahn, J-H 2004, "Diffusion of broadband mobile services in Korea: the role of standards and its impact on diffusion of complex technology system", paper presented to e-Biz World Conference, Seoul, Korea, 25 February 2004.
- Yin, RK 1994, *Case study research: Design and methods*, 2nd edn, Sage Publications Ltd, Thousand Oaks.
- Zikmund, WG 2000, *Business Research Methods*, 6th edn, The Dryden Press, Orlando.

COPYRIGHT

Barbara Roberts and Mark Toleman ©2004. The authors assign the We-B Centre & Edith Cowan University a non-exclusive license to use this document for personal use provided that the article is used in full and this copyright statement is reproduced. The authors also grant a non-exclusive license to the We-B Centre & ECU to publish this document in full in the Conference Proceedings. Such documents may be published on the World Wide Web, CD-ROM, in printed form, and on mirror sites on the World Wide Web. Any other usage is prohibited without the express permission of the authors.